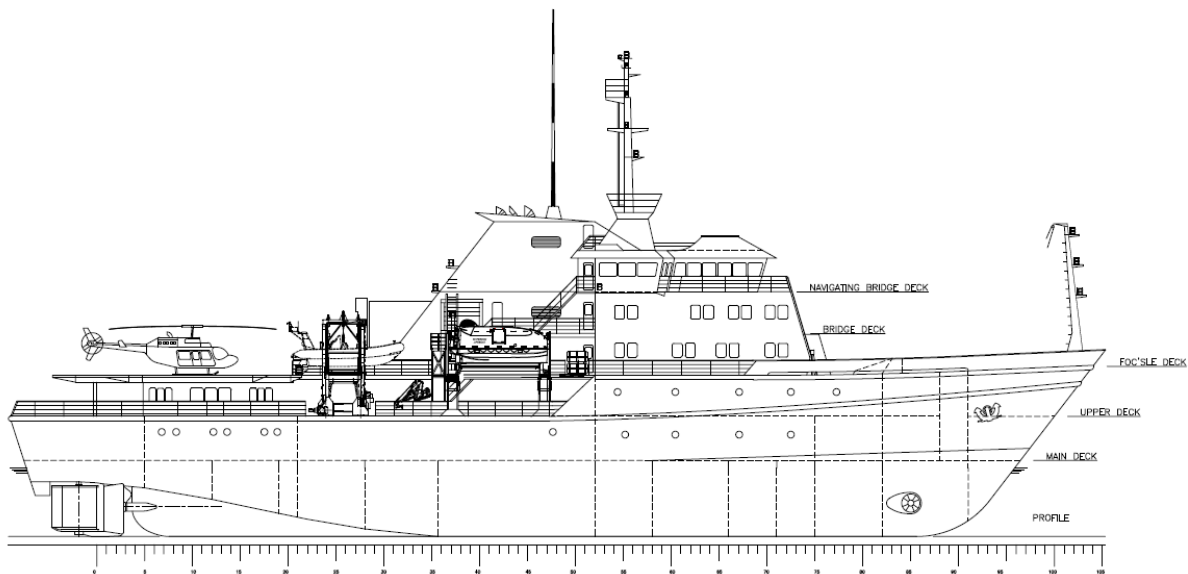


	CCGS Leonard J Cowley	
	Specification	

CCGS Leonard J Cowley

Vessel Life Extension

2022/2023



April 27, 2023 – July 25, 2024

F7049- 210183

REVISION #1

	CCGS Leonard J Cowley	
	Specification	
TABLE OF CONTENTS		

TABLE OF CONTENTS.

TABLE OF CONTENTS.....	1
General Notes..	6
H-01 Production Chart.....	123
H-02 Life Raft Service.....	126
H-03 Fire Detection System Annual Service..	129
H-04 Fixed Fire Suppression System.....	133
H-05 Galley Hood and Laundry Dryer Exhaust Cleaning..	137
H-06 Portable Extinguishers..	141
H-07 Firefighters Suits, SCBA's and Cylinders.....	150
H-08 Bilge Cleaning.....	157
H-09 HVAC and Machinery Spaces Duct Cleaning.....	161
H-10 Port and Stbd Miranda Davit Annual Inspection..	165
H-11 Lifeboat and Davit Replacement.....	173
H-12 Crankshaft Deflections.....	191
H-13 Port and Stbd Windlass Replacement.....	194
H-14 Potable Water Tank Modifications and Coatings..	209
H-15 Fuel Oil Tank Manhole Cover Replacements..	219
H-16 Port and Stbd Ship Service Generator Diesel Engine Overhaul..	223
H-17 Weather Door Replacement..	231
H-18 Washroom Renewals..	235
H-19 Emergency Generator Diesel and Alternator Overhaul.....	250
H-20 Port and Stbd Bridge Wing Catwalks..	255
H-21 Bridge Fixed Window Replacement.....	263
H-22 Fuel Oil Purifier Replacement..	268
H-23 Lube Oil Purifier Replacement..	273
H-24 Fixed Foam and Wet Chemical – UPDATED	278
H-25 Machinery Space Deck Plate Renewals..	282
H-26 Hot Water Calorifier Replacement – UPDATED	285

	CCGS Leonard J Cowley	
	Specification	
TABLE OF CONTENTS		

H-27	Port and Stbd Main Engine Overhaul – UPDATED	286
H-28	New Fire Insulation Requirements..	311
H-29	Fresh Water Piping Replacement..	318
H-30	Hangar Upgrades – UPDATED	323
H-31	Ladder & Hatch - Nav Bridge Deck to Wheelhouse..	331
H-32	Cabin Renewals – UPDATED	339
H-33	Helicopter Hanger Fixed System.....	357
H-34	Steel Repairs - Forward Engine Room Cofferdam Closure of Rat Holes..	358
H-35	FWD Stairwell Lead Removal..	365
H-36	Watertight Door Controls and Hydraulics Upgrades..	368
H-37	Watertight Door Sealing Surface Machining – UPDATED	376
H-38	Deck Hatch Replacement.....	381
H-39	Replace Main Engine Silencer Insulation..	389
H-40	HVAC System Modification..	394
H-41	Exhaust Pipe Insulation Replacement.....	407
H-42	Misc Pump Inspections and Overhauls - UPDATED	411
H-43	Fire Damper Replacement..	416
H-44	Bilge Piping Replacement..	421
H-45	Stack Louver Replacement.....	428
H-46	Relief Valve Certification – UPDATED	433
H-47	Ships Office Upgrades..	436
H-48	CANCELLED.....	441
H-49	Wheelhouse Upgrades.....	442
H-50	Immersion Suit Annual Service..	447
H-51	Air Receiver Inspection..	450
H-52	Galley Fire Door Replacement – UPDATED.....	454
H-53	Fuel Monitoring System Install..	458
H-54	Sewage Compartment Vent Modification – ADDED.....	468
H-55	#2 Port Water Ballast Tank – Removal Of Doubler Plates – ADDED.....	480
H-56	Steel Renewals – Heli Deck Structure – ADDED.....	488
H-57	Replacement of Forepeak Void Vent – ADDED.....	495

	CCGS Leonard J Cowley	
	Specification	
TABLE OF CONTENTS		

H-58	Weld Repairs – Upper Deck Pipe Penetrations at Frame 5 – ADDED	503
H-59	CANCELLED.....	510
H-60	General Guide For Conversion of Aft Main Deck Cabins (Frames 5 to 21) – ADDED	511
H-61	Relocation of LAN Equipment To Engineer’s Store – ADDED	519
H-62	CANCELLED.....	527
H-63	CANCELLED.....	528
H-64	Installation Of New Tank Top Manhole Frames 34 To 35 – ADDED	529
H-65	Steel Renewals – Forecastle Deck Save Alls – Frames 55 To 64 – ADDED.....	536
H-66	Fuel Station Renewals – ADDED	543
H-67	Fresh Water System Modifications – ADDED	549
HD-01	Services..	558
HD-02	Dry-Docking.....	568
HD-03	Butts and Seams.....	574
HD-04	Cathodic Protection, Hull Impressed Current System..	578
HD-05	SW Cooling Anti-Fouling System.....	583
HD-06	Sacrificial Anodes..	590
HD-07	Bilge Keel Inspection.....	592
HD-08	Steering Gear Bilge Cleaning and Coating..	595
HD-09	Underwater Hull Coating – UPDATED.....	599
HD-10	Above Waterline Hull and Inside Bulwarks Painting.....	605
HD-11	Hull Inspection and Survey..	612
HD-12	Weather Deck, Superstructure and Flight Deck Cleaning and Painting – UPDATED	616
HD-13	Fuel Oil Tanks Inspection – UPDATED.....	628
HD-14	Lube Oil Tanks Inspection – UPDATED.....	634
HD-15	Ballast Tank Inspection – UPDATED.....	640
HD-16	Propulsion Control Upgrade..	647
HD-17	Window and Porthole Repairs..	685
HD-18	Seabays and Seachests Cleaning and Inspections..	688
HD-19	UT Shot Survey.....	693
HD-20	Steel Repairs and Renewals – FR 52 To 56..	694
HD-21	Suction and Discharge Valve Re-Certification – UPDATED	701

	CCGS Leonard J Cowley	
	Specification	
TABLE OF CONTENTS		

HD-22	Rudder, Stock and Carrier Bearing Inspection.....	709
HD-23	Anchors, Chains and Chain Lockers – UPDATED	715
HD-24	Tailshaft, Bearings, Propeller and Mechanisms – UPDATED	720
HD-25	Port and Stbd Clutch Survey..	729
HD-26	Bow Thruster Replacement and Installation - UPDATED.....	735
HD-27	Gearbox Survey – UPDATED	756
HD-28	Steering Gear Actuator Replacement.....	761
HD-29	CPP System Hydraulics Upgrades..	787
HD-30	Steel Repairs – Sound & Fresh Water Fill Pipes Frames 75 – 77..	804
HD-31	Steel Repairs and New Wire Transit Tank Top – Frames 75 – 80..	811
HD-32	CANCELLED.....	819
HD-33	Fwd Draft Indicator.....	820
HD-34	AFT Draft Indicator	827
HD-35	Frame B Steel Renewals	835
HD-36	Stringers 75 – 82 Renewals.....	842
HD-37	Steel Repairs and Renewals – FR 0 To FR 5.....	849
HD-38	Steel Repairs and Renewals – FR 58 to 62..	856
HD-39	AV Gas Pump Room and Cofferdam..	863
HD-40	Conversion of Number 4 Center Double Bottom Fuel Oil Tank To Void Tank – Frames 29 To 42	870
HD-41	Kort Nozzle Inspection and Repair.....	877
HD-42	Void Tank/Space Inspection.....	883
L-01	Interior Lighting Upgrades..	889
L-02	Insulation Testing, Enclosure Cleaning and Terminal Tightening – UPDATED.....	893
L-03	Thermoscan..	897
L-04	Electrical Transit Repairs.....	902
L-05	Distance Measuring Equipment (DME) – UPDATED	905
L-06	VHF – DF System Upgrade..	913
L-07	AIS Antenna and Cable Installation.....	922
L-08	Anemometer Install..	928
L-09	MCC Panel Overhauls.....	936

	CCGS Leonard J Cowley	
	Specification	
TABLE OF CONTENTS		

L-10	CANCELLED.....	939
L-11	CANCELLED.....	940
L-12	CANCELLED.....	941
L-13	CANCELLED.....	942
L-14	CANCELLED.....	943
L-15	Synchronization Control Upgrade.....	944
L-16	CANCELLED.....	947
L-17	CANCELLED.....	948
L-18	LAN Upgrade.. ..	949
L-19	LAN Room Electrical Upgrades.. ..	956
L-20	LAN Room Rack Relocation Bridge Rack Modification – ADDED	967

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

General Notes..

1.0 Intent

1.1 These specifications are supplied to the shipbuilder or ship repairer, hereinafter referred to as The Contractor for the purpose of outlining the objectives, performance, standards, and basic engineering requirements for the planned Vessel Life Extension (VLE) refit of the CCGS LEONARD J. COWLEY for the Canadian Coast Guard, Department of Fisheries and Oceans.

1.2 The intention is to provide sufficient information such that The Contractor, with this guidance as well as their experience and knowledge of good marine practice, is capable of completing the work items defined herein by carrying-out the engineering and production work needed as well as conforming to the requirements of all applicable Regulatory Bodies, and the Coast Guard Technical and Inspection Authorities.

1.3 VLE Dry-Docking Dates

1.3.1 April 27, 2023 – July 25, 2024

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

2.0 Vessel Particulars

Name: **CCGS LEONARD J. COWLEY**

Type: Offshore Patrol Vessel

Ice Class: Type B IAA3120 KW

Year Built: 1985

Official Number: 805574

IMO Number: 8320494

Principle Dimensions:

Length: 72 m

Breadth, molded: 14.01 m

Loaded Draft: 4.5 m

Gross Tonnage: 2188

Net Tonnage: 655

Propulsion 3160 Kw, Geared Diesel, Twin Engine, Single CPP, Kort Nozzle

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

2.1 Physical Operating Conditions for Equipment

2.1.1 All new machinery and/or equipment that are to be supplied and installed must be designed for operation under the following conditions:

2.1.1.1 Outside air temperature (Winter): –40 degrees Celsius

2.1.1.2 Outside air temperature (Summer): +35 degrees Celsius

2.1.1.3 Sea Water temperature (Winter): 0 degrees Celsius

2.1.1.4 Sea Water temperature (Summer): +30 degrees Celsius

2.1.1.5 Wind Velocity of eighty (80) knots

2.1.1.6 Sea State six (6)

2.1.1.7 Ship inclination of up to thirty-five (35) degrees roll on either side, with a cycle frequency of 10 seconds, and ten (10) degree pitch with a cycle frequency of five (5) seconds and maximum linear acceleration of 1.0 g

2.1.1.8 Permanent list of 22.5 degrees port or starboard, and permanent trim of ten (10) degrees fore and aft.

2.2 Equipment Below Decks

2.2.1 All equipment must be capable of its intended operation at the following ambient conditions:

2.2.1.1 95% relative humidity at temperatures to fifty (50) degree Celsius.

2.3 Equipment Above Deck

2.3.1 The equipment must be protected by means of an enclosure and must be capable of its intended operation in the following conditions:

2.3.1.1 The installation of equipment in weather deck locations must be such that it is impervious to the effects of sea spray.

2.4 Electronic Compartments

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

2.4.1 Compartments containing electronic equipment must be provided with ships services to maintain the following conditions:

2.4.1.1 Manned Compartments:

Room temperature: 20°C to 25°C

Relative humidity: 5 to 70%

Noise level: 65 dBA.

2.4.1.2 Unmanned Compartments:

Room Temperature: 20°C to 25°C

Relative humidity: 40 to 70%

Noise level: 80 dBA.

2.5 Vibration

2.5.1 All shipboard equipment, racks, cables, and other accessories must be mounted so as to be capable of performing their intended operation under the following conditions:

2.5.1.1 Shipboard Vibration:

Up to 13.2 Hz with displacement amplitude of +/- 1.0mm

13.2 to 80.0 Hz acceleration amplitude of +/- 0.7g with a maximum acceleration of 0.7g

Natural frequencies at supports for equipment and parts of equipment must not be within the 0 to 80 Hz range, except where they cannot be kept outside this range by constructional design methods, the vibration must be damped so that undue amplification is avoided.

2.6 Docking

2.6.1 The Contractor must ensure there is a minimum of 21 meters of unobstructed dock space immediately aft of the propulsion hub to allow for removal of tail

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

shaft. For marine railway operations, this distance must be from the historical high water or winter ice mark for the past 5 years.

3.0 MAIN EQUIPMENT OVERVIEW

Equipment:	Make & Model
Propulsion Diesel (x2)	Make: Polar NOHAB Model: F312V
Ship Service Generators (x3)	Make: Caterpillar Model: 3412
Emergency Generator	Make: Caterpillar Model: 3306
Bow Thruster(Existing)	Make: Kongsberg Tunnel Thruster Model: 90TV-A
Steering System:	Make: TENFJORD Rotary Vane Steering Gear Model: SR 722 FCP
Deck Crane(s):	Make: Palfinger Marine Model: Tico Marine 35 PK32002M
FRC Davits:	Make: Palfinger Marine Make: Miranda Davit Model: MRT 3900
Lifeboat Davit(s):	Make: KISS 700 Model: NT 75 / KISS 700

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

4.0 REFERENCES

4.1 General

4.1.1 The CCGS LEONARD J. COWLEY is a steel hulled vessel built was built in West Coast Manly Shipyards Ltd. in Vancouver BC. The vessel was launched and placed in service in in 1985. The vessel is currently delegated to the American Bureau of Shipping (ABS) in accordance with the Transport Canada Marine Safety and Security (TCMSS) Delegated Statutory Inspection Program, (DSIP). The vessel is certified for 'Unlimited' voyages in accordance with the Canada Shipping Act 2001 and the Safety Convention as per the Regulations, Standards and Codes referenced therein. Inspection of the vessel in accordance with the Canada Shipping Act 2001 must be carried out by ABS as required for the purposes of this Vessel Life Extension (VLE) Contract.

4.1.2 All aspects of this project stated within the specification, or otherwise, are subject to Class approval and inspection, and must meet all Class imposed requirements.

4.1.3 "ABS" and "Recognized Organization" will be referred to as "Class" with regards to approval and inspection requirements throughout this specification.

4.2 Acts, Regulations, Standards, Rules, Codes and Guidelines (ARSR&G)

4.2.1 The vessel must meet the Act and Regulations in accordance with the Canada Shipping Act 2001 and comply with the additional Regulations, Standards, Guidelines and Codes referenced therein. The vessel must also comply with the Acts, Regulations, Standards, Rules, Codes and Guidelines referenced in this VLE project specifications as applicable.

4.2.2 The SOLAS (Safety of Life at Sea) Convention applies as referenced in the Regulations under the Canada Shipping Act 2001 and as applicable (where otherwise not directly referenced) for a government vessel on non-commercial service.

4.2.3 Individual specifications may draw attention to specific requirements prescribed in reference documents, however this does not limit the application of the Acts, Regulations, Standards, Rules, Codes and Guidelines referenced in this specification.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

4.2.4 The latest edition, at the time of Contract signing, of all ARSRC&G as well as CCG Fleet Safety Systems Manual listed below are to be used as reference unless otherwise specifically noted. The Contractor must ensure all work completed in the specification are done to all pertinent federal and territorial regulations and standards. CCG procedures and standards must be used if no other regulation takes precedence.

4.3 Regulations pursuant to the Canada Shipping Act 2001

4.3.1 The following table is a list of applicable CSA Regulations that are pertinent to this VLE. The Contractor is to note that this is not to be seen as a finite listing and any other CSA Regulations that are required but not noted herein is the responsibility of the Contractor to ensure that it is being met.

REF	REGULATION
A	<p>Vessel Construction and Equipment Regulations (VCER):</p> <p><i>It is anticipated that the proposed Vessel Construction and Equipment Regulations will be in force and Vessel Certificates Regulations will be amended pursuant to the CSA 2001 prior to the Contract date. The proposed Regulations are intended to largely adopt the construction and inspection standards of SOLAS and referenced IMO Standards and Codes with Canadian modifications.</i></p> <p><i>In anticipation of these regulations coming into force, Transport Canada Marine Safety and Security may consider issuing a Letter of Acceptance in Principle (LOAIP) to use the draft Vessel Construction and Equipment Regulations (VCER) and associated amended Technical Publications (TP's) as a regulatory regime subject to review of an application by CCG through ABS. (Application of these proposed Regulations will require a Marine Technical Review Board (MTRB) decision approval, see section 1.1.16 below, if they are not in force by the time of Contract)</i></p> <p><i>Several important extracts from the draft Vessel Construction and Equipment Regulations are noted below:</i></p> <p><i>1.2 Except as provided in section 1 above, all words and expressions defined and used in Chapter II-1, Chapter III, Chapter VII, Chapter VIII, Chapter X, Chapter XII, and Chapter</i></p>

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	REGULATION
	<p><i>XV of the SOLAS Convention and of Title 3 of MLC 2006 have the same meaning as in that Chapter or Title. {In reference to definitions in Regulations 2 or 3 of the various SOLAS Chapters}</i></p> <p><i>1.3 Unless otherwise specified in these Regulations, for the purpose of these Regulations, every reference to “Administration” in a document incorporated by reference in these Regulations means “Minister”.</i></p> <p><i>1.4 For the purpose of interpreting a document incorporated by reference in these Regulations, “should” is to be read as “must”.</i></p> <p><i>1.5 For the purposes of these Regulations, any guidelines, recommendations, requirements and similar matters set out in a document referred to in a footnote to a document that is incorporated by reference in these Regulations are to be considered mandatory.</i></p>
B	Marine Machinery Regulations (SOR/90-264)
C	Hull Construction Regulations (C.R.C., c. 1431)
D	Hull Inspection Regulations (C.R.C., c. 1432)
E	<p>Lifesaving Equipment Regulations (C.R.C., c. 1436)</p> <p><i>Note the proposed Vessel Construction and Equipment Regulations, are scheduled to come into force in 2021. These Regulations will replace the Regulations quoted in a), b), c), d) & e), m) & n) as well as x) & y) of this specification (Also includes Crew Accommodation Regs, Towboat Crew regs, Ships Elevator regs and Steering Appliances and Equipment Regs.)</i></p>
F	<p>Vessel Fire Safety Regulations (SOR-2017-14), principally Part 1. Particular attention is drawn to the following:</p> <p><i>Section 1(7) For the purposes of these Regulations, any guidelines, recommendations, requirements, and similar matters set out in a document referred to in a footnote to a</i></p>

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	REGULATION
	<p><i>document that is incorporated by reference into these Regulations are to be considered mandatory.</i></p> <p><i>Approvals required by the Minister of Transport as per sections 2 & 3. Additional Notice to industry European EC and MED type approval certificates are not accepted by TCMSS. See additional information provided as by TCMSS as a 'Letter to Industry' included as Appendix 1 of this document.</i></p>
G	<p>Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)</p> <p><i>Note, these regulations do not apply to government vessels iaw section 3(3) however CCG opt to comply and have certificates issued accordingly unless otherwise indicated.</i></p> <p><i>Incorporate MARPOL, I to VI inclusive as well as the Antifouling Convention, Energy Efficiency</i></p>
H	Arctic Shipping Safety and Pollution Prevention Regulations (SOR/2017-286)
I	<p>Ballast Water Control and Management Regulations (SOR/2011-237).</p> <p><i>Note: the new Ballast Water Regulations were published in the Canada Gazette Part 1, June 2019. TCMSS anticipates they will be published in the Canada Gazette Part II, in 2021. These regulations will impose the BWM convention as well as Canadian specific requirements on domestic vessels operating in Canadian waters only.</i></p> <p><i>Proposed Ballast Water Regulations, Application section 3.3.b do not apply to vessels that are owned or operated by a state and used only in government non-commercial service.</i></p>
J	Cargo, Fumigation and Tackle Regulations (SOR/2007-128)
K	Collision Regulations (C.R.C., c. 1416)
L	Crew Accommodation Regulations (C.R.C., c. 1418)

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	REGULATION
	<i>Note: The draft Crew Accommodation Regulations are proposed to be amended and the Vessel Construction and Equipment Regulations (VCER) amended to incorporate the construction requirements of the Crew Accommodation Regulations and those of the Maritime Occupational Health and Safety Regulations (MLC 2006) in Part 2 of the VCER.</i>
M	Fire and Boat Drills Regulations (SOR/2010-83)
N	Load Line Regulations (SOR/2007-99) <i>Incorporate the International Convention on Load Lines, as amended</i>
O	Long-Range Identification and Tracking of Vessels Regulations (SOR/2010-277)
P	Marine Personnel Regulations (SOR/2007-115)
Q	Navigation Safety Regulations (SOR/2020-216) <i>Note: The Navigation Safety Regulations, 2020, (SOR/2020-216) were published in the Canada Gazette Part II, October 21, 2020</i> <i>The regulations migrated a number of existing Regulations including:</i> <i>Voyage Data Recorder Regulations (Ref Chapter IV of the SOLAS Convention)</i> <i>Charts and Nautical Publications Regulations, 1995 (Ref Chapter V of the SOLAS Convention)</i> <i>Ship Station (Radio) Regulations, 1999 (ref Chapter IV of the SOLAS Convention)</i> <i>Ship Station (Radio) Technical Regulations, 1999 (Ref Chapter IV of the SOLAS Convention)</i> <i>VHF Radiotelephone Practices and Procedures Regulations (Ref Chapter IV of the SOLAS Convention)</i> <i>Anchorage Regulations</i>
R	Regulations Excluding Certain Government Ships from the Application of the Canada Shipping Act (SOR/2000-71)

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	REGULATION
	<i>Include exemptions from certain provisions of the Canada Shipping Act</i>
S	Safe Working Practices Regulations (C.R.C., c. 1467)
T	Safety Management Regulations (SOR/98-348) <i>Apply in accordance with Chapter IX of SOLAS, Reg. 2.2</i>
U	Steering Appliances and Equipment Regulations (SOR/83-810) <i>Reference item a) of this section for proposed amendment to these Regulations</i>
V	Vessel Certificates Regulations (SOR/2007-31) <i>Note: The revised Vessel Safety Certificates Regulations were published in the Canada Gazette Part I, October 2020. It is anticipated that the regulations will be adopted in 2021. The following regulations will be repealed when the new Vessel Safety Certificates Regulations come into force: Hull Inspection Regulations, Classed Ship Inspection Regulations, and the Vessel Certificates Regulations. The regulations will also adopt a new Technical Publication to be named the 'Canadian Vessel Plan Approval and Inspection Standard', which will adopt the IMO Harmonized System of Survey and Certification (HSSC) with Canadian amendments (anticipated date Spring 2021).</i>
W	Vessel Registration and Tonnage Regulations (SOR/2007-126) - Incorporates ITC 69 as applicable <i>Vessel tonnage may change due to modifications, weights on and weights off should be monitored closely and be included in the Contract.</i>

4.3.2 Any requests for exemptions to CSA 2001 Regulations/IMO Conventions/ IMO Codes (except for Collision Regulation exemptions) are subject to an MTRB decision by TCMSS. Any exemption or equivalency identified or being proposed by The Contractor must be brought to the attention of the owner which may, after consideration, make application for an MTRB to TCMSS through ABS.

4.3.3 Additional Acts and Regulations

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	ACT AND REGULATION
A	<p>Canada Labour Code, R.S.C., 1985, c. L-2</p> <p>Maritime Occupational Health and Safety Regulations (MOHS) (SOR/2010-120)</p> <p><i>Note: The MOHS Regulations contain mandatory requirements for accommodation which may not be exempted unless stated. Inspection approval is not delegated to ABS. These regulations currently contain prescriptive construction requirements. The construction requirements currently contained in these Regulations are planned to be migrated to the proposed Vessel Construction and Equipment Regulations, (see section G 1.2.2.1a above).</i></p>
B	<p>Marine Transportation Security Act, S.C. 1994, c. 40</p> <p>Marine Transportation Security Regulations (SOR/2004-144)</p> <p><i>201.2.a. Does not apply to government vessels on government non-commercial service.</i></p>
C	<p>Food and Drugs Act (R.S.C., 1985, c. F-27)</p> <p>Food and Drug Regulations, (C.R.C. c. 870)</p>
D	<p>Canadian Environmental Protection Act</p> <ol style="list-style-type: none"> <i>Sulphur in Diesel Fuel Regulations (SOR/2002-254)</i> <i>Federal Halocarbon Regulations, 2003 (SOR/2003-289)</i> <i>Ozone-depleting Substances and Halocarbon Alternatives Regulations (SOR/2016-137)</i>
E	<p>Transportation of Dangerous Goods Act (S.C. 1992, c. 34)</p> <p>Transportation of Dangerous Goods Regulations (SOR/2001-286)</p>
F	Note that all work must be completed by Contractors in accordance with the local workers' safety regulation of the province or territory where the work is

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

	performed. For guidance information can be found at: http://www.ccohs.ca/oshanswers/information/wcb_canada.html
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4.4 Standards, Rules, Codes and Guidelines

4.4.1 The following Standards, Rules, Codes and Guidelines are to be met. Note that any standards, rules, codes, or guideline referenced in the regulations are to be considered as mandatory Regulatory requirements.

4.4.2 IMO International Conventions are applicable as referenced in the Regulations under the Canada Shipping Act 2001, which may include Canadian specific requirements.

REF	IMO INTERNATIONAL CONVENTION
A	AFS - International Convention on the Control of Harmful Anti-Fouling Systems on Ships, 2001
B	BWM - International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004
C	COLREGS - International Regulations for Preventing Collisions at Sea
D	Load Lines, 1966/1988 - International Convention on Load Lines, 1966, as amended by the Protocol of 1988
E	MARPOL - International Convention for the Prevention of Pollution from Ships
F	SOLAS International Convention for the Safety of Life at Sea, 1974 as amended.
G	STCW - International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
H	Tonnage - International Convention on Tonnage Measurement of Ships, 1969
I	MLC 2006 Maritime Labour Convention, 2006

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

4.4.3 IMO Instruments

4.4.3.1 Any document such as Resolutions, Circulars, Guidelines, recommendations, or requirements adopted by IMO or set out in an IMO instrument referred to in a footnote to a document referenced in the Regulations are to be considered mandatory.

4.4.3.2 Principal IMO Codes, Resolutions, Circulars, Guidelines and Recommendations are listed below for guidance:

REF	IMO INSTRUMENT
A	FSS - Fire Safety Systems Code
B	FTP Code – International Code for Application of Fire Test Procedures
C	LSA Code – International Life-Saving Appliance Code
D	2008 IS Code – International Code on Intact Stability, 2008
E	Noise Levels – Code on Noise Levels on Board Ships
F	International Maritime Dangerous Goods (IMDG) Code, as referenced in the Cargo Fumigation and Tackle Regulations
G	NOx Technical Code (2008) - Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines
H	Polar Code - International Code for Ships Operating in Polar Waters
I	IMO Resolution MSC.81 (70), Revised Recommendation on Testing of Life-Saving Appliances.
J	MSC/Circ.504 Guidance on design and construction of sea inlets under slush ice conditions
K	IMO MEPC.207(62), Annex 26, Part 6 (for steel coating systems)

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	IMO INSTRUMENT
L	MEPC.1/Circular.642 Guidance Notes for an Integrated Bilge Water Treatment System (IBTS)

4.4.4 TCMSS Technical Publications (TP)

Note: Technical Publications (TP's) referenced in part or their entirety within a Regulation are considered as a mandatory requirement under the Regulation.

REF	TCMSS TECHNICAL PUBLICATIONS (TP)
A	TP 127 Ships Electrical Standards <i>(to determine if ABS Rules or TP 127 to be applied, recommend ABS Rules and referenced codes (see G1.2.2.4.6 below)</i>
B	TP 14612 - Procedures for Approval of Life-saving Appliances and Fire Safety Systems, Equipment and Products
C	TP 13430 - Standard for the Tonnage Measurement of Vessels (2012)
D	TP 13617 - A Guide to Canada's Ballast Water Control and Management Regulations (2007)
E	TP 1861 - Standards for Navigation Lights, Shapes, Sound Signal Appliances and Radar Reflectors (1991)
F	TP 3231 – Ship Safety Bulletins, <i>In Particular Note the contents of Bulletin 06/1989 Grounding Safety in Dry-dock</i>
G	TP 13585 – Marine Safety Management System
H	TP 14475 – Canadian Life Appliance Standard

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	TCMSS TECHNICAL PUBLICATIONS (TP)
I	TP 15211 – Canadian Supplement to the SOLAS Convention (to be replaced by TP 15415, ref. 2.3.1.4)

4.4.4.1 TCMSS Technical Publications (TP) Associated with Proposed Vessel Construction and Equipment Regulations

4.4.4.2 Associated Transport Canada Publications (TP's) as amended in conjunction with the Vessel Construction and Equipment Regulations as adopted by Marine Technical Review Board Approval or of coming into force will apply.

REF	TCMSS TECHNICAL PUBLICATIONS (TP)
A	Draft TP 7301 (as updated) Canadian Modifications to the International Code on Intact Stability, 2008 (2008 IS Code)
B	Draft TP 14475 - Canadian Modifications to the LSA Code
C	Draft TP 15415 - Canadian Modifications to the SOLAS Convention
D	Additionally, the draft 'Canadian Vessel Plan Approval and Inspection Standard' is planned to be adopted by TCMSS in conjunction with the Vessel Safety Certificate Regulations coming into force (ref. G 1.2.2.1.a of this document)

4.4.5 American Bureau of Shipping (ABS) Rules and Codes

4.4.5.1 ABS Rules for Building and Classing Marine Vessels (Marine Vessel Rules) Updated January 1, 2020 (ABS, Rules and Codes applicable for each vessel to be confirmed with ABS). Application of the ABS Rules and Codes to be discussed and agreed with ABS Surveyor prior to Contract. The ship is delegated to ABS, but it is not 'in-class', however the proposed Vessel Construction and Equipment Regulations will adopt SOLAS II-1 and accept ABS Rules.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

4.4.6 Electrical Codes and Standards

REF	ELECTRICAL CODES & STANDARDS
A	IEC International Electrotechnical Commission 60092 – Electrical Installations in Ships may be used as referenced in the Regulations, IMO instruments and accepted by ABS.
B	IEC 12207 - Systems and software engineering
C	IEC 2500, 25041 - Systems and software engineering – Systems and software Quality Requirements and Evaluation
D	IEC/ISO 31010 - Risk management – Risk assessment techniques
E	IEC 60034 - Rotating Electrical Machines
F	IEC 60068 – Environmental Testing of Electronic Equipment
G	IEC 60076 – Power Transformers
H	IEC 60079 - Explosive atmospheres
I	IEC 60146 - Semiconductor converters
J	IEC 60269 – Low-Voltage fuses
K	IEC 60309 IEC 60309 Pin & Sleeve Wiring Devices
L	IEC 60331 - Tests for electric cables under fire conditions
M	IEC 60332 - Tests on electrical cables and optical fibre cables under fire conditions
N	IEC 60529 – Degrees of Protection Provided by Enclosures
O	IEC 60533 Electrical and Electronic Installations in Ships – Electromagnetic Compatibility

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	ELECTRICAL CODES & STANDARDS
P	IEC 60695- Fire Hazard Testing
Q	IEC 60945 Maritime Navigation and Radio communication equipment and systems – methods of testing and required test results.
R	IEC 60947 – Low-Voltage Switchgear and Control Gear Rules
S	IEC 61000 - Electromagnetic compatibility (EMC)
T	IEC 61158 – Industrial Communication Networks
U	IEC 61363 - Electrical Installations of Ships and Mobile and Fixed Offshore Units
V	IEC 61439 – Low -Voltage Switchgear and Control gear assemblies
W	IEC 61508 - Functional safety of electrical/electronic/programmable electronic safety-related systems
X	IEC 61511 - Functional safety – Safety instrumented systems for the process industry sector
Y	IEC 61800 - Adjustable Speed Electrical Power Drive Systems
Z	IEC 62040 - Uninterruptible power systems (UPS)
AA	IEC 62271 – High Voltage Switchgear and Control gear
BB	IEEE Std 45 Institute of Electrical and Electronic Engineers Recommended Practice for Electrical Installations on Shipboard
CC	IEEE STD 315 - Graphic Symbols for Electrical and Electronics Diagrams
DD	IEEE 1584 Guide for Performing Arc-Flash Hazard Study
EE	IEC/IEEE 80005, IEC/IEEE International Standard - Utility connections in port

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	ELECTRICAL CODES & STANDARDS
FF	CSA Guide for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment.
GG	CSA C22.1 Canadian Electrical Code
HH	CSA C22.2 – General Requirements – Canadian Electrical Code Part II CSA C22.2 - Degrees of protection provided by enclosures (IP Code)
II	CSA Z462-18 Workplace electrical safety
GG	UL 1309 - Standard for Safety for Marine Shipboard Cable

4.4.7 CSA Standards

REF	CSA STANDARD
A	CSA W47.1- Certification of Companies for fusion welding of steel, Division 1 or 2 and Annex M
B	CSA W47.2-11- Certification of Companies for fusion welding of aluminum, Division 1 or 2
C	CSA W59 - Welded Steel Construction
D	CSA W 59.2 - Welded Aluminum Construction
E	CSA W178.2 - Welding Inspector Certification
F	CSA Code B64.10.17 – Selection and installation of backflow preventers
G	CSA CAN3-Z299.3-85 - Quality Assurance Program - Category 3
H	Note also the CCG Welding Specification CT-043-EQ-EG-001-E (KME#3049715 latest version) applies in addition to CSA and ABS standards

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

4.4.8 ISO Standards

4.4.8.1 The ISO standards prescribed below are applicable as referenced in the Specifications or otherwise in the Regulations or Rules.

REF	ISO STANDARD
A	ISO 2081- Metallic Coatings- Electroplated Coatings of Zinc on Iron or Steel
B	ISO 4406 – Hydraulic fluid power -- Fluids -- Method for coding the level of contamination by solid particles
C	ISO 5894 - Ships and marine technology — Manholes with bolted covers
D	ISO 7547 - Ships and marine technology — Air-conditioning and ventilation of accommodation spaces — Design conditions and basis of calculations
E	ISO 8501-1 - Preparation of steel substrates before application of paints and related products
F	ISO 8573.1 - Compressed air — Part 1: Contaminants and Purity Classes
G	ISO 8861 - Shipbuilding — Engine-room ventilation in diesel-engined ships — Design requirements and basis of calculations
H	ISO 8863 - Ship's wheelhouse windows — Heating by hot air of glass panes
I	ISO 8864 - Air-conditioning and ventilation of wheelhouse on board ships — Design conditions and basis of calculations
J	ISO 9785 - Ships and marine technology — Ventilation of cargo spaces where vehicles with internal combustion engines are driven — Calculation of theoretical total airflow required
K	ISO 9943 - Shipbuilding — Ventilation and air-treatment of galleys and pantries with cooking appliances

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	ISO STANDARD
L	ISO 10816-1 - Mechanical vibration -- Evaluation of machine vibration by measurements on non-rotating parts -- Part 1: General guidelines
M	ISO/TR 10949 - Hydraulic fluid power- Component Cleanliness Guidelines for achieving and controlling cleanliness of components from manufacture to installation
N	ISO14726 Ships and marine technology — Identification colors for the content of piping systems
O	ISO 15748-1 Ships and marine technology — Potable water supply on ships and marine structures — Part 1: Planning and design
P	ISO 15748-2 - Ships and marine technology - Potable water supply on ships and marine structures - Part 2: Method of calculation
Q	ISO/TS 16431 - Hydraulic fluid power – Verification of cleanliness
R	ISO 18413 - Hydraulic fluid power – Cleanliness of parts and components – Inspection document and principles related to containment collection, analysis, and data reporting
S	ISO/TS 18683 - Guidelines for systems and installations for supply of LNG as fuel to ships
T	ISO 20519 - Ships and marine technology — Specification for bunkering of liquefied natural gas fueled vessels

4.4.9 Other Applicable Standards and Codes

4.4.9.1 The standards prescribed below are applicable as referenced in the Specification or otherwise in the Regulations or Rules.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	STANDARD
A	ANSI TIA/EIA 568-B ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard
B	AN/CGSB - ASTM F1321-14- Canadian General Standards Board, Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to determine the Light Ship Displacement and Centers of Gravity of a Vessel
C	ASME Y14.100 - American Society of Mechanical Engineers Y14.100 - 2017 Engineering Drawing Practices - Nov. 14, 2017
D	ASME B31 - Pressure piping standard series
E	ASTM E84, entitled Standard Test Method for Surface Burning Characteristics of Building Material (as referenced in the VFSR)
F	ASTM F1166 Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities as guidance
G	ASTM F683 Standard Practice for Selection and Application of Thermal Insulation for Piping and Machinery
H	ASTM F708: Standard Practice for Design and Installation of Rigid Pipe Hangers
I	ASTM G82-98 (2014) - Standard Guide for Development and Use of a Galvanic Series for Predicting Galvanic Corrosion Performance
J	ASTM E1729-05 - Standard practice for field collection of dried paint samples for subsequent lead determination
K	American Water Works Association (AWWA): Backflow Prevention and Cross-Connection Control
L	CAN/CGSB 1.61-2004 - Canadian General Standards Board for Exterior Marine Alkyd Enamels

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	STANDARD
M	CAN/CGSB-1.193-99 - Canadian General Standards Board for High-Build Epoxy Marine Coating
N	CAN/CGSB 3.11- Naval Distillate Fuel
O	CAN/CGSB-3.517 - Diesel Fuel
P	CAN/CGSB-3.520 - Diesel fuel containing low levels of biodiesel (B1–B5)
Q	CAN/CGSB 48.9712 (latest edition)- Non-destructive testing – Qualification and certification of NDT Personnel
R	CAN/ULC-S102-03 - Surface Burning Characteristics of Building Materials and Assemblies (As referenced in the VFSR)
S	CAN/ULC-S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials (as referenced in the Vessel Fire Safety Regulations)
T	CAP 437 Civil Aviation Authority – Standards for Offshore Helicopter Landing Areas
U	EPS Report 1/RA/2 - Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems - Environment Canada
V	Food Safety Code of Practice published by the Canadian Restaurant and Foodservices Association. (as referenced in the Maritime Occupational Health and Safety Regulations)
W	Guidelines for Canadian Drinking Water Quality prepared by the Federal-Provincial-Territorial Committee on Drinking Water and published by the Department of Health. (As referenced in the Maritime Occupational Health and Safety Regulations, s. 73(2))
X	NFPA 306 2014 - Standard for the Control of Gas Hazards on Vessels
Y	NFPA 10 - Standard for portable fire extinguishers

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

REF	STANDARD
Z	NFS/ANSI 2:2018 - National Sanitation Foundation rated, Food Equipment.
AA	PMBoK 3rd Edition - A Guide to the Project Management Body of Knowledge (Project Management Institute guidelines to project management)
BB	SMACNA (Sheet Metal & Air Conditioning Contractors' National Association) – HVAC Duct Construction Standards - Metal and Flexible
CC	SNAME – T&R 4-16 Recommended Practices for Ship Heating, Ventilation & Air Conditioning Design Calculations
DD	SNAME – Society of Naval Architects and Marine Engineers - Rules/Guidelines for Shop and Installation Trials- latest edition
EE	SNAME (3-47)- Rules/Guidelines for Sea Trials-latest edition

4.4.10 Canadian Coast Guard Fleet Safety Manual (FSM) Safety Procedures.

4.4.10.1 Documents listed below are Coast Guard internal standards but not specifically FSM requirements. Applicable documents will be provided to the Contractor within forty-eight (48) hours of written request to the CG TA.

REF	CANADIAN COAST GUARD DOCUMENT
A	Canadian Coast Guard Welding Specification CT-043-EQ-EG-001-E (KME#3049715 latest version)
B	Canadian Coast Guard Marine Engineering AutoCAD Template And User Guide
C	CCG Electronic Data standard
D	CCG Trim and Stability Book Production MECTS# 3350860

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

E	Color Coding Standard for Piping Systems 30-000-000-ES-TE-001
F	Potable Water Tank Coating Standard
G	COVID-19-N9SOP-511 (If Applicable)
H	Lead Paint testing and disclosure Policy? See section G 1.2.2.4.11 below
I	Asbestos Disclosure Policy? See section G 1.2.2.4.11 below
J	Paint & Coating Standards

4.4.11 IACS References

- 4.4.11.1** International Association of Classification Societies, unified interpretations or guidelines and may be consulted for guidance in cases where the applicable Regulations do not set out specific requirements in respect of the design, construction, installation, or inspection, however compliance with the Regulatory requirements must be met and guidance must be accepted by CCG, ABS and TCMSS.

4.4.12 Ship Specific Documentation to be Provided

Ref	CCG LEONARD J. COWLEY
A	Lead Paint Survey and Test Results Report
B	Asbestos Free Certification Survey Management Plan

4.5 Abbreviations & Acronyms

- 4.5.1** The following table is a listing of the abbreviations and acronyms that will be encountered throughout this document:

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

ABS	American Bureau of Shipping
ACM	Asbestos Containing Material
AMS	Alarm and Monitoring System
APM	Assistant Project Manager
C.S.A.	Canadian Shipping Act
CAD	Computer Aided Drafting
CCGS	Canadian Coast Guard Ship
CFM	Contractor Furnished Material
CG TA	Coast Guard Technical Authority
CGSB	Canadian General Specifications Board
CLC:	Canada Labour Code
CPP	Controllable Pitch Propeller
CPU	Central Processing Unit
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
DFO/CCG	Department of Fisheries and Oceans / Canadian Coast Guard
DSIP	Delegated Statutory Inspection Program
ECR	Engine Control Room
EMI	Electromagnetic interference
FAT	Factory Acceptance Test
FMEA	Failure Mode Effect Analysis
FSM	Canadian Coast Guard Fleet Safety Manual

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

FSR	Field Service Representative
GM	Vertical distance between the Center of Gravity and the Metacentre.
GSM	Government Furnished Equipment
GZ	Perpendicular distance between the lines of action of the force of buoyancy and the weight of the vessel.
HC	Health Canada
IA	Inspection Authority
IEEE.	: Institute of Electrical & Electronic Engineers Inc
IMO	International Maritime Organization
IO	Input/Output, as in device or list
JB	Junction Box
LAN	Local Area Network
LED	Light Emitting Diode
MCT's	Multiple Cable Transits
MNS	Marine Navigational Services
MOSH	Marine Occupational Safety and Health Regulations
MSDS	Material Safety Data Sheet
MTRB	Marine Technical Review Board
N.C.	Noise Criteria
N.F.P.A.	National Fire Protection Association
NACE	National Association of Corrosion Engineers
NDT:	Non-Destructive Testing

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

NFU	Non-follow-up, as in alarm
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
PAP	Project Action Plan
PCS	Propulsion Control System
PID	Proportional, Integral, Derivative control loop
PIT	Portable Interface Terminal
PLC	Programmable Logic Controller
PM	Preventative Maintenance
PSPC	Public Services and Procurement Canada (Formally PWGSC)
RCS	Remote Control System
RFI	Radio Frequency Interference
RIO	Remote Input/Output
RO	Recognized Organization as defined by the Canada Shipping Act
RPU	Remote Processing Unit
RPU-TU	Remote Processing Unit for Terminal Units
SCR	Silicone Controlled Rectifier
SOLAS	Safety of Life at Sea Convention as per IMO
SSMS	Safety and Security Management System
SVMM	Senior Vessel Maintenance Manager
TA	Technical Authority – CCG Superintendent, Marine Engineering Atlantic North Region, or delegated Representative

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

TBS	Treasury Board of Canada Secretariat
TCMSS	Transport Canada Marine Safety & Security
TI	Technical Inspector – CCG Delegated
TSR	Technical Service Representative
UPS	Uninterrupted Power Supply
VCS	Vessel Condition Survey
VLE	Vessel Life Extension
WCB	Workers Compensation Board
WHMIS	Workplace Hazardous Material Information System
WOG	Water, Oil, Gas

4.6 Conditions and Definitions

4.6.1 The following conditions and definitions are applicable to all work contained in the Specifications of this VLE Document and are intended to outline the quality of workmanship and practice that is the minimum acceptable level:

4.6.1.1 The word "install" means that The Contractor must connect mechanically and electrically and provide the labour and materiel to complete the installation.

4.6.1.2 The word "re-install" means a piece of equipment that the Contractor has affected repairs on and is to be returned/installed in its original location and be mechanically and electrically connected. The Contractor must provide the labour and materiel to complete the reinstallation.

4.6.1.3 The word "remove" means that the Contractor must provide all labour and materiel to remove the unit, equipment, materiel, or system in its entirety. Part of the removal process is to blank openings, restore insulation and paint, etc.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 4.6.1.4** The word "relocate" means that the Contractor must provide all labour and material to remove the unit, piece of equipment, or system and to install the same unit, piece of equipment, or system in the new location.
- 4.6.1.5** The term "or equivalent" means a substitute which has equal characteristics (i.e., size, materiel type, life, weight, input, and output) as approved by the CG TA. A comparison of the general specifications must be provided to the CG TA for the equipment specified and the "or equivalent" (i.e., old compared to the new).
- 4.6.1.6** The term "overhaul" as applied to any mechanical equipment, structure or system comprises the following:
- 4.6.1.6.1** Disassembly into component parts
 - 4.6.1.6.2** Examination of cleaned parts for defects
 - 4.6.1.6.3** Gauging of parts for wear; reporting of parts worn beyond specification limits or otherwise defective and reassembly followed by specification adjustments; tests; and functional trials.
- 4.6.1.7** The word "disconnect" means the Contractor must mechanically and electrically disconnect the piece of equipment of all piping, wiring, seating, and other attachments permitting the removal of the unit as a whole.
- 4.6.1.8** The word "disassemble" means that the Contractor must provide all labour to take apart, piece by piece, the equipment, machinery, or system to be examined or repaired.
- 4.6.1.9** The word "reassemble" means that the Contractor must provide all labour and material to put together, piece by piece, the equipment, machinery, or system on completion of examination or repair.
- 4.6.1.10** The words "Additional Work Procedures" means the procedures as defined in solicitation and Contract and includes any additional

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

work required on a system, sub-system, or equipment which the original specification did not specify.

- 4.6.1.11** The word "calibrate" means the adjustment of readings and measurements to a known standard.
- 4.6.1.12** The word "check" means that the Contractor must provide labour to find faults by sighting, feeling, or listening. The checking of any equipment does not involve the disturbance or removal of parts, components, or sub-assemblies.
- 4.6.1.13** The word "examine" means that the Contractor must provide labour for the process of systematically examining, checking, and testing equipment, records or administrative procedures to detect actual or potential defects or errors.
- 4.6.1.14** The word "test" means that the Contractor must provide labour to conduct the operation of a unit in relation to a stated standard or procedure.
- 4.6.1.15** The words "set-to-work" means the tuning, alignment and adjustment of equipment/systems required subsequent to satisfactory installation. Inspection to make the equipment/systems ready for technical acceptance trials.
- 4.6.1.16** The word "trials" is an element of QA that means an action(s) by which the Contractor proves by a visual or instrumental presentation that the equipment or system satisfies the requirements of the specified trials agenda; and
- 4.6.1.17** The term "functional test" means operation of a piece of equipment in all its normal operating modes and throughout its operating range to establish that it will perform its designed function within normal operating parameters as indicated in the manufacturer's documentation.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

5.0 SAFETY MANAGEMENT

5.1 General

- 5.1.1** The Contractor and all of its Sub-Contractors must follow the Occupational Health and Safety (OHS) procedures in accordance with applicable federal and provincial OHS regulations, ensuring that The Contractor activities are carried out in a safe manner and do not endanger the safety of any personnel.
- 5.1.2** When the Owner retains Care and Custody of the vessel, it must be considered a Federal Workplace and Canada Labor Code requirements must apply to all persons present onboard or working onboard or around the vessel. The Safety and Security Management System, defined by the Coast Guard Fleet Safety and Security Manual (FSSM), must apply, directly, to all CG and Contractor activity specified onboard or around the vessel, unless a Contractor-proposed, comprehensive Safety and Security Management System is presented and accepted by the TA, in which case the Contractor's Safety and Security Management System may be applied.
- 5.1.3** When the Owner retains Care and Custody of the Vessel, the Contractor and all its representatives connected to this Contract must attend an orientation session on vessel safety, before beginning any work, to familiarize them with the dangers specific to the vessel, with required permit systems for work protocols, as well as with the procedures for safety, risk prevention, hazard response and pre-work safety assessments. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.
- 5.1.4** For the duration of the period during which The Contractor accepts Care and Custody of the vessel, the Contractor's Safety and Security Management System must be in effect and must be in accordance with the applicable OHS regulations and procedures and must meet or exceed the requirements of the Fleet Safety and Security Manual, as well as ship specific work instructions, in addition to all relevant requirements of the Canada Labor Code. Requirements for the following types of work are highlighted:

Work at heights

Work in confined spaces

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

Hot Work

Work requiring lockout and tagout of energy systems or access

Pre-work safety assessments

- 5.1.5** When a Contractor Safety and Security Management System is applied, the TA must have access to the Contractor Safety and Security Management documentation for audit purposes.

5.2 Safety Officer

- 5.2.1** The Contractor must identify a specified person that is responsible for the safety management of the work site. The Safety Manager must ensure that daily safety rounds are carried out, that safety issues are identified, and safety precautions are maintained.
- 5.2.2** The Contractor must assign at a minimum, one full time Safety Officer to the vessel for the duration of the refit. The name of the Safety Officer must be submitted with the deliverables in this section along with the Contractors bid.
- 5.2.3** The Safety Officer will be responsible for managing the Contractor's and Coast Guard's Safety and Security Management Plans when applicable depending on who is in Custody of the vessel.
- 5.2.4** The Safety Officer must ensure that all safe work procedures are being carried out by all its employees and other personnel in the shipyard or on the ship, at all times.
- 5.2.5** The Contractor's Safety Officer must meet with the Chief Engineer and CG Safety Officer daily to ensure that all work permits are up to date and all areas are safe for work. The CG TA reserves the right to ask to suspend work immediately when the work is seen to being performed in contravention of any safety procedures. Work shall be permitted to resume when the Technical Authority, in consultation with The Contractor and PSPC, is satisfied that the agreed-upon procedures are in place and being adhered to.

5.3 Emergency Response

- 5.3.1** The Contractor must provide, facilitate, coordinate, and demonstrate a single emergency response procedure that must apply to all persons onboard the vessel

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

at any given time. This response procedure must clearly define communication lines between The Contractor and Owner in the event of an emergency and must be approved by the TA.

5.3.2 This procedure must be made available to the CG TA five (5) days before the Kick-Off meeting.

5.3.3 The Contractor must coordinate an emergency response drill onboard the vessel within five (5) days of vessel arrival at The Contractor's facility and once monthly thereafter.

5.4 Liability

5.4.1 Any damage to the vessel attributed to The Contractor non-compliance with the Safety and Security Management System is the responsibility of The Contractor and must be repaired at The Contractor's expense.

5.5 Protection of Personnel

5.5.1 General

5.5.1.1 The Contractor must ensure the removal of all rough edges, points, sharp corners, and protrusions created during the conduct of the work.

5.5.2 Gas Free Certification

5.5.2.1 The following precautions must be taken prior to entering any confined space:

5.5.2.1.1 All compartment(s), tanks, or void spaces requiring entry for work to be performed, must be certified gas free by a certified marine chemist or a provincially recognized and qualified individual trained and certified for gas free certification. Note: Proof of certification is to be provided to the CCG Technical Authority.

5.5.2.1.2 The Contractor must provide copies of all gas free certificates issued, to the CCG TA. Certificates must specify, "Safe for Persons" (manned entry) and/or "Safe for Hot Work" as appropriate. Gas free verification is to be performed daily and a

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

copy, showing the date and time, of the latest verification, must be posted at the point of entry of each effected space(s).

5.5.3 Confined Space Entry

- 5.5.3.1** The Contractor must ensure that each compartment, tank, void space, etc. that is identified for work in this VLE document, is suitably ventilated and cleaned and provided with a gas free certificate, ether certified by a marine chemist or by other qualified person(s).
- 5.5.3.2** For all work requiring entering or working in confined spaces; the Contractor is to note that Canadian Coast Guard ships are presently working under the ISM Code and that each ship has a Fleet Safety Manual onboard. This manual will be made available to the Contractor upon request.
- 5.5.3.3** As a minimum The Contractor must comply with the work requirements as outlined in the Fleet Safety Manual during the Contracted work period. In accordance with the CCG Fleet Safety and Security manual, all work involving the entering of confined spaces must make use of a qualified rescue team. This team is to be used at all times when tanks or confined spaces are to be entered.
- 5.5.3.4** Any entry into confined spaces during the Contract period must be conducted in accordance with the Canadian Coast Guard Fleet Safety Management System procedures and individual shipboard work instructions. The Contractor's Standard Operating Procedures (SOP's) may be substituted for this requirement based upon a review and acceptance of the Contractor's SOPs by the PSPC CA and CG TA.
- 5.5.3.5** The costs associated with all known work requiring the services of a confined space rescue team must be the responsibility of The Contractor.

5.5.4 Hot Work

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

5.5.4.1 The following precautions must be taken where hot work is to be conducted:

5.5.4.1.1 The compartment(s) affected must be certified gas free suitable for Hot Work

5.5.4.1.2 Protective non-combustible non asbestos material must be used to prevent the spread of sparks, protecting electrical cables, machinery and other services.

5.5.4.2 A Fire Watch must be provided and maintained in the compartment, tank, or void, where the hot work is being performed and in all adjacent compartments. Fire watches must be provided with an appropriate fire extinguisher and must be trained in its use.

5.5.4.3 The fire watches must be maintained for **a minimum of thirty (30) minutes** after all hot work has been completed.

5.5.4.4 Any hot work carried out onboard the vessel during the Contract period must be conducted in accordance with the Canadian Coast Guard Fleet Safety Management System (CCGFSM) procedures and individual shipboard work instructions. Copies of the manual and site-specific work instructions are available from the TA.

5.5.4.5 The Contractor's Standard Operating Procedures (SOP's) or Provincial Legislation may be substituted for this requirement based upon a review and acceptance by the Contract Authority and the TA.

5.5.5 Lock-Out / Tag-Out

5.5.5.1 When working on electrically operated equipment, The Contractor must lock-out equipment in accordance with the Safety Management System, and as a minimum conduct the following:

5.5.5.1.1 Isolate the main power source and any alternative power source to the equipment.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

5.5.5.1.2 Install Electrical lockouts and place electrical caution tags on the main power source and any alternate power sources for the switches/disconnects supplying the equipment under maintenance.

5.5.5.1.3 Verify at the terminals to ensure power is not present.

5.5.5.1.4 Ensure the lockouts and electrical caution tags remain in place until completion of all work.

5.5.5.1.5 The CG TA must be notified of all such ongoing work.

5.5.5.2 All electrical installations and repairs must be done in accordance with the latest revisions of TP127E - Electrical Standards of Transport Canada Marine Safety and of IEEE Standard 45 – Recommended Practice for Electrical Installation on Ships. Standard TP127E takes precedence over the IEEE standard. Any electrical modifications to the vessel to be approved by both the RO and CG TA, if and as required.

5.5.6 Working Aloft

5.5.6.1 Any work aloft must be conducted in accordance with the Canadian Coast Guard Fleet Safety Management System procedures and individual shipboard work instructions. The Contractor's Standard Operating Procedures (SOP's) may be substituted for this requirement, based upon a review and acceptance of the Contractor's SOPs by the Contract Authority and the TA.

5.5.7 Smoking in the Workplace

5.5.7.1 The Contractor must ensure compliance with the Non-Smokers' Health Act. The Contractor must ensure that there is absolutely no smoking onboard the vessel by their employees and Sub-Contractors, including the employees of any Sub-Contractor.

5.5.8 Workplace Hazardous Information System

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 5.5.8.1** The Contractor must provide the CG TA with Safety Data Sheets (SDS) for all Contractor and Sub-Contractor supplied WHMIS controlled products. SDS sheets must be provided in electronic format.
- 5.5.8.2** The Contractor must provide the CG TA all SDS's for anticipated product usage throughout the project five days before the Kick-Off meeting.
- 5.5.8.3** The Contractor must provide the CG TA with any additional SDS's, as may be required, throughout the project.
- 5.5.8.4** All SDS sheets must be maintained in accordance with OHS procedures.
- 5.5.8.5** The CG TA will provide The Contractor with access to SDS for all controlled products on the ship for all specified work items, on request.

6.0 HAZARDOUS MATERIALS

6.1 General

- 6.1.1** The vessel is known to contain hazardous materials, both lead paint and asbestos having been identified previously and documented in a Lead Paint Survey and an Asbestos Survey, (reference section 4.4.1.2).
- 6.1.2** The Contractor must acknowledge the content of these surveys and include the cost of all management and remediation efforts, as required, when specified work includes disturbing of areas containing known hazardous materials.

6.2 Lead Paint & Paint Coatings

- 6.2.1** CCG ships have been painted with lead-based paints in the past and as a result some of The Contractor's work processes could disturb lead containing material and generate airborne lead hazards.
- 6.2.2** Known lead paint hazards are identified in the Vessel Specific - Lead Paint Test Report.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 6.2.3** For work areas where paint or coatings are to be disturbed that were not previously tested by Coast Guard, or have arisen from an extra to the Contract, the Contractor must arrange for lead testing of coating samples in accordance with ASTM E1729-05. The Contractor must test the affected work areas for lead content prior to disturbing any paint by engaging a qualified Environmental Consultant to collect samples and have these samples tested by a competent lab. Results of the lead testing must be provided to TA as soon as they are available.
- 6.2.4** The Contractor must provide a report of all lead testing, in which the location of each sample is clearly identified and mapped, and the test results for each sample are provided.
- 6.2.5** All work areas known, or determined, to contain lead paint, where paint or coatings will be disturbed, must be treated as though all coated surfaces have lead based paint. Measures are to be taken to abate and contain the lead dust hazard in accordance with applicable Federal and Provincial regulations.
- 6.2.6** Five (5) days before the Kickoff Meeting, The Contractor must provide, to the CG TA and CA, a copy of their lead paint work procedures showing compliance with the provincial regulations and which have been approved by the workplace Occupational Health and Safety Committee.
- 6.2.7** The Contractor must maintain records that demonstrate that supervisors and workers performing any lead abatement procedures have been trained. Current training records must be available for inspection and must, at a minimum, conform to section 6 of EACO Lead Guideline for Construction, Renovation, Maintenance or Repair, latest edition.
- 6.2.8** The Contractor must maintain records that demonstrate that their Quality Assurance department has the capacity to monitor on-site work progress, is capable of performing air quality monitoring on an ongoing basis as required by the Occupational Health and Safety Regulations and is able to assess the affected areas post abatement process. Current training records must be maintained and must be made available for inspections.
- 6.2.9** The Contractor must provide the CG TA with all records from any lead abatement processes and the final disposal certificates for all materials generated from the abatement process.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

6.2.10 The Contractor must quote, separately, the following costs:

- 6.2.10.1** Unit price for sampling/testing paint for lead content (price out x number initially)
- 6.2.10.2** Paint containing lead Class 1 removal (indicate \$/sq m, assume initial X sqm)
- 6.2.10.3** Paint containing lead Class 2 removal (indicate \$/sq m, assume initial X sqm)
- 6.2.10.4** Paint containing lead Class 3 removal (indicate \$/sq m, assume initial X sqm)
- 6.2.10.5** Disposal of (1) one tonne of waste containing lead (indicate \$/tonne)

6.2.11 These unit costs must be applied to determine final cost of all lead paint remediation requirements in areas where lead paint has not been identified by the Owner provided Vessel Specific - Lead Paint Test Report.

6.3 Asbestos Containing Materials (ACM)

- 6.3.1** The Contractor must not use any asbestos containing material, only materials with 0% ACM.
- 6.3.2** The Contractor will be supplied the most recent ship specific Asbestos Risk Assessment Report and Asbestos Management Plan by CCG.
- 6.3.3** Handling of any asbestos containing materials must be performed by trained personnel and/or a company certified in the removal of asbestos in accordance with Federal, Provincial/Territorial, and Municipal regulations.
- 6.3.4** The Contractor must provide the CG TA with disposal certificates for all asbestos containing material removed from the vessel indicating that the disposal was in accordance with Federal, Provincial and Municipal regulations in effect.
- 6.3.5** The Contractor must provide an "Observation Report (OR)" with reference to any concerns or intentions regarding materials encountered suspect of containing asbestos but not previously identified and reported in ship specific Asbestos Risk Assessment Report. Contractor must submit OR to CG TA prior to any further work

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

being initiated in area of concern. Any additional, unspecified work resulting from the OR must be addressed through 1379 process.

6.4 Halocarbon Containing Systems & Equipment

6.4.1 All work conducted on Halocarbon containing systems, must be in accordance with the Federal Halocarbon Regulations, 2003 (SOR/2003-289).

6.5 Waste Disposal

6.5.1 The Contractor must dispose of all solid, fluid, gaseous waste and scrap material removed from the vessel and/or generated by the execution of the work specified herein. All disposals must be made in full accordance with Federal, Provincial, and local laws and regulations.

6.5.2 The Contractor must make available proof of all disposal documentation on the request of the CG TA.

6.5.3 The Contractor must provide proof of the waste disposal Sub-Contractor's certification for disposal of various waste products, as applicable, on request of the CG TA.

7.0 QUALITY CONTROL REQUIREMENTS

7.1 Regulatory Inspections and/or Class Surveys

7.1.1 The Contractor must contact, coordinate, schedule, and be completely prepared for all regulatory inspections and surveys by the applicable authority: i.e., Recognized Organization (RO), Health Canada, Environment Canada, or others as indicated by individual specifications.

7.1.2 For the purposes of this Contract all regulatory inspections will be conducted by a RO, and Canada will be responsible for paying all of the RO's fees. The RO's retains the authority to inspect the vessel at any time. Any work arising within this Contract due to ROS inspections results or additional work not covered by this statement of work will be handled through PWGSC (PSPC) 1379 action.

7.1.3 Documentation generated by the above inspections and/or surveys indicating that the inspections and/or surveys were conducted (i.e., original signed and dated

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

certificates) must be provided to the CG TA in accordance with the “Documentation” Section of these General Notes.

- 7.1.4** The CG TA reserves the right to inspect all work and is to be invited to all inspections performed by the ROs unless otherwise agreed upon.
- 7.1.5** The Contractor must provide timely advance notification (minimum of one working day) of scheduled regulatory inspections to the CG TA so they may attend and witness the inspection.
- 7.1.6** The Contractor must arrange for all visits and inspections associated with RO’s, Health Canada, Environment Canada, or any other inspection required by the specification unless otherwise indicated. All costs and fees associated with these visits and inspections will be billed directly to Canada.
- 7.1.7** The CG TA must be allowed to review POs prior to placing the order for new equipment to ensure compliance with the requirements of the specifications and confirm the vendor/ sub contractor.

7.2 Contractor Inspections

- 7.2.1** The Contractor must afford the CG TA the opportunity to conduct an inspection with The Contractor on the condition and location of items to be removed prior to either carrying out the specified work or gaining access to a location to carry out the work.
- 7.2.2** The Contractor must take a before picture of conditions prior to removing any items. These photographs are to be in accordance with the Documentation section of the General Notes, named according to the specification section that resulted in removing those items.
- 7.2.3** Prior to the close out of any item under this specification, The Contractor must afford the CG TA the opportunity to verify the work has been completed in accordance with the specification. At that time the Contractor must have available all photographs, documents, reports, and trials in relation to the item being closed out as completed.

7.3 Recording of Work in Progress

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

7.3.1 The CG TA may record any work in progress using various means including, but not limited to, photography and video, digital or film.

7.4 Access for Maintenance, Installation, and Removal

7.4.1 The layout of newly installed machinery and equipment must be designed and constructed to permit ready access for routine maintenance, operational checks, and operational inspections without disturbance of other machinery, equipment, or structure. The access for maintenance of new equipment must meet or exceed the installation manual recommended clearances.

7.4.2 The Contractor must determine best routes for installing and removing equipment. All lifting points currently fitted on the ship must be treated as uncertified and must be certified before use by the Contractor.

7.4.3 Temporary lifting points installed by The Contractor must be removed prior to transfer of custody with welds ground flush, and paint coatings applied in accordance with the vessel's paint specification.

7.4.4 Manufacturer's recommended removal clearances must be allowed for.

7.4.5 After equipment installation and/or removal the Contractor must make good all equipment relocations, blemishes, and penetrations and must return the affected areas of the ship to the As-Delivered working condition.

7.5 Assembly of Components

7.5.1 The Contractor must ensure that during installation of specified equipment, that parts and assembled equipment are cleaned of smudges, spatter or excess solder, weld metal and metal chips or any other foreign material which might detract from the intended operation, function, or appearance of the equipment. (This would include any particles that could loosen or become dislodged during the normal expected life of the equipment). All corrosive material must be removed. This cleaning must take place before the parts are assembled into the equipment.

7.5.2 Covers, cowlings and components damaged by The Contractor must be replaced with a new cover, cowling, or component without any cost to Canada.

7.5.3 Where torque specifications are not provided by the manufacturer, the applicable SAE, ANSI, or BS1083 nut and bolt standard torques must be used.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

7.6 Protection of Equipment

- 7.6.1** The Contractor must ensure that surfaces and components of equipment installed on the vessel are protected against damage, soiling, and contamination as a result of Contracted work.
- 7.6.2** All electrical and electronic equipment and components must be protected during the Contract against physical damage, internal damage, and by the effects of adverse temperatures or other environmental conditions.
- 7.6.3** The Contractor must protect equipment that could be damaged as a result of movement of materials and equipment nearby. The Contractor must also protect equipment from nearby sources of contamination including but not limited to burning, welding, media (sand) blasting, grinding, and painting.
- 7.6.4** Any damage to surfaces, equipment, furnishings or decor incurred prior to acceptance must be returned to As-Delivered condition by the Contractor without any cost to Canada.
- 7.6.5** All openings in machinery and/or systems prior to connections being made must be kept covered by fitted secure solid inserts or covers at all times.
- 7.6.6** The Contractor must obtain and follow instructions from its Sub-Contractors for any special protection required for their equipment during the project work. Such instructions must be made available to the CG TA.
- 7.6.7** Physical protection including but not limited to plastic sheets, fireproof covers, heavy weight material covers, wood plugs, wood encasements and heaters must be used as required.
- 7.6.8** The Contractor must protect the vessel from the possibility of vermin infestation (insect/mammal/bird). If an infestation does occur during the Contract period, the Contractor must bear all costs to ensure the vessel is made vermin free before the vessel's departure and Contract completion.

7.7 Access to Vessel and Equipment

7.7.1 Installation and Removal Routes

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

7.7.1.1 Disturbing the physical structure of the vessel, to gain access to facilitate removal or installations of large equipment, must require approval by the TA prior to work commencing.

7.7.1.2 The Contractor must be responsible to identify all readily visible interference items that will require removal to facilitate removal routes.

7.7.1.3 All interference items removed or disturbed, including lagging and/or insulation, must be renewed in good order to an “As Delivered” condition on completion of work, unless otherwise specified.

7.7.2 The Contractor must ensure that while vessel is dry docked, the complete vessel is clear of water’s edge at high tide by minimum 27m to allow for removal of tailshaft and rudder systems.

7.8 Penetrations

7.8.1 Sealing of redundant penetrations must be performed in a manner acceptable to ABS. The Contractor must notify the CG TA of any such penetrations that have been sealed and provide copies of all ABS documentation. The costs for such penetrations that are required to be sealed are to be included in the pricing data sheet, wherever possible.

7.9 Access for Maintenance

7.9.1 The layout of the newly installed machinery and equipment must be designed and constructed to permit ready access for inspection, maintenance, and repair without disturbance of other machinery, equipment, or structures. Future removal routes of the aforesaid machinery components must be taken into account by the Contractor.

7.10 Securing Arrangements of System Equipment and Components

7.10.1 All new and existing systems, equipment and components installed or disturbed as a result of the work, must be secured to prevent damage caused by the physical operating conditions of the vessel.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

7.10.2 The Contractor must follow manufacturers' recommendations for installation arrangements. In the event this information is not available, securing arrangements must be approved by the regulatory requirements prior to the Contractor commencing the securing activities.

7.10.3 The Contractor must follow torque specifications as provided by the manufacturer. Where manufacturer specific torque specifications are not provided, standard SAE nut and bolt torques must be used.

7.11 Damaged Items

7.11.1 Machinery, equipment covers, cowlings, and components damaged by the Contractor, during the Contract period, will be repaired or replaced by the Contractor at no expense to Canada.

8.0 WELDING (In addition to section on Welding Certification – ITT main)

8.1 General

8.1.1 For the fusion welding for steel, The Contractor must be certified in accordance with the most recent version of the Canadian Welding Bureau (CWB), CSA\ACNOR W47.1-09. All such welding performed must be to the most recent version of SA Standard W59 - Welded Steel Construction (Metal Arc Welding). Individuals performing in steel fusion welding must be certified by the Canadian Welding Bureau to CSA Standard W47.1-09 and for the type of weld positions that they are required to perform.

8.1.2 All aluminum welding performed by The Contractor, of its qualified Sub-Contractor, must be certified to must conform to the requirements of the most recent version of CSA Standard W47.2-11 "Certification of Companies for Fusion Welding of Aluminum". Individuals performing aluminum welding must be certified by the Canadian Welding Bureau to CSA Standard W47.2-11 and for the type of weld positions that they are required to perform.

8.1.3 The Contractor must submit a list of names and the qualifications of all of the welders who will be working on this project and well as copies of their CBW certifications. This List is to be provided to the CG TA and is to be updated as required when new welders are introduced to the project.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

8.1.4 The Contractor is to provide a CBW recognized Welding Engineer developed and CWB approved welding specifications and weld procedure data sheets to both the CG TA and the regulatory body (ABS) where required.

8.1.5 Weld procedures for joining pipe connections must be recorded and approved by CWB in accordance with ASME Boiler and Pressure Vessel Code, Section IX.

8.1.6 All procedures pertaining to hot work must be adhered to. All pipe welding must be performed by qualified pipe welders qualified for the pipe application intended.

8.1.7 The Contractor must perform NDT on welds in accordance with ABS rules or the CCG Welding Standard, whichever is more stringent.

8.2 Weld Design Requirements

8.2.1 The size, length and details of welds must be approved by the Classification Society related to that specification item, or ABS.

8.3 Removal of Temporary Attachments

8.3.1 Temporary cleats, lifting eyes and fastenings for servicing structures must be removed by burning or grinding, and any remaining irregularities must be ground flush with the surface of the parent plate. Any disturbed paint is to be repaired in accordance with Section 9.0

9.0 PAINTING

9.1 General

9.1.1 Prior to the commencement of any painting, The Contractor must prepare a paint schedule and submit this schedule to the CG TA and the IA for review and acceptance. The paint schedule must list all areas and compartments on the vessel affected by the project work and indicate the proposed surface preparation, paint type, painting scheme, surface preparation, type of coating, number of coats and the drying time for each coat, Dry Film Thickness (DFT) and colors. All paint used must be compatible with the existing paint on the vessel.

9.1.2 All pipe markings must be in accordance with the Canadian Coast Guard Color Coding Standard for Piping Systems.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

9.1.3 All new and disturbed steel and aluminum work must be painted in accordance with publication Canadian Coast Guard Paints and Coatings Standard, unless otherwise stated in this document, and to the paint manufacturer's specifications.

9.1.4 Paint, varnish, and other finishes used on interior surfaces must have a Classification Society Type Approval certificate from a Transport Canada authorized Registered Organization. Copies of these certificates are to be provided to the TA.

9.1.5 Each coat of paint must be of a different shade to indicate proper coverage, and thoroughly dry before application of subsequent coats. As a minimum, the first primer coat must be applied by brush, roller or by airless spray. The final topcoats must be protected from soiling or damage until the custody of the vessel is returned to Canada. Care must be taken in the application of paint to ensure that furnishings, and equipment liable to more serious damage due to excess spray, must be adequately protected.

9.1.6 The following must NOT be painted:

Exposed screw threads

Grease fittings

Bronze pins

Door screens

Name plates

Gaskets

Stainless steel or Monel metal fittings

Machined surfaces

Instrumentation

Interior gratings

Electrical wires, insulation, and associated fittings

Electrical panels

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

Rubber seals of watertight doors and hatches

Fire door seals, and

In general, all working parts.

9.1.7 All paint intended for the painting the vessel's hull, or for an application on the underwater hull surface, must be registered and approved for use by Agriculture Canada. The Contractor must provide copies of these approvals to both the IA and the CG TA.

9.1.8 The Contractor must ensure that the ambient environmental conditions, as called for by the paint manufacturer are within the acceptable parameters for the application of any coatings. The Contractor must include in their bid, the cost of enclosing the vessel and the necessary heating required to meet the minimal temperature and humidity ambient conditions during the dry docking to permit the correct application of the specified hull coatings.

9.2 Heavy Metal Based Coatings

9.2.1 Paints or any other coating containing lead, mercury or copper must not be used under any circumstances.

10.0 IDENTIFICATION

10.1 Nameplates

10.1.1 Nameplates must be fitted for all new equipment, new compartments, new doors and closures.

10.1.2 All nameplates must be in English, except where required, by Transport Canada to be in both English and French for reasons of emergency operation.

10.1.3 Lettering must be clear and concise with the minimum use of abbreviations. Primary information must be given in larger size lettering than secondary information.

10.1.4 The type of nameplates must suit the location in the vessel as specified below:

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 10.1.4.1** Plastic must be used in accommodation and navigation spaces where the nameplate is free of exposure to mechanical damage or covering over by ice, paint, oil, grease, or dirt.
- 10.1.4.2** Plastic nameplates must be laminated phenolic rigid type with machine engraved lettering and secured with stainless steel or brass machine screws. Unless otherwise specified, nameplates must have white lettering on black for normal signs and white lettering on red background for warnings and emergency signs.
- 10.1.4.3** Laminated plastic nameplates, black with white core engraved through to the center core, must be provided for all devices located on the exterior surfaces of the switchboard.
- 10.1.4.4** Nameplates must be secured to the switchboard with machine screws. New nameplates to be fitted on the existing switchboard must be consistent in size and lettering with those already fitted. Nameplates for feeder circuits must identify each circuit by name and number and the fuse size and/or trip element rating.
- 10.1.4.5** Warning, or caution nameplates must be laminated plastic, red with white core engraved through to the center core and must identify circuit breakers with shunt trips requiring completion of remote circuits prior to being operated, and those having a potential power source connected to both sides, or to any other potentially hazardous condition.
- 10.1.4.6** Engraved Metal, stainless steel or brass nameplates must be used in machinery spaces and where exposed to the weather. Engraved metal nameplates must have lettering accentuated by means of black wax and secured with stainless steel or brass machine screws.
- 10.1.4.7** A complete drawing list of nameplates, detailing size of plate, size of lettering and inscription must be submitted to the IA and the CG TA for review and acceptance prior to ordering and/or manufacturing.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

10.2 Key Tags

10.2.1 Tags must be supplied for all new keys and must be of plastic composition. Tags must be marked to identify the space they serve. The description must be identical to that used for the space or equipment identification nameplate. A complete list of new keys and tags must be provided to both the IA and the CG TA.

10.2.2 All new keys and new key tags must be turned over to the CG TA as part of the acceptance of the vessel.

10.3 Safety Related Signs

10.3.1 Any new signs required as a result of this Contract must be all new signs and must be in English except where required, by Transport Canada to be in both English and French for safety reasons.

10.3.2 Painted signs for muster station directions, fire stations and emergency equipment, etc. must be supplied and located in accordance with ABS Rules and Regulations.

10.3.3 If required The Contractor must prepare and submit a drawing indicating the location, type and size of lettering for any new all signs. This drawing must be submitted to ABS for approval prior to construction or installation of the signs.

10.4 Vessel Cleanliness

10.4.1 The Contractor must maintain the vessel in a clean condition during the course of the whole Contract. Debris and garbage must be removed from the vessel and disposed of at the end of each working day.

10.4.2 The Contractor must ensure the below levels of cleanliness are achieved prior to vessels crew returning for remobilization and throughout the duration of the docking period:

10.4.2.1 Initial Cleaning – Continuous throughout the entire work period. Garbage bags, packaging materials, wasted or used consumable materials, damaged protective deck coverings must be removed on a weekly basis. Loose garbage (tripping hazards) must be removed on a weekly basis.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

10.4.2.2 Basic Cleaning – Upon completion of work in a specific area and interference items, bulkhead panel, furniture, etc are reinstalled. This basic cleaning must consist of sweeping protective deck coverings or mopping interior decks, wiping down of all areas in the space and removal of any tools and/or equipment no longer required in the space.

10.4.2.3 Contractor Cleaning – Prior to crew arriving all areas must be washed down with commercial cleaners and clean warm water to remove any remaining dust/dirt that may have accumulated or deposited on furnishings, decks, panels, lights, heaters, equipment, etc.

10.4.2.4 Final Cleaning and Sanitizing – Upon completion of Contractor Cleaning and within 5 days of crew returning, Professional (experience cleaning offices, hotels, hospitals, etc) cleaning crews must be brought in to sanitize and disinfect all accommodation spaces onboard. This must include waxing of decks, cleaning of freezers, fridges and walk-in spaces, galley spaces, lounges, cabins, washrooms, etc. Final acceptance will be by CG CE upon walkthrough of all spaces.

10.4.3 Attention must be given to hazardous materials such as flammable or toxic waste products. These must be disposed of in accordance with federal, provincial and municipal regulations.

10.5 Cleaning of Bilges

10.5.1 Prior to any work commencing in the machinery spaces, the bilge in the machinery spaces must be cleaned. Cleaning must include pumping and disposal of all bilge water and washing of all bilges to remove all grease, oil, and contaminants.

10.5.2 Disposal of waste must be in accordance with all federal, provincial, and municipal regulations. Disposal certificates must be provided to both the IA and the TA.

10.5.3 For bidding purposes the Contractor must bid on the removal and the disposal of 10,000 liters of oily bilge waste for disposal. PWGSC (PSPC) Form1379 must be submitted to adjust the cost of bilge waste disposal up or down to actual.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

10.5.4 Vessel cleanliness must extend to the bilge areas which must be maintained free of oil, water, and debris for the duration of the project. Prior to acceptance by the Coast Guard, the Contractor must thoroughly clean, to the satisfaction of the CG TA, all spaces of the vessel including all bilge areas if there is an accumulation of any liquids.

11.0 MECHANICAL REQUIREMENTS

11.1 General

11.1.1 The Contractor must supply all materials and/or equipment within the intent of these specification requirements.

11.1.2 All replacement machinery, equipment and fittings must be new and unused, manufactured by a recognized manufacturer, having established facilities and can supply of parts and service in North America

11.1.3 All machinery and equipment must be approved by a Classification Society for use onboard this class of ship and must meet all applicable ABS regulations. The Contractor must provide copies of Classification Society approval certificates to the IA and the TA. Approval certificates must be current, with sufficient validity period after the work is finalized and be for the type and model of equipment being installed by the Contractor. The Contractor must reference to Section 21.0 of this document for the complete documentation requirements.

11.1.4 All machinery must be capable of operating under the conditions set out in Section 2.1 of this Specification. All machinery must be installed to the manufacturer's recommendations with particular attention to the reduction of vibration and noise transmission.

11.1.5 All rotating machinery must be installed with axis fore and aft or vertical unless otherwise approved by ABS.

11.1.6 Location of all units must be done in accordance with the provided guidance drawings and the Contractor is to take into account the accessibility for maintenance and repair of the newly installed unit or machinery.

12.0 NEW PIPING REQUIREMENTS

12.1 Fabrication of Pipework

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

12.1.1 Pre-Fabrication

- 12.1.1.1** During all stages of the prefabrication, all materials used must be traceable and must comply with all relevant Class requirements and certificates for the applicable systems that they are being fabricated for.
- 12.1.1.2** During all stages of the fabrication, all pipe spools must be properly tagged with their unique spool number (when applicable). Labels must remain on the spool up to the installation. Labels must be selected and attached so that during and after blasting and painting the spool number remains readable.
- 12.1.1.3** Prefabricated pipe spools must be cleaned, preserved and end capped (temporary) prior to installation.
- 12.1.1.4** All welded attachments to piping, including pads and doubler plates, must be of a material 100 % compatible with the piping material. Fabrication of high alloy piping must take place in areas separated from areas where carbon steel piping is fabricated. Bending and forming of pipe must be carried out in accordance with ASME B31.3 and must be carried out according to documented procedures.
- 12.1.1.5** Pipe-tap connections, where required, must be drilled through the pipe wall and be smooth inside. All threading must be carried-out after bending, forging or heat treatment, but where this is not possible, suitable thread protection must be provided.
- 12.1.1.6** All pipes must be inspected by the CG TA before installation to ensure that they are free from loose contamination. Pipe work must be erected on permanent supports designated for the line. Temporary supports must be kept to an absolute minimum. Any weldolets used must be fully welded to the extent needed to confirm with the design requirements defined in ASME B31.3.
- 12.1.1.7** Pipework must be fitted in place without springing or forcing to avoid undue stressing of the line or strain being placed on adjoining system or item of equipment, etc. All temporary pipe spools and

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

supports that are an aid to erection, testing/flushing, sea fastening, etc. are to be specially marked for removal identification.

- 12.1.1.8** Flanges must not have any damage that will interfere with the integrity of the joint. The flanges must be clean and free from any rust, dirt, or other contamination. The joints must be brought up flush and square without forcing so that the entire mating surfaces bear uniformly on the gasket and then mated-up with uniform bolt tension.
- 12.1.1.9** With the piping flange fitted and prior to bolting-up the joint, the following must be maintained: bolting must move freely through accompanying bolt-holes at right angle to the flange faces. There must be a clear gap between two flange faces before gasket installation. There must be sufficient flexibility to install and replace gaskets.
- 12.1.1.10** Flange covers must be retained on all flange connections to valve(s) or equipment, until ready to connect the mating piping. All equipment must be blanked, either by pressure test blanks, spades, or blinds, to stop the ingress of internal pipe debris. Flanges connecting to strain sensitive mechanical equipment (e.g., pumps, compressors, turbines, etc.) must be fitted-up in close parallel and lateral alignment prior to tightening the bolting.
- 12.1.1.11** Welding must be completed before testing and/or coating.
- 12.1.1.12** Pipe supports must be fabricated and installed per drawings and specifications.

12.2 Requirements for Hot Dip Galvanized Piping

- 12.2.1** All spools, saltwater/raw water piping, bilge and ballast, grey and black water and fire main piping must be hot dipped galvanized after fabrication. Once galvanized, field welds are not allowed. After galvanizing and before installation, flange facings and threaded connections are to be checked for and cleaned from any excessive zinc.

12.3 Cleaning and Flushing

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

12.3.1 Cleaning

12.3.1.1 Cleaning methods required for different types of piping systems are summarized in the following table:

Piping Type	Cleaning Reqmts.
Fuel Oil	A, B, C, D, F
Lubricating Oil	A, B, C, D, F
Starting Air	A, B, C
Cooling Water and Seawater Piping	A, B, C
Exhaust Gas	A, B, C
Charge Air	A, B, C
Hot Water	A, F, G
Potable Water	A, F, G
Bilge And Ballast	A, B, C
Domestic Water	A, F, G
Grey And Black Water	A, B, C
Fire Main	A, B, C

Legend

Cleaning methods to be applied during prefabrication of pipe spools and sections

A = Washing with freshwater using an alkaline solution in hot water at 80°C for degreasing.

B = Mechanical Cleaning to remove rust and scale using a stainless-steel brush (not required for seamless precision tubes)

D = Pickling (not required for seamless precision tubes)

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

Cleaning methods to be applied after installation onboard the vessel

C = Purging with dry compressed air or nitrogen

F = Flushing

G = Super-chlorinization (to be performed when super-chlorinating potable /domestic water systems)

12.3.1.2 The following piping systems are to be pickled and passivated as a system for process reasons:

Hydraulic and Lube-oil systems

12.3.1.3 Pipes are to be pickled in an acid solution of 10% hydrochloric acid and 10% formalin inhibitor for 4-5 hours, then rinsed with hot water and blown dry with dry compressed air.

12.3.1.4 After acid treatment the pipes are treated with a neutralizing solution of 10% caustic soda and 50 grams of trisodium phosphate per litre of water for a minimum twenty (20) minute period at a temperature between 40 and 50°C. On completion the pipe(s) is to be rinsed with hot fresh water and then blown dry with dry compressed air or nitrogen.

12.3.1.5 All hydraulic lines must be cleaned to a minimum cleanliness level to ISO 4406 class 15/12.

12.3.1.6 Prior to commencement of cleaning, the Contractor's cleaning procedure must be presented to the CG TA for review and approval (cleaning procedure can be part of the system test procedure). As a minimum the cleaning procedure must include the following:

method of cleaning being used

define the extent of the cleaning to be performed

method of sampling and examination

description of the cleaning unit (flow rate, pressure, velocity. filter mesh size)

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

12.4 Flushing

12.4.1 After installation and before the pressure testing of the piping systems is to take place all new piping systems must be thoroughly flushed and cleaned to the satisfaction of the CG TA and FSR of any connected equipment. All debris and contamination of the piping system must be removed and disposed of. Depending on the use of the piping system, further requirements may be applicable (i.e., hydraulic systems, fuel systems, etc.).

12.4.2 Flushing in general must take place using fresh water; if water in the system is a problem, alternatives must be used (air for air-system, oil for hydraulic system, etc.) Prior to flushing taking place the Contractor's flush procedure(s) must be presented to the CG TA for review and approval.

12.4.3 Finished prefabbed galvanized pipe spools are to be flushed with fresh water to ensure that there are no blockages present as a result of the galvanizing process. This is to be witnessed by the CG TA.

12.5 Testing of Systems

12.5.1 Prior to initial operation (commissioning), each installed piping system must be pressure and leak tested to assure mechanical strength and tightness.

12.5.2 All pressure testing must be done in accordance with the Contractor's prepared and Class approved hydro test procedure and these tests are to be witnessed by both the attending ABS Surveyor and the CG TA. Pressure test procedures must be in accordance with Classification requirements for the type of system being tested.

12.5.3 OEM operation and/or maintenance instructions for pressure testing of their related systems on connected machinery and or equipment involved must be carefully followed.

12.5.4 Relief and check valves must be removed and openings temporarily plugged. On completion of successful test(s) all plugs are to be removed and the relief and check valves reinstalled.

12.6 Testing Medium(s)

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

12.6.1 Medium(s) types used for testing must be clearly indicated in the testing procedure.

12.6.2 In general for piping dry compressed air or nitrogen is to be used. Only in cases where such testing is not practical, water will be permitted subject to approval from the attending ABS Surveyor and the CG TA. When water is being used corrosion inhibitors must be added.

12.6.3 Fuel and instrument air piping must be tested with dry air or nitrogen. System drains can be tested with air in combination with a soap solution.

12.6.4 Lube and seal oil systems which could be impaired by the presence of water must be alternatively tested in accordance with OEM's recommended procedure.

12.6.5 Test and flushing water that has been used for carbon steel systems must not be used for stainless steel or duplex piping. Water for stainless steel or duplex must not contain more than 20 ppm chlorides.

12.7 Recording of Tests

12.7.1 Piping systems must be thoroughly flushed and filled with a medium type selected for testing (see above). The medium must have ample time for setting and to allow the entrapped air to be vented.

12.7.2 For system tests each pressure test must be monitored by one recorder, a thermometer and two (2) pressure gauges, one of which is connected to the highest point of the test system.

12.7.3 Recorders and gauges must be calibrated and certified and approved and accepted by the both the attending ABS Surveyor and the CG TA. Copies of certificates must be provided to the CG TA.

12.7.4 No testing must be performed when ambient temperature is below 10oC. The minimum test pressure must be measured at the highest point of the system.

12.7.5 If tested with water, the test system must be kept under pressure for settling until all entrapped air is dissolved into the water. After approval by the attending ABS surveyor and the CG TA the testing period can start and is to be recorded. The pressure must be maintained for the period mentioned in the pressure test

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

procedure or as long is required by the ABS Surveyor. Typically fresh water to be used for such hydro tests, unless or until specified otherwise.

12.7.6 Each weld, flange connection and piece of equipment must be carefully checked for leaks during the test. Any leaks found must be corrected after de-pressurizing the system.

12.7.7 After correction of leaks or defects, Contractor must retest the system.

12.7.8 If, during the test period, the pressure changes due to temperature variations of the test medium a correction calculation must be part of the test report. The calculation for this calibration is to be shown in the final report.

12.7.9 If the ambient temperature is considerably higher than the test medium, care must be taken that, due to expansion in case of liquid test medium, the pressure does not exceed the maximum test pressure.

12.8 Inspection and Witnessing

12.8.1 All tests must be witnessed and approved by both the attending ABS Surveyor and the CG TA. During the tests being performed the system(s) must be accessible for proper and safe inspection. (See Section 20.0 for further inspection requirements)

13.0 MACHINERY NEW INSULATION REQUIREMENTS

13.1 General

13.1.1 All new, approved, non-asbestos containing insulation must be installed on all sections of piping, machinery, and equipment where insulation was previously removed and all newly installed equipment requiring insulation. Valves and fittings CG TA and the IA for review prior to ordering any material. All insulation and lagging must meet the applicable Regulatory Body requirements and where possible be from one manufacturer.

13.1.2 Piping and units of equipment with design internal temperatures of more than 65.6°C (150°F) must be insulated from their supports or the supports insulated from the structures to which they are attached.

13.1.3 All flanges, flange fittings, flexible joints, expansion pieces or any components of machinery or piping susceptible to takedown for inspection and maintenance

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

must be covered by removable, reusable cover or pad. They must be made of the same material as the main pipe insulation. Voids between pads and fitted insulation must be filled with pieces of applicable felted material, tight enough to prevent airflow.

- 13.1.4** Piping hangers for piping with internal temperatures below 5°C must be insulated from the steel structure to which they are attached. Piping exposed to the weather must be effectively insulated against freezing. This requirement does not apply to systems in which a fluid is normally flowing or where the exposed portion of a respective system can be secured and drained to prevent freezing.

13.2 Lagging

- 13.2.1** New, approved, non-asbestos containing lagging must be installed. Lagging (protective covering or coating over insulating materials) must be suitable for temperature and location and must be either of the following:

Fibrous glass cloth, tape, and thread, Flextra™ or equivalent.

Aluminum mechanical protective guards, plain or hammered, secured with quick release fasteners.

- 13.2.2** Piping and/or equipment insulation not exposed to weather must be covered with either a cloth or tape type lagging, when not of the pre-lagged type. Cloth type lagging must be secured by an adhesive or by sewing. Lagging in tape form must be applied spirally wound with not less than 10mm overlap and with ends fastened to the insulation and/or lagging by adhesive, stitching, or stapling. Insulation and cements used for lagging purposes must comply with ABS standards and requirements.
- 13.2.3** Insulation, insulation jackets, canvas, fiberglass mat and wrapping and adhesives must be fire retardant with a flame spread rating and must comply with ABS standards and requirements.
- 13.2.4** Insulation on piping and/or equipment exposed to weather or excessive moisture must be protected by the application of a 6mm thick, weather resistant type coating thereon and secured in place prior to application of its lagging. Cracks and/or openings in the continuity of the completed coating lagging, especially at valves, flanges, and fittings, must be avoided to prevent entrance of moisture,

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

spray and/or water. In way of deck penetrations, insulation must be protected by a 150mm high steel kick guard, welded to the deck, and covered by the same insulation coating.

13.2.5 In locations where the completed insulation and lagging are liable to physical damage, a protective galvanized sheet metal must be installed. Where protective metal lagging is subject to frequent removal when servicing machinery, it must be plain or hammered aluminum secured by quick release clips.

13.3 Insulation Thermal Requirements

13.3.1 Surface temperature of insulation must not exceed 65.6⁰C (150⁰F). The maximum temperatures must determine the thickness of insulation and must correspond to 10% overload of a respective machine or engine.

13.3.2 Where the total required thickness of insulation is greater than 25mm (1 in), double layers must be used. These layers must be of equal thickness.

13.3.3 All lap joints must be staggered, and all end joints must be overlapped.

13.4 Securing and Retention Arrangements

13.4.1 All insulation materials must be properly secured to prevent settling and to permit ready removal for maintenance of equipment.

13.4.2 All high temperature piping systems must be insulated using reusable pre-made covers of the following materials, from pipe surface outwards:

13.4.2.1 Monel mesh

13.4.2.2 Fiberglass mat, of approximately 9-lbs/ft³ density and must contain no chemical binder and be resistant to service temperatures up to (232.2⁰F)

13.4.2.3 Foil-lined silicone-coated fiberglass lagging secured to insulation by stapling: all edges are to be sealed.

13.4.2.4 Covers must have stainless or Monel clips, secured by through-hooks around which stainless steel lacing wire can be wound for mounting and securing. The insulation, with all joints tightly butted,

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

must be secured to the pipe at ends with not less than two metal bands per section, minimum 19mm wide, with quick release clips.

- 13.4.2.5** Where pipe insulation abuts flanges and fittings, the ends of the insulation must be tapered to permit removal of bolts.

13.5 Anti-Condensation Insulation

13.5.1 Cold-water piping and equipment, including sewage pipes, must be insulated with anti-sweat type insulation. Anti-condensation insulation, other than elastomeric, foamed plastic type, must be covered with cloth lagging or tape lagging secured with adhesive to form a moisture proof finish. Anti-condensation insulation must be protected by lagging or protective screening as required where there is a potential for damage.

13.5.2 Where piping or tubing pass through the high humidity spaces i.e., the galley, shower spaces, etc.), the insulation must be double layered and waterproofed outside each layer.

13.6 Ventilation Ducting Insulation

13.6.1 All duct work must be insulated with an ABS approved vapor seal duct insulation with a 50mm factory applied vapor barrier (Manson AK Flex™ or equivalent). Vapor barrier dam must be Chil-Perm™ CP30 with fiberglass cloth reinforcing or an approved equivalent. Two (2) layers of canvas mat wrap, 16 oz weight, must be applied with Bakor™ insulation cement or equivalent as a final finish for all ducting. Alternative products may be used with approval of the TA.

13.6.2 Air duct penetrations must be sealed with non-shrink/hardening silicone-based caulking – while adhering to the applicable Fire Safety Regulations and ABS regulations.

14.0 MACHINERY SPACE OUTFIT REQUIREMENTS

14.1 General

14.1.1 Where directed by the guidance drawings the machinery spaces must be outfitted with ladders, gratings, and floor plates, providing access at convenient levels to all items of machinery for routine operation and maintenance.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

14.1.2 Where applicable and upon approval by the TA, existing ladders, gratings, and floor plates can be modified and reused.

14.2 New Floor Plates Requirements

14.2.1 New floor plates must be fabricated from 10 kg multi-grip aluminum tread-plate, supported on steel bearers, and secured by 13mm stainless steel counter-sunk screws at sides.

14.2.2 Panels must not exceed 1220mm by 1830mm. Smaller portable plates must be provided wherever frequent access is required.

14.2.3 Portable hinged openings must be arranged over valves, cocks, and strainers and identified with brass nameplates. Open boundaries must be bordered by upturned angle, except in way of low access openings in machinery.

14.2.4 All new bearers for floor plates must be painted. Bearers must be provided to allow for supporting machinery weights during refits (275 kg safe concentrated loads).

14.3 Protective Guards

14.3.1 Guards must be provided over all rotating drives accessible to personnel and be light weight and portable wherever possible, to allow for easy removal.

14.3.2 Open guards must be of the rolled expanded metal, closed guards of steel or aluminum. The guards must allow visibility of drives and dissipation of heat.

14.3.3 Access must be provided at the centers of shaft lines

14.3.4 Sea Suction and Overboard Discharges

14.3.5 Any new sea suctions and overboard discharges, required by this specification, must be made from an ABS approved material and protected by means of sacrificial anodes. All internal surface components must be given a full hull coating system

14.3.6 Each new installed sea suction line must have a sea isolation valve fitted as near the sea inlet as practicable.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

14.3.7 New Sea suction valves must be Classification Society approved, cast steel with stainless steel trim and come with certificates. Copies of the certificates are to be provided to the CG TA.

14.3.8 New hull valves must be attached by means of bolts to a steel pad with blind tapped bolt holes which has been welded directly to the ship's hull or sea chest. If it is not possible to attach the valve directly to the hull or sea chest, an ABS approved extension piece(s) must be installed between the valve and steel pad. Extension piece(s) must be as short as possible and must have no joints other than to the valve and pad.

14.3.9 Sea isolation valves must be of the high lift globe type. High lift angle valves may be used if globe valves are impracticable. The minimum size of fasteners used for connections on the seaside of isolations valves must be 19mm. The bolting material of fasteners must be phosphor bronze to ANSI/ASTM B139-79 alloy B1 or B2.

14.3.10 Where a pump or an eductor, having a direct sea suction, is located in a compartment remote from the sea isolating valve, an additional sea-isolating valve must be located within the pump compartment.

15.0 MACHINERY INSTRUMENTATION

15.1 Pressure/Suction Gauges

15.1.1 Unless otherwise specified, only 115mm diameter or bigger fluid filled gauges must be used for instrumentation.

15.1.2 All gauges with pressures exceeding 7,000 kPa (1,000 PSI) or those used with compressible fluids must be safety gauges with back blow outs.

15.1.3 All gauge lines must have a capped test tee. All gauges must have needle type isolation valves. Pulsation dampers must be fitted to keep gauge pulsation below 5% full scale. Gauge indication must be at ½ or 2/3 of its range respectively for fluctuating or steady state working pressure.

15.1.4 All pumps must be fitted with suction compound and discharge pressure gauges.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

15.1.5 All refrigeration compressors must be fitted with suction and discharge pressure gauges and Schroeder valves must be fitted at the gauge lines for the connection of portable refrigeration gauge manifolds.

15.1.6 All new gauges must read both in imperial (PSI) and metric units (kPa or Bar). The dial face must be white with black figures and the pointer must be of the micrometer adjustable type. Gauge movements must be stainless steel with stainless steel bushings and over-pressure and under-pressure stops. Bourdon tubes must be bronze or 316 stainless-steel with brass or 316 stainless steel sockets. Gauge accuracy must be $\pm 0.5\%$ of scale range, ASME B40.1 Grade 2A.

15.1.7 Gauges must be filled with glycerin or silicone according to ambient temperature requirements or severity of vibration expected.

15.2 Temperature Gauges

15.2.1 Unless otherwise specified all new thermometers must be a standard 9 inch scale thermometer with a universal adjustable angle stem, cast aluminum case with cured polyester powder coating, clear window and brass separable thermowell. Thermometers must be fitted with an acrylic window to 150 degrees Celsius and a double plated safety glass at temperature ranges above 150 degrees Celsius.

15.2.2 All thermometers must be housed in a 304 or 316 stainless steel thermowell to allow removal of the thermometer without disturbing the measured process. The thermometer and thermowell must extend at least $\frac{1}{2}$ the pipe diameter into the measured process. Where thermometers are installed in pipes fitted with insulation, longer stem thermometers must be used with extension neck separable thermowells. Extension necks must be at least 50mm long.

15.2.3 Thermometers for measuring air temperatures must be fitted with a perforated guard stem and a mounting flange instead of a brass separable thermowell. All thermometers must contain red spirit fills. Range selection for thermometers must be so that the operating temperature of the measured process will fall approximately mid-scale. The scale face must be white with black figures and must contain Celsius reading scales. Thermometer accuracy must be ± 1 scale division.

15.3 Equipment Foundations

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

15.3.1 Steel and/or aluminum foundations must be fitted for all newly installed machinery, pumps, motors, and all relocated equipment. Foundation scantlings must be of adequate strength and thickness and approved by ABS where required. Additional stiffening must be fitted where required to distribute loads and reduce vibrations.

15.3.2 Foundation design details for all new equipment/ machinery to be installed is to be approved by the manufacturer, CCG and if required, by ABS. Foundation changes and any associated local reinforcement, if required, should be included in the pricing for the new equipment.

15.3.3 Save-alls must be fitted around any hydraulic system and fluid pumps installed during the vessel life extension. Insulation must be provided between ferrous and non-ferrous materials and/or equipment.

15.4 Anti-Vibration Mounts for Equipment

15.4.1 All main engines and ship service generator sets must be mounted on anti-vibration mounts. The Contractor must coordinate the mounting requirements of the equipment with the equipment supplier and/or manufacturer taking into consideration the following information:

15.4.1.1 Weight of the combined equipment complete with sub-base.

15.4.1.2 Center of gravity of the equipment.

15.4.1.3 The requirement to limit vertical, longitudinal, and lateral motion of the equipment to minimize impact on ancillary systems and services while maintaining the required isolation.

15.4.2 Anticipated motions of the vessel are defined in Section 2.1 of this Specification; Vibration mounts must provide between 75 to 85% isolation of all equipment generated vibration to the hull structure.

15.4.3 Vibration mounts must be fitted with collision blocks to withstand up to 5g of acceleration. Vibration mount metal parts must be corrosion protected with Fe/Zn 8C as per ISO 2081 for the marine environment.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

15.4.4 The resilient mounts must be protected with a cover to prevent contamination of the damping elements and are to be date stamped when they have been installed and under load.

15.5 Hull Structure and Integrity Requirements

15.5.1 Note: Structural integrity must be preserved and any questions involving such integrity must be referred to ABS for resolution and approval.

15.5.2 All welding required to reinstall removed hull, deck or superstructure access panels must meet the requirements of the CWB Welding Standard and/or approved the Classification Society (ABS) Rules.

15.5.3 New structures and where permanent removal of fittings will result in the necessity of fitting insert plates in shell plating, watertight bulkheads and/or watertight decks, the following procedure must be adopted:

15.5.3.1 The Contractor must prepare and submit a CWB approved Weld Engineer approved welding procedure and work instructions for approval by ABS.

15.5.3.2 All inserts on shell plating, decks and superstructure must be installed flush.

15.5.3.3 All underwater inserts must be subject to 100% radiography on completion.

15.5.3.4 New tanks and existing tanks and void spaces and where inserts have been fitted must be hydrostatically tested to a head of water of 2.5 meters. The tests must be recorded, witnessed by both the ABS surveyor and the IA.

15.5.3.5 The Contractor will be responsible for modifying the vessel's Shell Expansion Drawing to reflect the locations of the new insert plates.

16.0 ELECTRICAL AND ELECTRONICS REQUIREMENTS

16.1 General

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

16.1.1 The requirements specified in this section apply to all electrical work. The electrical modifications to the vessel must be in accordance with TP 127E and IEEE 45 STD -2002 with approval by ABS.

16.1.2 All electrical/electronic equipment, fittings and fixtures temporarily removed for access must be reinstalled, secured, and the areas restored to the “As Delivered” condition.

16.1.3 The Contractor supplied equipment must conform to the requirements of IP56, IEC 60529 and Section 2.1 of this specification.

16.1.4 The Contractor must make reference to Section 21.0 for documentation requirements concerning the electrical system.

16.1.5 Electrical conducting surfaces, heat transfer surfaces and ventilation screens must not be painted. Such areas must be protected from dirt and debris including painting overspray during the Contract.

16.1.6 The Contractor must remove all electronic equipment from compartments in which work such as cutting, welding grinding, etc. is being performed. The Contractor must obtain the CG TA’s approval for equipment that will remain in place and such approval must require the equipment to be protected from all possible hazards.

16.2 Load Analysis – NOT APPLICABLE

16.3 Electrical Single Line Diagram – NOT APPLICABLE

16.4 Co-ordination Study of Main and Emergency Distribution Systems – NOT APPLICABLE

16.5 Short Circuit Current Analysis – NOT APPLICABLE

16.6 New Rotating Electrical Machinery

16.6.1 New electric motors required by this specification or purchased for this project, must be commercial marine quality meeting all regulatory requirements for the application intended. Motor enclosures for installations must conform to IEC 60529. Motors must be continuously rated except for deck machinery where one (1) full rated load, and continuous light running load are applicable.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 16.6.2** All electrical motors must have their windings covered with a class F insulating material, resistant to oil and water, and must operate in an ambient temperature of 50°C when installed inside machinery spaces and - 40°C when installed on enclosed decks. For motors operating on the open deck, the low ambient temperature must be considered as - 40°C.
- 16.6.3** Rotating machinery with enclosed slip rings or commutators must not have any form of silicone-impregnated material incorporated into their windings, or introduced into the enclosure.
- 16.6.4** Any rotating equipment incorporating brushes must be fitted with inspection windows.
- 16.6.5** All A/C motors rated in excess of 0.37 kW (1/2 HP) must be of squirrel cage induction type, rated for continuous duty and capable of reaching design parameters at 600 Volts, 60 Hz, 3 phase, unless otherwise specified. Induction motors of 0.37 kW rating and less may be designed for operation on 120 Volts, Single phase.
- 16.6.6** Particular care should be exercised in the selection of induction motors to ensure that each motor is not too large for the intended service and thus avoid the low power factor inherent in under-loaded induction motors. Single speed induction motors must be of a 4-pole 1800-RPM, unless otherwise specified.
- 16.6.7** Motors of 0.18 kW (1/4 HP) and over must be equipped with anti-friction bearings designed to meet the imposed thrust and radial loads. Where motors are used with solid couplings a bearing to take thrust must be fixed to the shaft end housing, and shaft endplay limited to the clearance in the bearing. Tandem ball bearings must not be used for axial thrust loads.
- 16.6.8** Motors equipped with anti-friction bearings using pressure grease fittings must have positive means, either by relief plugs or fittings, or by a clearance differential relief system, to prevent grease from being forced out onto the motor windings. Where anti-friction type bearings (ball bearings) are specified for rotating electrical machinery, they must:
- 16.6.8.1** Be rated and suitable for the type of drive
 - 16.6.8.2** Be noise tested

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 16.6.8.3** Be of the deep groove type where the drive introduces end thrust
- 16.6.8.4** Be of the pre-lubricated type, unless otherwise specified.
- 16.6.8.5** Axial flow fan motors must be equipped with factory sealed pre-lubricated ball bearings or factory sealed pre-lubricated ball bearing housings. The bearing housing must not be drilled.
- 16.6.9** Motors for V-belt applications must have their bearings designed for this purpose.
- 16.6.10** Motors rated above 0.75 kW (1 HP) must have their rotor both statically and dynamically balanced. All windings must be vacuum pressure impregnated followed by oven curing. Attention must be paid to the elimination of dust and dirt traps within both windings and the motor enclosure. Records of the static and dynamic balancing must be submitted to the IA and the CG TA.
- 16.6.11** Induction motors driving ventilation fans or pumps requiring both high and low operating speeds must be of the two (2) speed two (2) winding type with the top speed not greater than the four (4) pole design, unless otherwise specified.
- 16.6.12** The Contractor must confirm all pertinent characteristics of replacement motors prior to procurement and to ensure compatibility with requirements of retained machinery.
- 16.6.13** Before placing any purchase orders, the Contractor must submit for review and approval to the CG TA, a list of all electric motors to be installed. As a minimum this list must detail the following:
- 16.6.13.1** Manufacturer's name
 - 16.6.13.2** Duty/service factor
 - 16.6.13.3** kW and full load speed
 - 16.6.13.4** Enclosure type
 - 16.6.13.5** Efficiency

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 16.6.13.6** PF for full, $\frac{3}{4}$ and $\frac{1}{2}$ load (A/C motors)
- 16.6.13.7** Locked rotor torque and current
- 16.6.13.8** Weight
- 16.6.13.9** NEEMAC design characteristics
- 16.6.13.10** Insulation Class
- 16.6.13.11** Full Load Current
- 16.6.13.12** Temperature rise class
- 16.6.13.13** Voltage
- 16.6.13.14** Frequency
- 16.6.13.15** Frame size.
- 16,6,13.16** Starter type (for new equipment)

16.7 Anti-Condensation Heaters

16.7.1 Black heat, tubular or strip type space heaters must be fitted to all new motors and generators rated fifteen (15) kW or higher, and to electric equipment installed in open decks or in damp or unheated spaces, where specified. These space heaters must be arranged for operation from a separate supply. Heaters must be suitable for operation from 120/1/60 VAC.

16.7.2 A rated interlocking arrangement must be provided at the equipment control station to ensure that the heater is de-energized when the respective equipment comes into service.

16.7.3 Visual ON/OFF status indication must be provided at the equipment control station as detailed:

For motors on their respective control station or local starting panel

For electrical control equipment on the relevant panel.

16.7.4 Isolation switches or control station disabling arrangements must be provided at equipment requiring local maintenance where the feeder breaker is not in sight.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

The isolating switch or lock-out station must be within sight and easily accessible from the protected equipment – as per TP127E, clauses 17.4 and 17.8.

16.8 Electrical Nameplates

16.8.1 All electrical equipment must be fitted with nameplates. Each nameplate must identify the piece of equipment, and in addition must include: the manufacturer's name, type, serial number, model number, rating, and date of manufacture.

16.8.2 Any special precautions, maintenance or operating instructions must be included on the nameplates or on a separate plate attached to the equipment.

16.8.3 All electrical equipment and compartments housing hazardous voltages must carry a warning notice indicating that a hazard exists and specify the maximum system voltage.

16.8.4 Switchboards must have nameplates listing:

16.8.4.1 Name of switchboard

16.8.4.2 Manufacturer

16.8.4.3 Serial number, if applicable

16.8.4.4 Date of manufacture.

16.8.5 Each circuit breaker must have a nameplate showing the name and designation of the circuit and the setting of the breaker. Instruments, switches, etc., on the switchboard must be adequately marked with their function and designation as well as a red line at the full load or normal operating value.

16.8.6 Distribution panels must have nameplates showing the: space, service, apparatus, or circuits controlled, and the feeder designation.

16.8.7 Internally, switchboards, distribution panels and motor controllers must have marking plates identifying bus bars and terminals. Bus bars must have phases identified by color- coding.

16.8.8 Electrical enclosures that house a multiple of electrical or electronic equipment and devices must have a unique identification code for each device and the device must be labeled as such. Mechanical layout drawings of the enclosures must

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

clearly show the layout and Identification code of the devices within the enclosure.

16.8.9 Terminal blocks and terminal wiring must be marked with the circuit designation and must be treated as devices within enclosures. Terminal blocks must be labeled consecutively and ascending from left to right and top to bottom.

16.8.10 Nameplate size and other characteristics must comply with Section 10.1.

16.9 Cabling

16.9.1 All newly installed cabling must meet TP127E requirements, be manufactured, tested, and installed in accordance with the latest ABS Publication(s), IEEE and Classification Society requirements and come complete with certificates.

16.9.2 The Contractor must develop a schedule of all new electrical cables to be installed and existing cables to be reused. As a minimum the following must be listed for each cable:

- 16.9.2.1** Conductor size
- 16.9.2.2** Current rating
- 16.9.2.3** Estimated length
- 16.9.2.4** Identification number and name of manufacturer
- 16.9.2.5** Approximate weight
- 16.9.2.6** Voltage drop
- 16.9.2.7** Insulation level (voltage)
- 16.9.2.8** Insulation type designation and maximum allowable temperature.

16.9.3 This schedule must be submitted for review and approval to TA before any cables are installed and/or removed. The schedule may be submitted in sections as the detailed design develops.

16.9.4 New cables must not be spliced. Splicing in existing cables of 600VAC or less cable may be permitted with prior permission by ABS and the CG TA providing splices are performed in accordance with TP 127E. Radio frequency co-axial cable must

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

not be spliced. In-line connectors must not be used in such cables other than as required to terminate the cable. All wire and cable terminations must be accordance with TP127E.

16.9.5 Where cables enter drip proof or watertight cubicles, motors, or other equipment, ABS approved glands and/or strain relief devices must be used. Cable entry into drip proof enclosures must be from the bottom or side of the enclosure.

16.9.6 Where cables enter the side of an enclosure, they must run downward from the cabinet before running in an upward direction.

16.9.7 A minimum of 15% spare space must be provided on each new raceway and on all modified cable runs.

16.9.8 Cables must be concealed, except in machinery spaces, workshops, and storerooms. The location of cable runs, connection boxes, hangers, etc., concealed by paneling or linings must be clearly indicated on the “As-Fitted” drawings. Concealed connection boxes must have the circuit designation stamped or painted on a part of the box not subject to being removed.

16.9.9 All permanently installed cables must be tagged with the circuit designation at all points of connection and on both sides of bulkheads and decks. Tags must be of metal compatible with the cable sheathing. Both ends of the tags must be strapped to the cable with metal strap after all painting has been completed. Straps must pass through holes in the tags so that tags are positively secured. Strap ends must be permanently folded and crimped.

16.9.10 Adhesive or permanently printed plastic identification tags for individual cables and conductors may be used inside equipment cubicles and equipment racks.

16.9.11 All conductor identification markings and cable tags must be reflected in the “As-Fitted” system drawings and must be as follows:

16.9.11.1 Cable tags must be printed with indelible ink and must not be handwritten

16.9.11.2 Each cable must have an identifier unique to the installation

16.9.11.3 Each cable tag must have the following information:

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

16.9.11.3.1 unique cable name and

16.9.11.3.2 location for each end

16.9.11.4 Conductor identification markings must be secured to the conductors to prevent them from becoming disassociated from the conductor when it is terminated to a device.

16.9.12 Spare conductors within a cable must not be stripped back or shortened and must be tied back and appropriately marked as spare. Control cables and cables for the alarm and monitoring system must contain a minimum of 10% spare conductors. Shielded control cable must have the shield bonded to ground at one end of the cable run only, preferably at the input signal end. The cable must not be grounded at both ends.

16.9.13 To avoid mutual interference, cables must be grouped and separated as specified per Figure 16-1. If the spacing is impractical, additional shielding must be provided as approved by ABS.

16.9.14 Low loss co-axial cables of correct impedance must be used for co-axial cable antenna feeders.

16.9.15 Where foam core dielectric cables are used, crimp shield connectors must be fitted. The Contractor must not use solder type connectors.

16.9.16 The routing of new generator cables must be as direct as possible and such cables must be run on the wire ways carrying existing generator cables or if this is impractical, then on wire ways specifically designed for this purpose. When taking generator cables to their respective machines, provision must be made for sufficient slack to permit the machine to be subsequently disconnected and reconnected without damaging the cable.

16.10 Separation of Cables

16.10.1 The Contractor must refer to Figure 16-1 indicating the physical separation to be maintained between various categories of cables. The separations do not apply to cables crossing at, or close to, right angles. Cables of all types must be kept well separated from antennas, antenna couplers and feed wires. Deviations must be

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

preapproved by ABS and the CG TA must be provided documentation of the approved deviations.

16.10.2 Cables may be bundled according to their categories in Figure 16-1 and the following guidelines:

16.10.2.1 Cables from group A to group E inclusive may be bundled with cables from the same group and share a common wire way with the remaining groups.

16.10.2.2 Bundling of cables from Group F to Group K should be avoided and, if necessary, additional screening material should be provided.

16.10.2.3 Cables in Group F to Group K should use separate wire ways wherever possible.

Figure 16 -1 - Recommended Cable Separation (inches)

Cable Group	Cable Classification	Recommended Inter-Cable Group Separation in inches									
		A	B	C	D	E	F	G	H	J	K
A	Ship's power and lighting	-	4	2	2	4	12	18	18	18	18
B	Receiving antenna cables	4	-	4	2	2	12	18	18	18	18
C	Electrical control cables	2	4	-	2	4	12	18	18	18	18
D	TV/VHF antenna distribution cables	2	2	2	-	2	12	18	18	18	18
E	Telephone/audio distribution cables	4	2	4	2	-	12	18	18	18	18
F	Echo sounder transducer	12	12	12	12	12	-	18	18	18	18

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

G	Transmitter/antenna coupler feed cables	18	18	18	18	18	18	-	18	18	18
H	Antenna coupler/antenna cables	18	18	18	18	18	18	18	-	18	18
J	VHF/UHF transceiver/antenna cables	18	18	18	18	18	18	18	18	-	18
K	Radar transceiver co axial/wave guide	18	18	18	18	18	18	18	18	18	-

16.11 Circuit Breakers

16.11.1 Breakers must be equipped with individually insulated, braced, and protected connectors. Tripped indication must be clearly shown by the handle at a position between ON and OFF and/or a visual trip indicator.

16.11.2 All breakers must be rated for the application with due consideration to voltage, amps, interrupting rating, number of poles, auxiliaries, etc., as determined by the final approved "Short Circuit Current Analysis" (Section 16.5) and selected as per the coordination study. As a minimum the breakers being supplied must meet the following requirement:

16.11.2.1 Breakers must be calibrated at 50°C.

16.11.2.2 Breakers must be suitable for marine application

16.11.2.3 Be the molded case type

16.11.2.4 Be rated for 460 VAC, 240 VAC or 120VAC

16.11.2.5 Be the quick make/quick break type

16.11.2.6 Have inverse time over current characteristics

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

16.11.2.7 Have overload device in each phase.

16.12 Motor Controllers

16.12.1 Motor controllers must be rated for marine duty. Motor controllers and contactors controlling machines which require continuous operation, must be fitted with low voltage release complete with timing circuitry, adjustable from 0.5 to 10 seconds, which must restart all running motors in case of a short duration power interruption.

16.12.2 Motors thirty (30) kW and above must be equipped with solid-state reduced voltage starters (soft starts) to limit the inrush current.

16.12.3 Individual starters controlling 3-phase AC motors must conform to the latest edition of TP 127E and IEEE STD 45-2002 and must be:

16.12.3.1 Fitted with a means of locally isolating the motor where the starter is not located adjacent to the motor.

16.12.3.2 Fitted with indicating lights at the starter to indicate the state of the isolating switch.

16.12.3.3 Fitted with molded case type circuit breaker for each motor circuit to isolate the power supply and provide short circuit protection. The circuit breaker must have means to indicate its status locally and auxiliary contacts for remote monitoring.

16.12.3.4 Fitted with two (2) indicating lights: one to show when the associated motor is operating and one to show when it is stopped.

16.12.3.5 Indicating lights must be LED type.

16.12.3.6 Fitted with drip proof or watertight type START and STOP pushbutton

16.12.3.7 Fitted with one (1) externally operated, overload reset button mounted in the front, for all three overload relays

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 16.12.3.8** Fitted with auxiliary contact to operate anti-condensation heaters where required
- 16.12.3.9** Arranged for bottom cable entry through glands
- 16.12.3.10** Fitted with an ammeter with selector switch for individual phase amperage readings for motor ratings of twenty (20) kW and over.
- 16.12.4** Where alarm indication lights are provided at the local control station, facilities must be provided for a lamp test.
- 16.12.5** Where alarm buzzers are provided at the local control stations, facilities must be provided for buzzer mute.
- 16.12.6** Starters controlling single phase motors less than 0.37 kW, unless they are for automatic duty, must be totally enclosed, double pole, manually operated, marine type switches, complete with overloads, provided the required protection is included within the switch enclosure.
- 16.12.7** All internal wiring must be permanently numbered. Numbering must be included in schematic and wiring diagrams to be supplied under the "As-Fitted" requirement. Each motor controller or starter must have a wiring diagram mounted on the inside of the door or cover.
- 16.12.8** A schematic diagram for each starter must be submitted. In the event that a number of motors have the same control schematic, the submission of one drawing must suffice providing that it is cross-referenced with a table listing the conductor identification for each circuit.
- 16.12.9** The Contractor must submit for review and approval to the CG TA, a list of all motor starters for motors to be fitted during the vessel life extension. This list must detail the following:
 - 16.12.9.1** Manufacturer's name
 - 16.12.9.2** Duty
 - 16.12.9.3** Type of starter
 - 16.12.9.4** Type of protection – over-current under voltage

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 16.12.9.5** Weight
- 16.12.9.6** Enclosure
- 16.12.9.7** Schematic wiring diagram
- 16.12.9.8** Starter size

16.13 Transformers

- 16.13.1** Any new transformers that are required to be Contractor supplied must meet the following parameters.
- 16.13.2** Where a three (3)-phase transformers are to be supplied or installed they must be made of three (3) single phase transformers connected delta/delta, except where specified otherwise. Transformers must be fitted with electrostatic shields.
- 16.13.3** In general, the following principles must apply to transformers:
 - 16.13.3.1** Be of the single-phase type (unless otherwise specified).
 - 16.13.3.2** Be suitable for 3-phase operation, delta/delta.
 - 16.13.3.3** Be suitable for bulkhead and/or deck mounting up to fifty (50) kVA and platform or deck mounting above fifty (50) kVA.
 - 16.13.3.4** Be of the air-cooled type.
 - 16.13.3.5** Have a drip proof enclosure with louvers.
 - 16.13.3.6** Have a winding insulation of Class F or better.
 - 16.13.3.7** Have final operating temperature not exceeding Class B temperature rise.
 - 16.13.3.8** Have +/- 2 ½ % and +/- 5% taps on all primary windings (two (2) FCAN and two (2) FCBN)
 - 16.13.3.9** Be supplied with copper windings.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

16.13.3.10 Be built in accordance with the latest edition of TP 127E and IEEE 45 STD -2002.

16.13.3.11 Sound levels must be at or below the latest CSA standards.

16.13.3.12 Transformers must have nameplates consisting of the following:

16.13.3.12.1 Manufacturer's name.

16.13.3.12.2 Rating in kVA

16.13.3.12.3 Rate full load temperature rise.

16.13.3.12.4 Primary and secondary voltage ratings.

16.13.3.12.5 Frequency in Hertz

16.13.3.12.6 Rated impedance

16.13.3.12.7 Noise level.

16.13.4 Where a transformer may be de-energized for relatively long periods of time, the transformer enclosure must include a space heater. Space heaters must be capable of raising the internal temperature to, and maintaining it at 5 degree C above ambient. The TA may waive this requirement providing the transformer is located in a dry heated space.

16.13.5 The Contractor must supply to the IA and the TA ABS approval certificates for all transformers with a 15 kVA rating or greater. Certification documentation must be as per Section 21.2.5 of this Specification.

16.14 Electronic Equipment Installation

16.14.1 The Contractor must prepare layout drawings showing the location of electronic equipment at both rack/console as well as the compartment level. These must be prepared for all compartments containing electronic equipment. An Antenna Layout Diagram must also be prepared where required by this VLE Project.

16.14.2 The Contractor must prepare drawings based upon the manufacturers' installation data showing the electrical details of the installation of each

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

electronic system, e.g. cable details such as identifier number and type, connector detail, power supply detail. Point connection detail must be supplied separately but the drawing must reference the source.

16.14.3 The Contractor must provide a device list showing all device information and associated parts manufacturer data. Where devices are software and/or hardware configurable, such as DIP switches and device memory settings, The Contractor must record and provide all software and hardware configuration settings along with the device documentation to the CG TA and the IA in an electronic format that is editable.

16.14.4 Each field device within each discrete field location must be uniquely identified.
This identification must correspond to the identification for the field device used within all other documentation.

16.14.5 Field device identification labels must contain the following information:

16.14.5.1 Location of field device.

16.14.5.2 Primary drawing associated with field device.

16.14.6 The intent of the field documentation is to provide a system by which all devices have a unique identifier thus allowing the cross referencing of all related OEM data, device specific configuration settings, schematic drawings, and electrical connections to a specific device within the system.

16.15 Safety Switches

16.15.1 Each piece of electronic equipment must be capable of being switched off locally.
This may be achieved by means of a normally provided front panel switch. For equipment not provided with such a feature, and which is remotely activated, a local ON/OFF safety switch must be provided.

16.15.2 Where any electronic unit or terminal box is obscured by ceiling tiles or liner board, access to the obscured equipment must be provided. The access panel must be clearly and permanently marked with the identity of the obscured equipment as detailed in Section 10.0.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

16.16 Rack/Console Mounting

- 16.16.1** Rack and/or console mounting is the preferred method for the mounting of electronic equipment. The Contractor must supply racks and/or consoles required to mount the electronic equipment.
- 16.16.2** Racks and/or consoles must be all welded steel construction and must be well secured in a vertical position. The rack/console must be properly braced to meet the shock and vibration requirements of Section 2.1.
- 16.16.3** Racks and/or consoles must be designed for the retractable, slide mounting of standard nineteen (19) inches (483 mm) electronic equipment to an equipment depth of twenty-four (24) inches (600 mm). Console height should be the maximum consistent with its purpose and surroundings.
- 16.16.4** The mounting slides must be of two (2) piece construction with one (1) piece attached to the rack, the other piece to the equipment. A means must be provided to prevent cable snags during slide insertion and/or withdrawal.
- 16.16.5** The racks must be designed with removable side panels. Racks must be arranged so that adjacent racks may be bolted together without interior side panels. Racks must be given to racks that are easily adapted for forced air ventilation.
- 16.16.6** The mounting of equipment must be by means of the retractable slides. Any equipment not mounted in this way must be supported from below. Equipment must be retained in the rack by front panel retaining screws. The retaining screws must be standardized for maintenance reasons.
- 16.16.7** Heavy equipment must be located at the bottom of the rack while lighter equipment without front panel controls, must be at the top. Equipment requiring frequent maintenance or control actions must be mounted in the center portion.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

16.17 Bulkhead/Tabletop Mounting

- 16.17.1** Equipment mounted upon bulkheads must be secured, either directly or indirectly to the ship's structure. Under no circumstances must any equipment be supported on linerboard or ceiling panels.
- 16.17.2** Tabletop mounting of equipment is acceptable, but the use of windowsills must be avoided unless approved by the CG TA. Maximum use must be made of the manufacturers' standard mounting accessories. All mounted equipment must be oriented to best serve the operator.
- 16.17.3** All bulkhead and tabletop mounted equipment must have its equipment cases bonded to the ship's metal structure.

16.18 Overhead Mounting

- 16.18.1** The overhead mounting of electronic equipment must be avoided and used only when alternative methods of mounting are impractical. The method must be by means of an overhead console, securely fixed to the ship's structure, and designed to provide ease of maintenance access. The installation of any such overhead console must be such that there is no threat of personal injury. All equipment so mounted must be bonded to the ship's hull.

17.0 ELECTRO-MAGNETIC INTERFERENCE REQUIREMENTS

17.1 General

- 17.1.1** The Contractor must identify sources of electromagnetic interference caused by the installation of equipment and for the subsequent suppression of the interference.
- 17.1.2** The following standards contain the acceptable limits for the specified frequencies of RF current and for radiated fields:
 - 17.1.2.1** IEC No. 60533 ed 2.0, en 1999; Electrical and electronic installations in ships - Electromagnetic compatibility
 - 17.1.2.2** Appendix 7 of IEEE 45 std-2002, Recommended Practice for Electrical Installations on Shipboard.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

17.1.2.3 IACS Test Specification for Type Approval E10.

17.2 Limits of Interference

17.2.1 Separate limits are defined for radiated interference, i.e., transmitted through the air; for conducted interference, i.e., transmitted by wire. Each type of interference has different levels allowed.

17.2.2 Radiated Interference (above 150 kHz)

17.2.2.1 The radiated interference limits must conform to the test parameters in IACS E10.

17.2.3 Conducted Interference (30 Hz to 15 kHz)

Measured at the incoming terminals of an electrical distribution panel, the level must not exceed 3% total distortion of the supply waveform. When measured at the electronic equipment terminals, it should not exceed 1% total distortion. Total distortion is defined as the ratio of the root sum square value of all interfering voltages to the root sum square value of the fundamental and all interfering voltage.

17.2.4 Conducted Interference (above 15 kHz)

17.2.4.1 Voltage interference levels measured at the terminals of any single piece of electrical equipment must not exceed the levels given in the Department of Communications Circular No. S11-10-47, Interference Suppression in Marine Craft.

17.2.4.2 Class 1 limits must apply where equipment or cables are poorly screened, such as:

17.2.4.2.1 Above decks in general unless proper screening has been used.

17.2.4.2.2 Where close coupling exists between the affected equipment and their associated cables.

17.2.4.3 Class 2 limits must apply in well-screened situations, such as:

17.2.4.3.1 Within the metallic structure of the vessel.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

17.2.4.3.2 Where screening has been specially provided.

17.2.4.3.3 Measurements must be made using instruments compliant to Canadian Standard C108.1.1. Measurements should be made under the worst-case conditions.

17.3 Interference Suppression

17.3.1 Interference must be suppressed at its source or receiver using the following guidelines:

17.3.1.1 Any sensitive electronic equipment must be housed in a tested and certified enclosure which must provide at least 40 dBm of shielding for the onboard electromagnetic environment.

17.3.1.2 The minimal cable separations must be observed.

If capacitors are used, they should be on the equipment side of any isolating switch or the capacitor must be provided with an uninterruptible leakage path.

17.3.1.3 Capacitors must not be used to suppress arcs across electrical contacts.

17.3.1.4 Components in metal boxes must have the boxes bonded to the metal of the interfering source.

17.3.1.5 Electro statically shielded isolation transformers and/or suitable power line conditioners must be fitted in the power lines to electronic equipment, preferably at the equipment end of the feeder.

17.3.1.6 Double sided PCB's must be utilized wherever practicable.

17.4 Screening of Cables

17.4.1 The screening of cables must satisfy the following ground rules:

17.4.1.1 Screens must have a shielding efficiency of at least 90%.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 17.4.1.2** Low frequency cables should use a ferrous screen material, grounded at a single point, i.e., below fifteen (15) kHz.
- 17.4.1.3** High frequency cable should use bronze, copper, or aluminum material and should be grounded at intervals of less than 0.15 wavelengths at the highest frequency of interest, wherever practical.
- 17.4.1.4** Metallic trunking may provide effective screening provided it is bonded as it passes through any bulkhead and any seams and joints are continuously welded.

17.5 Racks and Consoles

17.5.1 The following applies to the grounding of equipment racks and consoles:

- 17.5.1.1** Racks and consoles must be of all welded construction with direct electrical connection of the rack or console to ship's metal. Where direct connection is not feasible, ground straps are required.
- 17.5.1.2** The use of non-welded racks and consoles is subject to the requirement that each individual member is properly grounded. Members may be either individually grounded or they may be bonded to each other by means of a strap. Electrically continuity between adjacent members must not be inferred from their proximity and mechanical connection.

17.6 Equipment Cases

17.6.1 Equipment Cases must have at least 40 dB attenuation capabilities. Sheet steel must be preferred. Individual equipment cases must be grounded as follows:

- 17.6.1.1** Cases must be connected to the ground rail or metal of the rack or console in which they are mounted.
- 17.6.1.2** Each case must be individually grounded, i.e., case-to-case connection is not allowed for grounding.
- 17.6.1.3** If practical, equipment within a single system must be located close together and connected to a single point ground.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 17.6.1.4** The grounding of equipment cases must not rely upon their retaining hardware.
- 17.6.1.5** Access doors/covers must be bonded to the equipment case.
- 17.6.1.6** Slide mounted equipment must use straps which allow for the withdrawal of equipment.
- 17.6.1.7** On permanently mounted equipment, the ground strap must be as short as possible.
- 17.6.1.8** Flexible braid straps may be used only where movement of equipment or components so dictate.

17.7 Methods and Materials

17.7.1 The following applies to materials and methods used in grounding and bonding:

- 17.7.1.1** All contact surfaces must be clean and free from paint, scale, rust, or any material considered likely to impair the contact efficiency.
- 17.7.1.2** The contact surface area must be as large as practical.
- 17.7.1.3** Contact surfaces must be bonded using a method that will not impair contact efficiency, i.e., welding welded stud, etc.
- 17.7.1.4** Straps must be of 25 mm (1 inch) solid copper, 0.6 mm (0.025 inch) thick and as short as possible while avoiding the creating of sharp bends and corners.
- 17.7.1.5** Ground straps and joints must be readily accessible for maintenance.
- 17.7.1.6** Other low resistance, chemically compatible, corrosion-resistant materials may be approved for use by ABS.
- 17.7.1.7** All bonding hardware must be of low resistance, corrosion-resistant material, and preferably stainless steel. Upper deck hardware must be of stainless steel.
- 17.7.1.8** All grounding (earthing) and bonding must be in accordance with TP127E.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

17.7.2 Additional Precautions

17.7.2.1 Care must be taken in the grounding and bonding of metallic structures and of equipment in areas of high-level radio frequency energy, such as radio and electronic equipment rooms. Antennae, antenna tuners and radar transceivers are also critical regardless of where they are located. In these locations, all floating metallic structures such as conduit, air ducting, water pipes, box cable, cable screens, and metal support frames for liner board or ceiling tiles must be grounded at intervals of less than 1m. The use of metal faced liner board and/or ceiling tiles must be avoided in these locations.

17.7.2.2 All metallic structures on the upper deck such as pipes, rails, stanchions, and casings must be bonded to ship's metal.

18.0 Not Used

19.0 WEIGHT AND STABILITY MANAGEMENT

19.1 General

19.1.1 The Contractor must utilize the services of a professionally certified Naval Architect or a recognized Naval Architect firm to determine both the cumulative effect of all the removals and replacements performed during the vessel's VLE and their impact on the vessel's stability characteristics as well as performing the Inclining Experiment requirements as defined in section 3.0 of this document entitled Stability Management.

19.2 Weight Management Requirement

19.2.1 The intent of this requirement is to have the Contractor to be responsible for providing an accurate and strict Weight Control Program during the course of this Vessel Life Extension project. Data obtained through this program will be used in conjunction with the inclining experiment to be conducted by the Contractor at conclusion of the vessel's VLE.

19.2.2 General Requirements

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 19.2.2.1** All equipment, components, and steel removed must be weighed and its location noted. The replacement equipment and materials used must also be weighed and relocated as close to the same position as the equipment being replaced. A record must be maintained of the weights removed, the weights of the replacement equipment and the differences in weight for each component.
- 19.2.2.2** Weight may be obtained either from suppliers, by calculation from working drawings, by weighing items, or by a combination of the above. The weight of piping, insulation, structural components etc., may be calculated. These items must be weighed on a selective or sampling basis, as determined by the Contractor, to establish the accuracy of calculated weights. Where factors or percentages are utilised for calculating paint, welding, weights etc., The Contractor must be prepared to substantiate values with background information.
- 19.2.2.3** Calibrated, and certified scales must be used for weighing items. Copies of the scales calibration certificate(s) are to be provided to the CG TA.
- 19.2.2.4** The Contractor must measure and record the location of each piece of equipment removed and replaced in comparison to a vertical and horizontal baseline reference point.
- 19.2.2.5** It must be the responsibility of The Contractor to continuously update the weight estimate and advise the CG TA of any aspects of the vessel's structure, fittings or equipment which are above the estimated values, and which could limit the ability of the CCG to recertify the vessel at the end of the refit to the same certification as had prior to the VLE. During the course of the vessel life extension project The Contractor must prepare and submit an updated Weight Control report monthly to the CG TA.
- 19.2.2.6** At the conclusion of this VLE project the "as delivered" weight and centre of gravity must be determined by an Inclining Experiment

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

and any remaining construction margins adjusted to match the as-inclined lightship weight.

- 19.2.2.7** Three (3) hard copies and one electronic copy (PDF) of the final “as-delivered” Weight Control report must be submitted to the CG TA at the end of the Contract. The final Weight Control report must use the standard weight breakdown structure to the four-digit accuracy and include the future growth margin. A stability analysis of the worse operating condition with the future growth margin must be included in the report to demonstrate that TC-MSS STAB 6 stability criteria will be met.

19.3 Stability Management Requirements

19.3.1 Intent

- 19.3.1.1** The purpose of this requirement is to have the Contractor manage and monitor the overall vessel stability throughout this Vessel Life Extension Project in order to achieve an accurate determination of the vessel’s lightship weight and of the coordinates of its centre of gravity.
- 19.3.1.2** All Stability related data must be processed and managed using General HydroStatics 1

19.3.2 General Requirements

- 19.3.2.1** The Contractor must be responsible for performing the following:
- 19.3.2.2** The accurate tracking of all weights removed from, and added to, the vessel throughout this VLE Refit Project.
- 19.3.2.3** Ongoing evaluation of the effect on overall vessel draught, trim, heel, and stability as a result of weights removed and added through the full VLE project. This requirement must originate, and be included in, all planning and design phases of the project. Anticipated changes in vessel draught, trim, heel, and stability, as a result of specified work, must be presented to the CG TA on a regular basis as project development progresses.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

19.3.3 Inclining Experiment Condition

19.3.3.1 General

- 19.3.3.1.1** Prior to implementing the Inclining Experiment, the vessel must be as near to completion as possible. Equipment used by the Contractor on board must be limited to the utmost extent possible. Prior to the inclining experiment being performed, lists of all items which are to be added, removed, or relocated must be prepared. These weights and their locations must be accurately recorded.
- 19.3.3.1.2** All objects must be secured in their regular positions. All weights which may swing, or shift must be secured in their known position. If more than one sea stowage position is possible, the actual stowage position used during the experiment must be recorded.
- 19.3.3.1.3** The vessel is to be cleared of residues of tools, debris, scaffolding and snow.
- 19.3.3.1.4** All bilge water and other extraneous standing liquids must be removed. When draining individual tanks is impracticable, allowances for such liquids is to be at the discretion of the attending ABS survey, the attending Naval Architect and the CG TA.
- 19.3.3.1.5** All service tanks and machinery plant piping are to be filled as for the normal working condition.

19.3.3.2 Tank Contents

- 19.3.3.2.1** All tanks must be either full or empty and the number of tanks containing liquids must be kept to a minimum.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

19.3.3.2.2 Soundings and density of liquids in tanks are to be taken. Shapes of tanks which are partly filled are to be known in order to determine the free liquid surface effect.

19.3.3.2.3 Adequate measures are to be taken to preclude air pockets in completely full tanks. All connections between tanks are to be closed and all empty tanks are to be adequately dried.

19.3.3.3 Mooring Arrangements and Environmental Conditions

19.3.3.3.1 Mooring lines must be free of any tension in the transverse direction of the ship during the reading after each weight shift. No external moments are to be brought upon the ship (from mooring lines, quay, shore cables, hoses, etc.). If possible, the ship is to be located in a calm, protected area free from external forces.

19.3.3.3.2 The depth of water under the hull must be sufficient to ensure that the hull will be entirely free of the bottom. Prior to the experiment, the depth of water is to be measured in as many locations as necessary to positively satisfy this requirement, taking into account tide differences, if applicable.

19.3.3.3.3 When tidal currents are present the experiment is to be conducted at or around slack tide.

19.3.3.3.4 The ship's gangways are to be in the stowed position or removed during the inclining experiment. Shore cables, hoses, etc., are to be limited to only those which are required to provide services during the experiment. Those which are needed must be slack.

19.3.3.3.5 The experiment must not be conducted under adverse wind, wave, and current conditions where the accuracy of the results cannot be assured.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

19.3.3.4 Inclining Weights

19.3.3.4.1 For the inclining experiment, solid inclining weights are to be used.

19.3.3.4.2 Each weight is to be compact, impervious to water and shaped such that its centre of gravity can be accurately determined.

19.3.3.4.3 Each inclining weight must be marked with an identification number. The inclining weights must have been weighed with a calibrated instrument witnessed and to the satisfaction of the attending ABS Surveyor and the CG TA.

19.3.3.5 Trim and Stability

19.3.3.5.1 The vessel must be upright prior to the inclining.

19.3.3.5.2 The attending ABS surveyor, Naval Architect and the CG TA must be satisfied that the vessel has adequate, positive stability and acceptable stress levels during the experiment. The estimated initial metacentric height must be at least 0.20 m.

19.4 Inclining Experiment and Record of Data

19.4.1 Measurement of Inclining Experiment data must be as accurate as possible and to the satisfaction of the attending ABS Surveyor, the Naval Architect, and the CG TA.

19.4.1.1 Draught and Water Density Measurements

19.4.1.1.1 Draught/freeboard must be measured immediately before and verified after the experiment, to ensure that no significant changes in vessel's condition have occurred during the experiment.

19.4.1.1.2 Draughts/freeboards must be measured at fore and aft and midship draught marks at both sides. If the freeboards are not measured from the upper edge

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

of deck line at side of freeboard deck or at the same frame locations as the draught marks, the locations and vertical datum must be stated.

19.4.2 Weight Shifts

- 19.4.2.1** The inclining weight positions are to be marked on the deck to ensure that consistency in placement is achieved. The transverse shift distance is to be as great as practicable and appreciable changes in longitudinal or vertical position when moving port to starboard and vice versa are to be avoided.

19.4.3 Recording of Environmental Conditions

- 19.4.3.1** The weather conditions, i.e., wind speed and direction relative to the vessel, sea state, air, and water temperatures, etc., during the experiment are to be recorded.

19.5 Experiment Report and Analysis of Lightship Data

- 19.5.1** The Contractor must be responsible for incorporating the data gathered during the experiment into a comprehensive Inclining Experiment report, which is to be combined with the analysis of the lightship data. Experiment readings not used in the final analysis are to be still shown in the report.
- 19.5.2** The Inclining Experiment report and analysis, combined with the report, must be submitted to Class for review and acceptance of results as the basis for approval of the stability information of the ship.

19.6 Trim and Stability Book

- 19.6.1** The Contractor must produce and provide, before the vessel proceeds on sea trials, an approved preliminary Trim and Stability Booklet and Damage Control Assessment Booklet for the vessel in accordance with Coast Guard's reference Document: MECTS#3350860 entitled Trim and Stability Book Production.
- 19.6.2** On completion of sea trials and the vessel's acceptance by Canada, the Contractor is to provide the final approved Trim and Stability Booklet and the Damage Control Assessment Booklet within ninety (90) days.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

20.0 TESTS, DOCK TRIALS AND SEA TRIALS

20.1 General Requirements

- 20.1.1** The Contractor must demonstrate that the completed work and equipment is in compliance with the performance requirements of this Specification. The Contractor must develop test and trial procedures, and conduct all tests and trials required by this Specification and as may be required by the regulatory bodies in order to permit the issue of all appropriate certificates for the vessel. The Contractor must obtain all necessary certificates for the vessel to ensure that the vessel is fully certified and seaworthy for a vessel of its class prior to the completion of the Contract.
- 20.1.2** The Contractor must provide the CG TA with a complete list of disturbed services and ship's systems that require functional and operational tests prior to the completion of each specification requirement. The Contractor must develop specific test procedures to test the operational and functional condition of each of the disturbed services and/or ship's systems. The Contractor must submit the list of disturbed services and ship's systems and the associated specific test procedures for review to the IA and the CG TA twenty (20) working days prior to the start of these system tests.
- 20.1.3** The Contractor must prepare a trials schedule showing dates, sequence, procedures, and duration of each trial or set of trials. This agenda, including the proposed trial record sheets for all trials, must be submitted for review and comment to the CG TA and the IA twenty (20) working days prior to the start of any tests and trials.
- 20.1.4** The Contractor must coordinate the trials agenda with ABS to ensure attendance where necessary. The Contractor must ensure a manufacturer's FSR or written authorization from the manufacturer must be available prior to initial start-up of newly installed or modified equipment. All trials must be witnessed by the TA or his or her appointed representative and where necessary, by ABS, FSR's and any Sub-Contractors. All tests must be completed on individual components of a system and all defects corrected to the satisfaction of the IA, ABS and/or the attending FSR. Once defects are corrected, the test and trial must be repeated to the satisfaction of the IA and where necessary ABS.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

20.1.5 Shop testing, dock and sea trials procedures must be to the standards required by ABS. Where ABS has no requirements for shop test procedures, the Contractor must adhere to the S.N.A.M.E. guidelines as referenced in Section 4.4.9 of this Specification. The minimum standard for all electrical dock and sea trials must be in accordance with ABS, TP127E and IEEE Std 45-2002. All electronic equipment static tests must be completed prior to sea trials with only the operational tests to be carried out at sea.

20.1.6 Mechanical and piping systems must be tested hydrostatic tested. Hydrostatic testing of piping and components forming part of any system must be completed prior to any operational testing of the system. The Contractor must have on hand signed and witnessed test sheets showing the results of hydrostatic tests prior to the operational tests of the system. As a minimum the TA must be notified when any components are being hydrostatically tested.

20.1.7 The Contractor must make reference to Section 21.0 with regard to the documentation requirements for the tests, trials, and inspection records

20.2 Mechanical and Piping Systems

20.2.1 All sub-assemblies and piping systems fabricated by The Contractor must be hydrostatically tested to 1.5 times the system's working pressure and proven tight to the satisfaction of the CG TA prior to installation on the vessel.

20.2.2 Machinery and equipment must not be subjected to pressures higher than their maximum allowable operating pressure during system pressure tests. Valves at the components may be closed, or the connection blanked off to protect such components from excessive pressure. If there are any flanged joints in the piping between a tank isolating valve and the open end of the tail pipe, or where a tank isolating valve has not been installed, the flanged joint next to the open end of the tailpipe must be temporarily blanked off so the system may be pressure tested up to that point. Instruments, pressure switches and other components that could be damaged by excessive pressure of system tests must be removed or otherwise protected during the tests.

20.2.3 For tests, calibrated pressure gauges must be installed at the connections provided in the gauge piping for this purpose. During tests, readings of installed gauges must be checked with the calibrated test gauges. Installed gauges must be

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

adjusted where necessary to register pressure accurately. The Contractor must provide calibration certificates for all instrumentation used for the testing of systems to the CG TA.

20.2.4 When the duration of a pressure test is not specified, the test pressure must be held a sufficient length of time to permit a thorough examination of the system for leaks to the satisfaction of the CG TA.

20.2.5 Relief and safety valves and all other components installed to limit operating pressures must be removed, blanked, or bypassed where necessary to build up to the pressure specified for the test. After a system has satisfactorily passed these tests, such components must be reinstalled and tested under pressure to assure they operate at approved set pressures. Set pressures indicated on identification plates of these valves must conform to the approved set pressures.

20.2.6 All components necessary for the safe operation of the system must be checked and adjusted during the operating tests to demonstrate compliance with the requirements specified and approved for the system. Operating tests must demonstrate that the piping design and installation adequately meet the service demands.

20.2.7 Components, such as spring hangers must be adjusted where necessary and flexible piping connections slip joints, expansion joints and noise isolation pipe fittings must be checked for satisfactory operation while the system in which they are installed is being operated.

20.2.8 Where pumps or ejectors have suctions from tanks or compartments, the operating test must demonstrate the ability of the system to remove the service liquid down to the level of the open end of the suction tail pipe.

20.2.9 Open systems such as air escapes, overflows and deck drains must be tested for unobstructed flow with dry compressed air or water at not more than 100 PSI. Systems for hand pumps, portable drainage facilities and similar miscellaneous systems must be given an operating test and the specified pressure test. Pressure tests must precede operating tests.

20.2.10 All systems must have a visual inspection and must be leak-free during the specified tests.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

20.2.11 All of the system pressure and operating tests must be completed before the system trials.

20.2.12 Where tanks have been opened for the purpose of conducting work, all tanks are to be cleared, cleaned, and submitted for inspection to the IA prior to closing of the tank or space. Failure to notify the CG TA does not absolve The Contractor of the responsibility of providing the opportunity to inspect any completed items. Inspection of any tanks or spaces by the TA does not substitute for any required inspection by ABS. At the completion of the inspection, all tank covers are to be fitted with new gasket material prior to the closing of the tanks.

20.2.13 Where work has been carried out in or on any structural part of a tank, that tank must be subjected to a hydrostatic pressure test of 2.5m head of water. The hydrostatic test must be witnessed by ABS and the IA. The hydrostatic tests must be documented as per Section 21.0 of this Specification.

20.3 Ship Performance Sea Trials

20.3.1 In addition to dock trials and commissioning tests of individual ship systems specified within this Specification the Contractor must perform a full set of sea trials in accordance with the “Guide for Sea Trials” as published by S.N.A.M.E. The Contractor must develop all sea trial procedures and data sheets. The sea trial procedures with attached data sheets must be submitted to the CG TA for review and approval twenty (20) working days prior to the start of the Sea Trials.

21.0 DOCUMENTATION REQUIREMENTS

21.1 All Contractor supplied documentation must become the property of Canada. This must include all electronic media. Electronic media must not be protected to prevent making additional copies for internal use.

21.2 Drawings

21.2.1 General

21.2.1.1 All drawings supplied by the Contractor must be in AutoCAD 2017 DWG format compatible, or later edition. Electronic drawings must not be protected so as to be “Read-Only” files. Fonts for text must be AutoCAD 2017 standard. Blocks are not to be grouped. All text included in a block must be an attribute.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 21.2.1.2** A complete list of layer names and brief description of each layer's use must accompany all files. Layer names, layer colour codes, and layer line types must be standardized across the drawings or drawing types.
- 21.2.1.3** Electronic drawings must be provided to the CG TA via email, FTP server or USB device. All files must be clearly labelled with the project number, file names and drawing numbers. Files must be labelled "As-Fitted" drawings for those drawings that have been approved and finalized.
- 21.2.1.4** A complete list of symbols (block) names with a description of each symbol must be provided. One block per drawing must be provided in electronic format suitable for use with AutoCAD 2017. Drawing sheet sizes, including where possible vendor drawings, must be ANSI standards with standard border and title block in the layout section.
- 21.2.1.5** "As-Fitted" prints/plots must not contain markings or corrections by hand, i.e., marker, pen, pencil.
- 21.2.1.6** The Contractor must provide the IA and the CG TA with all drawings required by or are generated by the Sub-Contractors.
- 21.2.1.7** Schematic drawings of systems must include all pertinent system information, including sizes, dimensions, labelling, equipment locations, and all information relating to system fittings.
- 21.2.1.8** The Contractor must have in place a complete system of documenting and controlling all drawings and drawing revisions affected by the work. The Contractor must maintain an up-to-date list of drawings and revisions and must provide this list to the IA and the TA at the monthly progress meeting. This list must include a column of all drawings sent to ABS for approval.

21.2.2 Guidance Drawings

- 21.2.2.1** All technical guidance drawings are issued to The Contractor from the Canadian Coast Guard are for guidance purposes only. The

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

Contractor must develop working drawings and ensure that all drawings receive regulatory approval. The Contractor is to note that not all guidance drawings supplied are “As-Fitted” drawings. The Contractor must physically verify all affected items and all dimensions necessary for the work.

21.2.3 Working Drawings

- 21.2.3.1** The Contractor must develop detailed working drawings for all project work and regulatory body approval purposes. All variations must be incorporated into the working drawing revisions.
- 21.2.3.2** Working drawings must clearly indicate the materials and/or equipment being supplied, all details of construction, accurate dimensions, capacity, operating characteristics and performance. Each working drawing must have a unique identification number and blocks of numbers must be used to identify the various specification items. Where multiple working drawings are required each drawing must indicate the total number of sheets within the series.
- 21.2.3.3** Each working drawing for non-catalogue items must be prepared specifically for this project. Working drawings and brochures for catalogue items must be clearly marked to show the items being supplied.
- 21.2.3.4** The Contractor must sign off on all working drawings indicating:
 - 21.2.3.4.1** The drawing has been checked for conformance with all Specification requirements.
 - 21.2.3.4.2** The equipment has been coordinated with other equipment to which it is attached and/or connected.
 - 21.2.3.4.3** All dimensions have been verified to ensure the proper installation of equipment within the available space

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

21.2.4 Working Drawings – Submission for Review by CCG

- 21.2.4.1** The Contractor must submit to the TA two (2) copies of all working drawings, shop drawings and schedules required for the work. Drawings must be submitted to the CG TA at least fourteen (14) days prior to commencement of work for the affected drawings. The CG TA must review the drawings within five (5) working days. This review will consist of verification of adherence to the requirements of the specification. Where necessary the CG TA will return one (1) copy of the drawing to the Contractor with comments from the TA. The Contractor must make any required amendments and return two (2) copies of the revised drawing, with revision dates and revision numbers, to the CG TA.
- 21.2.4.2** Reviewed drawings must not be modified in any way without written approval of the CG TA. In the event of subsequent revisions to drawings already reviewed the entire drawing, i.e., all sheets, whether revised or not, must be resubmitted for review.
- 21.2.4.3** Space must be provided on the working drawings for review dates and signatures of the CG TA.
- 21.2.4.4** Drawings submitted for review, unless otherwise specified, must be in the form of plotted originals. Manufacturer's printed data sheets for standard items are acceptable providing pertinent characteristics are identified and relate to specified items.

21.2.5 Working Drawings – Submission for Class Approval

- 21.2.5.1** The Contractor must submit to Class (ABS) copies, of working drawings, ship drawings and/or layout drawings, schedules and calculation required for approval by ABS.
- 21.2.5.2** It must be the responsibility of the Contractor to ensure working drawings are ABS approved prior to the start of work for any section of the specification where ABS approval is required.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 21.2.5.3** Space must be provided on the working drawings for ABS approval stamps. This space must be clear of all technical information and must not be on the back of any sheets.
- 21.2.5.4** The Contractor is responsible for contacting the respective ABS approvals office to determine the number and type of materials required for approval submissions.
- 21.2.5.5** The Contractor must supply one (1) original stamped drawing, and one (1) copy of all ABS approved drawings to the CG TA.
- 21.2.5.6** The Contractor must supply four (4) scanned copy, electronic TIF and PDF format, of all ABS approved drawings via email, FTP server or USB device to the CG TA.

21.2.6 As Fitted Drawings

- 21.2.6.1** Upon completion of all work, The Contractor must transfer all mark-ups from the working drawings to a final revision of all vessel drawings affected by the project work. These drawing must become the “As-Fitted” drawings for the project work. The Contractor must update all vessel drawings affected by the work.
- 21.2.6.1** Prior to completion of the Contract, The Contractor must supply to the TA the following:
- 21.2.6.1.1** Two (2) plotted copies of the latest revision of each of the “As-Fitted” drawings.
- 21.2.6.1.2** Four (4) electronic copies of the latest revision of each “As-Fitted” drawing via email, FTP server or USB device in AutoCAD 2017 DWG or later format.

21.2.7 All drawings must become the property of Canada

21.2.8 Plotted drawings must be on standard ANSI paper sizes.

21.2.9 If no AutoCAD drawing files are produced, then scanned files (raster format) must be supplied to the TA in a TIF format. “As-Fitted” drawings must be delivered within 30 working days after completion of the sea trials.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

21.2.10 Framed Drawings

- 21.2.10.1** Should the following drawings need to be modified i.e., General Arrangement Drawings including Plan View of all Decks and Profile; Capacity Plan, and the Fire Fighting Systems and Life Saving Equipment, they are to be modified to reflect the actual “As-Fitted” status for the vessel. The modified drawings must be printed, framed, and mounted on board the vessel in locations to be designated by the TA.
- 21.2.10.2** Note any modifications to the Fire Fighting Systems or the Life Saving Equipment drawing(s) will require approval by ABS prior to mounting.

21.2 Manuals and Records

21.2.1 General

- 21.2.1.1** Instruction Manuals and Records must be individually bound in a hard cover three (3) ring book formats with a page size of 8 1/2 inches x 11 inches. Three (3) Ring binders must be of the “D” type with positive locking mechanisms. Drawings and documents of a larger size must be concertina folded to suit. The covers must have the following information printed thereon:
- CCGS LEONARD J. COWLEY – Vessel Life Extension
- Equipment/System Identification
- Equipment Manufacturer
- Revision number and date.
- 21.2.1.2** Plastic tabbed indices must be provided for all sections of the manuals. Major equipment components must be subdivided into separate sections of the manuals.
- 21.2.1.3** A master index must be provided at the beginning of each binder indicating all items included in each section.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 21.2.1.4** A list of names, addresses and telephone numbers of contacts associated with the equipment manufacturers must be provided that can be used after the project completion for maintenance and information data purposes.
- 21.2.1.5** A copy of the final reviewed and approved “As-Fitted” drawing(s) must be provided within the maintenance manual.
- 21.2.1.6** The Contractor must supply four (4) paper copies of all manuals and data sheets in English for all CFE items to the TA prior to the completion of the Contract.
- 21.2.1.7** The Contractor must supply four (4) copies of each manual and all associated data sheets via email, FTP server or USB device in electronic PDF file format to the TA prior to the completion of the Contract.

21.2.2 Operation Manuals – “As-Fitted”

- 21.2.2.1** Operation manuals must include the following items:
 - 21.2.2.1.1** General description of equipment operating sequence.
 - 21.2.2.1.2** Step by step procedure to follow in commissioning the equipment.
 - 21.2.2.1.3** Schematic wiring diagram for the fitted equipment.
 - 21.2.2.1.4** All pertinent equipment performance criteria.
- 21.2.2.2** Where software/hardware systems are fitted, the operation manual must include the following:
 - 21.2.2.2.1** Full software documentation manual for the system and via email, FTP server or USB device such that Canada may revise programs without recourse to the Contractor.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 21.2.2.2.2** The minimum software documentation must include system level diagrams describing the overall scheme of the software/hardware system.
- 21.2.2.2.3** The functional specifications, which must describe in detail the functional capabilities of the system and each software components.
- 21.2.2.2.4** Project specific program listings including all comments describing the details of the code functions.
- 21.2.2.2.5** All listings, files, manuals, and associated documentation materials must be delivered to and become the property of Canada.
- 21.2.2.2.6** The Contractor must supply the number of paper copies and electronic copies of the operations manuals as set out in Section 21.2.1

21.2.3 Maintenance Manuals – “As-Fitted”

- 21.2.3.1** Maintenance manuals are to include:
- 21.2.3.2** Manufacturer's maintenance instructions for each item of the equipment requiring maintenance activity.
- 21.2.3.3** Instructions are to include installation instructions, part numbers, part lists, master drawings and exploded views with part identification for all mechanical, electrical and electronic parts, name of suppliers.
- 21.2.3.4** Summary list of each item of the equipment requiring lubrication, indicating the name of the equipment item, location of all points of lubrication, type of lubricant recommended, and frequency of lubrication.
- 21.2.3.5** Troubleshooting sections must be included for all equipment in the maintenance manual under a separate heading.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 21.2.3.6** The Contractor must supply the number of paper copies and electronic copies of the maintenance manuals as set out in Section 21.2.1.

21.2.4 Tests / Trials and Inspection Records

- 21.2.4.1** The Contractor must prepare a separate binder, arranged as per Section 21.2.1, for the documentation of all Test, Trials, and Inspection Records. The binder must be indexed for each test, trial and inspection performed.
- 21.2.4.2** The Contractor must maintain a complete and accurate record of all tests, trials and inspections conducted during the execution of the work. This must include those tests, trials and inspections performed at Sub-Contractors facilities. The records must include all relevant documentation, test procedures, associated test sheets, including shop test data, and test, trial and inspection data and observation results.
- 21.2.4.3** All originals of the test, trial and inspections records must be signed by ABS, the Contractor and where necessary by the Sub-Contractors and/or Field Service Representative (FSR) who witnessed the tests.
- 21.2.4.4** Tests and inspections carried out for the specific purpose of satisfying the ABS requirements for the Ship Inspection Reporting System (SIRS) update of the vessel must be recorded and signed on documents meeting the requirements of ABS to clearly indicate which piece of equipment or system with associated field number was tested and the results of the tests carried out. All copies of the documentation must be dated and signed by the attending ABS surveyor and the Contractor.

21.2.5 Certificate Records

- 21.2.5.1** The Contractor must prepare a separate binder, arranged as per Section 21.2.1, for the documentation of all Certificate Records. The binder must be indexed for each item or piece of equipment for which Certificate Records are available.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

21.2.5.2 The Contractor must maintain a complete and accurate record of all certificate records applicable to the work. Certificate records must be current and for the type of equipment being installed by the Contractor. The Contractor must ensure that where classification society approval certificates are required, these certificates are provided within the Certificate Records binder. Where manufacturers have supplied certificates for equipment within operational manuals, copies of these certificates must be indexed within the Certificate Records binder. The Contractor must also obtain and index all certificates issued by its Sub-Contractors.

21.2.5.3 The Contractor must supply the number of paper copies and electronic copies of the test, trials and inspection records as set out in Section 21.2.1.

21.2.5.4 NOTE: Where original certificates are provided, especially ABS certificates, one of the four (4) paper copies must be the original document.

21.3 Electrical System Documentation

21.3.1 The Contractor must provide the following documentation with regards to the “As Fitted” load analysis to the CG TA:

21.3.1.1 Two (2) paper copies of the final ABS approved load analysis and calculations of the “As-Fitted” electrical system. This must be provided as detailed in Section 21.2.1

21.3.1.2 Four (4) copies of the final ABS approved load analysis and calculations of the “As-Fitted” electrical system in electronic format. The electronic files must be in Microsoft Excel format and must be via email, FTP server or USB device with a detailed listing of all files.

21.3.2 The Contractor must provide the following documentation with regards to the “As Fitted” short circuit current analysis to the CG TA:

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

21.3.2.1 (2) paper copies of the final approved short circuit current analysis and calculations of the “As-Fitted” electrical system. This must be provided as detailed in Section 21.2.1

21.3.2.2 Four (4) copies of the final approved short circuit current analysis and calculations of the “As-Fitted” electrical system in electronic format. The electronic files must be in Microsoft Excel format and must be via email, FTP server or USB device with a detailed listing of all files

21.4 Inclining Experiment Documentation

21.4.1 The Contractor must refer to Section 19.0 of this Specification for the details required for the Inclining Experiment.

21.5 Stability Booklet Documentation

21.5.1 The Contractor must refer to Section 19.0 for the details required for the Trim and Stability Booklet.

21.6 Photographs and Images

21.6.1 “As Delivered” Photographs/Images

21.6.1.1 The Contractor must supply a professional photographer to deliver a minimum of one thousand (1,000) high resolution (minimum 12 Mega Pixel) digital images in JPEG format. Images must be delivered via email, FTP server or USB device media. The IA and the TA must be in attendance for all images. The entire ship must be photographed with enough detail to point out specific parts and/or pieces. If Canada requests more images to be taken, the price must be prorated.

21.6.1.2 The Contractor must provide two (2) copies of all “As Delivered” digital images via email, FTP server or USB device to the IA and the TA at the first progress meeting after the delivery of the vessel to the Contractor’s facility.

21.6.2 Progress Status Photographs/Images

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

21.6.2.1 The Contractor must provide high-resolution (minimum 12 Mega Pixel) JPEG digital images delivered via email, FTP server or USB device of the work in progress during each phase of the project. The photographs must commence when the work on the vessel begins and continue as long as work is in progress.

21.6.2.2 The Contractor must take sufficient exposures during the modernization project to ensure that an adequate record of work progress is captured. The date of exposure must be automatically recorded for all images.

21.6.2.3 The Contractor must provide two (2) copies of all progress photographs delivered via email, FTP server or USB device media in JPEG format to the IA and the CG TA at monthly progress meetings.

21.6.2.4 The Contractor must name all photos provided to CG in the following format. Location – Description – Date. An example is shown below:

21.6.2.4.1 Engine Room Port Side – May 25, 2023 – Overboard Discharge

22.0 COMPUTERIZED MAINTENANCE MANAGEMENT (CMM) SUPPORT REQUIREMENTS

22.1 General

22.1.1 The Contractor must complete and populate the CMM data spreadsheet included as reference document to this VLE Project.

22.1.2 This document must be completed as per examples offered on the template and as per further instruction below.

22.2 Instructions to Contractors

22.2.1 Equipment and Parts Info Sheet

22.2.1.1 The Contractor is to populate as much information as possible into the Equipment and Parts Info Sheet as defined by the template. As minimum requirement, columns “B”, “C”, “F”, “G”, “H”, and “I” must be completed if applicable.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

- 22.2.1.2** One line is required for each piece of equipment that is a repairable/maintenance significant item (engine, pump, purifier, etc.)
- 22.2.1.3** The same consumable/disposable spare parts can be grouped into one line with the quantity reflected in column "E"
- 22.2.1.4** Column "D" is to reflect what system or equipment the material is associated with.

22.2.2 Equipment Maintenance Plan Sheet

- 22.2.2.1** The Contractor is to populate as much information as possible concerning OEM recommended maintenance for repairable/maintenance significant items (engine, pump, purifier, etc.). As minimum requirement, columns "A", "B", "E" and "F" must be completed. Maintenance tasks for the same equipment at the same frequency can be grouped together in Column "F" on one row.
- 22.2.2.2** A summary of the maintenance must be included in Column "F". Reference to a manual page number only is not acceptable.
- 22.2.2.3** Reference manual page numbers where detailed descriptions and illustrations can be found.

23.0 LOGISTICS REQUIREMENTS

23.1 General

- 23.1.1** The Contractor must supply all machinery, equipment, hardware, materials, tools, parts, and consumables required to execute the work defined within this specification, unless supply by the Owner is indicated otherwise in an individual specification item.
- 23.1.2** The Contractor must manage the supply chain, as required, and must provide an environmentally controlled storage space for receiving of materials and preparation for inspection of material received by the CG TA, prior to movement of material to the vessel.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

23.2 Contractor Supplied Materials (CSM) and Tools

- 23.2.1** The Contractor must ensure that replacement material such as jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings etc. are in accordance with the equipment manufacturer's drawings, manuals and/or instructions.
- 23.2.2** Where no item is specified, or where substitution must be made, the Contractor must submit an Observation Report indicating the substitution or item not specified to the CG TA. The Contractor must provide information about materials used, certificate of grade and quality of various materials to the CG TA, prior to use.
- 23.2.3** The Contractor must provide all equipment, devices, tools, and machinery such as crane, staging, scaffolding, hoarding, and rigging necessary for the completion of the work in this specification.
- 23.2.4** The Contractor must deliver and store all new CSM at their facility. The CSM must be stored in a secure, environmentally controlled space in accordance with the Equipment Storage section of this specification, Section 23.4.
- 23.2.5** All tools must be Contractor supplied unless otherwise stated in section 2.0 of individual specifications.

23.3 Government Supplied Materials (GSM) & Tools

- 23.3.1** Where tools are supplied by the TA (GFE – Government Furnished Equipment) they must be returned by the Contractor in the same condition as when they were borrowed. Borrowed tools must be inventoried and signed for by the Contractor on receipt and return to the CG TA. The Contractor must provide a suitable tracking document for such transfers of equipment.
- 23.3.2** Any GSM not specifically stated in the Technical Specification must be received by the Contractor and stored in accordance with the Equipment Storage section 23.4 below. These activities are to be covered by the Procedures for Design Change or Additional Work. (PWGSC 1379).

23.4 Equipment Storage

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

23.4.1 Equipment (i.e., covers, cowling and other items that may need to be removed and stored) must be stored in accordance with the equipment manufacturer's or equipment vendor's specific storage instructions. The Contractor must make these instructions available to the CG TA.

23.4.2 All equipment and items must be stored in such a manner to be easily accessible for inspection.

23.4.3 All items are to be stored either on metal shelving or on pallets and not directly on floors. Humidity control, as required, to be ensured in the storage facilities.

23.5 Removed Material

23.5.1 All materials and equipment removed from the vessel by the Contractor, unless specifically identified within the project requirements for disposal as scrap, must remain the property of Canada.

23.5.2 All such equipment and materials must be held and retained in good condition by the Contractor pending instructions from the CG TA.

23.5.3 The Contractor must obtain agreement with the CG TA for the disposal of materials and equipment that will have no market value after removal from the vessel. Cost estimation must be supplied, and environmental regulations may apply on some products.

23.6 Categorization

23.6.1 Property of Canada that is to be either permanently or temporarily removed from the vessel must be identified as being in one of the following three (3) categories as determined by the TA and this Specification:

Category "A":

These items must be permanently removed from the vessel and must remain the property of Canada. The Contractor must store and protect these items from physical damage. The Contractor must store these items on pallets, skids, or in containers suitable for shipment until such a time as they have been inspected and accepted into the care and custody of Canada. The Contractor must provide storage to Canada of these items for the Contract period. Canada must be responsible for the removal of these items from the Contractor's premises.

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

Category “B”:

These items must remain the property of Canada and must be temporarily removed from their location on the vessel during the Contract work. They must be returned to their original location on the vessel prior to the vessel leaving the Contractor’s facility. The Contractor must protect these items from weather or physical damage. These items must be stored to allow movement of the items to permit access for inspection, refurbishment and/or maintenance of these items as necessary. The Contractor must take care not to damage the equipment and material.

Category “C”:

Upon removal, these items must become the property of the Contractor and are to be disposed of in accordance with all applicable laws, rules and regulations as per section 7.5 of this specification.

23.6.2 Prior to removal of any items from the vessel, the items must be clearly identified with wire tags as falling into either Category “A”, “B”, or “C”.

23.7 Spare Parts

23.7.1 As a general requirement, all new machinery and equipment procured by The Contractor for installation on the vessel must be supplied complete with spare parts as per the following guidelines:

23.7.1.1 As required and defined by Class where applicable.

23.7.1.2 As defined in the pertinent Section(s) individual specification items

23.7.1.3 As required for twelve (12) months or 2,000 hours of operation, whichever is greater, as defined and recommended by the equipment manufacturer.

23.7.1.4 All system spares must be identified in a spare parts list, supplied by the Contractor, in a MS Excel spreadsheet. This list must include the following fields:

23.7.1.4.1 Supplier

23.7.1.4.2 Manufacturer

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

23.7.1.4.3 Manufacturer's Part Number

23.7.1.4.4 Price per Unit

23.7.1.4.5 Unit definition (each, case, etc.)

23.7.1.4.6 Recommended Quantity

23.7.1.4.7 Associated System/Equipment

23.7.1.4.8 An electronic copy of the spares parts list must be supplied to the CG TA.

23.7.2 The Contractor must notify the CG TA when spare parts have been received. The Contractor must prepare all spare parts for inspection and reconciliation with the spare parts list by the CG TA.

23.7.3 Spare parts must be supplied, packaged, and individually identified with equipment description, model number and catalogue/part number.

23.7.4 The Contractor must store the spare parts in an environmentally controlled facility in accordance with manufacturer's requirements, ensuring that the spares are protected from weather, physical damage, or complete loss.

24.0 Facilities For Government Personal

24.0 The Contractor must provide a minimum of 50 square meters of secure office space with the following requirements for CG personnel:

24.0.1 Two (2) lockable offices with a minimum of 20 square meters each;

24.0.1.1 One (1) boardroom with furnishings to seat ten (10) people (arrangements must consist of one large boardroom table with seating for ten). The boardroom must also be furnished with a 1.2 meter by 1.8 meter whiteboard on one wall.

24.0.2 Three (3) desks, full size with double pedestals containing drawers:

24.0.2.1 Desk drawers must be lockable;

	CCGS Leonard J Cowley	
	Specification	F7049-210183
GENERAL NOTES		

24.0.2.2 One (1) desk must be an “L” shaped secretary style desk with side tables;

24.0.2.3 One (1) desk size tables;

24.0.3 Ten (10) chairs, of which six (6) must be fully adjustable and fitted with a swivel base and casters (in addition to the boardroom furnishings);

24.0.4 Two (2) bookcases – 1.2 meter wide by 1.8 meter height;

24.0.5 Three (3) filing cabinets – four (4) drawers per cabinet. All cabinets are to be lockable;

24.0.6 Four (4) keys must be provided for each lockable door, desk and filing cabinet;

24.0.7 Three (3) direct telephones – one (1) of which must be in the boardroom;

24.0.8 Three (3) high speed internet connections and high speed wireless internet access.

24.0.9 One (1) office copier printer capable of handling 216 by 279 mm paper, 216 by 356 mm paper and 279 by 432 mm paper sizes. The copier must be equipped with an auto sheet feeder and serviceable within two (2) hours of any breakdowns. The printer to be wireless remotely operated type.

24.1 The offices must be supplied with heating, ventilation/air conditioning, and lighting as per provincial health and occupancy regulations.

24.2 Washroom facilities must be located on site.

24.3 All of the above equipment and facilities must be clean and in good condition to the full satisfaction of Canada.

	CCGS Leonard J Cowley	
Spec Item #: H-01	Specification	F7049-210183
PRODUCTION CHART		

H-01 Production Chart..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to give the owner’s representatives an accurate timeline on production and completion dates for Coast Guard Operational Services.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

2.2 Standards

2.2.1 N/A

2.3 Regulations

2.3.1 N/A

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

- 3.1.1** The successful Contractor must supply the CG TA and the PSPC CA with three (3) hard copies and an electronic copy of a detailed bar chart showing the planned work schedule for the ship’s refit 15 days after contract award, and again 5 days prior to the start of work with any changes incorporated. This bar chart must show each specification item with its main work breakdown structure (WBS), the planned and actual start date, the duration and the completion date, along with the workforce deployment plan. An electronic version must also be forwarded to the (CG TA) - Geoffrey.Stewart@dfo-mpo.gc.ca 5 days prior to start of work.
- 3.1.2** A critical path of work must be identified, which shows the critical tasks that may delay the completion of the refit and if they will not be completed within the

	CCGS Leonard J Cowley	
Spec Item #: H-01	Specification	F7049-210183
PRODUCTION CHART		

estimated time frame. The critical path may exist due to labor constraints or tasks which cannot be completed concurrently with other tasks.

- 3.1.3** If work arises that affects the critical path, it must be immediately brought to the attention of the CG TA and the PSPC CA. Every effort must be made to prevent the vessel from delay in completing the refit in the time frame provided. Regular Quality Assurance (QA) procedures must apply.
- 3.1.4** The bar chart must be updated weekly (every Friday afternoon, unless Friday is a holiday, in which case subsequent Monday) and 3 hard copies and an electronic copy supplied to the CG TA and PSPC CA at least 24 hours prior to scheduled production meetings. Bar chart must reflect all changes to the actual production of the refit and changes to the anticipated completion dates of each individual item. Planned workforce for each planned job for the week to be indicated with the weekly updates of the bar chart. The Contractor must include on the updates to the production chart any work arising from PSPC 1379 action that indicates the additional work will impact the completion schedule for the vessel.
- 3.1.5** The contractor must bid \$5,000 for the preparation of the initial schedule for the vessel and \$2,000 for each weekly update. On receipt of the update the CG TA will review the schedule to determine if it adequately reflects the status of the work and provides a realistic schedule to completion. If the delivered schedule does not meet this threshold the amount attributable to that delivery will be deducted from the total amount payable under the contract.
- 3.1.6** Time is of essence and changes, if any, to the overall delivery date of the project must be presented by the contractor to the PSPC CA and CG TA minimum one week in advance, along with the reasons for the proposed change to the delivery date well justified, for it to be considered.

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor where applicable.

4.2 Testing

	CCGS Leonard J Cowley	
Spec Item #: H-01	Specification	F7049-210183
PRODUCTION CHART		

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The successful Contractor must supply the CG TA and the PSPC CA with three (3) hard copies and an electronic copy of a detailed bar chart showing the planned work schedule for the ship's refit 5 days prior to the start of work. This bar chart must show each specification item with its main work breakdown structure (WBS), the planned and actual start date, the duration and the completion date and planned workforce for the jobs in progress during the week in the weekly schedules. An electronic version must also be forwarded to the CG TA - Geoffrey.Stewart@dfo-mpo.gc.ca 5 days prior to start of work.

5.1.2 The bar chart must be updated weekly (every Friday afternoon, unless Friday is a holiday, in which case subsequent Monday)) and 3 hard copies and an electronic copy supplied to the CG TA and PSPC CA 24 hours prior to scheduled production meetings. Bar chart must reflect all changes to the actual production of the refit and changes to the anticipated completion dates of each individual item. The Contractor must include on the updates to the production chart any work arising from PSPC 1379 action that indicates the additional work will impact the completion schedule for the vessel.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-02	Specification	F7049-210183
LIFE RAFT SERVICE		

H-02 Life Raft Service..

Part 1 - Scope

- 1.1** The Contractor must remove and transport the four (4) ships life rafts and four (4) hydrostatic releases to and from an authorized service center for servicing, testing and re-install.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** N/A

2.2 Standards

- 2.2.1** See General Notes

2.3 Regulations

- 2.3.1** Canada Shipping Act
- 2.3.2** Maritime Occupational Health and Safety Regulations (SOR/87-183)
- 2.3.3** ABS Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** N/A

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must remove the inflatable life rafts and releases from the ship, as listed herein, and transport them to and from the OEM service center for annual inspection and recertification. Upon return of the life rafts and releases, The Contractor must install and secure them on board the vessel in the correct locations as confirmed by Chief Officer. This work must be completed before the refloating of the vessel after drydocking, but after all the work in the area around the location of the life rafts is finished.

	CCGS Leonard J Cowley	
Spec Item #: H-02	Specification	F7049-210183
LIFE RAFT SERVICE		

3.1.1.1 25 Person Survitec Zodiac Liferaft, Class A Pack, S/N 4FF22A212

3.1.1.2 25 Person Survitec Zodiac Liferaft, Class A Pack, S/N 4FF21A212

3.1.1.3 25 Person Survitec Zodiac Liferaft, Class A Pack, S/N 5FJ29B313

3.1.1.4 25 Person Survitec Zodiac Liferaft, Class A Pack, S/N 7FK33F314

3.1.2 An allowance of \$2000.00 per life raft must be included in the bid for replacement of survival equipment for a total allowance of \$8000.00 for this specification item; this cost to be adjusted up or down via PSPC 1379 action on proof of invoice.

3.1.3 Certification for the life rafts must be dated so that the expiry date will be on or after the first week of January 2024.

3.2 Location

3.2.1 For'sle Deck Port and Stbd Side

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 ABS witnessing/ inspection as required

4.2 Testing

4.2.1 Testing must be completed as per OEM service center.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

	CCGS Leonard J Cowley	
Spec Item #: H-02	Specification	F7049-210183
LIFE RAFT SERVICE		

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-03	Specification	F7049-210183
FIRE DETECTION SYSTEM ANNUAL SERVICE		

H-03 Fire Detection System Annual Service..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to arrange for a certified company to perform an annual inspection and certification of the fire detection system.
- 1.2** The Contractor must report to the CG TA prior to any work commencing with this item.
- 1.3** This work must be carried out in conjunction with the following spec items:
 - 1.3.1** H-04 Fixed Fire Suppression System
 - 1.3.2** H-05 Galley Hood and Laundry Dryer Exhaust Cleaning
 - 1.3.3** H-06 Portable Extinguishers
 - 1.3.4** H-07 Firefighters Suits, SCBA's and Cylinders
 - 1.3.5** H-24 Fixed Foam and Wet Chemical

Part 2 – References

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** 590-70 Ships General Arrangement
 - 2.1.2** 1512-003 Life Saving Equipment Plan
 - 2.1.3** 1512-003 Fire Fighting Plan
 - 2.1.4** Cowley Fire Alarm Detector Listing
- 2.2 Standards**
 - 2.2.1** See General Notes
- 2.3 Regulations**
 - 2.3.1** Canada Shipping Act 2001 – Marine Machinery Regulations (SOR/90-264)
 - 2.3.2** Maritime Occupational Health and Safety Regulations (SOR/87-183)
 - 2.3.3** ABS Rules and Regulations

	CCGS Leonard J Cowley	
Spec Item #: H-03	Specification	F7049-210183
FIRE DETECTION SYSTEM ANNUAL SERVICE		

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must report to the CG TA prior to any work commencing with this item.

3.1.2 The system is a Notifier NFS2-640 Fire Alarm System.

3.1.3 The Contractor must contact ABS prior to work beginning and must arrange for ABS Class Surveyor to be present for the inspection if required.

3.1.3.1 The Contractor must disconnect and remove all devices prior to start of any onboard work causing dirt, dust, smoke, etc that may contaminate the devices. These devices must be stored in individual plastic bags and kept in a safe location until safe to reinstall and test.

3.1.4 Technician must test the Notifier systems panels, smoke and heat detectors, pull stations, alarm bells, rotating beacons, flashing lights and fire door magnetic hold backs. Fans, fire doors and dampers and any other connected devices for spaces being tested must be checked for auto shut down.

3.1.4.1 The Contractor must ensure all detectors activate the Notifier panel on the Bridge with the correct location observed on Notifier panel print screen.

3.1.4.2 The Contractor must ensure that the LED on the master panel and mimic panel are activated while each detector is tested.

3.1.4.3 The Contractor must test the Notifier panel emergency batteries and replace as required. If batteries are replaced this must be included in service report.

3.1.4.4 The Contractor must test the operation of the low temperature alarm located in the FM-200 storage cabinet.

3.1.5 Detection Panels consists of the following:

	CCGS Leonard J Cowley	
Spec Item #: H-03	Specification	F7049-210183
FIRE DETECTION SYSTEM ANNUAL SERVICE		

3.1.5.1 Master panel located in the wheelhouse fwd port side and a mimic panel located in the machinery control room and on the bridge.

3.1.6 Detector heads and pull stations must be tested for correct operation and consist of:

3.1.6.1 Zone – 96 smoke and 34 heat detectors

3.1.6.2 21 total pull stations

3.1.6.3 18 fire doors and magnetic hold backs

3.1.7 The Contractor must perform annual inspection and certification as per ABS Class requirements.

3.1.8 All deficiencies must be first reported to the CG TA and then repaired or components replaced by The Contractor through PSPC 1379 action.

3.1.9 Once all testing is complete the Service Technician must return the system to normal operational status.

3.2 Location

3.2.1 Master panel located in the wheelhouse fwd port side and a mimic panel located in the machinery control room and on the bridge.

3.2.2 Detector heads, pull stations, bells, doors and magnetic hold backs are located throughout the vessel.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 The Contractor is responsible for arranging with ABS Class Surveyor for inspection of the fire detection system as required

4.2 Testing

	CCGS Leonard J Cowley	
Spec Item #: H-03	Specification	F7049-210183
FIRE DETECTION SYSTEM ANNUAL SERVICE		

4.2.1 All testing as per recommended Notifier test procedures. Where non Notifier equipment is used(IE: Fenwal heat detector), the specific OEM instructions must be used.

4.2.2 As required to the satisfaction of CG TA and ABS Class Surveyor.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-04	Specification	F7049-210183
FIXED FIRE SUPPRESSION SYSTEM		

H-04 Fixed Fire Suppression System..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to arrange for an authorized and certified Kidde Factory Service Representative to perform an annual inspection and certification of the fixed fire fighting system.
- 1.2** This work must be carried out in conjunction with the following spec items:
 - 1.2.1** H-03 Fire Detection System Annual Service
 - 1.2.2** H-05 Galley Hood and Laundry Dryer Exhaust Cleaning
 - 1.3.3** H-06 Portable Extinguishers
 - 1.3.4** H-07 Firefighters Suits, SCBA's and Cylinders
 - 1.3.5** H-24 Fixed Foam and Wet Chemical

Part 2 – References

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** General Arrangement
 - 2.1.2** Fire Zone Plan 590-78
 - 2.1.3** Fire Fighting Equipment Plan 1590-03
 - 2.1.4** Fire Fighting Plan 590-82
- 2.2 Standards**
 - 2.2.1** The Contractor must be approved by ABS to recertify these systems.
 - 2.2.2** See General Notes
- 2.3 Regulations**
 - 2.3.1** Canada Shipping Act 2001 – Marine Machinery Regulations (SOR/90-264)
 - 2.3.2** Maritime Occupational Health and Safety Regulations (SOR/87-183)

	CCGS Leonard J Cowley	
Spec Item #: H-04	Specification	F7049-210183
FIXED FIRE SUPPRESSION SYSTEM		

2.3.3 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

3.1.1 The vessel has a combination FM200 and CO₂ as listed below.

3.1.2 The following Kidde FM200 and CO₂ systems are fitted onboard.

Space	System Purpose	# of Bottles	Full Weight of Cyl/Agent incl Cap	Type
Shaft Tunnel	Purifier Room	1	181.8	FM 200
Tank and Pump Room	Paint Room	1	47.8	FM 200
Emerg Gen Room	Emerg Gen Room	1	175.2	FM 200
Harbour Gen Room	Harbour Gen Room	1	200.4	FM 200
Fwd Main E/R Port Side	Motor Control Room	1	209.8	FM 200
Bridge Deck Stbd Side Stack	Engine Room Stbd	1	615.4	FM 200
Bridge Deck Stbd Side Stack	Engine Room Port	1	613.8	FM 200
Bridge Deck Stbd Side Stack	E/R Stack Fwd Cylinder	1	340	FM 200
Helicopter Hanger	AV Gas Fueling Disp Cabinet	1	31.0	FM 200
Incinerator Room	Incinerator Room	1	100.3	FM 200
Bow Thruster Comp Stbd Cyl	Bow Thruster Compt	1	274.4	FM 200
Bow Thruster Comp Port Cyl	Fwd Machinery Space	1	240	FM 200
Steering Flat	AV Gas Pump Room	1	75.8	FM 200
Steering Flat	Steering Gear	1	338.4	FM 200

	CCGS Leonard J Cowley	
Spec Item #: H-04	Specification	F7049-210183
FIXED FIRE SUPPRESSION SYSTEM		

Steering Flat	AV Gas Tank Cofferdam	1	187.6	FM 200
Hanger	Hanger	1	125 lb	CO2
Hanger	Hanger	1	23 ft3	N2
Foc'sle Deck Fan Room	Gun Lockers	1	25 lb	CO2

3.1.3 Before any work is to commence The Contractor must meet with the CG CE for identification and lockout of all FM200 system power isolation switches and to inform ships personnel that these systems will be worked on and will be non-operational.

3.1.3.1 The Contractor must contact ABS before work begins and must arrange for an ABS Class Surveyor to be present for the inspections if required.

3.1.4 The level and contents of each cylinder must be ascertained, recorded and given to the CG CE.

3.1.5 The FM200 cylinders, CO2 cylinders and N2 cylinders must be disconnected as per the manufacturer's recommendations and instructions. After advising CG CE of planned work, the CG CE will determine if he/she is required to witness testing. All FM200 heads must be removed and all associated piping must be blown through to prove all lines are clear and that the time delays and sirens are operational. All controls, electrical and mechanical, including sirens, ventilation shutdowns, pull handles and valves must be proven operational.

3.1.6 The Contractor must include in the bid a \$20,000 allowance for replacement of FM Flexible lines as per Manufacturers recommendations. Actual amounts to be adjusted up or down via PSPC 1379 action based on invoice.

3.1.7 Upon completion of all work, all systems must be reconnected and in correct working order.

3.2 Location

3.2.1 The locations are listed in the above charts in 3.1.2.

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: H-04	Specification	F7049-210183
FIXED FIRE SUPPRESSION SYSTEM		

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 The Contractor is responsible for arranging with ABS for inspection of the fire detection system as required

4.2 Testing

4.2.1 As per Technical Description, CG TA and ABS Class Surveyor must be notified of all testing. Attendance to be verified prior to starting.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to the CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-05	Specification	F7049-210183
GALLEY HOOD AND LAUNDRY DRYER EXHAUST CLEANING		

H-05 Galley Hood and Laundry Dryer Exhaust Cleaning..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to carry out the annual cleaning of the galley range hood exhaust trunking and laundry drier exhaust cleaning. Starting at the galley range hood to the exit point at the exterior deck ventilator mushroom as well as the clothes dryer vents from laundry room to exit on Focsle deck in front of the wheelhouse.
- 1.2** This work must be carried out in conjunction with the following spec items:
 - 1.2.1** H-03 Fire Detection System Annual Service
 - 1.2.2** H-04 Fixed Fire Suppression System
 - 1.2.3** H-06 Portable Extinguishers
 - 1.2.4** H-07 Firefighters Suits, SCBA's and Cylinders
 - 1.2.5** H-24 Fixed Foam and Wet Chemical

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Ventilation Arrangement Bridge and Focsle Deck S-111-2
- 2.1.2** Ventilation Arrangement Aft and Upper Deck S-111-3
- 2.1.3** Ventilation Arrangement FWS Upper Deck S-111-4
- 2.1.4** Ventilation Arrangement Aft Main Deck S-111-5
- 2.1.5** Ventilation Arrangement Main Deck FWD S-111-6

2.2 Standards

- 2.2.1** See General Notes

2.3 Regulations

- 2.3.1** Canada Shipping Act

	CCGS Leonard J Cowley	
Spec Item #: H-05	Specification	F7049-210183
GALLEY HOOD AND LAUNDRY DRYER EXHAUST CLEANING		

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.3 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

Galley Hood

3.1.1 The Contractor must ensure this work is scheduled around working hours of the vessels galley (if operational). Advance notice must be given and a time agreed upon with the CG CE.

3.1.2 The Contractor must carry out the lock out procedure with the ships CG CE for isolation of the galley range, stove, deep fryer and range hood ventilation exhaust fan.

3.1.3 The Contractor must degrease all galley exhaust ductwork including range hood and exhaust fan. Any removed sludge/residues must be properly disposed of by The Contractor.

3.1.4 The Contractor must remove the exterior deck ventilation diffuser top for internal inspection and cleaning of the ventilator piping/duct work. The Contractor must note that the exhaust fan and motor assembly are house in the exterior deck ventilator top.

3.1.5 The Contractor must dis-connect the motor wiring at the junction box prior to removing the vent top and must re-connect upon completion of the work. The Contractor must fit the ventilator top complete with new gasket upon completion of the cleaning. The Contractor must supply and fit new stainless steel securing bolts, nuts and lock washers.

3.1.6 The Contractor must thoroughly clean ventilation ducting from the range hood up through to the exit point on deck.

	CCGS Leonard J Cowley	
Spec Item #: H-05	Specification	F7049-210183
GALLEY HOOD AND LAUNDRY DRYER EXHAUST CLEANING		

3.1.7 The Contractor must ensure that the condition of the galley is left in a clean condition upon completion of the work in this specification.

Laundry Dryer Exhaust Cleaning

3.1.8 The Contractor must thoroughly clean by a combination of mechanical/pneumatic/vacuum methods both clothes dryer vents leading from the laundry room to their exit on the Focsle deck in front of wheelhouse.

3.1.9 These ducts exit through mushroom vents on a raised platform on the Focsle deck. These vent covers must removed to gain suitable access to portions of the duct work. This platform is at a height of approximately 9 feet and has no railings. ISM working aloft procedures must be followed.

3.2 Location

3.2.1 Refer to drawings listed in Section 2.1.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to the vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected by CG TA or CG CE prior to completion.

4.2 Testing

4.2.1 All systems must be run up for a minimum of 30 mins and all spaces must be checked to confirm acceptable air flow.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

	CCGS Leonard J Cowley	
Spec Item #: H-05	Specification	F7049-210183
GALLEY HOOD AND LAUNDRY DRYER EXHAUST CLEANING		

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

H-06 Portable Extinguishers..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to secure the services of an authorized and certified company to perform an annual inspection and certification of the vessels portable fire extinguishers.
- 1.2** This work must be carried out in conjunction with the following spec items:
- 1.2.1** H-03 Fire Detection System Annual Inspection
 - 1.2.2** H-04 Fixed Fire Suppression System
 - 1.2.3** H-05 Galley Hood and Laundry Dryer Exhaust Cleaning
 - 1.2.4** H-07 Firefighters Suits, SCBA's and Cylinders
 - 1.2.5** H-24 Fixed Foam and Wet Chemical

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1

#	Type	Location	Serial #	Manu Date	Next DC 6yr Maint	Last DC 6yr Maint	Last Hydro	Next Hydro	Remarks
1	5lb/CO 2	Navigation Bridge	222209	1990			Feb 2020	Feb 2025	
1.1	15lb CO2	Navigation Bridge	895958	2015			Feb 2020	Feb 2025	
2	20lb/D C	Bridge deck alleyway	96596880	2020	Jan 2026			Jan 2032	
3	20lb/D C	Bridge Deck/Fire stn #7	96596881	2020	Jan 2026	Sep 2014		Jan 2032	
4	20lb/D C	Focsle deck/Fire stn #4	96596884	2020	Jan 2026	Sep 2014		Jan 2032	

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

5	20lb/D C	Focsle deck alleyway/Fire stn #8	96596870	2020	Jan 2026	Sep 2014		Jan 2032	
6	125lb ABC	Helicopter Hanger	9047	2003			Jan 2016	Jan 2028	
6.1	50 kg ABC	Helicopter Hanger	TA5015641	2018	Jan 2024			Jan 2030	
7	15lb/C O2	Helicopter Hanger	137078	1990			Feb 2020	Feb 2025	
8	15lb/C O2	Helicopter Hanger	658248	2013			Feb 2019	Feb 2024	
11	15lb/C O2	Focsle deck- Outside Hangar door	26046	2021					
12	20lb/D C	Upper deck Officers Mess	96596885	2020	Jan 2026			Jan 2032	
13	20lb/D C	Upper deck Officers Pantry	96596882	2020	Jan 2026			Jan 2032	
14	20lb/D C	Emergency Generator Room	96596889	2020	Jan 2026			Jan 2032	
15	20lb/D C	Upper deck/Fire stn #10	96092812	2018	Jan 2024			Jan 2030	
16	20lb/D C	Upper deck/Fire stn #9	965969888	2020	Jan 2026			Jan 2032	
18	20lb/D C	Upper deck/Fire stn #5	96596887	2020	Jan 2026			Jan 2032	
19	20lb/D C	Upper deck Accom. Forward	96596883	2020	Jan 2026			Jan 2032	
20	20lb/D C	Upper deck Accom. Forward	96596895	2020	Jan 2026			Jan 2032	
21	20lb/D C	Upper deck Accom. Forward	96596898	2020	Jan 2026			Jan 2032	
22	20lb/D C	Upper deck Accom. Forward	96596896	2020	Jan 2026			Jan 2032	
23	20lb/D C	Upper deck Accom. Forward	96596886	2020	Jan 2026			Jan 2032	

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

24	20lb/D C	Upper deck Accom. Forward	96596886	2020	Jan 2026			Jan 2032	
25	5lb/CO 2	Upper deck Bosun's locker	2222671	2005			Feb 2020	Feb 2025	
26	20lb/D C	Survivor's Lounge	96596873	2020	Jan 2026			Jan 2032	
27	20lb/D C	Forepeak/Fire stn #2	96596865	2020	Jan 2026			Jan 2032	
28	20lb/D C	Main Deck/Fire stn #1	96596850	2020	Jan 2026			Jan 2032	
29	20lb/D C	Main deck/Fire stn #6	96596857	2020	Jan 2026			Jan 2032	
30	20lb/D C	Main Deck Rec. Room	96596866	2020	Jan 2026			Jan 2032	
D31	10lb/C O2	Incinerator room	999620	2019			Feb 2019	Feb 2024	
32	20lb/D C	Main Deck- under stairs	96596858	2020	Jan 2026			Jan 2032	
33	20lb/D C	Main Deck- under stairs	17738586	2021	Jan 2027			Jan 2033	
34	20lb/D C	Main Deck- under stairs	96596872	2020	Jan 2026			Jan 2032	
35	20lb/D C	Engineers Change Room	96596859	2020	Jan 2026			Jan 2032	
36	20lb/D C	Engineers Change Room	96596863	2020	Jan 2026			Jan 2032	
37	20lb/D C	Engineers Change Room	96596890	2020	Jan 2026			Jan 2032	
38	20lb/D C	Engineers Change Room	96596852	2020	Jan 2026			Jan 2032	
39	20lb/D C	Engineers Change Room	96596860	2020	Jan 2026			Jan 2032	
40	20lb/D C	Main Deck- crews lounge	96596854	2020	Jan 2026			Jan 2032	
41	25lb/K	Main deck- Galley	88061489	2020					

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

42	20lb/D C	Main deck/Fire stn #15	96596868	2020	Jan 2026			Jan 2032	
43	20lb/D C	Main deck- outside dry stores	96596856	2020	Jan 2026			Jan 2032	
44	20lb/D C	Main deck- outside dry stores	96596855	2020	Jan 2026			Jan 2032	
45	20lb/D C	Main deck- outside dry stores	96596864	2020	Jan 2026			Jan 2032	
46	20lb/D C	Main deck- outside dry stores	96596875	2020	Jan 2026			Jan 2032	
48	20lb/D C	Main deck- outside dry stores	5012898	2015	Sep 2021	Sep 2014		Sep 2027	
49	20lb/D C	Aft Accom.- Steering Flat	96596878	2020	Jan 2026			Jan 2032	
50	20lb/D C	Aft Accom/Fire stn #14	96596871	2020	Jan 2026			Jan 2032	
51	20lb/D C	Hold deck/Fire stn #22	96596862	2020	Jan 2026			Jan 2032	
52	20lb/D C	Engine Room/Fire stn #16/Gen.room	96596872	2020	Jan 2026			Jan 2032	
64	20lb/D C	Aft ER - near air compressor	96596857	2015	Dec 2021	Dec 2015	Dec 2015	Dec 2027	
53	15lb/C O2	Engine Control Room	137084	1990			Feb 2020	Feb 2025	
54	20lb/D C	Engine Room- under phone	96596869	2020	Jan 2026			Jan 2032	
55	20lb/D C	Engine Room/Fire stn #17	96596853	2020	Jan 2026			Jan 2032	
56	20lb/D C	Engine Room/Fire stn #18	96596867	2020	Jan 2026			Jan 2032	

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

57	20lb/D C	Engine Room/Fire Stn #19	96596876	2020	Jan 2026			Jan 2032	
59	15lb/C O2	Aft WTD	137266	1990			Feb 2020	Feb 2025	
60	20lb/D C	Engine Room-Under escape hatch	88378691	2019	Feb 2025			Feb 2031	
58	20lb/D C	Gear Box (Fire stn #20)	96596877	2020	Jan 2026			Jan 2032	
61	20lb/D C	Engine Work shop/Fire stn #21	96596849	2020	Jan 2026			Jan 2032	
62	20lb/D C	Fore Peak Stores	96596897	2020	Jan 2026			Jan 2032	
63	20lb/C O2	Fore Peak Stores	112316	1990			Feb 2020	Feb 2025	
?	8lb/DC	Port lifeboat	97201043	2020	Jan 2026			Jan 2032	
?	5lb/DC	Port FRC	89877349	2020	Jan 2026			Jan 2032	
?	10lb/A BC	Spare (SAR Locker)	13831650	2016	Jan 2022	Jan 2016	Jan 2016	Jan 2028	
?	8lb/AB C	Stbd lifeboat	51045740	2018	Dec 2019	Dec 2013	Dec 2013	Dec 2025	
?	8lb/AB C	Stbd FRC	51046986	2018	Sep 2020	Sep 2014	Sep 2009	Sep 2021	

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 See General Notes

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

2.4.1 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must secure the services of a certified company to perform the annual inspection, servicing and certification of the ship's portable fire extinguishers. Annual maintenance must be performed on sixty-six (66) portable extinguishers; both CO₂ and dry chemical. These extinguishers must be thoroughly examined, serviced and refilled as necessary.

3.1.2 The Sub-Contractor must inspect and certify all extinguishers and components to the requirements of NFPA 12.

3.1.3 The Contractor must remove the ships fire extinguishers from the vessel and transport them to the sub-contractors facility for servicing and testing, if required and the costs for that to be included in the pricing. Testing can be completed onsite if possible, and if permitted by Sub Contractor.

3.1.4 The below extinguishers must be hydrotested:

3.1.4.1 #1 - 5lb CO₂ – 222209

3.1.4.2 #1.1 - 15lb CO₂ – 895958

3.1.4.3 #6 – 125lb ABC – 9047

3.1.4.4 #7 – 15lb CO₂ - 137078

3.1.4.5 #8 – 15lb CO₂ – 658248

3.1.4.6 #11 – 15lb CO₂ – 504910

3.1.4.7 #25 – 5lb CO₂ – 2222671

3.1.4.8 #D31 – 10lb CO₂ – 999620

3.1.4.9 #48 – 20lb DC – 5012898

3.1.4.10 #64 – 20lb DC – 96596857

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

3.1.4.11 #53 – 15lb CO2 – 137084

3.1.4.12 #59 – 15lb CO2 – 137266

3.1.4.13 #63 – 20lb CO2 – 112316

3.1.4.14 10lb ABC – Spare (SAR LOCKER) – 13831650

3.1.4.15 8lb ABC – Stbd Lifeboat – 51045740

3.1.4.16 8lb ABC – Stbd FRC - 51046986

3.1.5 The Contractor must fit each extinguisher with a tag indicating the inspection date.

3.1.6 The Contractor must provide a unit cost to replace each of the below types/sizes of extinguishers. Any repairs and/or refilling of any fire extinguishers will be addressed with PSPC 1379 action and shall be approved by CG TA prior to work commencing.

3.1.6.1 5lb DC/ABC

3.1.6.2 2.5lb DC/ABC

3.1.6.3 20lb DC/ABC

3.1.6.4 10lb DC/ABC

3.1.6.5 8lb DC/ABC

3.1.6.6 10lb CO2

3.1.6.7 15lb CO2

3.1.6.8 5lb CO2

3.1.6.9 20lb CO2

3.1.6.10 2.5 gal Pressurized Water & Wet Chemical Class K

3.1.7 The Contractor must return all extinguishers to the vessel and reinstall them in their original positions to the satisfaction of the CG TA.

3.1.8 CO2 bottles must be hydro tested every 5 years and DC bottles must have a 6 year maintenance check and must be hydro tested every 12 years.

3.1.9 The serial numbers for the CO2 bottles are the ones stamped on the cylinder itself.

3.1.10 The Contractor must bid an allowance of \$5500.00 to be used for required repairs and adjusted by PSPC 1379 action based on proof of invoice.

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

3.2 Location

3.2.1 See 2.1.1

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 As required

4.2 Testing

4.2.1 As required

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date. Each extinguisher must be “tagged” to show the inspection date

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

	CCGS Leonard J Cowley	
Spec Item #: H-06	Specification	F7049-210183
PORTABLE EXTINGUISHERS		

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

H-07 Firefighters Suits, SCBA's and Cylinders..

Part 1 - Scope

- 1.1** The purpose of this specification is for The Contractor to carry out the annual safety inspection of the vessel's fire suits including the associated breathing apparatus. The Contractor must perform all required annual maintenance. All work must be inspected by the attending ABS Class Surveyor. The Contractor must be responsible for scheduling the ABS Class Surveyor.
- 1.2** This work must be carried out in conjunction with the following spec items:
 - 1.2.1** H-03 Fire Detection System Annual Inspection
 - 1.2.2** H-04 Fixed Fire Suppression System
 - 1.2.3** H-05 Galley Hood and Laundry Dryer Exhaust Cleaning
 - 1.2.4** H-06 Portable Extinguishers
 - 1.2.5** H-24 Fixed Foam and Wet Chemical

Part 2 - References

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** N/A
- 2.2 Standards**
 - 2.2.1** See General Notes
 - 2.2.2** All annual maintenance must comply with applicable National Fire Protection Association standards.
 - 2.2.3** All work must be performed by authorized manufacturer's qualified technicians.
- 2.3 Regulations**
 - 2.3.1** See General Notes
- 2.4 Owner Furnished Equipment**

	CCGS Leonard J Cowley	
Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

2.4.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** Annual maintenance and inspection of the five MSZ AirHawk MMR Breathing Apparatus must be conducted by a certified MSA Technician. The BA's must be thoroughly examined, tested, cleaned, pass annual performance flow test and overhauled if necessary. Certification of such work must be provided to the CG TA.
- 3.1.2** Annual maintenance and inspection must be performed on all thirteen air cylinder bottles. The cylinders must be thoroughly examined, tested, cleaned, pass annual performance flow test and overhauled if necessary. Hydrostatic tests are **NOT** required . Certification of such work must be provided to the CG TA.
- 3.1.3** The Contractor must inspect seven fire suits for damage/wear and must alert the CG TA of any required repairs.
- 3.1.4** Each fire suit, cylinder and breathing apparatus must be reinstalled in its original position and in accordance with ABS requirements. Each suit must be verified as being ready for donning by CG TA.
- 3.1.5** All inspection certificates, satisfactory to ABS, must be provided for all equipment inspected. Certification (Including Air Quality Certificate from supplying source) must be on a date as close as practicable to the completion of refit.
- 3.1.6** The Contractor must bid an allowance of \$7500.00 to be used for required repairs and adjusted by PSPC 1379 action based on proof of invoice.

3.2 Location

3.2.1 Locations of five (5) MSA breathing apparatus:

- 3.2.1.1** Two in the alleyway aft of Bosun's store
- 3.2.2.2** Two in the Engineer's change room
- 3.2.3.3** One outside Gym

	CCGS Leonard J Cowley	
Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

3.2.2 Location of the seven (7) fire suits:

3.2.2.1 Three in the alleyway aft of Bosun's store

3.2.2.2 Two in the Engineer's change room

3.2.2.3 Two in the Hanger

3.2.3 Details of thirteen (13) cylinders:

Location	Cylinder S/N	Regulator S/N	Last Air Change/VIP	Next Air Change	Next Hydro Test
Upper Deck Fwd (Complete Set)	DG253597	240583	Jan 2020	Jan 2021	Nov 2022
Upper Deck Fwd (Complete Set)	DG253644	136913	Jan 2020	Jan 2021	Nov 2022
Survivors Lounge (Spare Cyl) Fwd	DG248204	N/A	Jan 2020	Jan 2021	Nov 2022
Survivors Lounge (Spare Cyl) Fwd	DG248587	N/A	Jan 2020	Jan 2021	Nov 2022
Survivors Lounge (Spare Cyl) Fwd	DG248323	N/A	Jan 2020	Jan 2021	Nov 2022
Upper Deck Fwd (Spare Cyl)	DG253635	N/A	Jan 2020	Jan 2021	Nov 2022
Upper Deck Fwd (Spare Cyl)	DG248355	N/A	Jan 2020	Jan 2021	Nov 2022
Upper Deck Fwd (Spare Cyl)	DG248317	N/A	Jan 2020	Jan 2021	Nov 2022
Main Deck Aft Accom. (Complete Set)	DG248312	240577	Jan 2020	Jan 2021	Nov 2022
Engineer's Change Rm (Spare Cyl)	DG248589	N/A	Jan 2020	Jan 2021	Nov 2022

	CCGS Leonard J Cowley	
Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

Engineer's Change Rm (Complete Set)	DG248341	240584	Jan 2020	Jan 2021	Nov 2022
Engineer's Change Rm (Spare Cyl)	DG248394	N/A	Jan 2020	Jan 2021	Nov 2022
Engineer's Chge Rm (Complete Set)	DG105311	240581	Jan 2020	Jan 2021	Nov 2022

3.2.4 Details of Firesuits

	Size	Manufacture date	Manufacturer	Model #	Serial #
Helmet	n/a	25 Jan 2010	Cairns Helmets	660CRFSY	n/a
Liner	Std	Mar 2008	American Firewear	3002207	n/a
Jacket	LG	Feb 2009	Fyersol OSX	22205K92L	C2002709
Gloves	L	n/a	Laurentide	n/a	n/a
Boots	9M/11W	n/a	Black Diamond	n/a	n/a
Pants	LG	Feb 2009	Fyrepel OSX	22305K92L	C2002732
Helmet	n/a	25 Jan 2010	Cairns Helmets	660CRFSY	n/a
Liner	Uni	n/a	Lifeliners Inc	NOM22ES	n/a
Jacket	XL	Feb 2009	Fyrepel OSX	22205K92X	C2002785
Gloves	L	n/a	Laurentide	14325	
Boots	12M	n/a	Black Diamond	n/a	n/a
Pants	XL	Feb 2009	Fyrepel OSX	22305K92X	C2002835
Helmet	n/a	25 Jan 2010	Cairns Helmets	660CRFSY	n/a
Liner	Uni	n/a	Majestic Fire	PAC II	n/a

	CCGS Leonard J Cowley	
Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

			Apparel		
Jacket	LG	Feb 2009	Fyrepel OSX	22205K92L	C2002716
Gloves	L	Dec 1995	Glove Corporation	Firefighter	n/a
Boots	10M	n/a	Black Diamond	n/a	n/a
Pants	LG	Feb 2009	Fyrepel OSX	22305K92L	C2002757
Helmet	n/a	25 Jan 2010	Cairns Helmets	660CRFSY	n/a
Liner	Uni	Dec 2006	Dire-Dex	H-11-NE-NB	77284
Jacket	2XL	Jun 2009	Fyrepel OSX	22205K922	C2003363
Gloves	L	Dec 1995	Glove Corporation	Firefighter	n/a
Boots	12M	n/a	Black Diamond	n/a	n/a
Pants	2XL	Jun 2009	Fyrepel OSX	22305K922	C2003381
Helmet	n/a	25 Jan 2010	Cairns Helmets	660CRFSY	n/a
Liner	Uni	n/a	Majectic Fire Apparel	n/a	n/a
Jacket	LG	Feb 2009	Fyrepel OSX	22205K92L	C2002730
Glove, L	L	Mar 1998	American Firewear	7500	n/a
Glove, R	L	n/a	Laurentide	n/a	n/a
Boots	10M	n/a	Black Diamond	n/a	n/a
Pants	L	Feb 2009	Fyrepel OSX	22305K92L	C2002758
Helmet	6 ¼ -8 ¾	Jul 2002	Chieftan	911	n/a
Liner	n/a	n/a	Ice Hood Liner Corp	25397	n/a
Jacket	LG	n/a	Fyrepel OSX	22205K92L	C2002724

	CCGS Leonard J Cowley	
Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

Gloves	XL	n/a	Glove Corporation	Firefighter	n/a
Boots	10M	n/a	Black Diamond	n/a	n/a
Pants	LG	Feb 2009	Fyrepel OSX	22305K92L	C2002751
Helmet	n/a	Dec 2008	Cairns Helmets	360SFSY	n/a
Liner	n/a	n/a	Majestic Fire Apparel	n/a	n/a
Jacket	XL	Sep 2005	Fyrepel OSX	12202Y98X	C100045
Gloves	XL	n/a	Laurentide	n/a	n/a
Boots	10 med	n/a	Fire Pro	002	n/a
Pants	XL	Aug 2006	Fyrepel OSX	12302498	C0002288C

3.3 Interferences

3.3.1 N/A

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected by CG TA or CG CE prior to completion.

4.2 Testing

4.2.1 As per Technical Description, CG TA and ABS Class Surveyor must be notified of all testing. Attendance to be verified prior to starting.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

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Spec Item #: H-07	Specification	F7049-210183
FIREFIGHTERS SUITS, SCBA's and CYLINDERS		

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-08	Specification	F7049-210183
BILGE CLEANING		

H-08 Bilge Cleaning..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to power wash (3000psi minimum) with hot water and degreaser the main engine room, shaft tunnel, steering flat and transducer tunnel bilges.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Transducer Compartment Arrangement
- 2.1.2** Tank Tops FRS. 18 – 52 590-11
- 2.1.3** Tank Tops FRS. 58 – 82 590-11
- 2.1.4** Engine Room Layout 590-59
- 2.1.5** Structural Sections, AFT – FR. 20 590-02 1 of 2
- 2.1.6** Structural Sections, FRS. 22 – 65 590-02 2 of 2
- 2.1.7** Structural Sections, FRS. 67 – 99 590-03

2.2 Standards

- 2.2.1** See General Notes

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

	CCGS Leonard J Cowley	
Spec Item #: H-08	Specification	F7049-210183
BILGE CLEANING		

3.1.1 This work must be carried out toward the end of refit when all other spec items are complete.

3.1.2 The Contractor must remove all deck screws, deck plates, lift and secure in order to gain access to tank top and engine room bilge.

3.1.3 The Contractor must power wash (3000 psi minimum) with hot water and degreaser the main engine room, shaft tunnel, steering flat and transducer tunnel bilges. The Contractor must bid on removing 10 m3 of residual oil/water mixture prior to cleaning and provide a unit cost per m3 for any additional oil/water mixture required to be removed for adjustment via PSPC 1379 action. Any fluid removal as a result of bilge cleaning is to be The Contractors responsibility.

3.1.3.1 The tank top areas of these bilges are listed below:

3.1.3.1.1 Main Engine Room – 134m2

3.1.3.1.2 Shaft Tunnel – 25m2

3.1.3.1.3 Pipe Tunnel/Sonar Compartment – 56m2

3.1.3.1.4 Steering Flat – 21m2

3.1.3.2 The Contractor must provide a unit cost per m2 to clean and degrease additional bilge areas. Any additional area to be adjusted by PSPC 1379 action.

3.1.4 During this work, all accumulated water, cleaning fluids and debris are to be removed manually or by a vacuum truck.

3.1.5 The Contractor must take all necessary precautions to protect electrical machinery and equipment, junction boxes and all other machinery and equipment from ingress of water during the washing process. Any ingress of water or damage to any equipment caused thereby will be corrected by The Contractor at their expense.

3.1.6 Any splashing of dirt, debris, oily sludge or other substance onto any area above or beyond areas listed in 3.1.3.1 must be contained and limited. Any areas so affected must be cleaned by The Contractor. All areas must be left in a clean condition.

	CCGS Leonard J Cowley	
Spec Item #: H-08	Specification	F7049-210183
BILGE CLEANING		

3.1.7 Any chemicals used for cleaning must be non-flammable and the vapors non-toxic. The Contractor must provide a copy of the WHMIS MSDS to the CG TA prior to start of work.

3.1.8 The Contractor must arrange for an inspection of the bilges by CG TA prior to leaving vessel to ensure they are cleaned to a satisfactory condition.

3.1.9 On completion of the work all bilge wells must be shown to be clean and float alarms must be proven operational to CG TA. Upon completion of all inspections by CG TA, The Contractor must re-install all deck plates back in their original position and secure them with deck screws.

3.2 Location

3.2.1 Main Engine Room Bilges

3.2.2 Shaft Tunnel Bilges

3.2.3 Pipe Tunnel/Sonar Compartment

3.2.4 Steering Flat

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 To the satisfaction of CG TA and CG CE after completion of the cleaning.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5 – Deliverables

	CCGS Leonard J Cowley	
Spec Item #: H-08	Specification	F7049-210183
BILGE CLEANING		

5.1 Drawings/Reports

5.1.1 N/A

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-09	Specification	F7049-210183
HVAC AND MACHINERY SPACES DUCT CLEANING		

H-09 HVAC and Machinery Spaces Duct Cleaning

Part 1 - Scope

- 1.1** The intent of this specification is to carry out the cleaning and testing of the air handling units ducting, intake plenums, recirculation plenums, washroom exhaust, louvers and dampers associated with the shipboard accommodation and machinery ventilation systems.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Ventilation Arrangement Navigation Bridge Deck S-111-1
- 2.1.2** Ventilation Arrangement Bridge and Focsle Deck S-111-2
- 2.1.3** Ventilation Arrangement Aft and Upper Deck S-111-3
- 2.1.4** Ventilation Arrangement FWS Upper Deck S-111-4
- 2.1.5** Ventilation Arrangement Aft Main Deck S-111-5
- 2.1.6** Ventilation Arrangement Main Deck S-111-6
- 2.1.7** Ventilation Arrangement E/R and Hold Deck S-111-7
- 2.1.8** Bow Thruster Ventilation Arrangement Hold Deck S-111-9

2.2 Standards

- 2.2.1** See General Notes

2.3 Regulations

- 2.3.1** Canada Shipping Act
- 2.3.2** Maritime Occupational Health and Safety Regulations (SOR/87-183)
- 2.3.3** ABS Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** N/A

	CCGS Leonard J Cowley	
Spec Item #: H-09	Specification	F7049-210183
HVAC AND MACHINERY SPACES DUCT CLEANING		

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must ensure all 3 AHU's, washroom exhaust fans, machinery space fans and air heaters are locked out before commencing of this work. Proper lock out procedures must be followed as per the vessels ISM lockout procedures.
- 3.1.2** The Contractor must thoroughly clean all ventilation ducting for the vessels 3 air handling unit systems, machinery space supply fans and washroom exhaust by a combination of mechanical/pneumatic/vacuum methods in full conformance with applicable industry standards.
- 3.1.3** The Contractor must include the removal and cleaning of the ventilation diffusers throughout the ship and their replacement after completion of the duct cleaning.
- 3.1.4** The Contractor must use vacuum hoses capable of extending through all sections of ducting.
- 3.1.5** Existing openings and access patches in ductwork must be used, and must be returned and resealed to the as found condition using approved fire-rated materials. All dampers must be proved functional and operational to CCG TA, including signage for open and close position for the dampers.
 - 3.1.5.1** All flow control dampers must be returned to their original positions after cleaning.
- 3.1.6** If additional access openings are required to enable a full and proper job, The Contractor will be responsible for closing/re-sealing with approved fire rated materials. Plastic plugs and/or other flammable sealants must not be used. Any existing non-fire rated materials found in the system must be replaced with approved fire-rated materials. The Contractor must bid an allowance of \$15000.00 for the repairs of existing defects found as a result of the cleaning.
- 3.1.7** The Contractor must ensure cleanliness of all work and accommodation spaces affected by the cleaning process is maintained in an as found condition during and upon completion of the duct cleaning. Upon completion of work all debris and cleaning chemicals must be removed from the ship. The Contractor must clean all deck heads, bulkheads, furniture, equipment of all dirt, hand prints, etc. after re-

	CCGS Leonard J Cowley	
Spec Item #: H-09	Specification	F7049-210183
HVAC AND MACHINERY SPACES DUCT CLEANING		

assembly of all interior surfaces to the satisfaction of TA. All cleaned surfaces for accommodation ventilation duct are to be treated with a safe, sanitizing biocide coating that has been demonstrated to prevent the growth of bacteria and fungi.

3.2 Location

3.2.1 Refer to drawings listed in Section 2.1.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to the vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected by CG TA or CG CE prior to completion.

4.2 Testing

4.2.1 All systems must be run up for a minimum of 30 mins and all spaces must be checked to confirm acceptable air flow.

4.2.2 The Contractor must prove all dampers and diffusers operate properly and according to the signage.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

	CCGS Leonard J Cowley	
Spec Item #: H-09	Specification	F7049-210183
HVAC AND MACHINERY SPACES DUCT CLEANING		

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

H-10 Port and Stbd Miranda Davit Annual Inspection..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to arrange for the services of a Palfinger Marine Representative to carry out the Annual Inspection and Survey on both Port and Stbd Miranda Davits.
- 1.2** The inspection and survey must be in accordance with Transport Canada Regulations and must include issuance of a T8 certificate.
- 1.3** This work must be carried out in conjunction with the following:
 - 1.3.1** H-11 Port and Stbd Lifeboat and Davit Replacement.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Miranda MRT 3900 Davit & BHY 5300 Winch
 - 2.1.1.1** Port Serial Number – CE014-3737-B-ARM-B1
 - 2.1.1.2** Stbd Serial Number – CE014-3737-A-ARM-A
- 2.1.2** BHY 5300 Winch
 - 2.1.2.1** Port Serial Number – 145700
 - 2.1.2.2** Stbd Serial Number – 145701
- 2.1.3** Ships Manual #55 in CG CE Cabin

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet Safety and Security Manual (DFO/5737)

2.3 Regulations

- 2.3.1** See general Notes
- 2.3.2** Canada Shipping Act 2001

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

2.3.3 Cargo, Fumigation & Tackle Regulations (TC)

2.3.4 Maritime Occupational Health and Safety Regulations (SOR/87-183), Relevant ABS Rules and Regulations

2.3.5 TP 14475 E - Canadian Life Saving Appliance Standard

2.3.6 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.2 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 The Contractor must arrange for the services of a Palfinger Marine Representative to carry out the Annual Inspection and Survey.

3.1.2 The Contractor must bid on having FSR onsite for 14 working days at 10hrs per day (140 hrs total) and 2 travel days at 12 hrs per day(24 hrs total). Contractor must provide a daily rate for FSR to be used for adjustment purposes via PSPC 1379 action.

3.1.2.1 The Contractor must bid on providing person lift/basket and operator for 30 hrs as directed by FSR to be adjusted up/down via PSPC 1379 action as required. The Contractor must provide an hourly rate for person lift/basket and operator to be used for adjustment purposes via PSPC 1379 action.

3.1.2.2 The Contractor must bid on providing 280 hours of assistance as required by FSR to be adjusted up/down via PSPC 1379 as required. The Contractor must provide hourly rate for assistance to be used for adjustment purposes based on PSPC 1379 action.

3.1.3 FRC's will be placed in the water prior to docking and must be removed from water using The Contractor supplied crane. FRC's must be placed onto CG supplied cradles for duration of docking. Upon undocking, FRC's must be placed back in the water using The Contractor supplied crane. The Contractor must be responsible for offloading and loading of cradles from vessel to dock.

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

- 3.1.4** The Contractor must ensure the electric motors are locked out by ships crew prior to work commencing.
- 3.1.5** FSR and CG TA to perform complete visual inspection of the appliance, including structure, winches, attachments and markings (SWL, Load diagram, operating control instructions, etc) prior to work starting.
- 3.1.6** UT Shots and MPI testing of the davit structure, lugs, pins, deck area, etc must be carried out by a Certified Level II Technician. FSR, CG TA and ABS Class Surveyor to provide guidance as to where the UT Shots and MPI are to be taken. The Contractor must bid on performing 200 UT Shots and 80 linear ft of MPI. The Contractor must provide unit cost per UT Shot and per ft of MPI to be adjusted up or down via PSPC 1379 action.
- 3.1.7** Any deficiencies found must be discussed with the CG TA, FSR and ABS Class Surveyor prior to work commencing.
- 3.1.8** The Contractor must drain oil from the winch gear case and remove the gear case cover. The Contractor must inform the CG TA if there is any water content showing in the used oil. The Contractor must inspect the gear case for wear and damage. The Contractor must measure and record all backlash on all internal gears.
- 3.1.9** The Contractor must prove that the gear case vent is free/clear and functioning properly to prevent internal pressure. The Contractor must flush the gear case with new oil until all residue water and dirt is removed. The Contractor must fit gear case oil drain plug with pipe sealant and fill the gear case to the correct operating level with oil. The Contractor must replace the gear case cover with a new gasket, same material as original. The oil required for refilling to be Contractor supplied.
- 3.1.10** The Contractor must dismantle the winch brake assemblies to gauge wear and check for signs of overheating. This must include dismounting of the manual hand brake and centrifugal brake assembly from its shaft. The brake linings and centrifugal brake pads must be inspected for wear and damage. The brake lining retaining screws must be inspected. The centrifugal brake springs must be inspected for wear and damage. Wear measurements of the brake linings must be recorded and compared to manufactures specifications, if measurements are below specifications, The Contractor must supply and renew brake linings.

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

- 3.1.11** The Contractor must clean all parts including any brake dust from the brake housing. The Contractor must de-glaze the running contact surfaces of the centrifugal brake drum housing and the hand brake inner cone clutch by machining them true. The Contractor must check with the Manufacturer to obtain the minimum rotor thickness tolerance.
- 3.1.12** The Contractor must re-assemble the brake assemblies using lock-tite on all the brake lining securing screws. After re-assembly the breaks must be adjusted to the correct setting. The davit must be lowered under load(Cradle and FRC) to test the operation of the brakes post re-floating of the vessel.
- 3.1.13** The Contractor must prove to the CG TA that all grease fittings and hoses are clear on all davit and cradle components.
- 3.1.14** The Contractor must drain oil from hydraulic system and properly dispose of. The Contractor must flush hydraulic system with new oil of same weight as existing to ensure all old oil is purged from system.
- 3.1.15** The Contractor must wipe clean the hydraulic oil tank to the satisfaction of FSR. The Contractor must supply and install new filters in system, new inspection covers and new hydraulic oil compatible gaskets on tank.
- 3.1.16** The Contractor must dismantle all 20 sheave and pins, clean, inspect, measure and reinstall. Any pins or sheaves that do not meet the minimum requirements as determined by FSR must be replaced. All grease ways to be proven clear on the davits prior to sheaves and pins being re-installed. Any parts requiring replacement to be addressed via PSPC 1379 action.
- 3.1.16.1** The Contractor must bid a unit price to machine 1 bushing and 1 pin for adjustment purposes via PSPC 1379 action.
- 3.1.16.2** The Contractor must measure wear on all as fitted sheave brass wear washers for comparison to the original readings.
- 3.1.16.3** The Contractor must measure and record:
- 3.1.16.3.1** Pin diameters taken uniformly along the axis in the horizontal and vertical planes.

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

3.1.16.3.2 Sheave bushings inside diameters taken uniformly along the axis in the horizontal and vertical planes.

3.1.16.3.3 All three sheave support bracket pin bores.

3.1.16.3.4 All wear washer thicknesses at four equidistant points.

3.1.17 The Contractor must re-install the three sheave assemblies on the davit and lock up the securing arrangement with Lock-Tite with the bolts tightened as per the standard torque chart for the type and grade of bolt used. The Contractor must grease all three sheaves and prove freedom of movement in their housing brackets.

3.1.18 The Contractor must remove both cradles from vessel and transport to The Contractor shop for inspection.

3.1.18.1 The Contractor must remove all rollers for inspection by FSR. The Contractor must perform visual inspection of cradles and perform Dye Penetrant testing on lifting lugs and all other welded connections on cradle. Upon completion of testing, The Contractor must blast cradles to bare steel and repaint according to paint scheme outlined in HD 12 Superstructure Steel Replacement and Painting. The Contractor must reinstall all rollers. Any rollers requiring replacement to be Contractor supplied and addressed via PSPC 1379 action. Any repairs required to be addressed via PSPC 1379 action.

3.1.19 Upon re-assembly of all davit and cradle components The Contractor must torque all bolts, screws and fasteners as per the standard torque chart for the type and grade of fastener used. All fasteners must be cleaned and coated with anti-seize compound prior to installation.

3.1.20 The Contractor must power tool any areas of disturbed coating to SSPC-SP3. All disturbed areas must be feathered and an area 2" beyond feathering must be abraded prior to installing the cradles.

3.1.21 The Contractor must include in their bid all costs for coating the entire davit using coating scheme listed in HD-12 Superstructure Steel Replacement and Painting.

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

3.1.22 All limit switches must be inspected, tested and replaced as deemed necessary with Contractor supplied.

3.1.22.1 The Contractor must bid on supplying and installing two new limit switches and provide a unit cost per switch to be adjusted via PSPC 1379 action.

3.1.23 The Contractor must bid on performing 2 load test and provide a unit cost per load test if additional are required. Actual number of loads tests to be adjusted up or down via PSPC 1379 action as required. The Contractor must provide crane, calibrated load cell, weights and any other parts required for completion of load test and removal of the same thereafter.

3.1.24 Following load testing(if required) and installing FRC's a full function test must be performed by The Contractor including:

3.1.24.1 Control panel alarms and indicators

3.1.24.2 Correct operation of controls

3.1.24.3 Limit switch, emergency stop and/or other safety device

3.1.25 Contact information for the FSR:

Sean Kasper - Service Coordinator

Palfinger Marine Canada 120-20575 Langley By Pass, Langley BC V3A 5E8 CANADA

Office +604 530 0814 | **Fax** + 604 530 0812 **Email** sean.kasper@palfingermarine.com

3.1.26 The Contractor must contact ABS Class Surveyor prior to starting work to determine what inspection points need to be witnessed and arrange for the presence of an ABS inspector accordingly.

3.2 Location

3.2.1 Port and stbd amidships on Upper deck.

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel.

Part 4 - Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA, FSR and ABS Class Surveyor.

4.2 Testing

4.2.1 Load test and any other tests as required by FSR and ABS Class Surveyor.

4.2.2 NDT as outlined in 3.1.6 and 3.1.18

4.2.3 Function test as outlined in 3.1.24

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date. All measurements taken must be included in the reports along with the limits of clearances.

5.2 Spares

5.2.1 N/A

5.3 Training

	CCGS Leonard J Cowley	
Spec Item #: H-10	Specification	F7049-210183
PORT AND STBD MIRANDA DAVIT ANNUAL INSPECTION		

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

H-11 Lifeboat and Davit Replacement..

Part 1 – Scope

- 1.0** The intent of this Statement of Requirements (SOR) is for The Contractor to supply two (2) new fifty (50) person lifeboats complete with their associated davits, equipment/components, and controls to replace the existing lifeboat and davit systems currently fitted onboard the CCGS Leonard J Cowley.
- 1.1** The proposed make of lifeboats and davit systems must be in current marine service and must have Original Equipment Manufacturer (OEM) representation in Canada. The manufacturer's appointed service organization must hold a stock of essential spares and be capable of providing qualified field service representatives (FSRs), thorough component documentation support, with the capability to provide technical support for standard overhaul as well as repair. The service organization must be capable of delivering these services and parts to St. John's, NL, within forty-eight (48) hours of notification by the CCG.
- 1.2** The Contractor must submit their proposed lifeboat and davit packages and recommendations to Canada for review, selection, and approval.
- 1.3** The Contractor must develop and submit all of the necessary Classification Society approved drawings (e.g., foundation modifications, hydraulic piping, electrical etc.) and any engineering studies that will be needed to obtain the required regulatory approvals and certifications for this installation.
- 1.4** The Contractor must be responsible for the removal of the existing Schat-Harding Davits and lifeboats and their associated controls.
 - 1.4.1** All removed equipment must be disposed of by The Contractor unless otherwise specified by the CG TA. The costs associated with disposal must be included as part of the bid.
- 1.5** The Contractor must also be responsible for the supply, installation, commissioning and testing of the agreed upon lifeboat and davit packages in accordance with the OEM's installation procedures and the Class Approved drawings. Class and statutory approvals are to be obtained and certificates provided as and where required
- 1.6** This work must be carried out in conjunction with the following specification items:
 - 1.6.1** H-10 Port and Stbd Miranda Davit Annual Inspection

Part 2 - References

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

2.1 Rules, Regulations and Standards

2.1.1 All design, material and work must meet the Classification Society's (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify and coordinate any specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines referenced in this specification, (reference General Requirements, Section 4.0).

2.1.2 TCMSS approval, of design, material, work, and testing, over and above Class approval, must be met as and when required.

2.2 Drawings and Documents

2.2.1 The following drawings and documents are being referenced for guidance purposes only and a complete listing of available documents and drawings for the CCGS Leonard J Cowley's VLE Project is included in Appendix A of this VLE's Technical Data Package.

Drawing N°.	Description
590-70	General Arrangement – Profile Navigating Deck, Bridge deck & Foc'sle Deck Sht. 1 of 2
590-70	General Arrangement – Upper, Main Deck and Hold Sht. 2 of 2
590-12	Superstructure – Structural Plan Sht. 2 of 2
590-04	Profile and Decks Sht. 10f 2
548-12	Boarding and Lifeboat Arrangement
NB3037 A	KISS700 C Stbd GA SABB L3 w/EL. Start
NB3059 A	KISS700 C Port GA SABB L3 w/EL. Start
1512-004	Life Saving Equipment Plan

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

ATS/3632791/H/01	LRS Marine Design Appraisal Document Leonard J Cowley Port and Stbd Davit Installation
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2.3 Existing Equipment

2.3.1 Davits

2.3.1.1 OEM: Schat-Harding UK

2.3.1.2 Model: GRANT75 (x2)

2.3.2 Davit Winch(s)

2.3.2.1 OEM: Schat-Harding UK Harding Safety AS

2.3.2.2 Model BE4500 (x2) Model: BHY 5300 (x2)

2.3.3 Lifeboat

OEM Schat-Harding USA

Model KISS 700 (x2)

Length Overall:	6490 mm	Height Overall:	2850 mm
Breadth Overall:	2910 mm	Capacity:	50 Persons
Weight Empty:	2399 KG	Weight Fully Loaded:	6578 KG
Engine:	29 HP	Speed:	6 Knots

2.4 Contractor Supplied Material

2.4.1 The Contractor must supply all labour, equipment, materials, and tools required to perform the work as specified.

2.5 OEM/SUPPLIER/FSR

2.5.1 The Contractor must also include in their proposal the cost to provide the services of an authorized OEM FSR for the new davits, lifeboats, and the associated

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

equipment, and components being supplied. The OEM FSR is to oversee the installation(s) as well as the related commissioning and testing.

2.6 Government Supplied Equipment

2.6.1 N/A

2.7 Government Furnished Equipment

2.7.1 N/A

Part 3 – Technical Requirements

3.0 General

3.0.1 The Contractor must replace the existing two (2) Schat-Harding KISS700 Lifeboats complete with their associated davits, winches, and control systems with two (2) new lifeboat and davits packages complete with all associated components and controls.

3.0.2 All aspects of the exiting vessel structure, mechanical and electrical systems must be included in this design. The Contractor must be responsible for determining the full scope of structure and system and electrical changes required to accommodate the new lifeboat and davit package. Note: The Contractor is to reference LRS' MDAD ATS/3632791/H/01 entitled "*Leonard J Cowley Port and Stbd Davit Installation*" for further structural requirements regarding the davit installation.

3.0.3 The Contractor must be accountable for the Total System Responsibility for the new lifeboat and davit installations which is to include as a minimum the installation and systems' design, the integration to the vessel structure, the required vessel modifications, and the installation both mechanical and electrical, testing and the set to work of the lifeboat and davits.

3.0.4 The Contractor must provide a complete, Class approved design and drawing package for full scope of the lifeboats and davit replacement. The design and drawing package must include a specification detail defining how each aspect of the requirement will be dealt with.

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

- 3.0.5** The Contractor must provide any part or device necessary for the successful operation of the new installation(s) regardless of whether such part or device is specifically indicated herein.
- 3.0.6** Any items that, in the opinion of The Contractor, should form part of this package and/or need further clarification to enable the Contractor to prepare and price a complete replacement package must be brought to the attention of Canada, prior to the submission of bids.
- 3.0.7** The Lifeboat and davit replacements must be accomplished using Class approved Marine components and hardware throughout.
- 3.0.8** All new equipment being supplied and used to satisfy the requirements of this specification must be of current manufacture.

3.1 Procurement Requirements

3.1.1 Introduction

- 3.1.1.1** The Contractor must be responsible for the procurement and delivery of the lifeboats and davit package assemblies, complete with their associated ancillary, auxiliary equipment, controls, and any agreed upon spares and specialized tools, to their facilities in Canada.
- 3.1.1.2** All lifeboats and davit equipment, their supporting systems, auxiliary equipment/ components, and controls must be supplied by The Contractor, on a turnkey basis.

3.2 Delivery

- 3.2.1** On delivery to The Contractor's facilities, the lifeboats / davit packages must be inspected for any shipping damage. Arrangements must be made with Canada to have a representative present when these deliveries arrive on site and this representative must be allowed complete access to allow him or her to perform a full inspection on behalf of Canada. This inspection will require the opening of crates and or shipping boxes but will not require the opening of any hermetically sealed units unless damage to the packaging can be readily seen.
- 3.2.2** The Contractor must provide a minimum of five (5) days' notice to Canada to allow their designated representative to prepare and attend this inspection and The Contractor must provide any assistance required to allow Canada's representative access the various components.

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

3.2.3 The Contractor must also provide the necessary services and labor required to allow these inspections to take place.

3.2.4 After a satisfactory inspection, the lifeboats, davits, and their associated equipment/components are to be safely stored, protected from adverse weather and are to be quarantined until they are ready for installation.

3.3 Vessel Installation Requirements

3.3.1 The proposed davit system, complete with stowed lifeboat, must not impede access or otherwise block passage around or under the davit as currently fitted.

3.3.2 The installation must operate on a supply of 600 VAC / 3 PH / 60 Hz. For the lifeboat power requirements, the proposal must include 600 VAC / 1 PH / 60 Hz step-down transformers to the required operational voltage required by the OEM. The transformers must be mounted separately inside the ships adjacent machinery spaces and are to be marine rated with NEMA 4x enclosures.

3.3.3 All metal structures of the davit are to be coated with two (2) coats of primer followed by two (2) coats of RAL 9010 Pure White for a final DFT of 5 mils. This excludes any bearing surfaces, greased connections, or non-corroding material.

3.4 Davit Requirements

3.4.1 The davit must be electro-hydraulic and must have all major electric and hydraulic components housed internally for protection from water, ice, and debris. The internally housed electric and hydraulic components must be provided with inspection covers for access and maintenance. Inspection cover fasteners must be stainless steel.

3.4.2 The davit must be fitted with one (1) or two (2) shore connections as required by the OEM for the purpose of battery chargers and heating devices. Where two (2) different voltages are utilized, the receptacles must be of different designs to prevent interconnection with the incorrect voltage.

3.4.3 The lifeboat's engine compartment must be fitted with a thermostatically controlled space heater for the purpose of maintaining a dry environment.

3.4.4 The lifeboat and davit must be capable of launching with its full complement

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

of personnel and equipment, with a vessel trim under 10° and listing at 20°.

- 3.4.5** The davit must be fitted with a two (2) speed winch for the purpose of recovery.
- 3.4.6** The davit must be fitted with a lifeboat securing system, i.e., gripes, for the purpose of securing the lifeboat when the vessel is in service. These gripes must be automatic release upon the davit's movement from the stowed position.
- 3.4.7** The davit must be capable of remote operation from the helm position within the lifeboat for the purpose of deployment and for local operation for deployment and recover from the operator station on the vessel.

3.5 Lifeboat Requirements

- 3.5.1** The lifeboat must be of a totally enclosed and designed for a minimum complement of fifty (50) persons.
- 3.5.2** The lifeboat must be a rigid hull construction of a self-extinguishing glass fibre reinforced plastic (GRP) material. This material must be resistant to rot, corrosion, seawater, oil, fungus, and sunlight and deterioration from air temperature in the range of - 40°C to + 65.5°C.
- 3.5.3** All lifeboat release and retrieval systems must comply with the requirements of IMO Resolution MSC. 317 (89).
- 3.5.4** The exterior hull and canopy of the lifeboat must be of gel coat resin with a final colour of RAL 2008 Bright Red Orange or equivalent international standard. Lifeboat interior must be a finish colour of RAL 7035 Light Grey or similar.
- 3.5.5** Lifeboat markings must include the vessel's name, IMO number, Port of Registry, boat # and capacity marked on the port and starboard bows. The vessel's call sign CG2959 must be on the top of the lifeboat in retro-reflective markings.
- 3.5.6** The lifeboat must have an identification plate affixed to the interior hull with the following information provided:
 - 3.5.6.1** Serial number,
 - 3.5.6.2** Dimensions,

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

3.5.6.3 Date of manufacture,

3.5.6.4 Date of inspection,

3.5.6.5 Number of persons and

3.5.6.6 Load capacity.

3.5.7 The lifeboat must be fitted with retro-reflective tape as per the Life Saving Equipment Regulations and the IMO Life-saving Appliance (LSA) Code.

3.5.8 All walking surfaces, interior and exterior, must be fitted with non-skid coatings of the same colour as above.

3.5.9 The lifeboat must be fitted with a hull drain. The drain must be self-sealing in the event the drain plug is dislodged when the boat is in operation.

3.5.10 The lifeboat passenger cabin must be fitted with a ventilation arrangement that can be manually closed for passage in toxic atmospheres.

3.5.11 The lifeboat must be fitted with a manual bilge pump with valved connections to the passenger space and the engine compartment.

3.5.12 The lifeboat must be fitted with a rubber fender to protect the exterior hull. All fasteners must be 316 stainless steel.

3.5.13 The lifeboat must be fitted with buoyant grab lines along the exterior of the hull as per the requirements of the LSA Code.

3.5.14 The lifeboat must be fitted with a power connection receptacle for the supply of the battery charger(s) and lifeboat electrical system when not in operation. The power receptacle must be marked clearly as such.

3.5.15 The lifeboat must be fitted with internal cabin heaters. Voltage is to be the same as the onboard voltage for the lifeboat and cannot exceed the OEM recommended voltages. The heater total rating must be a minimum of 300 watts.

3.5.16 The lifeboat must have the following electrical equipment installed:

3.5.16.1 Two (2) canopy light,

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

3.5.16.2 Handheld search light,

3.5.16.3 Position indicating light

3.5.16.4 Illuminated compass.

3.5.17 The switch panel containing the circuits for these devices must be protected with fuses.

3.5.18 The lifeboat must be supplied with a full stock of standard life saving appliances and equipment as per the Life Saving Appliance Regulations for a Canadian SOLAS convention vessel; these must be stored in clearly marked watertight storage cabinets. The storage cabinets must be constructed within the interior of the lifeboat.

3.6 Lifeboat Prime Mover Requirements

3.6.1 The Lifeboat(s) prime mover must be an inboard compression ignition engine, water cooled, complete with pre-heater and dual electric start. The engine minimum engine power to be sized to fulfill the lifeboat speed requirements as per regulations. This engine must be capable of running in any position in the event of capsize or inclement weather and continue to run once the vessel has been returned to an upright position as per the requirements of the applicable Regulations.

3.6.2 All engine exhaust piping and the exhaust silencer are to be suitably insulated with a thermal insulating material.

3.6.3 The engine instrumentation panel must contain controls for engine start / stop, alternator output (voltage meter), battery charge / level indication, tachometer, jacket water temperature gauge, high jacket water temperature alarm, lube oil pressure gauge, and a low lube oil pressure alarm.

3.6.4 The lifeboat fuel tank must be constructed of stainless steel and have a capacity to operate the vessel underway at full rated speed for a minimum of twenty-four (24) hours as per the LSA Code and Life Saving Appliances Regulations for a Canadian SOLAS convention vessel. The fuel tank vent must be routed to the exterior of the vessel and be fitted with a spark arrestor at the exterior. The fuel system must be fitted with a disposable cartridge type in-line filter with isolation valves. The tank must be fitted with a level indication and fuel shut-off valve.

3.6.5 The helm position must be fitted with a reversible transmission and throttle

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

control and steering system. An emergency tiller steering system must also be incorporated within the lifeboat which disengages the helm control for steering.

- 3.6.6** The helm position must be fitted with a battery selector switch with positions of “Battery One, Battery Two, Both, and Off”.
- 3.6.7** The lifeboat must be fitted with a dual battery charger capable of maintaining the charge on the batteries when the lifeboat is stowed. The required operational input voltage not to exceed the OEM requirements. The batteries must be capable of receiving a charge from the battery chargers and the engine driven alternator.
- 3.6.8** Batteries must be supplied with the lifeboat and must be maintenance free, mounted in class approved containers, and be vented to the exterior of the lifeboat.
- 3.6.9** The lifeboat propeller shaft must be supported in water lubricated bearings and be fitted with a sealing arrangement fitted to the interior of the lifeboat.
- 3.6.10** The fitted propeller must be fabricated from a non-corroding material and be fitted with a guard.
- 3.6.11** The lifeboat engine cooling system must be a sealed system comprised of a keel cooler arrangement and be filled with a distilled water / antifreeze mixture suitable to - 40 °C. This system must also permit the running of the lifeboat in the stowed for a minimum time as defined by the LSA code and the Life Saving Appliance Regulations.

Part 4 – Proof of Performance

4.0 Inspection

- 4.0.1** All work performed must be inspected and must be to the satisfaction of the attending ABS Surveyor, and the CG TA.

4.1 Test and Trials

- 4.1.1** The Contactor under the guidance of the OEM’s FSR, must be responsible for proof testing the new davit assemblies to the satisfaction the attending ABS surveyor and the CG TA.

4.2 Factory Acceptance Testing (FAT)

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

- 4.2.1** The lifeboat and davit systems must be tested in accordance with regulatory requirements. Factory Acceptance Testing (FAT) procedures must be carried out at the manufacturer's facility.
- 4.2.2** The Contractor must ensure that a Factory Acceptance Trials (FAT) Plan from the OEM is provided for submission and review by Canada and then arrange to perform the required FAT, based on the submitted plan.
- 4.2.3** The FAT Plan must identify the tests and trials which are to be performed in order to satisfy this SOR, and to support certification requirements by the designated Classification Society. The FAT plan is to identify all conditions, precautions, adjustments, the expected test results, and the test equipment required to verify the correct operation of the new engines.
- 4.2.4** The FAT test report must be provided by the OEM and is to be signed off by the attending Class surveyor and copies provided to Canada. The results of the FAT tests and the accompanied test report are to be to the satisfaction of both attending Class surveyor and Canada, before the new lifeboat and davit assemblies are prepared for shipment to the Contractor's facilities.
- 4.2.5** Canada reserves the right to provide personnel to visit the OEM Facilities during the fabrication phase of the new engines as well as attending the FAT(s), at the OEM's facilities. These visits will be at Canada's expense. For such cases, the Contractor must provide a minimum thirty (30) days' notice for trials at OEMs premises.
- 4.2.6** Three (3) typewritten copies of all above noted test data must be provided to the CG TA prior to acceptance.

4.3 Harbour (Dock) Acceptance Trials (HATs)

- 4.3.1** Once the new davit installations has been completed, and is ready for operation, The Contractor must be responsible for the necessary commissioning and startup tests required by the OEM and Class. The commissioning and testing must only be done under the full guidance of the OEM's authorized FSR and is to be witnessed by the attending Class surveyor and the CG TA.
- 4.3.2** The Contractor must arrange to have the attending ABS Surveyor and the CG TA to inspect the newly installed equipment, to establish cleanliness, tightness, and that the supporting systems are correctly connected, i.e., electrical power, hydraulics, fluid levels, control systems, etc. All work is to be to the satisfaction of

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

ABS and the CG TA. Any deficiencies found must be rectified immediately by The Contractor. Necessary battery charging, signals, food rations, water rations, communications, hoisting hook connections with inside releases, loose equipment etc. to be also delivered to the satisfaction and requirements of the authorities.

4.3.3 All controls, alarms, and shutdowns must be proven functional, their operations witnessed, and is to be to the satisfaction of all both the attending ABS Surveyor and the CG TA.

4.3.4 Davits are to be tested using certified weights and copies of the weight certificates are to be provided to the CG TA.

4.4 Sea Acceptance Trials (SATs)

4.4.1 Upon completion of successful HATs and when all work has been completed to the satisfaction of the attending ABS surveyor and the CG TA, The Contractor must then be responsible for arranging to have a formal SAT performed to prove the operability and performance acceptance of the new lifeboat and davit assemblies whilst at sea.

4.4.2 Five (5) working days prior to commencing sea trials, the Contractor must provide a trials agenda and booklet to the CG TA complete with the sign off section for evaluation by the witnessing parties.

4.4.3 The Contractor must be responsible for producing, recording, and maintaining all trial sheets.

4.4.4 Three (3) typed copies of these trial sheets must be given to the CG TA after completion of all trials

4.5 Completion and Acceptance

4.6.1 On completion of a satisfactory SAT the Contractor must remove all hydraulic filters used during trials and replace them with new Contractor supplied filters units.

4.6.2 Filters are to be broken open and the filter elements removed for inspection. This is to be witnessed by the OEM's FSR, the attending ABS surveyor and the CG TA.

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

- 4.6.3** Final acceptance will not be performed until all of the above tests and trials have been satisfactorily completed with data available for review. The new lifeboats and davits gear must be ready for service in all respects and any identified discrepancy(s) must have been corrected.
- 4.6.4** The CG TA will conduct the final inspection and will advise the PSPS CA when the new lifeboat and davit assembly is ready for Acceptance as per the Contract.

Part 5 - Deliverables

5.1 Technical Data

- 5.1.1** The following technical data must be supplied for the proposed lifeboat and proposed davit system; the documentation must be supplied in three (3) typewritten and three (3) electronic copies in Adobe PDF documents. All documents provided shall be provided in both English and French .
- 5.1.1.1** Complete Bill of Materials (BoM)
 - 5.1.1.2** Operation, Service, and parts manuals
 - 5.1.1.3** Functional Descriptions
 - 5.1.1.4** Detailed drawings of equipment to be installed within the Contractor's scope
 - 5.1.1.5** Approved foundation/mountings and dimension details
 - 5.1.1.6** Approved schematic drawings of all systems.
 - 5.1.1.7** Electrical Single Lines and Schematics
 - 5.1.1.8** Site Acceptance Test Procedures
 - 5.1.1.9** All relevant class approved drawings, engineering studies, and documents.
 - 5.1.1.10** Individual masses, including Center of Gravity (CoG) indication, of the proposed lifeboat, davit, and as a combined system.
 - 5.1.1.11** Original Class Type Approval certificates for the lifeboat and davit, along with two (2) copies.
- 5.1.2** The above noted drawings are to be submitted in triplicate, both in hard copy and

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

in AutoCAD DWG format to Canada.

5.1.3 All drawings requiring Classification approval shall be the responsibility of The Contractor. Copies of the original stamped drawing shall be provided to Canada.

5.1.4 Electronic documents must be supplied within sixty (60) days of award of contract and be Adobe PDF. Electronic files must have a resolution no less than 300 dpi, be manufacturer approved, and retain the colors of the original documents.

5.1.5 The supplier must provide a minimum of one (1) year warranty from the date at which each lifeboat and davit system becomes operational.

5.1.6 For the purpose of the installations the various components may need to be separated and subsequently reassembled. If separation and reassembly is required, this practice must not void the manufacturer's warranty.

5.1.7 The Supplier must indicate if warranty requires Field Service Representative installation and commissioning.

5.1.8 The Contractor must provide updated "as fitted" drawings of the structural modifications made, updating the GA of the Main Deck Profile drawing to reflect the locations of the new equipment installed, the updating of the Life Saving Equipment Plan, and providing single line electrical drawings of all new electrical installations and connections.

5.1.9 In addition to the above The Contractor must also provide to the CG TA with all of the documents listed below:

5.1.9.1 All original Classification certificates and TCMSS Notices of Compliance

5.1.9.2 Copies of all hydraulic hose pressure test certificates

5.1.9.3 Copies of all NDT report(s) relating to this installation.

5.1.10 The Contractor must provide the CG TA with a typewritten report of The Contractor's work in both electronic and hardcopy formats outlining the details of the installation and any alterations / repairs made prior to the acceptance of this item.

5.2 Manuals

5.2.1 Lifeboat and Davit Operational Manual

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

5.2.1.1 The Contractor must compile and provide a comprehensive LIFEBOAT AND DAVIT OPERATIONAL MANUAL which must include all of the general information in sufficient detail to support the operational and maintenance requirements of the lifeboats and davit packages.

5.2.1.2 The LIFEBOAT AND DAVIT OPERATIONAL MANUAL, including any necessary Annexes and supporting documents, must fully describe all features of the davits and lifeboats and document its production, tests, trials, and certification.

NOTE: All original classification certificates and TCMSS Notices of Compliance must be separately delivered to the TA – copies only must be included in the LIFEBOAT AND DAVIT OPERATIONAL MANUAL

5.2.1.3 The LIFEBOAT AND DAVIT OPERATIONAL MANUAL must be presented in the following format with its individual sections defined as follows:

TABLE OF CONTENTS

INDEX TO DOCUMENTS (separate manuals)

1.0 – DESCRIPTION

2.0 – CERTIFICATION

3.0 – ARRANGEMENT DRAWINGS

4.0 – STRUCTURAL DRAWINGS

5.0 – ELECTRICAL SYSTEM SCHEMATICS

6.0 – HYDRAULIC POWER PACKS

7.0 – HYDRAULIC SCHEMATICS

8.0 – HYDRAULIC CYLINDERS

9.0 – CONTROL AND SAFETY SYSTEM SCHEMATICS

10.0 – PRIMARY CONTROL STATION

11.0 – DAVIT RIGGING DIAGRAM

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

12.0 – LOAD HOOKS AND LOOSE GEAR

13.0 – MISCELLANEOUS

ANNEX I – (separate document)

ILLUSTRATED PARTS BREAKDOWN DIAGRAMS

DETAILED PARTS LIST

ANNEX II – (separate document)

SUPPLIER MANUALS

ANNEX III : (separate document)

CLASS CERTIFICATES, TCMSS NOTICES OF COMPLIANCE (etc., copies only)

MATERIAL, EQUIPMENT & RIGGING TEST CERTIFICATES

TESTS AND TRIALS RECORDS

5.3 Spare Parts and Specialize Tool Requirements

5.3.1 The Contractor must provide all mechanical and electrical spares required to perform two (2) years of the recommended regularly scheduled maintenance. The required spares must be genuine OEM parts as published in the manufacturer's maintenance manual.

5.3.2 The Contractor will provide a list of manufacturer recommended spares for a fifteen (15) year lifespan as published in the manufacturer's maintenance manual. The list must include part numbers, lead-time to order, retail prices at time of bid submission, complete with a list of Canadian distributors and service centers.

5.4 Certification

5.4.1 The new lifeboat, davits and their associated equipment / components must be designed, approved, constructed, tested, trialed, inspected, and certified in

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

accordance with the Rules of the designated Classification Society (ABS) and TCMSS.

5.4.2 All original Class and TCMSS (where applicable) approval certificates for all system components must be submitted to the CG TA prior to the acceptance of this item.

6.0 Training

6.1 The Contractor must be responsible for developing and providing two (2) separate pre-delivery familiarization training programs on the new lifeboats and davits and their associated systems and equipment(s) installations. All training must be provided in English at The Contractor's facility, on-board the vessel, whilst the vessel is at The Contractor's facility. Training is to be performed by either the OEM's FSR or another OEM qualified representative.

6.2 The Contractor must also be responsible for developing and providing a Training Manual intended for the instruction of the vessel's engineers. As a minimum the manual shall cover the following topics:

6.2.1 Review of general safety

6.2.2 Familiarization with the operation of the installed davits , and their control systems (both at the local and remote locations). etc.

6.2.3 Safety matters and safety systems, particular to the davit and lifeboat installation,

6.3.4 Practical operation instruction and .

6.3.5 Maintenance and troubleshooting procedures

6.3 All training material developed must be delivered in both in hard and in soft copy and in English.

6.4 Each course participant must receive a hard copy version of the training manual, and this is to be available to them when they are taking the training for reference purposes.

6.5 Pre-delivery familiarization training must:

6.5.1 Be provided for a maximum of (TBD) CCG personnel per course with one (1) course given for each crew shift. CC TA will be responsible for finalizing the number of course participants as well as arranging and coordinating the availability of the required personnel from each crew shift.

6.5.2 Provide training on the safety systems and safe operation of the davit launching gear system and its control systems including practical operational experience.

	CCGS Leonard J Cowley	
Spec Item #: H-11	Specification	F7049-210183
LIFEBOAT AND DAVIT REPLACEMENT		

6.5.3 Provide training regarding the maintenance and troubleshooting of the davit assemblies as well as the lifeboat mechanical systems.

	CCGS Leonard J Cowley	
Spec Item #: H-12	Specification	F7049-210183
CRANKSHAFT DEFLECTIONS		

H-12 Crankshaft Deflections..

Part 1 -Scope

- 1.1** The intent of this specification must be for The Contractor to carry out a complete set of crankshaft deflections/thrust clearances on both the port and starboard main engines prior to docking and again after undocking.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Procedure available from Wartsila service manual on vessel.

2.2 Standards

- 2.2.1** General Notes

- 2.2.2** Fleet Safety Manual (DFO/5737)

2.3 Regulations

- 2.3.1** General Notes

- 2.3.2** Marine Machinery Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

- 3.1.1** The Contractor must arrange for an experienced diesel mechanic with a minimum of two (2) overhauls on Nohab Engines within the past five (5) years to carry out a complete set of crankshaft deflections/thrust clearances on both the port and starboard main engines prior to docking and after undocking.

- 3.1.2** The Contractor must be responsible for removal and reinstallation of crankcase doors and associated equipment to allow access to perform the deflections.

	CCGS Leonard J Cowley	
Spec Item #: H-12	Specification	F7049-210183
CRANKSHAFT DEFLECTIONS		

Sufficient cool down time after main engine shutdown must be allowed for prior to commencement of the deflections.

- 3.1.3** These deflections must be taken when the vessel is at the same draft, trim, and loaded condition as is required to enter the drydock. The main engine temperature is to be at the normal temperature (40 degrees Celsius) required for starting.
- 3.1.4** The procedure for taking main engine crankshaft deflections is to be as per the manufacturer's service manual. This service manual is available from the Chief Engineer. The table to be used is also in the engine manufacturers' service manual.
- 3.1.5** Readings after drydocking must be taken after 24 hours has passed since the vessel is afloat in the water where no keel blocks are touching the hull. The readings must be taken at the same temperature of the engine as the initial readings.
- 3.1.6** All crankshaft deflections must be carried out in the presence of the Chief Engineer or his delegate.
- 3.1.7** Two copies of the readings must be given to the Chief Engineer at the time of completion.
- 3.1.8** Any discrepancy discovered in the crankshaft deflections is to be addressed by the contractor.

3.2 Location

- 3.2.1** Engine Room

3.3 Interferences

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.
- 3.3.2** Crankshaft deflection tool and gauge, if not available with The Contractor, will be provided from the ship by the owner. In such a case, the gauge and the tool must be returned to the owner in the same condition as before.

Part 4 - Proof Of Performance

	CCGS Leonard J Cowley	
Spec Item #: H-12	Specification	F7049-210183
CRANKSHAFT DEFLECTIONS		

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the Chief Engineer, CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver 1 hard copy of Service Certificates and original Service Certificates to CG TA. The Contractor must deliver 3 electronic copies of all reports/certs to the CG TA.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manual

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

H-13 Port and Stbd Windlass Replacement..

Part 1 – Scope

- 1.1** The intent of this Statement of Requirements (SOR) is for The Contractor to supply two (2) new anchor windlasses complete with their associated power packs, equipment / components, and controls to replace the existing Port and Starboard Burrard Iron Works Model H6 hydraulically driven windlasses and their associated equipment currently fitted onboard the CCGS LEONARD J. COWLEY.
- 1.2** The proposed windlass replacements must be high pressure hydraulically driven, in current marine service and must have Original Equipment Manufacturer (OEM) representation in Canada. The manufacturer's appointed service organization must hold a stock of essential spares and be capable of providing qualified field service representatives (FSRs), thorough component documentation support, with the capability to provide technical support for standard overhaul as well as repair.
- 1.3** Prior to ordering The Contractor must submit their proposed windlass packages and recommendations to Canada for review, selection, and approval.
- 1.4** The Contractor must develop and submit all of the necessary Classification Society approved drawings (e.g., foundation modifications, hydraulic piping, electrical etc.) and the engineering studies that will be needed to obtain the required regulatory approvals and certifications for this installation.
- 1.5** The Contractor will be responsible for the removal of the existing port and starboard windlass and their associated controls and then supply, install, commission, and test the agreed upon windlass packages in accordance with the OEM's installation procedures and the Class Approved drawings.
- 1.6** This work must be carried out in conjunction with the following specification items:
 - 1.6.1** HD-23 Anchors, Chains and Chain Locker

Part 2 – References

- 2.1** **Guidance Drawings/Nameplate Data**

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

The following drawings and documents are being reference for guidance purposes only and a complete listing of available documents and drawings for the CCGS Leonard J Cowley's VLE Project is included in Appendix A of the Technical Data Package

- 2.1.1** Sectional Arrangement Drawing 840603
- 2.1.2** Anchor Chain Fairlead Roller Details Dwg 590-SK19
- 2.1.3** Anchor Chain Emergency Release 590-94
- 2.1.4** Anchor Arrangement 590-81
- 2.1.5** Existing Windlass Parts and Overhaul Manual #62

2.2 Rules, Regulations and Standards

- 2.2.1** All design, material and work must meet the Classification Society's (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify and coordinate any specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines (ARSRC&G) referenced in this specification, (refer to General Requirement Section 4.0).
- 2.2.2** TCMSS approval, of design, material, and work, over and above Class approval, must be met as and when required.

2.3 Existing Equipment

- 2.3.1** Manufacture – Burrard Iron Works Limited
Model Number – H6
Serial Number – 840707 (Port) / 840708 (Stbd)

2.4 Contractor Supplied Material

- 2.4.1** The Contractor must supply all labour, equipment, materials and tools required to perform the work as specified.

2.5 OEM/Supplier/FSR

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

2.5.1 The Contractor must also include in their proposal the price to provide the services of an authorized OEM FSR for the new windlass installation, the associated equipment and the components being supplied. The OEM FSR is to oversee the installation(s) as well as the related commissioning and testing.

2.6 Government Supplied Equipment

2.6.1 N/A

Part 3 – Technical Requirements

3.1 General

3.1.1 The Contractor must replace the existing two (2) Burrard Iron Work Limited H6 Windlasses complete with their associated hydraulic power units and control systems and replace them with two (2) new hydraulically driven windlasses complete with all associated components and controls. The existing anchor and chains to be used. The weight of the anchor and chain is as per drawings.

3.1.2 All aspects of the existing vessel structure, mechanical, hydraulic, controls and electrical systems must be included in this assessment. The Contractor must be responsible for determining the full scope of any and all structure and any system changes required to accommodate the new windlass installations.

3.1.3 The Contractor must provide all parts or devices necessary for the successful operation of the new installation (s) regardless of whether such part or device is specifically indicated herein.

3.1.4 Any items that, in the opinion of The Contractor, should form part of this package and/or need further clarification to enable The Contractor to prepare and price a complete replacement package must be brought to the attention of Canada, prior to the submission of bids.

3.1.5 The new windlass replacements must be accomplished using Class Approved Marine components and hardware throughout.

3.1.6 All new equipment being supplied and used to satisfy the intent of this specification must be of current manufacture and of the most current version available that satisfies the requirements of this specification.

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

3.1.7 The Contractor must be accountable for the Total System Responsibility for the new windlass installations which is to include as a minimum the installation and system's design, the integration to the vessel structure, the required vessel modification (if any), and the installation of the mechanical, hydraulic, controls and electrical systems required, and the testing and the set to work of the new windlasses.

3.1.8 The Contractor must provide a complete, Class approved design and drawing package for full scope of the windlass replacement. The design and drawing package must include a specification detail defining how each aspect of the requirement will be dealt with.

3.2 Procurement Requirements

3.2.1 Introduction

3.2.1.1 The Contractor must be responsible for the procurement and delivery of the windlasses complete with their associated ancillary and auxiliary equipment, and any agree upon spares and specialized tools, to their facilities in Canada.

3.2.1.2 The windlasses and their supporting systems, auxiliary equipment/components, are to be supplied by The Contractor, on a turnkey basis.

3.2.1.3 The broad scope of services, to be executed by The Contractor are as follows:

3.2.1.3.1 Windlass FAT(s) for ensuring compliance to performance requirements.

3.2.1.3.2 Development of detailed Class Approved design drawings, any required engineering studies, and documents for the finalization of the windlass installations layout/arrangement, associated support system(s) and equipment foundations.

3.3 Delivery

3.3.1 On delivery to the Contractor's facilities, the windlass packages must be inspected for any shipping damage. Arrangements are to be made with Canada to have a

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

representative present when these deliveries arrive on site and this representative is to be allowed complete access to allow him or her to perform a full inspection on behalf of Canada. This inspection will require the opening of crates and or shipping boxes but will not require the opening of any hermetically sealed units unless damage to the packaging can be readily seen.

3.3.2 The Contractor must provide a minimum of five (5) days' notice to Canada to allow their designated representative to prepare and attend this inspection and the Contractor must provide any assistance required to allow Canada's representative access the various components.

3.3.3 After a satisfactory inspection, the new windlasses and their associated equipment / components are to be safely stored, protected from adverse weather and are to be quarantined until they are ready for installation.

3.4 Foundation / Structural Modifications

3.4.1 Once the existing windlasses has been removed, the structure, framing and deck immediately below each of the old windlasses is to be cleaned of all dirt, oil residue and other contaminants down to bare steel, to allow for seat/foundation modifications to be performed.

3.4.2 The existing foundations are to be removed and cut flush with the deck. The foredeck plating directly below and in the immediate area of the old foundations (radiating two (2) feet from all sides of the existing foundations) is to be subjected to NDT testing to ascertain that the existing deck plating thickness is acceptable to ABS for the new installations of the windlass foundations.

3.4.3 The Contractor must also ascertain that the existing supporting structure for the old windlass is adequate and strong enough to support the new windlass installations. Should additional structure and or strengthening be required this is to be the responsibility of the Contractor.

3.4.4 The design of the new foundations must be of a strong construction, approved by the OEM and ABS, fabricated from Class approved steel, and be well braced to form a rigid supporting base.

3.4.5 On completion of the welding performed when installing the new foundation, all full penetration welds and all fillet welds are to be subjected to NDT Testing.

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

Method of and types of acceptable testing will be determined and to be to the satisfaction of the attending ABS surveyor.

3.4.6 All Work performed is to be inspected and is to be to the complete approval and satisfaction of the attending ABS surveyor. Any structural changes proffered by the Contractor will have to have prior approval of both ABS and the CG TA before the actual Work can take place.

3.4.7 The new foundations, deck area and or structure, etc. are to receive a minimum two (2) separate coats of "Interplate NLA 069" epoxy zinc grey (1 GP 183). Once cured this is then to be followed by two (2) separate coats of paint that matches the surrounding paint schedule of the area.

3.4 Windlass Requirements

3.4.1 Each windlass is to be hydraulically driven and suitable for the size of the vessel's existing chain cable and the mass of the anchors.

3.4.2 The windlasses are to be fitted in a suitable position in order to ensure an easy lead of the chain cables to and through both the chain stoppers and the hawse pipes.

3.4.3 Windlasses are to be capable of operating in temperatures ranging from of -40°C to + 40°C.

3.4.4 The installation must operate on a supply of 600 VAC / 3 PH / 60 Hz.

3.4.5 All metal structures of the windlasses are to be coated with two (2) coats of primer followed by two (2) coats of RAL Design 070 7040 Beige / Buff to a final DFT of 5 mils. This excludes any bearing surfaces, greased connections, or non-corroding material.

3.5 Hydraulic Power Supply Location

3.5.1 The new hydraulic power supply(s) for the windlasses are to be located and connected electrically in the location(s) previously occupied by the old HPU units located in the Fore Peak Stores area.

3.6 Connection of Systems

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

- 3.6.1** The Contractor must be responsible for the connection and the modifying of the associated systems i.e., hydraulics, electrical, etc. to make the new windlasses operable and meet the OEM's and Class requirements and the intent of this Statement of Requirements.
- 3.6.2** The Contractor is also responsible for fabricating and fitting all the necessary piping, piping connections, valves, and flexible hoses, needed to connect the windlasses to their respective hydraulic power units (HPU).
- 3.6.3** Lengths and diameters of any piping required, will be the responsibility of the Contractor and are defined in OEM's dimensional piping requirements. New hydraulic pipe sections are to be fabricated from stainless-steel seamless heavy walled hydraulic tubing and stainless-steel heavy duty fittings (Swagelok or equivalent).
- 3.6.4** The Contractor is to note that prior to connecting to the new windlasses to their respective HPUs each system must be completely cleaned and flushed by a qualified company. This cleaning and flushing must be done in accordance with the requirements of ISO 28521:2009 Ships and Marine Technology — Hydraulic Oil Systems — Guidance for Grades of Cleanliness and Flushing.
- 3.6.5** The flushing process must be witnessed and is to be to the complete satisfaction of both the attending ABS Surveyor and the CG TA. A flushing report will be required and must include, the flushing media used, the flushing pressures, how long the flushing occurred, the final particle count found, etc.

4.0 PROOF OF PERFORMANCE

4.1 Inspection

- 4.1.1** All work performed is to be inspected and is to be to the satisfaction of both the attending ABS Class Surveyor, and the CG TA.

4.2 Test and Trials

- 4.2.1** The Contactor under the guidance of the OEM's FSR, must be responsible for proof testing the new windlass assemblies to the satisfaction the attending ABS surveyor and the CG TA.

4.3 Workshop Inspection and Testing

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

4.3.1 General

4.3.1.1 Windlasses are to be inspected during fabrication at the Manufacturers' facilities by an ABS Surveyor for compliance with the approved plans.

4.4 Windlass Prime Mover

4.4.1 Each prime mover (HPU) is to be tested at the shop to verify its ability to meet the power, speed, and braking capacity.

4.4.2 The windlasses hydraulic system(s) are to be tested at 1.5 times the maximum working pressure. In addition to the hydraulic motor, the hydraulic pump is also to be tested at the OEM shop. During the testing, the input/output torque, speed, delivery pressures and flow rates of the pump and the hydraulic motor are to be measured, as appropriate.

4.5 No-Load Test

4.5.1 Each windlass is to be run without load at nominal speed in each direction for a total of thirty (30) minutes. If the windlass is provided with a gear change, additional run in each direction for five (5) minutes at each gear change is required.

4.6 Load Test

4.6.1 The windlass is to be tested to verify that the continuous duty pull, temporary overload and hoisting speed can be attained. The load tests, including the adjustment of the overload protection, are to be carried out on board ship and are to be witnessed by the attending ABS Surveyor and the CG TA.

4.7 Brake Capacity Test

4.7.1 The Holding Load of the brake is to be verified through testing, by applying for two (2) min the required load on the cable-lifter. During testing, the cable-lifter is to be disengaged from the prime mover system.

4.7.2 Upon testing, a visual inspection is to be carried out to check that there is no permanent deformation on the windlass structural and mechanical parts.

4.8 On-Board Working Test of Windlass

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

4.8.1 General

4.8.1.1 The working test of each windlass is to be carried out on board in the presence of the attending ABS Surveyor and the CG TA to demonstrate satisfactory operation.

4.8.1.2 Each unit is to be independently tested for braking, clutch functioning, lowering, and hoisting of chain cable and anchor, proper riding of the chain over the chain lifter, proper transit of the chain through the hawse pipe and the chain pipe, and proper stowage of the chain and anchor.

4.8.1.3 It is to be confirmed that the anchors are properly seat in the stored position and that chain stoppers function as designed.

4.8.1.4 The test is to demonstrate that the windlasses comply with Class Regulations and the requirements the of this specification and in particular, that they work adequately and have sufficient power to weigh the anchor(s) at the required speed (excluding the housing of the anchor in the hawse pipe) when suspended to the maximum practicable length of chain cable.

4.8.1.5 The braking capacity is to be tested by intermittently paying out and holding the chain cable by means of the application of the brake.

4.9 Marking

4.9.1 Each windlass must be permanently marked with the following information:

4.9.1.1 Nominal size of the windlass (e.g., 100/3/45 is the size designation of a windlass for 100 mm diameter chain cable of grade 3, with a holding load of 45% of the breaking load of the chain cable).

4.9.1.2 Maximum anchorage depth, in metres.

4.10 Harbour (Dock) Acceptance Trials (HATs)

4.10.1 Once the windlass installations has been completed, and are ready for operation, the Contractor must be responsible for the necessary commissioning and startup tests required by the OEM and Class. The commissioning and testing must only be

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

done under the full guidance of the OEM's authorized FSR and is to be witnessed by the attending Class surveyor and the CG TA.

4.4.2 The Contractor is to arrange to have the attending ABS Surveyor and the CG TA to inspect the newly installed equipment, to establish cleanliness, tightness, and that the supporting systems are correctly connected, i.e., electrical power, hydraulics, fluid levels, control systems, etc. All work is to be to the satisfaction of ABS and the CG TA. Any deficiencies found must be rectified immediately by the Contractor.

4.4.3 All controls, alarms, and shutdowns must be proven functional, their operations witnessed, and is to be to the satisfaction of all both the attending ABS Surveyor and the CG TA.

4.5 Sea Acceptance Trials (SATs)

4.5.1 Upon completion of successful HATs and when all work has been completed to the satisfaction of the attending ABS surveyor and the CG TA, the Contractor must then be responsible for arranging to have a formal SAT performed to prove the operability and performance acceptance of the new windlasses whilst at sea.

4.5.2 Five (5) working days prior to commencing sea trials, the Contractor must provide a trials agenda and booklet to the CG TA complete with the sign off section for evaluation by the witnessing parties.

4.5.3 The Contractor must be responsible for producing, recording, and maintaining all trial sheets.

4.5.4 Three (3) typed copies of these trial sheets must be given to the CG TA after completion of all trials

4.6 Completion and Acceptance

4.6.1 On completion of a satisfactory SAT the Contractor must remove all HPU hydraulic filters used during trials and replace them with new Contractor supplied filters units.

4.6.2 Filter elements removed and are to be broken open and examined for any contaminants. This is to be witnessed by the OEM's FSR, the attending ABS surveyor and the CG TA.

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

4.6.3 Final acceptance will not be performed until all of the above tests and trials have been satisfactorily completed with data available for review. The new windlasses must be ready for service in all respects and any identified discrepancy(s) must have been corrected.

4.6.4 The CG TA will conduct the final inspection and will advise the PSPS Contracting Authority when the new windlasses are ready for Acceptance as per the Contract.

5.0 DELIVERABLES

5.1 Technical Data

5.1.1 The following technical data must be supplied for the proposed windlasses documentation must be supplied in three (3) typewritten and three (3) electronic copies in Adobe PDF documents. All documents provided must be provided in both English and French .

5.1.1.1 Complete Bill of Materials (BoM)

5.1.1.2 Operation, Service, and parts manuals

5.1.1.3 Functional Descriptions

5.1.1.4 Site Acceptance Test Procedures

5.1.1.5 All relevant class approved drawings, engineering studies, and documents.

5.1.1.6 Original Class Type Approval certificates for the new windlasses, along with two (2) copies.

5.1.2 The Contractor must also be responsible for providing updated “As Fitted” drawings of the new windlass installations including all machinery installs, dimensional drawings piping systems, electrical systems (one line diagrams), and structure modifications (if any), etc.

5.1.3 The above noted drawings are to be submitted in triplicate, both in hard copy and in AutoCAD DWG format to Canada.

5.1.4 All drawings requiring Classification approval must be the responsibility of the Contractor. Copies of the original stamped drawings must be provided to Canada.

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

- 5.1.5** Electronic documents must be supplied within sixty (60) days of award of contract and be Adobe PDF. Electronic files must have a resolution no less than 300 dpi, be manufacturer approved, and retain the colors of the original documents.
- 5.1.6** For the purpose of the installations the various components may need to be separated and subsequently reassembled. If separation and reassembly is required, this practice must not void the manufacturer's warranty.
- 5.1.7** The Contractor is to provide updated "as fitted" drawings of the structural modifications made, updating the GA of the Main Deck Profile drawing to reflect the locations of the new equipment installed, as well single line electrical drawings of all new electrical installations and connections.
- 5.1.8** In addition to the above the Contractor must also provide to the CG TA with all of the documents listed below:
- 5.1.8.1** All original Classification certificates and TCMSS Notices of Compliance
- 5.1.8.2** Copies of all hydraulic hose pressure test certificates
- 5.1.8.3** Copies of the NDT report(s)
- 5.1.9** The Contractor must provide the CG TA with a typewritten report of the Contractor's work in both electronic and hardcopy formats outlining the details of the installation and any

5.2 Manuals

5.2.1 Windlass Operational Manual

- 5.2.1.1** The Contractor must compile and provide a comprehensive HYDRAULIC WINDLASS OPERATIONAL MANUAL which must include all of the general information in sufficient detail to support the operational and maintenance requirements of the new windlass packages.
- 5.2.1.2** The HYDRAULIC WINDLASS OPERATIONAL MANUAL, including any necessary Annexes and supporting documents, must fully describe all features of the new hydraulically operated windlasses, their production, tests, trials, and certification.

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

NOTE: All original classification certificates and TCMSS Notices of Compliance must be separately delivered to the TCG A – copies only must be included in the HYDRAULIC WINDLASS OPERATIONAL MANUAL

5.2.1.3 The HYDRAULIC WINDLASS OPERATIONAL MANUAL must be presented in the following format with its individual sections defined as follows:

TABLE OF CONTENTS

INDEX TO DOCUMENTS (separate manuals)

1.0 – DESCRIPTION

2.0 – CERTIFICATION

3.0 – ARRANGEMENT DRAWINGS

4.0 – STRUCTURAL DRAWINGS

5.0 – ELECTRICAL SYSTEM SCHEMATICS

6.0 – HYDRAULIC POWER PACKS

7.0 – HYDRAULIC SCHEMATICS

8.0 – CONTROL AND SAFETY SYSTEM SCHEMATICS

9.0 – PRIMARY CONTROL STATION

10.0 – MISCELLANEOUS

ANNEX I – (separate document)

ILLUSTRATED PARTS BREAKDOWN DIAGRAMS

DETAILED PARTS LIST

ANNEX II – (separate document)

SUPPLIER MANUALS

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

ANNEX III : (separate document)

CLASS CERTIFICATES, TCMSS NOTICES OF COMPLIANCE (etc., copies only)

MATERIAL, EQUIPMENT CERTIFICATES

TESTS AND TRIALS RECORDS

5.3 Spare Parts and Specialize Tool Requirements

- 5.3.1** The Contractor must provide all mechanical and electrical spares required to perform two (2) years of the OEM's recommended regularly scheduled maintenance. The required spares must be genuine OEM parts as published in the manufacturer's maintenance manual.
- 5.3.2** The Contractor is also to provide a list of manufacturer recommended spares for a fifteen (15) year lifespan as published in the manufacturer's maintenance manual. The list must include part numbers, lead-time to order, retail prices at time of bid submission, complete with a list of Canadian distributors and service centers.

5.4 Certification

- 5.4.1** The new windlasses and their associated equipment / components must be designed, approved, constructed, tested, trialed, inspected, and certified in accordance with the Rules of the designated Classification Society (ABS) and TCMSS.
- 5.4.2** All original Class and TCMSS (where applicable) approval certificates for all system components must be submitted to the CG TA prior to the acceptance of this item.

6.0 TRAINING

- 6.1** The Contractor must be responsible for developing and providing two (2) separate pre-delivery familiarization training programs on the new windlasses and their associated systems and equipment(s) installations. All training must be provided in English at the Contractor's facility and on-board the vessel, whilst the vessel is at the Contractor's facility. Training is to be performed by either the OEM's FSR or another OEM qualified representative.

	CCGS Leonard J Cowley	
Spec Item #: H-13	Specification	F7049-210183
PORT AND STBD WINDLASS REPLACEMENT		

- 6.2** The Contractor must also be responsible for developing and providing a Training Manual intended for the instruction of the vessel's engineers. As a minimum the manual must cover the following topics:
- 6.2.1** Review of general safety
 - 6.2.2** Familiarization with the operation of the installed windlasses, and their control systems (both at the local and remote locations if fitted). etc.
 - 6.2.3** Safety matters and safety systems, particular to the windlass installation,
 - 6.2.4** Practical operation instruction and .
 - 6.2.5** Maintenance and troubleshooting procedures
- 6.3** All training material developed must be delivered in both in hard and in soft copy and in English.
- 6.4** Each course participant must receive a hard copy version of the training manual, and this is to be available to them when they are taking the training for reference purposes.
- 6.5** Pre-delivery familiarization training must:
- 6.5.1** Be provided for a maximum of (TBD) CCG personnel per course with one (1) course given for each crew shift. CC TA will be responsible for finalizing the number of course participants as well as arranging and coordinating the availability of the required personnel from each crew shift.
 - 6.5.2** Provide training on the safety systems and safe operation of the windlass system and its control systems including practical operational experience.
 - 6.5.3** Provide training regarding the maintenance and troubleshooting of the windlass and hydraulic systems.

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

H-14 Potable Water Tank Modifications and Coatings..



CCGS Leonard J Cowley

Specification Modifications to Fresh Water Tank

Completed By:

Marine Services International Ltd.
P.O. Box 29132
St. John's, NL
Canada, A1A 5B5
Phone: 709 782 2700
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Completed For:

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	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of modifications to be completed in way of the existing center fresh water tank for the purpose of converting it into port and starboard fresh water tanks with the volume of each tank also being increased.
- 1.2** This work must be carried out in conjunction with the following spec items:
- 1.2.1** H-29 Fresh Water Piping Replacement

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3285-D-01-R0 Modifications to Fresh Water Tank

2.2 Standards

The following Standards are to be adhered during completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.

2.3 Regulations

The following Regulations are to be adhered during completion of the work scope:

- 2.3.1** Canada Shipping Act 2001

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

2.3.2 Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 It is The Contractor's responsibility to follow all applicable federal, provincial and local regulations. The Contractor must adhere to all DFO-Coast Guard / PSPC work requirements and must complete the work to the satisfaction of both the CG TA and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean up and disposal of debris generated due to the work.

3.1.3 Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space is certified as gas free and suitable for hot work and man-entry. Ceiling, bulkhead linings and insulation materials shall be removed in way of the hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials must meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads and outfit as required to limit additional damages. Fire watches shall be maintained by The Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by CG TA and ABS prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates and structural members are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.

3.2.5 The following scantlings of steel and piping are as follows:

3.3.5.1 Bulkhead Plating – 8.5mm (original), 3/8" (new)

3.3.5.2 Bulkhead Stiffeners – 150 x 100 x 12.5mm (original), 6"x 4"x 1/2" (new)

3.3.5.3 Bracket Plating(1) – 9.0mm (original), 3/8" (new)

3.3.5.4 Bracket Plating(2) – 12.5mm (original), 1/2" (new)

3.3.5.5 Ladder Rails and Bulkhead Connection Flat Bar Sections – 12.5mm (original), 1/2"(new)

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.3.5.6 Ladder Rungs – 19mm Square Bars (original), 3/4" Square Bars(new)

3.3.5.7 Manhole Cover Plate – 8.5mm (original), 3/8" (new)

3.3.5.8 Handles on Manhole Cover and Bulkhead – 19mm Solid Round (original),
3/4" Solid Round (new)

3.3.5.9 Vent Piping – 65mm SCH80 Black Pipe (original), 2½" SCH80 Black Pipe (new)

3.3.6 Linings and insulation material that may be required to replace any non- reusable removed items as noted in section 3.1.4 shall be supplied and installed by the contractor and meet the noted standard listed in that section. All such materials and their install shall also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative.

3.3 Welding

3.3.1 All welding associated with fitting of new bulkheads, manhole with access ladder, and new port side tank vent to be as per original specification.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams and sharp edges and remove grease, smoke and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat affected and new steel both externally and internally. The heat affected paint is to be to hand tooled to a feathers edge and the current coating reapplied. The Contractor must supply all coatings.

3.4.1.1 The Contractor must use Interline 975 and compatible products when performing internal tank coatings.

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the work place daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessels coating system.

3.4.4 The Contractor must follow the most recent version of CG Fleet Safety Manual 7.A.13 Potable Water Tank Coating requirements for all internal potable water tank coatings.

3.4.4.1 At time of writing, the requirements are:

3.4.4.1.1 The selected coating holds a valid National Sanitation Foundation (NSF) / American National Standards Institute (ANSI) / Canada (CAN) Standard 61 certification for the intended use, including tank volume, throughout the duration of coating work period.

3.4.4.1.2 When an epoxy coating is used, only 100% solids epoxy, volatile organic compound (VOC) free (United States Environmental Protection Agency [USEPA] Method 24) products are to be used to coat or patch potable water tanks.

3.4.4.1.3 If a different NSF/ANSI/CAN 61 coating other than the currently applied coating is being considered, an approval must be requested from ME by emailing ccgmedoccontrol.xnat@dfo-mpo.gc.ca, prior to application.

3.4.4.1.4 Written proof or certification of a valid NSF/ANSI/CAN Standard 61 certification for the coating applied is provided by The Contractor.

3.4.4.1.5 The Contractor follows the manufacturer's application processes and cure time

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.4.4.1.6 The service of a certified National Association of Corrosion Engineers (NACE) International coating inspector with a minimum certification of Coating Inspector Program Level 2, be provided by the CCG to verify the entire coating application process is conducted in accordance with the coating manufacturer's instructions

3.4.4.1.7 The Contractor is to use all new equipment for the application of the coating, including pumps, hoses, spray guns, and brushes with the following considerations:

3.4.4.1.7.1 Equipment that was cleaned using thinners or solvents must not be used during the coating application process

3.4.4.1.7.2 Equipment that was cleaned using thinners or solvents must not come in to contact with the coating at any stage prior to, during, and/or after the coating is applied

3.4.4.1.8 The re-use of pumps, not hoses, may be permitted if The Contractor demonstrates that they have been cleaned and/or flushed with a product that is ANSI/NSF/CAN Standard 61 certified for use in potable water tanks, and the product does not contain any solvents

3.4.4.1.9 When the tank coating is cured, the tank is to be filled with potable water for the purpose of testing for VOCs only. After 24 hours, water samples are to be collected directly from the tank and sent for analysis to ensure VOCs are not present in the water. Refer to FSM 7.A.12 - Potable Water Quality, Section 3.7.4 for instructions on submitting the sample for VOC testing. Provided the VOC analysis results are acceptable, the tank is to be super-chlorinated in accordance with the procedures outlined in Section 3.6 of FSM 7.A.12 – Potable Water Quality.

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.4.4.1.10 Following the completion of the super-chlorination procedures, baseline water samples are to be collected directly from the tank and analyzed in accordance with the 29 water quality parameters listed in Annex I of FSM 7.A.12 – Potable Water Quality

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class surveyor and CG TA. The completed steel work is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor and CG TA. All costs associated with the inspection to be included in the Contractor's price for known steel work.
- 3.5.3** The CG requires full access to the vessel for inspections by the Owner's personnel and or other Owner appointed representatives.

3.6 Documentation

- 3.6.1** The Contractor must provide the CG TA with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection and any alterations / repairs made prior to acceptance.
- 3.6.2** The Contractor must ensure that the following documents are included in the final report for this specification item:
 - 3.6.2.1** Material Certificates for Plate & Structural Members
 - 3.6.2.2** CWB Certificates for Welders
 - 3.6.2.3** CWB Certificates for Weld Supervisors
 - 3.6.2.4** CWB Weld Procedures
 - 3.6.2.5** CWB Weld Data Sheets
 - 3.6.2.6** NDT Testing Documentation

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.7 Scope of Work

3.7.1 Modifications to Fresh Water Tank

3.7.1.1 The Contractor must disassemble bulkhead fixtures, linings, deck head panels and remove insulation in way of steel hot work areas in the crew accommodations above on the main deck and reassemble said items upon completion of work scope.

3.7.1.2 The Contractor must crop the existing fresh water tank port and starboard side bulkheads from frames 71 to 74. New bulkheads are then to be fitted 625mm further outboard on port and starboard from frames 71 to 74. A centerline bulkhead is to then be fitted which will convert the original center fresh water tank into separate port and starboard tanks. In addition to the bulkhead(s) modification work, a new manhole and tank vent are to be fitted. The vent will be fitted on the port side to serve as the port side tank vent with the existing vent serving as the starboard side tank vent. The new port tank vent location will mirror, where possible, the existing starboard tank vent. The new manhole will be fitted on the starboard side for the starboard side tank. This new manhole will be fabricated and installed as per the existing port side manhole. New manhole to have access ladder installed as per existing manholes on bulkhead. Pressure testing to be completed on port and starboard tanks. For details of modification work see supplied MSI drawing no. 3285-D-01-R0.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by The Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage and reinstallation of all fittings deemed to interfere with steel work as outlined.

3.8.3 The Contractor must be responsible for the removal, storage and reinstallation of any/all electrical components (wiring, junctions and panels) deemed to interfere with the work as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-14	Specification	F7049-210183
POTABLE WATER TANK MODIFICATIONS AND COATINGS		

3.8.4 The Contractor must be responsible for the removal, storage and reinstallation of all wiring and equipment deemed to interfere with the work as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-15	Specification	F7049-210183
FUEL OIL TANK MANHOLE COVER REPLACEMENTS		

H-15 Fuel Oil Tank Manhole Cover Replacements..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to remove the existing manhole covers on #1 and #3 Fuel Oil Tanks Port and Stbd.
- 1.2** All manhole covers must be removed (8 in total). New covers must be made for four (4) of the manholes.
- 1.3** The other four (4) covers must be removed and sandblasted.
- 1.4** All nuts, bolts, studs, washers and gaskets for the manholes must be renewed
- 1.5** This work must be completed in conjunction with the following spec items:
 - 1.5.1** HD-13 Fuel Oil Tank Inspection

Part 2 - References

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** Manhole and Level Transmitter Location Dwg Number 590-54
- 2.2 Standards**
 - 2.2.1** See General Notes
- 2.3 Regulations**
 - 2.3.1** See General Notes
- 2.4 Owner Furnished Equipment**
 - 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

- 3.1 General**

	CCGS Leonard J Cowley	
Spec Item #: H-15	Specification	F7049-210183
FUEL OIL TANK MANHOLE COVER REPLACEMENTS		

- 3.1.1** Prior to removing the manhole covers, The Contractor must confirm with the Chief Engineer that the tanks are empty. Tanks are not to be left open unless they are gas free.
- 3.1.2** The Contractor must install lockouts on tanks quick closing valves prior to removing covers.
- 3.1.3** The Contractor must remove all eight (8) manhole covers and all studs.
- 3.1.4** New covers must be fabricated for the following tanks manholes:
 - 3.1.4.1** #1 Aft Cover Port and Stbd – Frame 58
 - 3.1.4.2** #3 Fwd Cover Port and Stbd – Frame 52
 - 3.1.4.3** The removed covers must be used as a template for the fabrication of the new covers. The covers on #1 tank have 20 studs and #3 tank have 24 studs.
 - 3.1.4.4** New covers must be made from 8 mm mild steel plate complete with handles made from 16 mm round stock. Tank number and location must be welded in the cover with large enough numbers to read through the paint. Example of the identifying numbers required is No.1 FO Port Aft.
- 3.1.5** The covers to be reused must have identifying numbers welded on as per 3.1.4.4
- 3.1.6** All covers must be sandblasted on both sides. Outside of all covers must be coated with one coat of marine grade primer and inside of all covers must be coated with mineral oils.
- 3.1.7** The manhole gasket area must be cleaned of all paint, scale and old gasket materials.
 - 3.1.7.1** The Contractor must remove all manhole studs and replace with new mild steel studs of same size tightened into manholes.
 - 3.1.7.2** The Contractor must supply and install all new mild steel washers and mild steel zinc coat nuts or similar.
- 3.1.8** The Contractor must install the covers using new ¼" white nitrile gasket material.
- 3.1.9** The Contractor must ensure tank is inspected by CG TA prior to installing covers.

	CCGS Leonard J Cowley	
Spec Item #: H-15	Specification	F7049-210183
FUEL OIL TANK MANHOLE COVER REPLACEMENTS		

3.2 Location

3.2.1 Frame 52 and Frame 58

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected and completed to the satisfaction of the CG TA.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

	CCGS Leonard J Cowley	
Spec Item #: H-15	Specification	F7049-210183
FUEL OIL TANK MANHOLE COVER REPLACEMENTS		

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

H-16 Port and Stbd Ship Service Generator Diesel Engine Overhaul..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to obtain the services of the below FSR to perform a complete five (5) year overhaul of the Port and Starboard Ship Service Generators' Diesel Engines.
 - 1.1.1** FSR – Caterpillar
- 1.2** The Contractor must include a \$300,000.00 allowance in the bid costs for diesel engine FSR labour and travel costs for each vessel.
- 1.3** The Contractor must carry out a vibration test on the diesel engines and generator at various loads before and after the overhaul for comparison. Vibration analysis report must be type written and two copies supplied to the CG TA upon completion.
- 1.4** This work must be carried out in conjunction with the following spec items:
 - 1.4.1** H-19 Emergency Generator Diesel and Alternator Overhauls

Part 2 - Reference

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** Port and Starboard Ship Service Generators' Engines

Caterpillar Model: 3412

Serial Numbers: 60M02023/60M02033
- 2.2 Standards**
 - 2.2.1** See General Notes
- 2.3 Regulations**
 - 2.3.1** See General Notes
 - 2.3.2** Maritime Occupational Health and Safety Regulations
- 2.4 Owner Furnished Equipment**

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

2.4.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 The diesel engines must be disassembled for inspection by CG TA and ABS Class Surveyor. The Contractor must remove and dispose of ashore all lubricating oil and jacket water (coolant) from the diesel engine, associated piping including the heat exchanger. The five yearly overhaul must be completed to the satisfaction of ABS, engine manufacturer and CG TA.

3.1.2 The diesel engines must be reassembled according to the manufacturer's instructions, tolerances, clearance and timing. Prior to filling the engine with new contractor supplied manufacturer approved lubricating oil, the sump is to be inspected by CG TA and ABS Class Surveyor.

3.1.3 The Contractor must provide one worker to assist the FSR. The Contractor must bid on providing the worker for a total of 400 hours. Actual hours to be adjusted up or down via PSPC 1379 action based on sign in sheet.

3.1.4 The Contractor must perform an alignment check of the engine to generator and record the measurements prior to work commencing and after completion.

3.1.5 The following components must be exchanged for Re-Man components on each diesel engine:

3.1.5.1 Existing cylinder heads for newest type

3.1.5.2 Cylinder head spacer plates

3.1.5.3 Vibration damper

3.1.5.4 Lube oil pump

3.1.5.5 Jacket water pump with gear

3.1.5.6 Sea water pump with gear

3.1.5.7 Fuel oil lift pump

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

3.1.5.8 Injectors

3.1.5.9 12 Power pack assemblies

3.1.5.10 Cylinder liner spray nozzles

3.1.5.11 Rocker arm assemblies

3.1.5.12 Lifters

3.1.5.13 Bridges

3.1.5.14 Cam followers

3.1.5.15 Valve rotators

3.1.5.16 Lifter clips (spring clips)

3.1.6 The Contractor must be supply and renew the below parts:

3.1.6.1 Main bearings

3.1.6.2 Thrust bearings

3.1.6.3 Connecting rod bearings and piston rings

3.1.6.4 Cam shaft bearings

3.1.6.5 Idler gear bushings

3.1.6.6 High water temperature sensor

3.1.6.7 Exhaust bellows

3.1.6.8 Exhaust thermocouple

3.1.6.9 Temperature regulators

3.1.6.10 Front end gaskets

3.1.6.11 Aft end (Bell end) gaskets

3.1.6.12 Cylinder head gaskets

3.1.6.13 Bottom end gaskets (central and lower)

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

3.1.6.14 Lube oil cooler gaskets

3.1.6.15 Charge air cooler gasket

3.1.7 The high pressure fuel injection pump assembly must be removed from the engine and suitably crated and sent to an authorized Caterpillar fuel injection equipment service center where it must be completely overhauled, cleaned and calibrated to manufacturer's specifications using OEM parts. Upon completion, the high pressure fuel pump must be power tested, returned to the vessel and installed. A Caterpillar representative must be available prior to and during the trial run of the engines to make any adjustments as required.

3.1.8 The Woodward mechanical governor and actuator must be removed from the engine and properly crated and sent to an authorized Woodward governor repair and testing facility where it must be thoroughly cleaned, inspected, tested and calibrated to the manufacturer's specifications. Upon completion the mechanical governor and actuator must be returned to the ship and installed on the engine. After the engine overhaul is completed, a Woodward FSR must be in attendance to make final adjustments as required.

3.1.9 The Contractor must ensure all rocker arm bushings are reamed to manufactures specifications providing the required clearance between bushing and rocker arm shafts.

3.1.10 The lubrication oil pump suction strainer must be checked for damage and all lubrication piping must be proven clear. The relief valve on the lubrication oil pump must be set to manufactures specifications.

3.1.11 The Crankshaft must be examined for scoring, cracking, and signs of overheating and gauged for wear on all journals. The crankshaft must be properly crated and sent to a machine shop to be polished and tested for trueness. Crankshaft must have all journals measured and recorded. All measurements must be compared to manufacturer's specifications. Upon completion of inspection and testing, the crankshaft must be returned to the ship and installed in the engine.

3.1.12 The charge air cooler, lube oil cooler and jacket water coolers must be removed and cleaned. The coolers must be pressure tested as per ABS requirements. The CG TA and ABS Class Surveyor must witness the pressure test on each cooler. After testing the coolers must be-reassembled using new gaskets and seals.

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

- 3.1.13** The flywheel ring gear must be examined for tightness and worn or damaged teeth. All oil passages must be cleaned and proven clear. The Contractor must install new main and thrust bearings with Caterpillar wear in grease. Main bearing cap bolts must have a torque applied as per manufactures specification. The Contractor must record all main bearing to crank journal clearances to ensure they are within the manufactures specifications. The Contractor must record crankshaft axial clearance after assembly of new bearings in engine.
- 3.1.14** Backlash must be taken and recorded on the front gear group which includes the fuel pump drive gear and timing advance, camshaft gear, water pump drive gear, idler gear, crankshaft and oil pump idler gear. All measurements recorded measurements must be given to the CG TA.
- 3.1.15** The Vibration Damper must be removed and the wear marks checked for alignment. If the marks are not in alignment a new vibration damper must be installed.
- 3.1.16** Camshafts must be examined for wear in way of cam lobes. The Contractor must gauge wear on all camshaft lobes to see if they are within tolerance of new limits. The camshaft must be removed and inspected for wear and damage. New bearings must be installed with camshafts.
- 3.1.17** The fuel pump control gear must be examined for slackness and all wasted motion must be removed. Fuel strainers and filter housings must be cleaned and new elements installed on reassembly.
- 3.1.18** The engine must be completely assembled using new gaskets and seals including the fore end and aft end gaskets as well as the crankshaft oil seals on the fore and aft end. The generator end has to be separated from the engine for the removal/installation of the rear crankshaft oil seal, The Contractor must support the generator end at all times when carrying out this procedure. The Contractor must re-connect generator to engine using specified procedures and torque settings, alignment between generator and engine must be checked and adjusted so that it is within manufacturers specifications.
- 3.1.19** The Contractor must ensure that cylinder liner spray nozzles are installed after power pack installation. After installation care must be taken so that the spray nozzles are not disturbed.

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

3.1.20 The Contractor must fill engine jacket water space with clean fresh water and apply pre-heat. All jacket water spaces must be free of entrapped air, including turbo charger cooling space. The engine must be checked for any sign of water leaks. All leaks must be corrected.

3.1.21 The Contractor must clean the engine base prior to filling to the working level with new Contractor supplied lubricating oil. New Contractor supplied lube oil filters must be fitted.

3.1.22 Before start-up of engine the valve clearances must be adjusted as per manufacturer's specifications. Fuel pump timing must be checked and set as per manufactures specifications. The engine must be adjusted and tested at full speed and full load for four hours. Before attempting full load test, the engine must be run at a reduced load as outlined by engine manufacture. The Contractor must provide the load bank as required for testing. The overspeed trip, low lube oil pressure and high jacket water temperature safety shutdowns must be functionally tested and witnessed CG TA and ABS Class Surveyor. Pressures and temperatures of engine must be recorded at 15 minute intervals while testing engine. After initial start-up of engine the lube oil filters must be opened up and checked for any sign of metal. An oil sample must be taken after the trial period of four hours and sent to an oil analysis lab for testing, the results of the oil test must be given to the CG TA.

3.1.23 The Contractor must open up, clean, recalibrate and test the engine shutdown and safety systems. These systems consist of but not limited to overspeed, high jacket water temperature, low lube oil shut down and engine start blocking sensors.

3.2 Location

3.2.1 Port and Starboard main engine room

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 - Proof of Performance

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA.

4.2 Testing

4.2.1 All testing to be completed with the presence of FSR, CG TA and ABS Class Surveyor and to their satisfaction

4.3 Certification

4.3.1 Overhaul technician must provide documentation that the company is an authorized FSR for equipment being worked on. A complete set of operating parameters at various loads during testing to be recorded and submitted to the CG TA. An inventory of all parts changed to be provided to the CG TA.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 A complete set of operating parameters at various loads during testing to be recorded and submitted to the Chief Engineer. An inventory of all parts changed must be provided to the Chief Engineer.

5.1.2 All checklists, reading, pictures and findings must be included in the final report and submitted to the Chief Engineer.

5.1.3 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-16	Specification	F7049-210183
PORT AND STBD SHIP SERVICE GENERATOR DIESEL ENGINE OVERHAUL		

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-17	Specification	F7049-210183
WEATHER DOOR REPLACEMENT		

H-17 Weather Door Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to remove identified exterior weather doors and frames and replace with new Contractor supplied weather doors, frames, sealings, gaskets and any other material required to complete the work as specified.
- 1.2** This work must be carried out in conjunction with the following:
 - 1.2.1** HD-12 Weather Deck, Superstructure and Flight Deck Paint

Part 2 – References

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** General Arrangement Drawings
- 2.2 Standards**
 - 2.2.1** N/A
- 2.3 Regulations**
 - 2.3.1** N/A
- 2.4 Owner Furnished Equipment**
 - 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

- 3.1 General**
 - 3.1.1** The Contractor must remove and replace the below ten (10) weathertight doors:
 - 3.1.1.1** Foc'sle Deck – Port and Stbd Accomodation Doors
 - 3.1.1.2** Foc'sle Deck – Port Fwd Accomodation Door
 - 3.1.1.3** Upper Deck – Port and Stbd Main Doors
 - 3.1.1.4** Upper Deck – Officers Pantry Door Stbd

	CCGS Leonard J Cowley	
Spec Item #: H-17	Specification	F7049-210183
WEATHER DOOR REPLACEMENT		

3.1.1.5 Upper Deck – Port Side Aft, Aft Steering Flat and Stbd Side Aft

3.1.1.6 Emergency Gen Room Door

3.1.2 The Contractor must ensure new supplied doors meet the below requirements:

3.1.2.1 ABS or other recognized class society approved for the location being installed

3.1.2.2 Means of operating must be by single lever action

3.1.2.3 All doors must come equipped with a built in lockset and be capable of being locked from both inside and outside.

3.1.3 The Contractor must temporarily remove any interference items in the vicinity of the doors. This includes wire mesh, insulation, lights, switches, etc. and provide a fire watch and protective material/ barricades to prevent cutting and welding debris from spreading around the interior of the ship while the hot work is being done. Cleaning the affected areas after finishing the work to 'as found' to be included.

3.1.4 The Contractor must remove the existing door and frames and dispose of ashore.

3.1.5 The Contractor must ensure that the minimum coaming height is adhered to when installing new doors and frames.

3.1.6 Details of each door and install locations will be provided in the included reference materials.

3.1.7 The Contractor must ensure all areas to be welded including mating areas of bulkhead and angle frame, are cleaned and free of paint, dirt grease and other contaminants.

3.1.8 Existing aluminum bulkhead must be sufficiently strengthened and must align in the same vertical plane.

3.1.9 Door frame must be fitted into bulkhead cut-out opening of appropriate size as indicated on supplier drawings and made square and true.

3.1.10 After door frame is square and true in the cut-out, door frame must be tack welded on all four sides of the frame to hold framework in place.

	CCGS Leonard J Cowley	
Spec Item #: H-17	Specification	F7049-210183
WEATHER DOOR REPLACEMENT		

3.1.11 The door frame must be welded all around the frame on the outside of the bulkhead surface until framework is fully welded, such that no water can enter between the frame and bulkhead. Welding must be done intermittently to avoid excessive heat, which can distort the frame. Stich welding, 25mm long, on the interior side of the bulkhead wall should be staggered every 300-400mm.

3.1.12 The Contractor must perform NDT testing on all welds and provide a report to the CG TA and ABS Class Surveyor.

3.1.13 The Contractor must prime and coat all bare material as outlined in HD-12 Weather Deck, Superstructure and Flight Deck Paint

3.1.14 The Contractor must perform a water hose test for 10 minutes all around the door to ensure watertightness.

3.1.14.1 Any areas not passing a water hose test must be addressed and corrected by The Contractor prior to acceptance by CG TA.

3.1.15 The Contractor must reinstall all removed interference items and replace any disturbed insulation with new the same as existing.

3.2 Location

3.2.1 As indicated in 3.1.1

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 NDT testing required on all welds and reports provided to CG TA and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-17	Specification	F7049-210183
WEATHER DOOR REPLACEMENT		

4.2.2 Hose test must be performed in the presence of ABS Class Surveyor to prove water tightness.

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG TA outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and one (1) electronic copy to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

H-18 Washroom Renewals..

Part 1 – Scope

- 1.1** The Contractor must replace the deck material in the following 19 washrooms with a Seamless Deck Epoxy System and make modifications as listed below.
- 1.2** The Contractor must supply and install all new washroom fixtures, vanities, toilet stalls and showers as listed in section 3.1.1 for 19 washrooms. Any furnishings not listed for renewal must be removed and reinstalled.
- 1.3** This work must be carried out in conjunction with the following spec items:

- 1.3.1** H-32 Cabin Renewals

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** N/A

2.2 Standards

- 2.2.1** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
 - 2.2.2** Coast Guard ISM Confined Space Entry 7.D.9
 - 2.2.3** ISM hot work, Confined Space entry, and fall protection procedures are to be strictly enforced.
 - 2.2.4** All welding must be as per specification preamble.
 - 2.2.5** CG Lockout Procedure.

2.3 Regulations

- 2.3.1** All deck covering materials must be non-combustible, approved by ABS for its intended usage, and must comply with the requirements of hull construction Regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C. ABS Rules and Regulations.
 - 2.3.2** Canada shipping Act

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

2.3.3 Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 Senior Program Officer Washroom - The Contractor must perform the below listed work:

- Remove and replace approx. 30 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 10 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 36" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.2 Chief Officer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 32 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 10 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 39" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 37" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.3 Chief Engineer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 33 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 10 panels
- Supply and install all new perforated deckhead panels, approx 7 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 36" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 38" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.4 Captains Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 33 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 10 panels
- Supply and install all new perforated deckhead panels, approx 7 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 36" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 38" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.5 Senior Engineer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 30 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 9 panels
- Supply and install all new perforated deckhead panels, approx 5 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 32" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.6 First Engineer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 30 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 9 panels
- Supply and install all new perforated deckhead panels, approx 7 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 30" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.7 First Officer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 30 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 11 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 20" deep x 31" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.8 Jr Program Officer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 31 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 9 panels

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install all new perforated deckhead panels, approx 5 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 32" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.9 Second Officer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 28 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 9 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 33" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.10 Second Engineer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 14 sqft of deck material as per section 3.2 below.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install all new bulkhead panels, approx 8 panels
- Supply and install all new perforated deckhead panels, approx 4 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 20.5" deep x 24" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 38" deep x 32" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.11 Second Program Officer Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 17 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 10panels
- Supply and install all new perforated deckhead panels, approx 5 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 20.5" deep x 23" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 37" deep x 32" wide.
- Supply and install new sink and fixtures as per section 3.4 below.
- Supply and install new LED lighting fixtures as per Spec Item L-01.
- Supply and install new vanity mirror, shower curtain rod and towels racks same color and size as existing.

3.1.12 Boatswain Washroom – The Contractor must perform the below listed work:

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Remove and replace approx. 32 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 9 panels
- Supply and install all new perforated deckhead panels, approx 5 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 19.5" deep x 41" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.1.13 Chief Cook Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 32 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 8 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 19.5" deep x 41" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.1.14 Leading Seaman Number 1 Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 31 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 7 panels
- Supply and install all new perforated deckhead panels, approx 5 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 20" deep x 40" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.1.15 Leading Seaman Number 2 Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 29 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 9 panels.
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 19.5" deep x 34" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.1.16 Seaman Number 1 Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 29 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 6 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 19.5" deep x 26" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install new sink and fixtures as per section 3.4 below.

3.1.17 Seaman Number 2 Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 29 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 6 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 19.5" deep x 26" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.1.18 Second Cook Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 31 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 7 panels
- Supply and install all new perforated deckhead panels, approx 6 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 19.5" deep x 37" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.1.19 Upper Deck Washroom – The Contractor must perform the below listed work:

- Remove and replace approx. 15 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 7 panels

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- Supply and install all new perforated deckhead panels, approx 3 panels.
- Supply and install new custom made vanity with marine approved plywood and professional finish. Approx size 21" deep x 77" wide x 32" high.
- Supply and install new stainless steel shower stall as per section 3.3 below. Existing shower stall is approx 36" deep x 30" wide.
- Supply and install new sink and fixtures as per section 3.4 below.

3.2 Deck

3.2.1 The Contractor must arrange the services of a Dex O Tex authorized company to complete the flooring renewals including labour, supply of materials and all equipment, tools and consumables as outlined in work below.

The authorized company laying the underlayment must also be responsible for the preparation of the deck as the surface profile is critical to the manufacturer's guidelines for the underlayment application.

The authorized company and all their installers must be trained and certified for Dexotex installation to ensure efficient timelines.

3.2.2 Any furnishings not being replaced with new must be removed and stored at the expense of The Contractor to be reinstalled after completion of work.

3.2.3 The whole of the steel deck in the areas listed in Section 1.2 must be prepped to SP11 by flooring contractor with NACE 2 certified inspector on staff to perform salt and temp readings on steel deck.

3.2.4 The Contractor must have an ultrasonic NDT technician take 24 ultrasonic shots on the exposed steel in each washroom to establish the amount of deck plating if any to be replaced. The CG TA in consultation with the NDT technician will decide the best locations for the ultrasonic shots. Before testing, The Contractor must at each identified test location grind the surface coating to bare metal while ensuring that any dishing of the metal is prevented. The Contractor must prepare and supply a report on the findings and amount of plating to be replaced to Chief Engineer immediately after the testing is complete. This Survey report must include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any to be replaced.

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

- 3.2.5** Before any more remedial work on this item is commenced; The Contractor must invite ABS Class Surveyor to inspect the deck to ascertain if additional testing/repairs are required and so that proper notes for future vessel hull surveys can be made. The Contractor must also bid on unit cost per additional ultrasonic shot and to be adjusted up or down by PSPC 1379 action.
- 3.2.6** The Contractor must crop out, dispose of and replace any deteriorated deck plating as determined by ABS. The new plating must also have the proper mill certification; copy of same must be given to CG TA and ABS Class Surveyors.
- 3.2.7** The Contractor must bid on replacing 5 Square feet of 3/8 inch deck plating per washroom. The Contractor must also quote on unit price per square foot of deck plate replacement. Deck Plating required to be adjusted up or down by PSPC 1379 action. The Contractor must also bid on the replacement of two deck scuppers per washroom(unless otherwise stated in section 3.1) if required to be adjusted up or down using PSPC 1379 if not required. The Contractor must also provide a unit cost per deck scupper in the event additional are required for replacement.
- 3.2.8** All steel decks (new and existing) and bottom section of bulkheads must be coated under the supervision of NACE 2 inspector, with 2 coats of Amercoat 83HS (or equivalent) epoxy primer following paint manufacturer application procedures, and time required between coats. Thickness and temperature readings must be recorded.
- 3.2.9** The Contractor must supply and install Transport Canada IMO approved Insul-Dex system installed by Certified Marine Dexotex installer at a thickness specified by the manufacturer. Areas and locations as per section 3.1. Thickness and temp readings must be taken at time of install
- 3.2.10** After Insul-Dex has cured it must be covered by a VLW IMO bond coat installed by certified dexotex marine installer. Thickness and temp readings must be taken at time of install. VLW IMO underlayment must be installed by certified dexotex marine installer on top of the VLW IMO bond coat.
- 3.2.11** The Contractor must install a Dexotex Seamless Epoxy deck system (color to be determined) in accordance with manufacturers' specifications.

3.3 Shower Stalls

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

3.3.1 The existing shower stall decks must be completely removed to steel deck and the new shower stall deck must be incorporated in the new Seamless Floor as per directions in Section 3.2. The Contractor must bid on the replacement of 20 shower drain scuppers, to be adjusted by PSPC 1379 if not required. The Contractor must also provide a unit cost per shower drain scupper in the event additional are required for replacement. The Contractor must install new SS sheeting sides in all shower stalls. SS sheeting must be continuous vertically with no horizontal join/seams. Sheeting must be secured with SS hardware and all seams must be silicone sealed. The Contractor must remove and replace existing shower heads and mixing valves . The Contractor must ensure the bottom of the sheeting is bent to allow it to cover the top edge of Epoxy Deck.

3.4 Sinks and Mirrors

3.4.1 The Contractor must disconnect and remove existing sinks, faucets and vanities, and replace with new Contractor supplied sinks, faucets and custom made vanities. Vanities must be made from marine grade plywood and with quality hardware. New sinks and faucets must be similar stye to existing and be approved by CG TA prior to installing. The Contractor must bid on replacing water pipe deck penetrations if required, to be adjusted using PSPC 1379 if not required.

3.4.2 When deck work is completed, all piping and drain connection must be re-oriented to fit and re-connected.

3.4.3 The Contractor must install toilets, cabinets and sinks and any other fittings removed for the work.

3.5 Toilets

3.5.1 The toilets must be removed and re-installed when deck work is completed. The deck must be cleaned and prepped as per Section 3.2. This must be completed prior to taking ultrasonic shots. New toilet securing studs must be stainless steel. The toilet must be installed on new Contractor supplied Teflon pad; some minor rework of ABS pipe in the toilet area may be required.

3.6 Bulkhead and Deck Head Panels

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

3.6.1 The Contractor must supply and replace all panels and associated tracks, trim, joiner pieces, hangers and new vinyl baseboards. All panel colors must be similar to existing panels fitted.

3.7 Location

3.7.1 As per section 3.1

3.8 Interferences

3.8.1 The Contractor must be responsible for the identification of all interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 All welding must be as per specification preamble.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must prepare and supply a report on the ultrasonic shots. This survey report must include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any, to be replaced.

5.1.2 All reports from the work specified must be given to the CG TA.

5.2 Spares

5.2.1 N/A

5.3 Training

	CCGS Leonard J Cowley	
Spec Item #: H-18	Specification	F7049-210183
WASHROOM RENEWALS		

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-19	Specification	F7049-210183
EMERGENCY GENERATOR DIESEL AND ALTERNATOR OVERHAUL		

H-19 Emergency Generator Diesel and Alternator Overhaul..

Part 1 - Scope

1.1 The intent of this specification is for The Contractor to obtain the services of the below FSR, to perform a complete overhaul of the Emergency Generator Diesel Engine and Alternator.

1.1.1 Caterpillar

1.2 The Contractor must include an \$80,000 allowance in the bid costs for Caterpillar FSR labor and travel costs. Final amounts to be based on invoices provided.

1.3 This work must be carried out in conjunction with the following spec items:

1.3.1 H-16 Port and Stbd Ship Service Generator Diesel Engine Overhauls

Part 2 - Reference

2.1 Guidance Drawings/Nameplate Data

2.1.1 Emergency Generator

Caterpillar Model: Cat 3306

Serial Number: 85Z01022

Alternator Model: MSC434D

Serial Number: H8935

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act 2001

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, tools and equipment required to perform the specified work unless otherwise stated.

	CCGS Leonard J Cowley	
Spec Item #: H-19	Specification	F7049-210183
EMERGENCY GENERATOR DIESEL AND ALTERNATOR OVERHAUL		

2.4.2 All parts required for overhaul must be supplied by The Contractor.

Part 3 - Technical Description

3.1 General

3.1.1 Diesel Engine

3.1.1.1 The diesel engine must be disassembled and cleaned for inspection by CG TA and ABS Class Surveyor. All parts are to be cleaned, decarbonized and any parts found defective and worn near tolerance limits, and/ or recommended for changing by the FSR must be brought to the immediate attention of the Chief Engineer. All parts found defective and worn near tolerance limits and/or recommended for changing by the FSR must be supplied by The Contractor for replacement. Only approved/certified OEM parts and/or components are to be supplied and install. The Contractor must bid an allowance of \$100,000.00 for the supply of replacement parts. Actual amount to be adjusted up or down via PSPC 1379 action based on invoices. The Contractor must remove and dispose of ashore all lubricating oil and jacket water (coolant) from the diesel engine, associated piping including the heat exchanger.

3.1.1.2 The diesel engine must be reassembled according to the manufacturer's instructions, tolerances, clearance and timing. Prior to filling the engine with new Contractor supplied manufacturer approved lubricating oil, the sump is to be inspected by the CG TA and ABS Class Surveyor.

3.1.1.3 The Contractor must provide one worker to assist the FSR. The Contractor must bid on providing the worker for assistance for a total of 140 hours. Actual hours to be adjusted up or down via PSPC 1379 action based on sign in sheet.

3.1.1.4 The Contractor must open up, clean, recalibrate and test the engine shutdown and safety systems. These systems consist of but not limited to overspeed, high jacket water temperature, low lube oil pressure shut down and engine start blocking sensors.

3.1.1.5 The operation of the diesel engine is to be demonstrated by a series of dock trials. The Contractor must develop trials procedures and recording

	CCGS Leonard J Cowley	
Spec Item #: H-19	Specification	F7049-210183
EMERGENCY GENERATOR DIESEL AND ALTERNATOR OVERHAUL		

sheets in conjunction with the engine manufacturer's instructions to demonstrate that the engine is running within its design specifications during periods of no load and various stages of loading up to full load.

3.1.1.6 At the end of each dock trial the crankcase doors are to be removed and the crankcase inspected to ensure that lubrication is correct, all large end bearings are free and no overheating has occurred. All leaks of lube oil, fuel oil, fresh and salt water are to be corrected during dock trials. The Contractor must ensure that the dock trials reflect this procedure.

3.1.2 Alternator

3.1.2.1 See 2.1.1 for Model, Serial and Arrangement.

3.1.2.2 The Contractor must ensure the generator is “Locked Out” from starting air supply, fuel supply, electronic power supply and breaker is “Racked Out” prior to work commencing.

3.1.2.3 Prior to starting any work on the alternator, the unit is to be meggered, air gaps measured and readings recorded.

3.1.2.4 The unit must be separated from the diesel engine; this to be completed in conjunction with The Contractor carrying out overhaul of the diesel.

3.1.2.5 The Contractor must remove rotor from vessel to a certified contractors facilities for cleaning, inspection, coating repairs as necessary, balancing and inspection by the CG TA and ABS Class Surveyor. Work on stator, same as above, to be completed in place unless deemed necessary to be removed for repairs.

3.1.2.6 Bearing on rotor shaft must be replaced during reassembly with Contractor supplied bearing the cost for which must also be included.

3.1.2.7 Once reassembled, the unit must be meggered and air gaps measured and recorded.

3.1.2.8 Alternator to be re-coupled and re-aligned to the diesel in accordance with FSR conducting overhaul of diesel.

	CCGS Leonard J Cowley	
Spec Item #: H-19	Specification	F7049-210183
EMERGENCY GENERATOR DIESEL AND ALTERNATOR OVERHAUL		

3.1.2.9 During run up of the diesel, the alternator, including its shaft, bearing and coupling must be monitored to ensure it is operating properly, electrical output to be measured and recorded.

3.1.2.10 The Contractor must bid on supplying and installing new start batteries of the same type and size as existing. The Contractor must properly dispose of original batteries as per Provincial Regulations.

3.1.2.11 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

3.2 Location

3.2.1 Emergency Generator Compartment

3.3 Interferences

3.3.1 The Contractor is responsible for all interference items that may require attention during the overhaul process.

Part 4: Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Function testing must be to the satisfaction of and witnessed by diesel FSR, generator overhaul representative, CG TA and ABS Class Surveyor.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5: Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: H-19	Specification	F7049-210183
EMERGENCY GENERATOR DIESEL AND ALTERNATOR OVERHAUL		

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

H-20 Port and Stbd Bridge Wing Catwalks..



CCGS Leonard J Cowley

Specification

Port and Starboard Bridge Wing Catwalks

Completed By:

Marine Services International Ltd.
P.O. Box 29132
St. John's, NL
Canada, A1A 5B5
Phone: 709 782 2700
Fax: 709 782 2707

Completed For:

DFO Vessel Support
P.O. Box 5667
St. John's, NL
A1C 5X1

Document Number: 3289-R-002
Issued: November 2021

Revision No.: 0

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of work to be completed for the fabrication of new catwalks being installed outboard of the port and starboard navigation deck bridge wings.
- 1.2** This work must be carried out in conjunction with the following spec items:
 - 1.2.1** HD-12 Weather Deck, Superstructure and Flight Deck Cleaning and Painting
 - 1.2.2** H-21 Bridge Fixed Window Replacement

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3289-D-01-R0 Port and Starboard Bridge Wing Catwalks

2.2 Standards

The following Standards are to be adhered during completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.

2.3 Regulations

The following Regulations are to be adhered during completion of the work scope:

- 2.3.1** Canada Shipping Act 2001

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

2.3.2 Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

2.4.1 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 It is The Contractor's responsibility to follow all applicable federal, provincial and local regulations. The Contractor is to adhere to all DFO-Coast Guard / PWGSC work requirements and must complete the work to the satisfaction of both the CG TA and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings and shackles necessary to perform the work. All lifting equipment must be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. All welded attachments required in the performance of this specification must be welded into place by CWB certified welders, certified to Welding Standard W47.2, Div. 1, 2 and 3. The contractor is also responsible for all temporary enclosures to facilitate the work, as well as all clean up and disposal of debris generated due to the work.

3.1.3 Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas free if necessary and suitable for hot work. Bulkhead linings and insulation materials must be removed in way of the hot work zone. Removed linings and insulation must be re-used where possible. Any such required new replacement materials must meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class surveyor. The cost for any such new replacement material to be covered by PSPC 1379.

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This must include the provision of suitable extraction fans as well as suitable coverings for decks, decking, bulkheads and outfit as required to limit additional damages. Fire watches must be maintained by The Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

3.2.1 The Contractor must use new 5083 H-116 aluminum plating or equivalent, 6061-T6 aluminum angle bars and 6061-T6 schedule 40 aluminum piping for all structural work. The catwalk grating must be new moulded grating. Any proposal for material substitution must be made in writing and must be approved by the CG TA prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.3.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.3.4 The Contractor must ensure that all aluminum plates, structural members and piping are clean and free of scale. Material certificates for all aluminum must be provided.

3.3.5 The following scantlings of aluminum plating, angle bars, piping and grating are as follows:

3.3.5.1 Plating – 9.5mm(3/8")

3.3.5.2 Angle Bars – 4" x 4" x 3/8" OA

3.3.5.3 Piping(1) – 1½" Nominal Diameter

3.3.5.4 Piping(2) – 1" Nominal Diameter

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

3.3.5.5 Grating – 1½” Thick x 1½” Mesh Moulded Grating

3.3.5.6 Grating securing clips - M-Clips and C-Clips

3.3.6 Linings and insulation material that may be required to replace any non-reusable removed items as noted in section 3.1.4 must be supplied and installed by the contractor and meet the noted standard listed in that section. All such materials and their install must also be to the satisfaction of the CG TA.

3.3 Welding

3.3.1 All welding associated with fabrication of new catwalks to be 6mm double continuous welding with butt welds of structural members being full penetration. New catwalk hand rails welded as per original specification.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor`s welding inspector will complete a 100% visual inspection of all welds prior to arranging inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% Liquid Penetrant Inspection(LPI) by qualified NDT technician.

3.3.5 The Contractor must remove all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter as per SSPC-SP16. All welds must be power tool cleaned to SSPC-SP3.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat affected and new aluminum both externally and internally. The heat affected paint is to be to hand tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the work place daily.

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

3.4.3 The Contractor must repair all coatings disturbed during the listed work in accordance with the vessels coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class surveyor and CG TA. The completed aluminum work is to be visually inspected after welding is completed. Welding is subject to 100% LPI and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor and CG TA. All costs associated with LPI Inspection to be included in The Contractor's price for known aluminum work.

3.5.3 The owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the CG TA with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection and any alterations / repairs made prior to acceptance. ABS acceptance certificate to be provided.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Structural Members

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Port and Starboard Bridge wing Catwalks

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

3.7.1.1 The Contractor must disassemble decking, bulkhead fixtures linings and remove insulation in way of hot work areas in the navigation bridge wings(port 7 starboard) and reassemble said items upon completion of work scope.

3.7.1.2 The Contractor must crop the existing outboard handrail sections aft of the bridge wing on port & starboard from the rail stanchion just aft of frame 51 forward to the aft bridge wing bulkhead. The Contractor must crop the existing outboard handrail sections on port & starboard from the forward bridge wing bulkhead just forward of frame 58 to the outboard most rail stanchion forward of frame 59 on the exterior bridge wing. The Contractor must then crop the existing fittings welded to the outboard port & starboard bridge wings including the screens with side lights and the safety grip type steps/platforms welded at bottom of each bridge wing. The screens with side lights are to be stored until they are ready to be re-installed in new locations.

3.7.1.3 The new catwalk support brackets to be welded to the lower bridge wings(port & starboard) in way of existing bridge wing brackets. The catwalk frame is then positioned on top of the new support brackets and welded in place. The catwalk handrail stanchions are then to be welded to the new frame. The catwalk grating is to be placed in the frame and secured in place with hold down clips. The catwalk top rail and intermediate rails will then be welded to the new rail stanchions and the existing handrails fore and aft. The above noted screens with side lights will be fitted to the underside of the new catwalks on port & starboard.

For details of work see supplied MSI drawing no. 3289-D-01-R0.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by The Contractor unless otherwise directed by the CG TA.

3.8.2 The Contractor must be responsible for the removal, storage and reinstallation of all fittings deemed to interfere with steel work as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-20	Specification	F7049-210183
PORT AND STBD BRIDGE WING CATWALKS		

- 3.8.3** The Contractor must be responsible for the removal, storage and reinstallation of any/all electrical components (wiring, junctions and panels) deemed to interfere with the work as outlined.
- 3.8.4** The Contractor must be responsible for the removal, storage and reinstallation of all wiring and equipment deemed to interfere with the work as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-21	Specification	F7049-210183
BRIDGE FIXED WINDOW REPLACEMENT		

H-21 Bridge Fixed Window Replacement..

Part 1 - Scope

- 1.1** The intent of this spec is to have The Contractor supply and replace Eight (8) bridge fixed glass windows with new larger Beclawat Bolt on aluminum windows as indicated on the MSI drawing. The locations of windows to be replaced are shown on Sheet 1 of 3 of MSI dwg. The Contractor must be responsible for the complete supply and installation of all new windows and their ancillaries.
- 1.2** The Contractor is responsible for supplying and installing all new Stainless Steel trim once windows are installed. The new trim must be fabricated and welded into one complete unit.
- 1.3** Due to the timelines required to manufacture and procure these windows, The Contractor must issue PO's for these new windows within 1 month of contract award. The CG TA must be allowed to review POs prior to ensure compliance with the requirements of the specifications.
- 1.4** This work must be carried out in conjunction with the following spec items:
 - 1.4.1** HD-12 Weather Deck, Superstructure and Flight Deck Cleaning and Painting
 - 1.4.2** H-20 Port and Stbd Bridge Wing Catwalks
- 1.5** It is the responsibility of The Contractor to ensure that all requirements specified in the General Sections of this Statement of Work are taken into consideration and applied to this specification item's defined work requirements. This specification item may mention certain specific requirements from General Section. However, this does not exempt The Contractor from considering and including any other references from General Section that should also be applied and included for this specification item's work. All requirements must be assessed and included, when applicable, for the work described in this specification item. In cases of discrepancy between content sources, the content in this specification item must take precedence.

Part 2 - References

2.1 Guidance Drawings

	CCGS Leonard J Cowley	
Spec Item #: H-21	Specification	F7049-210183
BRIDGE FIXED WINDOW REPLACEMENT		

2.1.1 MSI Dwg# 3271-D-01 CCGS Leonard J Cowley New Navigation Bridge Wing Window

2.1.2 Rivtow Industries Ltd Dwg no 590-13, Rev no 3 Wheelhouse and Funnel Structure

2.1.3 Beclawat Manufacturing Inc DWG 70860- Fixed Aluminum Bolt on Window

2.1.4 Window and Sidelight Schedule

2.1.5 General Arrangement- Officers Deck and Wheelhouse

2.2 Furnished Equipment

2.2.1 The Contractor must supply all labour, materials, equipment, and parts required to perform the specified work unless otherwise stated.

2.3 Standards

2.3.1 See General Notes

2.4 Regulations

2.4.1 See General Notes

Part 3 - Technical Description

3.1 General

3.1.1 The Contractor must supply and replace eight (8) fixed glass windows on the bridge with new larger units. These new windows must be class approved, marine rated Beclawat 70860-Fixed aluminum bolt on style windows. The Contractor must reference MSI Dwg # 3271-D-01 CCGS Leonard J Cowley New Navigation Bridge Wing Window for additional details.

3.1.2 During the course of these installations, any aluminum work requiring repairs must be performed by The Contractor. The Contractor must cut the larger opening as per MSI Dwg # 3271-D-01 to fit the new window. The Contractor must consult with CG TA should there be discrepancies between the drawing and the current windows installations prior to cutting any plate.

3.1.3 The Contractor must ensure that paint coatings iwo of the new window cut-out does not contain lead. If lead is detected in the existing coatings, The Contractor

	CCGS Leonard J Cowley	
Spec Item #: H-21	Specification	F7049-210183
BRIDGE FIXED WINDOW REPLACEMENT		

must arrange for abatement by certified company. This additional work will be addressed via PSPC 1379 action.

- 3.1.4** The Contractor must replace bulkhead stiffeners interfering with the new windows bolt pattern and relocate on bulkheads with new (E)100X8 flat bar and (E)100X65X8 angle. A unit cost per meter of flatbar and angle must be included in the bid price to be adjusted up or down as required via PSPC 1379 action.
- 3.1.5** The Contractor must allow for the replacement of 10 m2 of 6.5 mm Aluminum Plate in their pricing. A unit cost per m2 must be included in the bid price to be adjusted up or down as required via PSPC 1379 action.
- 3.1.6** All welding must receive 100% visual inspection and be tested with 100% LPI. All repairs must follow Standards / Certification: CSA W47.2M, Division I, II, or III- Certification of Companies for Fusion Welding of Aluminum.
- 3.1.7** All new and localized areas damaged from hotwork must receive 2 coats of marine grade primer and correlating tie/top coats to match existing superstructure paint scheme where applicable.
- 3.1.8** During removals and installations, the window openings must be suitably sealed off to protect the ships interior from weather. The Contractor must be responsible to ensure that all equipment, flooring, fittings controls, etc. are properly protected against damage from the ingress of weather or from the work in progress. Any damages incurred as a result of inappropriate protection measures must be repaired at The Contractor's expense.
- 3.1.9** During all cutting and welding, work areas must be properly ventilated. Hotwork permits must be completed and followed during this work.
- 3.1.10** Areas of new, bare, or heat affected aluminum must be power tooled to SSPC-SP 3 and painted with two (2) separate coats of marine grade primer, followed by two (2) separate coats of marine white as per vessels painting specifications.
- 3.1.11** The Contractor must be responsible for all rigging of windows on/off the vessel and disposal of the removed windows ashore.

	CCGS Leonard J Cowley	
Spec Item #: H-21	Specification	F7049-210183
BRIDGE FIXED WINDOW REPLACEMENT		

3.1.12 The Contractor must install and seal the new windows as per manufacture instructions. All removed interference and trim items must be re-placed as per original.

3.1.12.1 The Contractor must supply and install all new Stainless Steel trim once windows are installed. The new trim must be fabricated and welded into one complete unit. The Contractor is responsible for supplying and installing new insulation as per original in any disturbed areas.

3.1.13 Prior to the installation of insulation and window trim on the newly supplied / installed windows, each window must to be subjected to a hose test to ensure water-tight and no leakage around the sealing faces. This hose test must be witnessed and to be to the satisfaction of by the attending ABS surveyor and both the CG TA and IA.

Part 4 - Proof of Performance

4.1 Inspection/Inspection

4.1.1 Upon completion windows must be inspected for good seal contact and hose tested and proven watertight to the satisfaction of the CG TA and the attending ABS surveyor.

4.1.2 All work areas must be thoroughly cleaned upon completion of all work to the satisfaction of the CG TA.

4.2 Testing

4.2.1 All welds must receive 100% Visual inspection and 100% LPI testing from a certified third party organization.

4.2.2 All new windows must be hosed tested to ensure proper installation. Any deficiencies found will be corrected by the contractor at their expense.

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: H-21	Specification	F7049-210183
BRIDGE FIXED WINDOW REPLACEMENT		

5.1.1 Copies of all manuals and/or certificates for the newly supplied windows and any drawings developed or modified by this specification must be provided to the CG TA.

5.1.2 The Contractor must update all existing shipboard drawings where new windows are shown.

5.2 Certificates

5.2.1 The Contractor must provide CG TA with new steel and flooring certificates.

5.2.2 The Contractor must provide CG TA with all NDT reports from the third party weld testing organization.

5.2.3 The Contractor must provide CG TA with all CWB welders tickets and welding procedures.

	CCGS Leonard J Cowley	
Spec Item #: H-22	Specification	F7049-210183
FUEL OIL PURIFIER REPLACEMENT		

H-22 Fuel Oil Purifier Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to replace the two (2) existing fuel oil purifiers with new GSM Alfa Laval purifiers.
- 1.2** The Contractor must include a \$15,000 allowance in the bid costs for the Alfa Laval FSR to commission the new purifier units following the installation. This allowance to be adjusted up or down via PSPC 1379 action.
- 1.3** This work must be carried out in conjunction with:

1.3.1 H – 23 Lube Oil Purifier Replacement

Part 2 - Reference

2.1 Guidance Drawings/Nameplate Data

2.1.1

Drawing Number	DRAWING TITLE	Sheet and Revision
	PMC Technical Specification Purifier Replacement No. 21-176-001	
	51489463#0 Alfa Laval Flow Chart-Single Flex P605 MDO	
	51489464#0 Alfa Laval Dimensional Drawing-Single Flex P605 MDO	
	51489465#0 alfa Laval Installation Drawing-Single Flex P605 MDO	
	51489466 Rev 1.0 Alfa Laval Electrical Diagrams	
590-420-01	Fuel Oil Piping Diagram	
590-35	Fuel Oil Diagram	
590-79	Capacity Plan	
	Alfa Laval local Representative Madsen Diesel & Turbine 141 Glencoe Drive Mount Pearl (St. John's), NL A1N 4S7 T: (709) 726-6774 C: (709) 769-7275	

	CCGS Leonard J Cowley	
Spec Item #: H-22	Specification	F7049-210183
FUEL OIL PURIFIER REPLACEMENT		

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 See General Notes

2.3.2 Maritime Occupational Health and Safety Regulations _

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 The Contractor must complete the work in accordance with the referenced drawings and manuals.

3.1.2 The purifiers are located on the #4 WB Tank Top Stbd Side in the Purifier Room

3.1.3 The Contractor must have the #4 WB Tank gas freed and certified for hot work before commencing removals.

3.1.4 The Contractor must remove existing two (2) purifier units and modify or fabricate new mounting frames to accommodate the new units. The exact mounting locations on the tank top must be determined by the CG TA after the old units have been removed.

3.1.5 The new FO purifiers are currently stored at CG Technical Stores in St John's, NL. The Contractor must provide a minimum of 10 days notice for delivery of the new purifiers prior to installing the units.

3.1.6 The new purifiers are loose supplied complete with control panel, feed pump, sludge removal tanks and control valves. The units must be disassembled to the point of allowing transport to the purifier room. The units must be assembled as per manufacturer spec. Access to the purifier room is through the soft patch, through watertight door and through the purifier room door.

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Spec Item #: H-22	Specification	F7049-210183
FUEL OIL PURIFIER REPLACEMENT		

- 3.1.7** The Contractor must follow the scope of work laid out in PMC Spec No.21-176-001(included in reference materials).
- 3.1.8** The Contractor must obtain the services of the local Alfa Laval FSR for direction on the assembly of the purifier components.
- 3.1.9** The existing power feed cables to each purifier must be reused and must not be cut. The existing alarm wiring for the AMS must also be reused.
- 3.1.10** The existing units recirculate the fuel to the suction side of the feed pump during recirculation/discharge mode. The new units must be piped to the 2 inch dia settling tank discharge pipe. Two separate pipes must be installed from the new units and branched into the settling tank discharge at “Y” connections. Some minor modifications to the existing pipework will be required to connect the new units. The Contractor must supply and install new check valves in the recirculating branch pipes; valves must be horizontal swing check with socket weld flanges.
- 3.1.11** The control panels must be fitted as per existing located external to the purifier room on the adjacent bulkhead in the shaft tunnel. The new control circuit wiring from the purifier units must be extended as required to connect to the control panels. The Contractor must make adjustments to the existing or fabricate new mounting brackets for the new control panels as required.
- 3.1.12** The Contractor must include an allowance of \$15,000.00 for the services of the Alfa Laval FSR to commission the new purifier units following installation by The Contractor. The amount to be adjusted up or down via PSPC 1379 action based on invoice.
- 3.1.13** The Contractor must supply and replace the existing 3 way directional discharge valve located overhead in the shaft tunnel.

3.2 Location

- 3.2.1** Stbd Side Purifier Room

3.3 Interferences

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

	CCGS Leonard J Cowley	
Spec Item #: H-22	Specification	F7049-210183
FUEL OIL PURIFIER REPLACEMENT		

Part 4 - Proof of Performance

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA, FSR and ABS Class Surveyor.

4.2 Testing

- 4.2.1** The Contractor must deliver to the CG TA prior to final acceptance, all reports detailing each test and trial performed by The Contractor.
- 4.2.2** As per FSR Commissioning directions.
- 4.2.3** Both purifiers must be run for 24 hours continuous in each of the below scenarios
 - 4.2.3.1** Individually (24 hours each)
 - 4.2.3.2** Both units running at the same time

4.3 Certification

- 4.3.1** Overhaul technician must provide documentation that the company is an authorized FSR for equipment being worked on. A complete set of operating parameters at various loads during testing to be recorded and submitted to the CG TA. An inventory of all parts changed to be provided to the CG TA.
- 4.3.2** The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must deliver to the CG TA, before acceptance, certificates in accordance with the Documentation section in the General Notes.
- 5.1.2** All checklists, reading, pictures and findings must be included in the final report and submitted to the Chief Engineer.

	CCGS Leonard J Cowley	
Spec Item #: H-22	Specification	F7049-210183
FUEL OIL PURIFIER REPLACEMENT		

5.1.3 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-23	Specification	F7049-210183
LUBE OIL PURIFIER REPLACEMENT		

H-23 Lube Oil Purifier Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to replace the existing lube oil purifier with new GSM Alfa Laval purifier.
- 1.2** The Contractor must include a \$15,000 allowance in the bid costs for the Alfa Laval FSR to commission the new purifier unit following the installation. This allowance to be adjusted up or down via PSPC 1379 action.
- 1.3** This work must be carried out in conjunction with:

1.3.1 H-22 Fuel Oil Purifiers Replacement

Part 2 - Reference

2.1 Guidance Drawings/Nameplate Data

2.1.1

Drawing Number	DRAWING TITLE	Sheet and Revision
	PMC Technical Specification Purifier Replacement No. 21-176-001	
	51489463#0 Alfa Laval Flow Chart-Single Flex P605 MDO	
	51489464#0 Alfa Laval Dimensional Drawing-Single Flex P605 MDO	
	51489465#0 alfa Laval Installation Drawing-Single Flex P605 MDO	
	51489466 Rev 1.0 Alfa Laval Electrical Diagrams	
	590-41 L/O Oil Piping Diagram	
	590-33 L/O Oil Piping Diagram	
	590-79 Capacity Plan	
	Alfa Laval local Representative Madsen Diesel & Turbine 141 Glencoe Drive Mount Pearl (St. John's), NL A1N 4S7 T: (709) 726-6774 C: (709) 769-7275	

	CCGS Leonard J Cowley	
Spec Item #: H-23	Specification	F7049-210183
LUBE OIL PURIFIER REPLACEMENT		

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 See General Notes

2.3.2 Maritime Occupational Health and Safety Regulations _

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 The Contractor must complete the work in accordance with the referenced drawings and manuals.

3.1.2 The purifier is located on the #4 WB Tank Top Stbd Side in the Purifier Room

3.1.3 The Contractor must have the #4 WB Tank gas freed and certified for hot work before commencing removal.

3.1.4 The Contractor must remove existing unit and modify or fabricate new mounting frame to accommodate the new unit. The exact mounting location on the tank top must be determined by the CG TA after the old unit has been removed.

3.1.5 The existing heater unit and supporting framework must be cropped from the tank top.

3.1.6 The new Lube Oil Purifier is currently stored at CG Technical Stores in St John's, NL. The Contractor must provide a minimum of 10 days notice for delivery of the new purifier prior to installing the unit\.

3.1.7 The new purifier is loose supplied complete with control panel, feed pump, sludge removal tanks and control valves. The unit must be disassembled to the point of allowing transport to the purifier room. The unit must be assembled as per

	CCGS Leonard J Cowley	
Spec Item #: H-23	Specification	F7049-210183
LUBE OIL PURIFIER REPLACEMENT		

manufacturer spec. Access to the purifier room is through the soft patch, through watertight door and through the purifier room door.

3.1.8 The Contractor must follow the scope of work laid out in PMC Spec No.21-176-001(included in reference materials).

3.1.9 The Contractor must obtain the services of the local Alfa Laval FSR for direction on the assembly of the purifier components.

3.1.0 The existing power feed cables to the purifier must be reused and must not be cut. The existing alarm wiring for the AMS must also be reused.

3.1.11 The existing unit recirculate the lube oil from the Main Engines or Lube Oil Storage Tank to the suction side of the feed pump during recirculation/discharge mode. A new pipe must be installed from the new unit and branched into the Main Engine Discharge piping at existing connection. Some minor modifications to the existing pipework will be required to connect the new unit. New Contractor supplied check valves must be installed in the new recirculating branch pipes; valves must be horizontal swing check with socket weld flanges.

3.1.12 The control panel must be fitted as per existing located external to the purifier room on the adjacent bulkhead in the shaft tunnel. The new control circuit wiring from the purifier units must be extended as required to connect to the control panels. The Contractor must make adjustments to the existing or fabricate new mounting brackets for the new control panels as required.

3.1.13 The Contractor must include an allowance of \$15,000.00 for the services of the Alfa Laval FSR to commission the new purifier unit following installation by The Contractor. The amount to be adjusted up or down via PSPC 1379 action based on invoice.

3.1.14 The Contractor must supply and replace the existing 3 way directional discharge valve located overhead in the shaft tunnel.

3.2 Location

3.2.1 Stbd Side Purifier Room

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: H-23	Specification	F7049-210183
LUBE OIL PURIFIER REPLACEMENT		

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 - Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA, FSR and ABS Class Surveyor.

4.2 Testing

4.2.1 The Contractor must deliver to the CG TA prior to final acceptance, all reports detailing each test and trial performed by The Contractor.

4.2.2 As per FSR Commissioning directions.

4.2.3 The purifier must be run for 24 hours continuous on each Main Engine.

4.3 Certification

4.3.1 Overhaul technician must provide documentation that the company is an authorized FSR for equipment being worked on. A complete set of operating parameters at various loads during testing to be recorded and submitted to the CG TA. An inventory of all parts changed to be provided to the CG TA.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver to the CG TA, before acceptance, certificates in accordance with the Documentation section in the General Notes.

5.1.2 All checklists, reading, pictures and findings must be included in the final report and submitted to the Chief Engineer.

	CCGS Leonard J Cowley	
Spec Item #: H-23	Specification	F7049-210183
LUBE OIL PURIFIER REPLACEMENT		

5.1.3 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-24	Specification	F7049-210183
FIXED FOAM AND WET CHEMICAL		

H-24 Fixed Foam and Wet Chemical – UPDATED

Part 1 – Scope

- 1.1** The purpose of this spec is to carry out the annual safety inspection of the Galley Range Guard and the Fixed Fire Fighting System in the Helicopter Hangar. The Contractor shall perform all required annual maintenance and testing. All work must be inspected by the attending ABS Surveyor. The Contractor must be responsible for scheduling the ABS Surveyor.
- 1.2** All annual maintenance is to comply with applicable National Fire Protection Association standards.
- 1.3** All work must be performed by authorized manufacturer’s qualified technicians.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1 GALLEY WET CHEMICAL FIXED FIRE EXTINGUISHING SYSTEM

Name	Model No.	Serial No.	Imperial Gallons	Agent	Pressure PSI @ 70 deg F	Last inspection
Range Guard	RG-4GM	015772	3.3	Karbaloy	175	2019

2.1.2 Fire Zone Plan 590-78

2.1.3 Fire Fighting Equipment Plan 1590-03

2.1.4 Fire Fighting Plan 590-82

2.1.5 Helicopter Hanger Manual #35 C/E Cabin

2.2 Standards

2.2.1 SOLAS

2.2.2 Marine Machinery Regulations

2.2.3 National Fire Protection Association standards.

2.3 Regulations

	CCGS Leonard J Cowley	
Spec Item #: H-24	Specification	F7049-210183
FIXED FOAM AND WET CHEMICAL		

2.3.1 Canadian Coast Guard Fleet Safety and Security Manual (DFO/5737)

2.3.2 Canadian Coast Guard ISM Lockout/Tagout

2.3.3 Canadian Coast Guard ISM Hotwork Procedures

2.3.4 Canadian Coast Guard Enclosed Space Entry Procedures

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must perform annual maintenance on the Nordic Foam Flood System in the Helicopter Hangar. The Contractor must also perform annual maintenance on Galley Wet Chemical fixed equipment

~~3.1.1.1 Nordic Foam Flood System~~

3.1.1.1 Ansul Twin Agent Model 450/100

~~**3.1.1.1.1** The Contractor must take a sample of foam from both Port and Stbd Hanger foam tanks and have foam analyzed to determine if it meets minimum requirements to remain in service.~~

3.1.1.1.1 The Contractor must take a sample of foam from Hanger foam tank and have foam analyzed to determine if it meets minimum requirements to remain in service.

3.1.1.1.2 The Contractor must inspect all aspects of this system as per manufacturers recommendations and ABS requirements to prove in good operating condition.

3.1.1.1.3 Any defects to be addressed via PSPC 1379 action.

3.1.1.2 Galley Wet Chemical System

	CCGS Leonard J Cowley	
Spec Item #: H-24	Specification	F7049-210183
FIXED FOAM AND WET CHEMICAL		

3.1.1.2.1 The Contractor must inspect all aspects of this system as per manufacturers recommendations and ABS requirements to prove in good operating condition.

3.1.1.2.2 The Contractor must perform annual inspection on system and provide service report and certificate upon completion to the CG TA.

3.1.1.2.3 Any defects to be addressed via PSPC 1379 action.

3.1.2 All inspection certificates, must be provided for all equipment inspected, and must be to satisfaction of the CG CE and ABS Surveyor. Certification date must as close as practicable to the VLE completion date.

3.2 Location

3.2.1. Hanger and Galley

3.3 Interferences

3.3.1 N/A

Part 4 - PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be inspected by CG TA or CG CE prior to completion.

4.2 Testing

4.2.1 As per Technical Description, CG TA and ABS Class Surveyor must be notified of all inspection and testing. Attendance to be verified prior to starting.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 – Deliverables

	CCGS Leonard J Cowley	
Spec Item #: H-24	Specification	F7049-210183
FIXED FOAM AND WET CHEMICAL		

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-25	Specification	F7049-210183
MACHINERY SPACE DECK PLATE RENEWALS		

H-25 Machinery Space Deck Plate Renewals..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to supply and replace existing deck plates in the Engine Room, Shaft Tunnel and Harbour Generator Room as shown on the attached Machinery Layout Drawing.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Machinery Arrangement

2.1.2 Virtual Walkthrough

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 See General Notes

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 Prior to commencement of work, The Contractor must inform the CG TA for clarification on which deck plates are to be replaced.

3.1.2 Work areas must be certified gas-free and safe for hot work prior to the performance of any burning/welding activity.

3.1.3 All areas of disturbed coatings must receive two (2) separate coats of marine grade primer, followed by two (2) separate coats of marine grade paint to match the vessels original color scheme.

	CCGS Leonard J Cowley	
Spec Item #: H-25	Specification	F7049-210183
MACHINERY SPACE DECK PLATE RENEWALS		

- 3.1.4** The Contractor must install new angle iron of same scantling as original IWO sections that have required modifications over the years or have material depletion by more than 30%. The Contractor must bid on supplying and replacing 1800 linear feet of angle framing and deck vertical stiffeners. The Contractor must provide a unit cost per foot to supply and install additional angle framing and deck vertical stiffeners to be adjusted up or down via PSPC 1379 action if required.
- 3.1.5** The Contractor must power tool the deck area and the existing vertical stiffeners to SSPC SP-03.
- 3.1.6** The Contractor must supply and install new 1/4" checkered aluminum plating in sections capable of making removing with ease. The decking sections must have recessed screws fitted to the new and existing angle via tapped holes. The Contractor must allow for 50 sheets (4'x8'). The Contractor must bid a unit cost per sheet to supply and install. The actual number of sheets to be adjusted via PSPC 1379 action based on proof of invoice.
- 3.1.7** The Contractor must conform to Class Rules regarding the maximum span for angle supports. The Contractor must use bolt in angle girders where access to manholes would be impeded with welded sections. The Contractor must bid a unit cost for bolt in sections of angle girders to be adjusted up or down via PSPC 1379 action.
- 3.1.8** The Contractor must cut access holes IWO valve access. The Contractor must bid on fitting and installing 25 access holes fitted with hinged covers. The Contractor must bid a unit cost for access holes to be fitted with hinged covers to be adjusted up or down via PSPC 1379 action as required.
- 3.1.9** The Contractor must bid on supplying and installing twenty -five (25) brass tags with stamped lettering in English to be installed with self tapping screws. The Contractor must bid a unit cost to supply and install each valve labels(brass tags with stamped lettering in English) with self tapping screws for attachment to be adjusted up or down via PSPC 1379 action as required.
- 3.1.10** The Contractor must maintain a safe and illuminated access throughout the engine room space for CG TA inspections to be carried out. Removed deckplate section must be clearly taped off with caution tape to provide an adequate barrier.

3.2 Location

	CCGS Leonard J Cowley	
Spec Item #: H-25	Specification	F7049-210183
MACHINERY SPACE DECK PLATE RENEWALS		

3.2.1 Harbour Generator Room, Engine Room Machinery Compartments and Shaft Tunnel.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work to be completed to the satisfaction of the CG TA.

4.2 Testing

4.2.1 All welding performed in this installation must be visually inspected by both ABS Class Surveyor and CG TA.

4.3 Certification

4.3.1 All welders must be CWB certified for the type of welding they are required to perform.

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 N/A

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-26	Specification	F7049-210183
HOT WATER CALORIFIER REPLACEMENT		

H-26 Hot Water Calorifier Replacement – UPDATED

This spec has been included in H-29 Fresh Water Piping Replacement

This spec has been included in H-67 Fresh Water System Modifications

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

H-27 Port and Stbd Main Engine Overhaul – UPDATED

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to completely open up and strip down both the port and starboard main engines for full overhaul and have the engines surveyed by the attending ABS Class Surveyor and the CG TA. The engines to be boxed back after complete overhaul and tested as per requirements.
- 1.2** The Contractor must arrange for a complete alignment of the propulsion system(main engines, clutch, gearbox, tailshaft and pedestal bearings) while in operational ballasting conditions prior to docking and again after undocking in same ballasting conditions. The Contractor must also arrange for the services of Chockfast FSR if required to oversee the pouring of chockfast upon completion of main engine overhauls.

Part 2 – Reference

2.1 Rules, Regulations and Standards

- 2.1.1** All design, material and work must meet the Classification Society's (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify and coordinate any specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines referenced in this specification, (reference General Requirements, Section 4.0).
- 2.1.2** TCMSS approval, of design, material, and work, over and above Class approval, must be met as and when required.

2.2 Drawings and Documents

- 2.2.1** The following documents and or drawings are being referenced for guidance purposes only and a complete listing of available documents and drawings for the CCGS LEONARD J. COWLEY's VLE Project is included in Appendix A of this VLE's Technical Data Package.

Drawing N°.	Description
N°. 12555	Wartsila Nohab Instruction Manual

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

Nº 91 960 003 00E	Wartsila Service Instruction Document - Group 4 - Cylinder Head Overhaul Service Instruction.
Nº 91 960 004 00E	Wartsila Service Instruction Document - Group 3 -
Nº 91 960 005 00E	Wartsila Service Instruction – Group 4- Cylinder Head And Valves
Nº 91 960 006 00E	Wartsila Service Instruction – Group 4- Gear Train and Camshaft
Nº 91 960 008 00E	Wartsila Service Instruction – Group 7- Fuel System
Nº 91 960 009 00E	Wartsila Service Instruction – Group 8- Lubricating System
Nº 91 972 028 00E	Wartsila Technical Bulletin (available on ship)

2.3 Existing Equipment

2.3.1 Machinery Particulars - Main Engines

Make: Nohab-Polar
 Model: F312A (x 2)
 Bore: 250 mm
 Stroke: 300 mm
 Number of Cylinders: 12 (Vee Configuration)
 Power (MCR) : 1560 Kw (each)
 RPM (MCR): 750 r/min
 Engine Rotation: CW (seen from the flywheel towards the engine)
 Serial Numbers: 3355 (Port), 3356 (Stbd.)

2.4 Contractor Supplied Material

2.4.1 The Contractor must supply all labour, equipment, parts, materials, and tools to perform the work as specified and also include all costs for travel, transporting of parts and machinery, machine and workshop services.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

2.5 Field Service Representation

2.5.1 The Contractor must ~~also include in their proposal the price to~~ provide the services of an experienced diesel mechanic(s) with a minimum of two (2) overhauls on Nohab Engines with the past five (5) years. The diesel mechanic(s) must be fully familiar with the engine type and model being overhauled and must oversee the overhauls as well as their related re-commissioning and testing.

2.5.2 The Contractor must be able to provide access to a maintained Technical Database of parts, technical bulletins, component upgrades and overhaul procedures for this type of engine. Maintained to be defined as data from time of build for this model engine up to present date.

2.5.3 The Contractor must bid an allowance of \$2,500,000.00 for the completion of this spec item by sub-contractors. This allowance must cover all parts, travel, accommodations and labor required from sub-contractors to complete the work as described in Part 3 Technical Requirements. This amount to be adjusted up/down via PSPC 1379 action based on invoices. Upon contract award and prior to commencing work , the Contractor must provide the Sub-Contractor information to CG for review prior to issuing the Purchase Order.

2.6 Government Supplied Equipment

2.6.1 N/A

2.7 Government Furnished Equipment

2.7.1 N/A

Part 3 – Technical Requirements

3.1 General

3.1.1 The two (2) NOHAB-POLAR, Model F312A, 1560 kW, 12 cylinder, Vee configuration, four cycle diesel engines must be completely opened-up for survey and inspection. This work is also subject to survey by ABS and the CG TA, and it will be the responsibility of the Contractor to notify ABS of all inspections required, as work progresses.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.1.2 All parts required (listed later in spec) will be Contractor's supply; unless otherwise specifically stated, The Contractor must be responsible for the supply of all consumable materials (e.g., gaskets, lubricants, solvents, lint free cleaning rags etc.). All new gaskets and joints must be used throughout and to be supplied by the contractor as they fall under consumables. Any new replacement parts required will be procured through 1379 action unless specified otherwise herein. The Contractor will be required to unwrap and clean any new parts used in the overhaul of these engines.

3.1.3 Any items that, in the opinion of The Contractor, should form part of this package and/or needs further clarification to enable The Contractor to prepare and price a complete overhaul package must be brought to the attention of Canada, prior to the submission of bids.

3.1.4 The Contractor must be responsible for blanking off all open engine connections to prevent foreign particles from entering the engine internal components during the overhauls. This is carried out by applying blanking pieces which include, for example, blind flanges or covers. Rags stuffed into open pipes will not be acceptable. Failure to adequately protect the opened systems will require The Contractor to repair or clean and flush the entire system(s) that may have been contaminated, at their expense.

3.1.5 The Contractor must remove all gauges, thermometers, and pyrometers to safe storage. The Contractor must mark these components and connection points for correct re-installation. All open gauge, thermometer and pyrometer openings must be blanked off. On completion all remove sensors noted above must be reinstalled in their respective locations and reconnected as appropriate.

3.2 Wear Measurements and Clearances

3.2.1 The Contractor must be responsible for taking and recording all wear measurements, gearing back lashes and clearances on all components as specified in this description of work. The Contractor must review, with the attending ABS Surveyor, the diesel mechanic and the CG TA, all measurements taken and compare them to the manufacturer's specifications and tolerance wear limits.

3.2.2 The following deflection measurements must be taken and The Contractor must take and record these measurements prior to commencing the overhaul.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.2.2.1 Baseline hot crankshaft deflections must be taken starting from the fly wheel end working forward. Deflections must be taken prior to the dismantling of engine with the clutch disengaged and with clutch engaged. Lube oil temperature must be maintained at or above fifty (50) degrees C, while deflections are being taken. The deflection readings must be witnessed by Canada and copies of the typed written measurement reports must be provided to the CG TA.

3.2.2.2 Crankshaft and camshaft axial thrust clearance prior to commencement of the overhaul and again after main and thrust bearing removal, inspection, and reinstallation.

3.2.2.3 Engine bedplate witness pin clearances, Port and Stbd forward and Port and Stbd aft. Clearances must be taken before and after the overhaul.

3.2.2.4 Backlash clearances of all gearing at the fore end and flywheel end of the engine.

3.2.3 In addition to the above The Contractor must also measure and record the following:

3.2.3.1 Piston diameters must be measured at the four cardinal points (i.e.; port and stbd and fore & aft) in relation to the engine in the following locations:

- At the top ring location
- At the location directly below the bottom ring and
- At the piston skirt location.

3.2.3.2 Crank pin journal diameters.

3.2.3.3 When new piston rings are fitted. All clearances on piston rings as per the manufacture's specifications.

3.2.3.4 All piston gudgeon pin diameters, piston pin bores, connecting rod upper bush inside diameters with corresponding clearances.

3.2.3.5 Crankshaft end play (axial) before starting overhaul and upon completion of the overhaul.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.2.3.6 All valve springs free height as per maker's specifications.

3.2.3.7 Pre-lube oil pump rotor to stator clearance.

3.2.3.8 Jacket water and raw water pump wear ring clearances.

3.2.3.9 Fuel oil booster pump axial clearance on pumping assembly.

3.2.3.10 Lubrication oil pump-axial clearance.

3.2.3.11 Radial and axial run out on both turbocharger's main rotor/compressor shaft assemblies.

3.2.3.12 All camshaft bearings diametrical clearances and camshaft thrust bearing axial clearances.

3.2.3.14 Hydraulic governor drive gear to pinion backlash.

3.2.4 Three (3) copies of all the above readings must be provided to the CG TA.

3.2.5 All parts found defective and worn near or beyond tolerance limits must be brought to the immediate attention of the CG TA for remedial action and addressed via PSPC 1379 action.

3.3 Cylinder Head Overhaul

3.3.1 A total of sixteen (16) cylinder heads per engine must be removed from each engine and taken to The Contractor's repair facility for disassembly and overhaul.

3.3.2 Each cylinder head must be stripped completely and all parts must be chemically cleaned to bare metal. Each cylinder head must be sealed and hydrostatically pressure tested for thirty (30) minutes to the manufactures recommended test pressure(s) and procedures. The hydrostatic tests must be witnessed by the attending ABS Surveyor and the CG TA.

3.3.3 The cylinder head valves must be removed, cleaned, and inspected. All valves, valve guides, valve guide clearances and valve depth in seat must be measured and recorded. The manufacturer's guidelines must be used to provide the parameters that will define what can be reused. Parts in excess of 50% wear must be replaced with new via PSPC 1379 action.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

- 3.3.4** All valve seats must be ground and both valves and seats must be refaced by machining and then must be hand lapped as a unit. Once a valve has been lapped into its respective seat and its associated guide it must be securely tagged to indicate its final fitted position.
- 3.3.5** All valve springs must be measured, tested, and compared to the manufacture's specification.
- 3.3.6** Non-destructive testing must be performed as follows to ensure that there are not any defects present:
- 3.3.6.1** Cylinder head seating spigot - this is the formed ring which sits on the liner seat supplying a mechanical machine face to face fit. No gasket or sealing ring is fitted.
- 3.3.6.2** All valve seats, valve lids and valve stems.
- 3.3.6.3** Bottom of the cylinder head combustion side on the face of the head between valves and around injector hole
- 3.3.6.4** The following valve mechanism components found on each cylinder head must be inspected, measured and results recorded.
- 3.3.6.4.1** Inspect rocker arm end balls, record rocker arm bushing inside diameters and pin outside diameters. Clean, blow through, and prove all oil ways.
- 3.3.6.4.2** Inspect push rods for damage, check for straightness by turning in lathe, clean, blow through, and prove all oil ways.
- 3.3.7** The Contractor must remove all rocker arm bushings, and fit new Contractor supplied bushings and ream to the manufacturer's running clearance requirements between the new bush and pin.
- 3.3.8** The Contractor must remove all injection valve yoke hold down studs on all cylinder heads and replace them with Contractor supplied new type studs as per manufacturers procedures outlined in the Wartsila Technical Bulletin document # 91 972 028 00E.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.3.9 ~~The sixteen (16) pressure relief valves and indicator cocks, found on each engine, must be removed, completely disassembled, cleaned, overhauled, and then reassembled. Once reassembled they must be tested and set for 145 kp/cm² (2060 psig) This testing must be witnessed by the CG TA and copies of the test certificates must be provided as well to the CG TA. Units must be reinstalled with new annealed copper washers~~

3.3.9 The Contractor must remove sixteen(16) pressure relief valves, found on each engine, completely disassemble, clean, overhaul and reassemble. Once reassembled the units must be tested and set for 145 kp/cm² (2060 psig). This testing must be witnessed by the CG TA and copies of the test certificates must be provided to CG TA. Units must be reinstalled with new annealed copper washers.

3.3.10 The Contractor must remove existing indicator cocks and install new Contractor supplied indicator cocks. New indicator cocks must be of updated design from OEM.

3.3.10 The cylinder heads must be reassembled and re-installed with all new gaskets, seals rubber hoses and O-rings where applicable.

3.3.11 Prior to installation, all cylinder heads must be hand lapped to the liner seat as per Wartsila specifications. The fit of all cylinder heads to liners must be verified by bluing and this must be witnessed by the CG TA.

3.4 Piston Overhaul

3.4.1 Piston rings must be removed, all ring grooves and oil scraper ring drain holes must be cleaned and gauged for wear. Piston outside diameter (O.D.) must be measured as per Section 3.2.3 (a) found herein. All new piston rings to groove clearances must be checked and ring butt gaps taken and recorded prior to re-installation.

3.5 Connecting Rod Overhaul

3.5.1 ~~Connecting rods and their associated oil ways must be cleaned, proven clear and checked for straightness. Each connecting rod prior to installation and the fitted bearing shells inside diameter must be gauged in the horizontal, vertical, and parting lines after cap is torqued.~~

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

~~**3.5.2** The Contractor must check that all connecting rod serrated mating surfaces meet the manufacturers procedures. (Reference Wartsila Technical Bulletin document # 91 972 009 00E.)~~

~~**3.5.3** The Contractor must include in their bid price to have all connecting rods and bearing caps subjected to a non-destructive MPI testing, performed by a qualified NDT technician, to check that each connecting rod and its associated bearing cap is free from any cracking and or defects. Preliminary test/inspection results must be given to the CG TA as soon as tests have been completed. Final test report must be provided as per the documentation requirements found in Section 5.0 found herein.~~

3.5.1 The Contractor must supply and install sixteen (16) new updated design connecting rods per engine from OEM.

3.5.2 All connecting rod bottom end bearings must be renewed with new Contractor supplied bearings. All new upper & lower con rod bottom end bearings must be fitted in each individual connecting rod and the bearing cap tightened to the manufacturers final torque value. The Contractor must then gauge the fitted bearing halves inside diameter axially and horizontally and compare these readings to the manufacturer's specifications prior to being fitted in engine.

3.5.2.1 The Contractor must arrange for measuring and recording of each bottom end bolt to ensure no elongation has occurred. Any bottom end bolts requiring replacement to be addressed via PSPC 1379 action.

3.5.3 All wrist pins and bushings must be gauged and measurements recorded.

3.6 Cylinder Liners and Water Jackets

3.6.1 The Contractor must withdraw all sixteen (16) cylinder liners found on each engine. The Contractor must note that the position of each cylinder liner relative to the block is marked by a scored line at the top of the liner and the cylinder block. It is important that these lines marry up on reassembly.

3.6.2 All liners must be measured at the top, middle and lower piston wear areas both in the port and starboard and fore and aft planes. The Contractor must record these measurements using Wartsila's measurement record sheet document no. 91 943 001 00E found in Group 2 of manual. Any liners exceeding the

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

manufacturer's wear limits must be brought to the immediate attention of the CG TA for remedial action.

- 3.6.3** All liners being re-used must be de-scaled on the jacket water side by the glass bead blasting process. After de-scaling the blasted area must have an anti-corrosive primer applied.
- 3.6.4** All rust scale and debris must be removed from internal block walls and the cylinder block must be checked for erosion and or pitting at the O-ring sealing surfaces and at liner flange collar.
- 3.6.5** The Contractor must include in their bid price to have the cylinder liner flange collar seats NDT tested using the MPI process. Preliminary test results must be given to the CG TA as soon as tests have been completed. Final test report must be provided as per the documentation requirements found in Section 5.0 found herein.
- 3.6.6** All cylinder liners must be honed to produce a cross hatch pattern as per manufacturer's specifications. The Contractor must gauge all liners after honing is completed as per manufacturer's instructions.
- 3.6.7** The Contractor must follow the instructions regarding the honing process found on pages 13 and 14 of Group 2 Section 2 and 2.2 of the Nohab Instruction Manual before re-installing cylinder liners into their respective engine block.
- 3.6.8** New Contractor supplied cylinder liner O-rings must be fitted and lubricated with a soap solution to allow ease of reinstallation.
- 3.6.9** The Contractor must lap the cylinder block landing areas where each liner seats on the engine. The Contractor must lap the underside of each of the cylinder liner shoulders. This lapping must be carried out on the block and cylinder liners until a uniform profile is attained on both. Final lapping must be inspected by the CG TA prior to re-assembly.
- 3.6.10** Once the liners have been installed and secured in place in their respective engine. The engine blocks must be isolated and sealed off. As this is a Vee type engine, each bank must be water tested separately to the recommended manufacturer's pressure(s) for a period of one (1) hour. Any leakage due to liner installation must be made good by the Contractor. Water must be drained off by the Contractor

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

into suitable containers after a successful test and not be allowed to drain into the bilge.

3.7 Turbocharger Overhaul

- 3.7.1** The Contractor must remove the two (2) Brown Broveri VTR 200N turbochargers of each engine, have them removed ashore and then crated in preparation of sending these units to an authorized repair facility for overhaul.
- 3.7.2** Once at the authorized facility the turbo chargers must be opened up and all parts cleaned and inspected for wear distortion and cracks.
- 3.7.3** Each turbo charger rotor must be dynamically balanced. Copies of the Balance Reports must be provided to the CG TA.
- 3.7.4** Each turbocharger must be reassembled using new bearings and Contractor supplied gaskets and seals. Once assembled each turbocharger is then to be bench tested. Bench testing must be witnessed by the attending ABS Surveyor and the CG TA. Contractor must record axial and radial run out and end float on the main turbine shaft.
- 3.7.5** The turbochargers to be re-crated and returned to Contractor for re- installation on their respective engines with new gaskets, all in accordance with manufacturer's specification.
- 3.7.6** Once installed on their respective engines each turbocharges must be filled to its working level with new Contractor's oil that meets the manufacturer's specifications for the intended application.
- 3.7.7** Further testing of these units will be done during the main engine trials.

3.8 Crankshaft and Main Bearings

- 3.8.1** The Contractor must remove, in a planned sequence, all main and support bearing shells for inspection. A maximum of two (2) main bearings must be removed at one time to provide support for the crankshaft. There are nine (9) main bearing in each engine of which two (2) are support bearings one in the fore end housing and one at the flywheel end. The support bearings are fitted in a cage bolted to the engine housing and fitted with lock wire.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.8.2 Removal of main bearing caps involves removal of the cross bar bolts in the cap being removed and slacking up the adjacent cross bar bolts fore and aft.

3.8.3 The Contractor must reference the Nohab Instruction Manual for the instructions for hydraulic tightening of the main bearing cap screws.

3.8.4 The Contractor must renew all O-rings on all cross bar bolts on re-installation. Contractor to take note that access to remove some of the cross bar bolts involves removal of deck plate framing which the Contractor is responsible for.

3.8.5 Before reinstalling the main bearings, the Contractor must gauge wear the crankshaft journals and record the results.

3.8.5.1 The Contractor must provide a unit cost for the replacement of one (1) main bearing(both halves) to be adjusted up/down as required via PSPC 1379 action.

3.8.6 The Contractor must remove, for inspection, the thrust bearings and the four (4) thrust ring halves located at the flywheel end of each engine. The Contractor must gauge for wear and if acceptable re-install the thrust bearings. The Contractor must gauge and record the crankshaft axial play before removal and after re-installation of the thrust bearings.

3.8.7 Balance weight housing bolts must be re torqued to the manufacturer's recommend torque. And the housing bolts must be secured using new locking wire.

3.8.8 The Contractor must check that the main bearing caps receiving nuts are numbered. The Contractor must also check to ensure that lubrication oil ways, drilled between the journals and crankpins for pressure lubrication of the large bearing, are clear.

Note: Special tools for inspection of the Main bearings and crankshaft are aboard the vessel and the The Contractor must coordinate with the CG TA for usage of these tools

3.9 Vibration Damper and For-end Housing Overhaul

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

- 3.9.1** The Contractor must remove the existing two (2) piece vibration damper assembly (high viscosity silicone fluid type) found on each engine and install two (2) new Contractor's supplied re-conditioned units.
- 3.9.2** Each engine's fore-end housing must be removed to gain access for the replacement of the damper assemblies and these must be re-installed after completion. The fore end housing is doweled to the cylinder block and the drive gears for the main lube oil pump, jacket water and raw water pumps will require removal so as to gain access to each damper.
- 3.9.3** The Contractor must inspect, measure and record the following measurements in regard to the drive gearing:
- 3.9.3.1** All diametrical clearances on all gearing bushings and check gearing teeth for defects using the dye-penetrant method.
- 3.9.3.2** Record back lash on all fore-end gearing prior to and after installation of the new damper is required.
- 3.9.4** The alignment between fore-end housing and crankshaft must be checked, measured and recorded prior to and after the installation of the recondition dampers.
- 3.9.5** All components must be re-assembled using new gaskets and seals where applicable, and all fasteners must be tightened to the manufacturer's specified torque values. Locking wire or an Loctite application must be applied where required and where recommended by the manufacturer.

3.10 Engine Coolers

- 3.10.1** The Contractor must open up the main engine jacket water cooler(s) (Alfa Laval Plate type) for both engines as per manufacturer's instruction for cleaning and for inspection by the attending ABS Surveyor and the CG TA. Each cooler must be reassembled using new Contractor supplied gaskets and hydrostatically tested as per manufacturer's instructions. The Contractor must supply new red rubber gaskets for pipe flanges.
- 3.10.2** The Contractor must open up the main engine lube oil coolers (tube and shell type) for each engine and clean for inspection by the attending ABS Surveyor and the

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

CG TA. The Coolers must be re-assembled using new Contractor supplied seals, and zinc anodes and are then to be hydro-statically tested. Tests must be witnessed by the ABS Surveyor and the CG TA. The Contractor must supply red rubber gaskets for pipe flanges.

3.10.3 The Contractor must remove the charge air coolers from each engine. Coolers are of the fixed tube plate design-non removable tube stack type. Approximate weight of each cooler is 454 Kg. (1,000 lbs.)

3.10.4 Each cooler must be removed ashore and carefully transported to the Contractor's facility for cleaning and overhaul. Each cooler must be opened up and their associated tube nests must be internally cleaned using a wire brush. Each cooler is then to be placed in chemical bath for cleaning of the air side. Once cleaned, each cooler must be then re-assembled with new Contractor supplied gaskets. Coolers must be blanked and pressure tested to the manufacturer's recommended test pressures for a period of thirty (30) minutes. The attending ABS Surveyor and the CG TA must be witness this test.

3.10.5 On completion of a successful test the coolers must be returned to the Vessel and re-installed in their respective locations on each engine using new Contractor supplied gaskets.

3.11 Fresh Water and Lube Oil Temperature Regulators

3.11.1 The Contractor must be open up the three (3) temperature regulators on the freshwater cooling system found on each engine.

3.11.2 All thermostat housings must be opened up, cleaned, and inspected. The Contractor must supply and install all new thermostatic elements. Prior to installation, the new elements must be tested to prove that they open at the specified manufacturer's rated operating temperature range.

3.11.3 After testing and inspection of the thermostats, the temperature regulators must be closed up using new Contractor supplied gaskets. Note: All three (3) temperature regulators on each engine have different temperature ratings; the temperature is stamped on the element. Contractor must have the CG TA confirm which elements belong in each unit.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.11.4 The Contractor must open up one (1) temperature regulator on the lubrication oil cooling system of each engine and clean the housing and flanges. The Contractor must then install new thermostatic elements. Prior to the installation the new elements each element must be tested to prove that they open at the manufacturer's rated operating temperature range. After testing and inspection the temperature regulator must be closed up using new Contractor supplied gaskets.

3.12 Water Circulating Pumps

3.12.1 The jacket water and saltwater cooling pumps found on each engine must be removed and opened up for survey and for inspection by the ABS Surveyor and the CG TA. All component clearances must be measured and recorded. The pumps must be re-assembled as per manufacturer's specifications ensuring correct clearances of all pump components, using new Contractor supplied O-rings, bearings, and seals, the pump must be re-installed with new Contractor supplied gaskets. All removed piping must be installed using new gaskets and fasteners.

3.13 Lubricating Oil Pump

3.13.1 The Contractor must remove the main lubrication oil pump(s) from each engine, and they must be opened up and inspected for wear. All pump components must be measured and these readings must be recorded. (Reference Wartsila technical bulletin No. 91 978 048 00E). Should internal parts exceed manufacture's tolerance limits then the pump will have to be replaced with an remanufactured unit(s). If required, the Vessel will supply a replacement pump(s). The original pump(s) must be then sealed, returned to the Vessel and correctly stored on board in a location determined by the CG TA.

3.13.2 The pumps must be reinstalled on each engine as per the manufacturer's instructions. All removed piping will be re-installed using new Contractor supplied gaskets and fasteners.

3.13.3 The oil pressure regulation dump valve on each engine must be opened up, inspected, re-assembled using new Contractor supplied gaskets , and re-installed in their respective locations. Contractor must verify adjustment setting(s) during trials and mark them accordingly when the proper pressures have been reached.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.13.4 The Contractor must remove and open up the pre-lube oil priming pumps for cleaning and inspection of their internal components. Each pump is attached to an electric drive motor. The Contractor must measure and record the clearances between the impeller and pump casing.

3.13.5 Each pump must be reassembled with new Contractor supplied gaskets and seals and installed on the engine as per manufacturer's specifications. The Contractor is test run each unit when the engine(s) have been primed with oil to ensure to ensure that there are no leaks present.

3.14 Exhaust Manifold

3.14.1 The exhaust manifold cowling cover plates and securing brackets on both engines must be removed. Cover plates must be marked so as to be reinstalled in their respective locations.

3.14.2 All exhaust expansion bellows, and exhaust manifolds must be removed and must be tested using Liquid Penetrant Inspection process. Exhaust pipes sections and bellows must be tagged for correct re-installation. New Contractor supplied gaskets to be used during reinstallation.

3.14.3 The Contractor must supply and install new updated material hardware as per OEM technical bulletin.

3.15 Fuel Oil Pumps, Pump Operating Gear

3.15.1 The sixteen (16) fuel oil pumps, and injectors, found on each engine, must be removed and sent to a qualified fuel injection shop for overhaul, calibration, and testing.

3.15.2 Contractor is responsible for the transportation to and from the certified fuel injection shop. Every precaution must be taken by the Contractor to prevent damage to these units in transit, any damage incurred due to negligence, will be repaired immediately to the Contractor's account.

3.15.3 The fuel feed pumps on each engine must be removed and thoroughly clean, overhauled and inspected. On completion the pumps must be reassembled using contractor supplied new gaskets and seals and re installed on the engine using a new drive coupling.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.15.4 Any items found worn and defective or near clearance and wear tolerance limits must be replaced by the Contractor via PSPC 1379 action. Dimensions must be measured and recorded and checked against those quoted in the manufacture's Schedule of Clearances and Wear Tolerances. Pump lifts on the cams must be checked and adjusted as necessary. Fuel pumps must be replaced and set. Fuel spill time to be taken from number one fuel pump.

3.15.5 The Contractor must remove and open up the fuel oil booster pumps on each engine for survey / inspection. The booster pump is fitted to the main lube oil pump at the fore end housing driven through a drive coupling. All components must be inspected for wear. The pumps must be reassembled and reinstalled as per manufacturers specifications using new Contractor supplied gaskets, seals, and drive coupling(s).

3.16 Main Engine Camshaft & Camshaft Followers

3.16.1 The condition of cam surface at each lobe on both engines must be checked for defects, pitting, and scoring marks. As the inspection must include the entire surface of the cam, the cam must be rotated 360 degrees during this inspection.

3.16.2 Caution! The crankshaft and camshaft(s) must not be turned in any direction when the drive gear wheels are removed.

3.16.3 The Contractor must measure and record the condition of all camshaft bearing clearances.

3.16.4 The Contractor must remove and inspect the flywheel end camshaft gear trains including one (1) primary / secondary gear, two (2) idler gears and the two (2) secondary gears driving the camshaft. (Reference instruction manual group 5 "Gear Case and Camshaft" Document No. 91 991 005 00E dated 2008-01-29 Issue No. 11. Section 2.4 details removal). All worn or defective parts must be brought to the attention of the CG TA for remedial action via PSPC 1379.

3.16.5 All parts removed must be marked to ensure that they are re-installed in their respective locations on each engine.

3.17 Crankcase Lubricating Oil System & Crankcase Doors

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.17.1 All associated engine lube oil pipes on both engines must be removed, examined, and cleaned. All drilled oil passageways must be blown through and proven clear. Crankcase oil sump screens must be lifted and sumps thoroughly cleaned using lint free rags to the satisfaction of the CG TA. Crankshaft doors must be removed and new Contractor supplied gaskets must be fitted.

3.17.2 The Contractor must remove and dismantle the three (3) crankcase relief valves found on each engine, for cleaning, inspection, and renewal of worn components as follows:

3.17.2.1 Springs, valve seats and O-rings. New Contractor supplied O-rings and door gaskets must be fitted.

3.17.2.2 On re-assembly of the relief valves the Contractor has to prove to the attending ABS Surveyor that they are functional.

3.18 Hydraulic Governor

3.18.1 The Contractor must remove the EGB-10 Woodward hydraulic governors from each engine and have them crated in preparation of transporting them to a certified facility for complete dismantling, overhaul, and recalibration.

3.18.2 All parts must be laid out for inspection and measurement and all readings must be recorded.

3.18.3 Each governor must be reassemble using gaskets and seals and must bench tested to their rated output and adjusted accordingly to the manufacturer's design specifications. Bench testing must be witnessed by both the attending ABS Surveyor and the CG TA.

3.18.4 Upon completion, the governors are be transported back to the vessel and installed on their respective engines using new Contractor supplied gaskets.

3.18.5 The Contractor must arrange to a have a qualified representative from the governor repair facility present when the engines are being initially started and trialed to make final adjustments to the governors in situ.

3.19 Air Starting Motor Overhaul

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.19.1 The air start motors on each engine must be removed and taken ashore for overhaul. Starter motors must be completely disassembled, cleaned, and laid out for inspection by the attending ABS Surveyor and the CG TA.

3.19.2 Motors must be re-assembled using Contractor supplied new gaskets, diaphragms, springs, O-rings, seals, and grease and returned to the vessel for installation in their respective locations.

3.19.3 The backlash of each air starter drive gear to the flywheel gear ring must be measured, recorded and must meet the manufacturer's recommended limits.

3.20 Engine(s) Re-assembly

3.20.1 Upon completion of the engine(s) overhaul, each engine sump base is again to be manually cleaned out using lint free rags and the sump must be inspected by the CG TA prior to closing up

3.20.2 Engine must be reassembled to an operable condition using new gaskets, seals, new lube oil filters and fuel oil filters. A new rear crankshaft oil seal must be fitted on each engine as per manufacturer's instructions.

3.20.3 The Air filters (2), per engine, must be washed and cleaned and blown dry with compressed air. All fresh and raw water systems must be filled purged of air checked for leakage.

3.20.4 Engines must be filled to their operating level with new Contractor's supplied, lubricating oil that is approved by the CG TA. The Lube oil system must be pressurized using the pre-lube pump and all lubrication points must be checked for free flow and pressures adjusted to the manufacturer's recommend parameters and to the CG TA's satisfaction.

3.20.5 Cylinder head valve clearances and fuel pump lifters clearances must be adjusted as per the manufacturer's requirements.

3.20.6 The Contractor must provide the services of a Chockfast (or equivalent) Technician to supply and pour Chockfast for the engine mounts.

3.20.6.1 The Contractor must install and remove required dams for Chockfast and provide any heaters required to obtain the required temperature for the Chockfast to cure.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

3.20.6.2 ~~The Contractor must bid an allowance of \$25,000.00 for the travel, accommodations, meals and labor for the Chockfast FSR. This amount to be adjusted up/down via PSPC 1379 action based on invoices. This allowance does not cover the cost of supplying materials.~~

3.20.7 The Contractor must inspect and verify the tightness of both engines hold down bolts, as per manufacturer's instruction, using a torque wrench. Verification of such adjustments must be recorded, and results provided to the CG TA.

4.0 PROOF OF PERFORMANCE

4.1 Inspection

4.1.1 All work performed must be inspected and must be to the satisfaction of both the attending ABS Class Surveyor and the CG TA.

4.2 Test and Trials

4.2.1 Contractor must arrange to have the attending ABS Surveyor and the CG TA to inspect the newly overhauled engines, to establish cleanliness, tightness, and that the supporting systems are correctly connected, i.e., electrical power, fluid levels, control systems, etc. All work must be to the satisfaction of ABS and the CG TA. Any deficiencies found must be rectified immediately by the The Contractor.

4.2.2 Once the engine reassemblies have been completed, and are ready for operation, the Contractor must be responsible for the necessary commissioning and startup tests required by the diesel mechanic(s) and Class. (Refer to Wartsila service instruction "Running-in Of Engines After Major Overhauls" Document No. 91 960 009 00E dated 1995-09-04)

4.2.3 The commissioning and testing must be witnessed by the attending ABS Surveyor and the CG TA.

4.2.4 Prior to starting the following controls, alarms, and shutdowns must be proven functional, their operations witnessed, and must be to the satisfaction of all both the attending ABS Surveyor and the CG TA:

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

4.2.4.1 As soon as the engine attains normal temperatures and pressures, the control, safety and over speed systems must be verified that they operate correctly:

4.2.4.2 Low lube oil pressure alarm

4.2.4.3 Low lube oil press shutdown

4.2.4.4 High jacket water temperature shutdown

4.2.4.5 High jacket water temperature alarm

4.2.4.6 Over speed

4.2.5 The CG TA must verify that all of the alarm and monitoring systems for the Port and Starboard main engines are functioning as per normal and to the satisfaction of the CG TA.

4.2.6 Once each engine has been completely reassembled to an operable condition they must be barred over manually, with the pre lube pump on, to ensure that there isn't any binding taking place through the moving parts of the engine(s) .

4.2.7 Under the guidance of the diesel mechanic and the manufacturer's recommended start up procedure, each engine must have the following start-up procedures performed:

4.2.7.1 Cold crankshaft deflections must be taken before prior to any engine starting and after the final test runs.

4.2.7.2 Each engine must be test run for an initial period of no more than three (3) minutes. At the end of this period the engine must be stopped and crankcase doors must be removed and the crankcase inspected to ensure that there is correct lubrication flow and no there is no localized overheating,

4.2.8 If the initial run is successful, then each engine must be further test run for the following time periods

4.2.8.1 Period 1 A ten (10) minute duration,

4.2.8.2 Period 2 A thirty (30) minute duration

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

4.2.8.3 Period 3 A one (1) hour duration, and

4.2.8.4 Period 4 A two (2) hours duration.

4.2.9 At the end of each period the crankcase doors must be again removed and the crankcase inspected to ensure that lubrication flows are correct, and that there is not any localized overheating. Advancement to the next test run must only occur after a successful inspection and all parties are fully satisfied. All test runs and inspections must be witnessed by the attending ABS Surveyor and the CG TA.

4.2.10 The Contractor must record temperature and pressures at fifteen (15) minute intervals following completion of the normal start up procedures including main and connecting rod bottom end bearing temperature checks.

4.2.11 Firing and compression readings must be taken and recorded by the Contractor when each engine reaches its maximum trial load limit.

4.2.12 Any leaks of lube oil, fuel oil, and fresh and salt water found during the course of the above trials must be corrected immediately.

4.3 Sea Acceptance Trials (SATs)

4.3.1 The Contractor must plan on a minimum a twelve (12) hour sea/endurance trials for the main engine trials. The Canadian Coast Guard will be responsible for the fuel needed for these trials. Contractor will be required to have a minimum of two (2) yard personnel, as well as the authorized services representative(s), and the attending ABS surveyor(s) on board during these trials.

4.3.2 Prior to commencing trials, the Contractor must provide a trials agenda and booklet to the CG TA complete with the sign off section for evaluation by the witnessing parties.

4.3.3 The submitted trials booklet must be based on latest version of the "Guide for Sea Trials" as published by the Society of Naval Architects and Marine Engineers (SNAME) and must include at a minimum, but not limited to the following requirements:

4.3.3.1 The trials performed must be taken with the vessel loaded to an even trim,

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

4.3.3.2 The following trials will be conducted with the control in the engine control room:

4.3.3.2.1 four (4) variable speed tests, each test for thirty minutes duration, must be performed at the following power levels: 25%, 50%, 75% and 100%.

4.3.3.2.2 Four (4) hours at 100% continuous rating. During this period, readings must be taken at fifteen (15) minute intervals and recorded on test sheets to provide a permanent record.

4.3.3.2.3 Proof of satisfactory operation of each engine's overspeed/ overload trip(s).

4.3.3.2.4 During these trials, engine control settings must be established for the endurance trials.

4.3.4 During the endurance trials the vessel must be in the constant power mode and the trials must be constructed in the following configuration:

4.3.4.1 Four (4) hours at cruising speed with main diesel engines at economical RPM

4.3.4.2 Four (4) hours endurance with main diesel engines operating at 100 % power.

4.3.5 The Contractor must be responsible for producing, recording, and maintaining all trial sheets.

4.3.6 During the course of the 100% powered endurance run an additional set of firing and compression readings must be taken and recorded, the diesel mechanic must balance individual cylinder loads at this time as required.

4.3.7 Hot crankshaft deflections must be taken immediately after sea trials have been completed with the clutch disengaged and with clutch engaged. Lube oil temperatures must be maintained at or above fifty (50) degrees C, whilst the deflection readings are being taken. The deflection readings must be witnessed by the CG TA and copies of the typed written measurement reports must be provided to the CG TA.

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

4.3.8 Three (3) typed copies of all trial sheets must be given to the on-site ABS Surveyor and the CG TA Owners after completion of all trials.

4.4 Completion and Acceptance

4.4.1 On completion of a satisfactory sea trial(s) the Contractor must be responsible for the removal of all lube oil and fuel oil filters used during trials and replacing them with new Contractor supplied filters units.

4.4.2 Old filters must be broken open and the filter elements removed and laid out for inspection. This must be witnessed by the attending ABS Surveyor, the diesel mechanic, and the CG TA.

4.4.3 Oil samples from both engines, taken prior to the shutting down of each engine after trials, must be sent to a certified laboratory for analysis. Analysis report must be provided to the CG TA upon receipt.

4.4.4 Final acceptance will not be performed until all of the above tests and trials have been satisfactorily completed with the corresponding data available for review.

4.4.5 The CG TA, or a representative of the CG TA, will conduct a final inspection and will advise the PSPC Contracting Authority when the engines are ready for Acceptance as per the Contract.

5.0 DELIVERABLES

5.1 Technical Data

5.1.1 The Contractor must provide to the CG TA with all of the documents listed below:

5.1.1.1 All original Classification certificates and TCMSS Notices of Compliance

5.1.1.2 Copies of all pressure test certificates

5.1.1.3 Copies of all test report(s) (where applicable)

5.1.1.4 Copies of all NDT reports

5.1.1.5 Copies of all measurements taken

	CCGS Leonard J Cowley	
Spec Item #: H-27	Specification	F7049-210183
PORT AND STBD MAIN ENGINE OVERHAUL		

5.1.2 The Contractor must provide the CG TA with a typewritten report of the Contractor's work in both electronic and hardcopy formats outlining the details of the overhaul and any repairs made.

6.0 TRAINING

6.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

H-28 New Fire Insulation Requirements..



CCGS Leonard J Cowley

Specification

New Fire Insulation Requirements

Completed By:

Marine Services International Ltd.

P.O. Box 29132

St. John's, NL

Canada, A1A 5B5

Phone:709 782 2700

Fax:709 782 2707

Completed For:

DFO Vessel Support

P.O. Box 5667

St. John's, NL

A1C 5X1

Document Number: 3291-R-004

Revision: 1

Issued: January 2021

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

Part 1 - Scope

- 1.1** This specification and associated drawings note the revised fire zone ratings and bulkheads requiring an increase in fire insulation rating. The compartments requiring changes/modifications from the current level of fire insulation include the Crane Hydraulic Room on Main Deck and the LAN room & LAN closet on the upper deck. In addition the existing wire transit between the Hydraulic Pump & Miscellaneous Tank Room on Upper Deck and the Crane Hydraulic Room is to be fitted with an approved type cable sealing system.

Part 2 - References

2.1 Supplied Drawings

Attached for use are the MSI drawings covering the scope of work. The MSI drawings are as follows:

2.1.1 3291-D-01-R1 Key Plan – New Fire Insulation Requirements

2.2.2 3291-D-02-R4 Fire Zone Plan

2.2.3 3291-D-03-R4 Insulation Plan

2.2 Standards

The following Standards are to be adhered to during the completion of the work scope:

2.2.1 Fleet Safety and Security Manual (DFO/5737)

2.2.2 IACS No. 47 - Shipbuilding and Repair Quality Standard

2.2.3 CSA W59-08 (R2008) - Welded Steel Construction

2.2.4 CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel

2.2.5 Society for Protective Coatings (SSPC) Standards

2.2.6 Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection
TP11469.

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

2.2.7 SOLAS – Chapter II-2: Construction – Fire Protection, Fire Detection and Fire Extinction

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

2.3.1 Canada Shipping Act 2001

2.3.2 Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

2.4.1 The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 It is the Contractor's responsibility to follow all applicable federal, provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the CG TA and the attending ABS Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment must be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials must be removed in way of the steel renewal hot work zone. Removed linings and insulation must be re-used where possible. Any such required new replacement materials must meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class surveyor. The new materials' certificates to be provided to CCG TA.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by The Contractor at all times while hot work is being conducted.
- 3.1.5** The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.
- 3.1.6** The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of work.

3.2 Materials

- 3.2.1** The Contractor must supply approved marine grade fire insulation, panels and wire/cable sealing systems. The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.
- 3.2.2** All steel work must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.
- 3.2.3** All materials used must be approved by ABS or equivalent Classification Society.

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.

3.2.5 The following scantlings of steel are as follows:

3.3.5.1 Plating –1/4” Plate

3.3.5.2 Minimum A0 fire rated approved type insulation to suit installation

3.3.5.3 Perforated steel panels, 16 guage with 3/16” staggered holes

3.3.5.4 A60 fire rated approved type cable sealing system

3.2.6 New insulation materials for bulkheads, deck head and wire transit must be supplied and installed by The Contractor. All such materials and their install must be to the satisfaction of the CG TA.

3.3 Welding

3.3.1 All welding associated with plating shall be double continuous fillet welding.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor`s welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's surface preparation and coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the applicable areas.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority.
- 3.5.3** The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner appointed representatives.

3.6 Documentation

- 3.6.1** The Contractor must provide the CG TA with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection and any alterations/repairs made prior to acceptance.
- 3.6.2** The Contractor shall ensure that the following documents are included in the final report for this specification item:
- 3.6.2.1** Material Certificates for insulation, panels and plates
 - 3.6.2.2** CWB Certificates for Welders
 - 3.6.2.3** CWB Certificates for Weld Supervisors
 - 3.6.2.4** CWB Weld Procedures
 - 3.6.2.5** CWB Weld Data Sheets
 - 3.6.2.6** NDT Testing Documentation

	CCGS Leonard J Cowley	
Spec Item #: H-28	Specification	F7049-210183
NEW FIRE INSULATION REQUIREMENTS		

3.6.2.7 ABS/ TC approved relevant as fitted drawings, with the changes marked

3.7 Scope of Work

3.7.1 New Fire Insulation

3.7.1.1 The Contractor must modify the existing arrangement of the noted fire rated bulkheads from B0 to A0 in the crane hydraulic room on the main deck and the LAN room & LAN closet on the upper deck. The existing wire transits in the hydraulic pump & misc. tank room are to be fitted with an approved type A60 rated cable gland system.

3.7.1.2 The Contractor must supply and install the new A0 rated bulkheads from deck plate to deck plate. The A0 bulkheads are to be of steel construction for each compartment.

3.7.1.3 This document does not include details for the fabrication of the required new A class bulkheads and approved type cable sealing system. This document serves as a guide only for determining the correct bulkheads within the noted compartments that will require modifications to suit the required changes as per the new revised Fire Zone and Insulation plans.

3.7.1.4 For information on the bulkheads to be modified see supplied MSI drawing no. 3291-D-01-R1.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by The Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, cable trays and hangers, and panels) and piping deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-29	Specification	F7049-210183
FRESHWATER PIPING REPLACEMENT		

H-29 Fresh Water Piping Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to replace all hot and cold water potable water piping in the accommodation areas of the vessel, with a Class approved thermoplastic schedule 80 piping and fittings.
- 1.2** All new pipe insulation must be installed on piping and must be of a Class and CCG TA approved material.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Domestic Fresh Water Diagram – 590-37
- 2.1.2** General Arrangement Diagram – 590-70, sheets 1-3

2.2 Standards

- 2.2.1** CCG Fleet Safety Manual (DFO/5737). The ships ISM Hot Work, Confined Space, Fall Protection and Lockout Procedures shall be adhered to at all times.
- 2.2.2** CCG Welding Specifications
- 2.2.3** See General Notes
- 2.2.4** IACS – No.47 – Part “B” Shipbuilding and Repair Quality Standard.

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Canada Shipping Act
- 2.3.3** Maritime Occupational Health and Safety Regulations
- 2.3.4** ABS Rules and Regulations

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: H-29	Specification	F7049-210183
FRESHWATER PIPING REPLACEMENT		

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated

Part 3 – Technical Description

3.1 General

- 3.1.1** Prior to commencement of work, The Contractor must inform the CG TA.
- 3.1.2** The Contractor must ensure, with the assistance of the Chief Engineer that the domestic fresh water system and tank(s), as well as any affected systems have been locked out and drained before commencement of any work. Fire watch to be kept at all times during hot work.
- 3.1.3** The Contractor must ensure all work areas are neat and tidy before the end of the work day and all deckhead/bulkhead panels are marked and stored to prevent damage while removed. Any disturbed insulation must be replaced at Contractor expense.
- 3.1.4** The Contractor must remove all sharp edges and grind all burrs smooth.
- 3.1.5** The Contractor must repaint any disturbed coatings as per specs.
- 3.1.6** The Contractor must drain all water from all hot and cold water lines prior to work starting.
- 3.1.7** The Contractor must remove all deckhead panels(included in separate spec item) and replace with new Contractor supplied. The Contractor is responsible for the removal and reinstall of all interference items associated with this job.
- 3.1.7.1** The Contractor must store all removed material that is to be reused in a safe and secure site so that it is not exposed to weather or damaged by other stored items.
- 3.1.8** The Contractor must supply and install all new Class Approved Thermoplastic Schedule 80 piping and fittings in the accommodation areas.
- 3.1.9** All piping must follow the piping runs as per the original drawing. Isolation valves must be installed on piping runs to be able to isolate decks(or areas) to enable crew to work on parts of the system without shutting down entire system. The location of the valves to be determined by CG CE. The Contractor must bid on

	CCGS Leonard J Cowley	
Spec Item #: H-29	Specification	F7049-210183
FRESHWATER PIPING REPLACEMENT		

supplying 20 new isolation valves and a unit cost per valve must be provided. Actual amount replaced to be adjusted up or down via PSPC 1379 action.

- 3.1.10** All piping must be insulated (hot and cold) with Class approved materials and original insulation must be disposed of by The Contractor as per provincial regulations.
- 3.1.11** The Contractor must remove and replace all hot and cold water piping from outside the fwd machinery space throughout the entire vessel. The old piping must be disposed of under the direction of the CG CE. The copper piping to Monkey Island for window wash system must remain copper. All potable water piping in the Engine Room spaces can remain.
- 3.1.12** The Contractor must reuse all existing pipe supports and hangers. The Contractor must replace any supports that are not reusable. Shower head terminations must be supported as closely as possible to the last connection point. The Contractor must bid on installing an additional 50 pipe supports and provide a unit cost per support. The actual amount used to be adjusted up or down via PSPC 1379 action.
- 3.1.13** The Contractor must reuse all existing deck penetrations which are of a gland type penetration. The cap for the penetration will require machining of opening as the plastic piping is larger than the original copper piping. The Contractor must bid on machining 40 caps and provide a unit cost per cap. The actual amount required for machining to be adjusted up or down via PSPC 1379 action.
- 3.1.14** The penetrations will require a non-asbestos fire proof packing (valve or pump packing) material to fill the space between the plastic pipe and the penetration pipe.
- 3.1.15** The Contractor can reuse all isolation valves and flex piping between supply piping and sinks, toilets, showers and galley appliances.
- 3.1.16** Care must be taken by The Contractor to ensure hot and cold water pipes are not crossed over.
- 3.1.17** The maximum length of pipe that can be safely maneuvered within the vessel is 6 feet, however 8 foot lengths of pipe can be maneuvered within the engine room via the workshop cargo hatch.

	CCGS Leonard J Cowley	
Spec Item #: H-29	Specification	F7049-210183
FRESHWATER PIPING REPLACEMENT		

3.1.18 The Contractor must store all materials as instructed by Chief Engineer.

3.1.19 The Contractor must label all pipes as per ASME A13.1 color coding no more than 4 ft apart.

3.1.20 For details on piping cleaning and treatment methods, refer to General Notes Section 17.

3.1.21 The Contractor must reinstall any removed valves, strainers, filter and other equipment removed to their original designated positions. The Contractor must replace all gaskets with new contractor supplied gaskets.

3.1.22 The Contractor must update CG supplied drawing to as currently fitted. Drawing must be provided back to CG in AutoCad and PDF format.

3.1.23 The Contractor must first pneumatically test the system to 6.5 bar for 1 hour. Upon completion of pneumatic test, the system must be hydrostatically tested to 6.5 bar for 1 hour.

3.1.24 The Contractor must reinstall all equipment removed to allow access to piping.

3.2 Location

3.2.1 Accommodation Spaces

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.1.2 Visual inspection of all welding 100%.

4.1.3 The Contractor must check piping system for leaks once system is put back in service and will be responsible for repairs all leaks on disturbed piping.

	CCGS Leonard J Cowley	
Spec Item #: H-29	Specification	F7049-210183
FRESHWATER PIPING REPLACEMENT		

4.2 Testing

4.2.1 Pneumatic and Hydrostatic test must be carried out on all fabricated new piping to 6.5 bar for 1 hour and must be witnessed by ABS Class Surveyor and CG TA.

4.2.2 All new piping to be proven it's correctly hooked up by The Contractor. If any changes/modifications are required it will be at The Contractors expense.

4.1.3 All new welds must be 100% tested by Magnetic Particle Inspection.

4.3 Certification

4.3.1 As per General Notes Section and ABS surveyor.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE. The Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 The Contractor must update CG supplied drawing to as currently fitted. Drawing must be provided back to CG in AutoCad and PDF format.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

H-30 Hangar Upgrades – UPDATED

Part 1 – Scope

- 1.1** The intent of this specification is to have The Contractor overhaul and maintain the telescoping hanger and flight deck aboard the vessel.
- 1.2** The Contractor must refurbish the hanger under the supervision of a Contractor arranged Service Representative as defined in Section 2.7 of this specification.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1

Dwg./Doc. N^o.	Description
590-70	General Arrangement - Profile Navigating Bridge, Bridge Deck and Foc'sle Deck - Sht 1 of 2
590-70	General Arrangement -Upper, Main Deck and Hold - Sht. 2 of 2
590-04	Profile and Decks
Manual	Telescopic Aluminum Helicopter Hanger Model 1235-1

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act 2001 – Marine Machinery Regulations (SOR/90-264)

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.3 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 N/A

2.5 General

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

2.5.1 All design, material and Work must meet, where applicable, the designated Classification Society (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the Vessel. The Contractor must identify, coordinate, and meet the specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines (ARSRC&G) referenced in this Statement of Work (SOW), under Part A, of the General Requirement Section. Approval, of design, material, and Work, is to be in accordance with the applicable Regulations and standards referenced therein over and above Class approval, must be met as and when required.

2.6 Name Plate Data

2.6.1 Hangar Details:

Manufactured by:	Daf Indal Ltd. (Now Indal Technologies Ltd.)
Type:	Telescopic Aluminum Helicopter Hangar.
Model:	1235-1
Length Extended:	16287 mm
Length Retracted:	4886 mm
Maximum Width (Outside)	5817 mm
Maximum Width (Inside)	4064 mm
Maximum Height (Outside)	5131 mm
Maximum Height (Inside):	4267 mm
Estimated weight of hangar:	6850 Kg.
Estimated weight of track:	1588 Kg.

2.7 OEM/SUPPLIER/FSR

2.7.1 The Contractor must also include in their proposal the price to provide the services of a qualified Field Service Representative (FSR) who will be responsible for overseeing the inspection, maintenance and the cleaning as described herein.

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

2.7.2 A recommended Field Service Representative, who has performed similar work on other Coast Guard vessels is:

Mr. Dean Mitchell

Canadian Maritime Engineering Ltd, Head Office

90 Thornhill Dr., Dartmouth,

Nova Scotia, B3B 153

Tel: 902-468-1888

2.7.3 The FSR will be responsible for providing the following services:

2.7.3.1 Supervision pre-start checks, tests and run ups.

2.7.3.2 Supervision of disassembly and removals.

2.7.3.3 Supervision of inspection and maintenance.

2.7.3.4 Supervision of reassembly and re-installation.

2.7.3.5 Provision of a written report including corrective action taken, parts used, and other information deemed to be relevant by the FSR.

2.7.4 The Contractor must include an allowance of \$50,000.00 for the services of the FSR. This allowance is to include the expected time on site and all travel, meals, and accommodation. Final pricing will be adjusted up or down via PSPC 1379 action and will be based on final invoices.

2.8 Contractor Supplied Materials

2.8.1 The Contractor must supply all labor, equipment, parts, materials and tools required to perform this work.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must be responsible for the identification of all readily seen interference items, their temporary removal, storage, and their refitting to the Vessel in their respective locations on the completion of the Work.

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

3.1.2 Prior to commencing Work and under the guidance of the FSR, the Contractor must operate the helicopter hangar to determine if there are any deficiencies present that have not been previously identified. Any defects found must be immediately brought to attention of the CG TA to determine what remedial action is required.

3.1.3 The Contractor must lock-out the helicopter hangar power supplies to the electric drive(s), track heating, lighting, limit switches and associated equipment to ensure it is safe for servicing. The Vessel's engineering staff will be available to assist the Contractor by showing the location(s) of the various power sources that will require to be locked-out.

3.2 Inspection and Cleaning of Tracks

3.2.1 The aluminum track sections, and steel troughs must be inspected by the FSR and The Contractor and a typed written report must be written and provided to the CG TA. Any defects found are to be brought to the immediate attention of the CG TA for any remedial action that is required. Any remedial action will be addressed via PSPC 1379 action.

3.2.2 The Contractor must bid on supplying and replacing 5 m² of deck plate. The Contractor must provide a unit cost per m² for steel plate replacement in case there is a requirement for steel work repairs. The total area(s) must be agreed upon before remedial work starts. Related steel repairs/replacements will be done via 1379 action.

3.2.3 The Contractor must supply ABS Approved (c/w Mill Certs) steel plate as required for any steel replacement and provide all required certs along with CWB certified welding tickets and welding procedures.

3.2.4 Tracks and troughs must be degreased and thoroughly cleaned of all dirt and debris and then inspected. Hangar tracks are approx. twenty-eight (28) feet outside track, forty-two (42) feet middle track and fifty-eight (58) feet of inside track.

3.2.5 All track drains to be proven clear and witnessed by the CG TA.

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

3.2.6 The Contractor must supply 100 litres (per side) of Bee's Wax that has to be heated and poured after tracks are laid to prevent water pooling in the spaces between the pads under the tracks.

3.3 Hanger Seal Replacement

3.3.1 The Contractor must remove the existing hanger seal arrangements between each section of the hanger. The seals are fastened to the aluminum hanger structure using flat bar and rivets. New EPDM rubber seals (Contractor supply) must be supplied and installed by The Contractor using the existing flat bar where possible. The Contractor must use all new CG approved rivets to secure the new seals in place. Seal surfaces located under the flat bars are to be sealed using Sikaflex 221 to prevent water ingress under the seal arrangement.

3.4 Hanger Refurbishment and Required Maintenance

3.4.1 All locked-out power supplies are to be reconnected and the following maintenance be performed, under the supervision of the FSR:

3.4.1.1 Wheel and Side Rollers: Wheel and side roller assemblies must have their shafts and center bolts removed and inspected. Any defects must be identified, and CG TA notified. The Contractor must remove any corrosion and accumulated debris. Assemblies must be lubricated as per of the Section 4 of the supplied hangar manual. Wheels must be inspected for flat spots and wearing, any wheels that do not meet specification must be clearly marked and CG TA notified. Upon assembly the wheel and roller assembly must be proven rotationally free, and this is to be witnessed by the CG TA.

3.4.1.2 Hangar Brake: Brake assembly covers must be removed and wiring inspected. All linkages must be cleaned and lubricated. Any defects must be identified and provided to the CG TA. Brakes must be operated in the presence of the FSR and the CG TA to ensure they move freely and properly engage with track when brake is de-energized.

3.4.1.3 Curtain Door: The curtain door must be inspected for damaged weather stripping, damaged slats, correct interlocking, and to ensure all center blocks are in place. Any defects must be identified and provided to the CG

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

TA. All weather stripping is to be replaced with new Contractor supplied materials.

3.4.1.4 All Windlock and Endlock Assemblies must be inspected for damage. Damaged components must be replaced to ensure proper alignment of the door slats are maintained.

3.4.1.5 Door upper and lower limit switch operation must be tested, and the rotary limit switches adjusted as required.

3.4.1.6 Motor brake function is to be checked and verified for proper operation.

3.4.1.7 The oil must be drained from the gearbox and disposed of and then filled with new oil Contractor supplied. All bearings and drive assemblies must be purged with new greased. All lubricants are to be Contractor supplied and types and quantities can be found under Section 4-3 of the Hanger operational manual.

3.4.1.8 Hangar Drive: Remove covers and lubricate pinions, racks, bearings, universals and pillow blocks. All shafting components are to be inspected for damage and or excessive wear. Gearboxes and reducers are to be drained of oil and then refilled with new Contractor supplied oil. Any deficiencies found are to be brought to the immediate attention of the CG TA.

3.4.1.9 Hanger Lights: The hanger interior lighting must be proven functional. The Contractor must bid on supplying and replacing twelve (12) overhead hanger lights with new Contractor supplied lights of same dimensions and particulars. The Contractor must provide a unit cost to supply and install each light. The actual amount of lights replaced to be adjusted up or down via PSPC 1379 action. New hanger lighting must be Class approved and certified for use in a hanger.

Note: Any additional repairs and or parts required outside the scope of this maintenance are to be provided by the Contractor via 1379 action.

3.4.2 Once the aforementioned has been satisfactorily completed, The Contractor, under the guidance of the FSR, must functionally test the Telescopic Hangar System including the door drive and the traverse operation of the hangar sections,

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

The Contractor must adjust all limit switches to provide correct operation of the door and traverse movement of the hangar sections during telescoping in and out to its extreme positions.

3.5 Flight Deck Maintenance

3.5.1 The maintenance performed on the flight deck must be done in conjunction with Weather Deck, Superstructure and Flight Deck Cleaning and Painting.

3.5.2 The safety net stanchions surrounding the perimeter of the flight deck must be proven operational and capable of being deployed and retrieved to and from their extended positions. This must be witnessed by the CG TA. Any repairs required will be performed via 1379 action.

~~**3.5.3** The flight deck's perimeter lighting is to be proven functional. The Contractor is to note that the existing perimeter lights will require the replacement of all bulbs and these are to be Contractor's supply. Once installed the lighting is to be tested and proven operational. Any repairs required will be done via 1379 action.~~

3.5.4 The Contractor must bid on supplying and replacing 10 deck hold downs, similar in size and design as existing. New hold downs must be Class approved and certificate of load test must be provided to CG TA prior to work starting. A load test must be completed on the new hold downs once installed. The Contractor must provide a unit cost per hold down to be adjusted up or down via PSPC 1379 action as required.

3.2 Location

3.2.1 Flight Deck

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 The Contractor is responsible for arranging with ABS Class Surveyor to witness function testing.

	CCGS Leonard J Cowley	
Spec Item #: H-30	Specification	F7049-210183
HANGER UPGRADES		

4.1.2 All work must be completed to the satisfaction of the CG TA.

4.2 Testing

4.2.1 As per Technical Description, CG TA and ABS Class Surveyor must be notified of all testing. Attendance to be verified prior to starting.

4.2.2 The Contractor must functionally test the hanger both prior to start of work and upon completion of all maintenance and any repairs outlined above to the satisfaction of the CG TA and FSR.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to the CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

H-31 Ladder & Hatch - Nav Bridge Deck to Wheelhouse..



CCGS Leonard J Cowley

Specification Ladder & Hatch – Nav. Bridge Deck to W.H. Top

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	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of work to be completed for the fabrication of a new ladder and hatch to be installed in way of the Nav. Bridge Deck and the Wheel House(W.H.) Top on the port side.

Part 2 – References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3300-D-01-R0 Ladder & Hatch – Nav. Bridge Deck to W.H. Top

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** Canadian Welding Bureau (CWB) to standard CSA W47.2M, Division I, II or III – Certification of Companies for Fusion Welding of Aluminium
- 2.2.4** Society for Protective Coatings (SSPC) Standards
- 2.2.5** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

- 3.1.1** It is the Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard / PSPC work requirements and must complete the work to the satisfaction of both the CG TA and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment must be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. All welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.2, Div. 1, 2, and 3. The Contractor is also responsible for all temporary enclosures to facilitate the work, as well as all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, the Contractor must ensure that the area of work and any adjacent space are certified as gas-free if necessary and suitable for hot work. If applicable bulkhead linings and insulation materials shall be removed in way of the hot work zone. Removed linings and insulation must be re-used where possible. Any such required new replacement materials must meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This must include the provision of suitable extraction fans as well as suitable coverings for decks,

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

decking, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

3.2.1 The Contractor must use new 5083 H-116 aluminum plating or equivalent and 6061-T6 schedule 80 aluminum piping and rods/bars for all structural work. Bolts for the hatch hinges to be 304 stainless steel or equivalent. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all aluminum plates, structural members, and piping are clean and free of scale. Material certificates for all aluminum shall be provided.

3.2.5 The following scantlings of aluminum plating, piping, and miscellaneous materials are as follows:

3.2.5.1 Plating – 6.4mm (1/4")

3.2.5.2 Plating – 8.0mm (5/16")

3.2.5.3 Piping – 1½" nominal diameter

3.2.5.4 Piping – 1" nominal diameter

3.2.5.5 Rods – 3/8" diameter

3.2.5.6 Bolts – 1/2" diameter

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

3.2.6 Any linings and insulation material damaged by The Contractor during removals noted in section 3.1.4 must be supplied and installed by The Contractor and meet the noted standard listed in that section. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative. Any damaged linings or insulation materials found during removals that were not damaged by The Contractor will be addressed via PSPC 1379 action.

3.3 Welding

3.3.1 All welding associated with the fabrication of the new hatch and access ladder is to be 5mm double continuous fillet welding.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% Liquid Penetrant Inspection (LPI) by qualified NDT technician.

3.3.5 The Contractor must remove all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter as per SSPC-SP16. All welds shall be power tool cleaned to SSPC-SP3.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new aluminum both externally and internally. The heat-affected paint is to be hand-tooled to a feather edge and the current coating reapplied. The Contractor must supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

3.4.3 The Contractor must repair all coatings disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work must be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed aluminum work is to be visually inspected after welding is completed. Welding is subject to 100% LPI and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for all testing requirements, as required by ABS, must be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must provide an updated copy of the ships drawing and provide to ABS for approvals.

3.5.3 The owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Structural Members

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

3.7 Scope of Work

3.7.1 Ladder and Hatch

3.7.1.1 Contractor must disassemble deckhead fixtures, linings and remove insulation in way of the bridge deck and nav. bridge deck in way of hot work areas and reassemble said items upon completion of work scope.

3.7.1.2 The Contractor must crop a section of deck plating on the wheelhouse top port side between frames 50 & 51 in way of the new hatch location. The new hatch coaming must be welded to the wheelhouse top in way of the new cutout in the deck plating. The Contractor must supply and install new hinged hatch cover with type and rating equivalent to the existing hatch.

3.7.1.3 The new ladder must be fitted between the nav. bridge deck and the wheelhouse top. It is to be positioned in way of the aft end of the new hatch above. The bottom of the ladder rails will be welded to the nav. bridge deck with doubler plates fitted. The top of the ladder rails will be welded directly to the underside of the wheelhouse deck plating. The inboard and outboard ladder rail tops are to be redirected slightly aft to be completely under the deck plating above to allow for proper welding. The inboard ladder rail top must also be redirected slightly inboard and away from the existing drainpipe deck head connection.

3.7.1.4 For details of work see supplied MSI drawing no. 3300-D-01-R0.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steelwork as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the work as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-31	Specification	F7049-210183
LADDER AND HATCH – NAV BRIDGE DECK TO WHEELHOUSE		

- 3.8.4** The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the work as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

H-32 Cabin Renewals – UPDATED

Part 1 – Scope

- 1.1** The Contractor must replace the deck coverings, bulkhead, deckhead panels and all tracks, joiners, trim where required for both bulkhead and deckhead panels in the following cabins and make modifications as listed below. The Contractor must dispose of all removed panels, tracks and trim.
- 1.2** The Contractor must supply and install all new furniture, lights, bunks, desks and shelves as listed in section 3.1 Any furnishings not listed for renewal must be removed and reinstalled.
- 1.3** The Contractor must bid an allowance of \$175,000.00 for the fabrication of computer desks and book shelves to be used for all cabins listed in section 3.1.1. Drawings and locations of desks and shelves to be provided and discussed upon vessel arriving at yard. The Contractor is responsible for installing new desks and book shelves.
- 1.4** This work must be carried out in conjunction with the following spec items:
 - 1.4.1** H-18 Washroom Renewals

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** 590-82-1 Fire Fighting Plan
- 2.1.2** 1512-001-01/02 General Arrangement
- 2.1.3** 590-77-01/02/03 Insulation Plan

2.2 Standards

- 2.2.1** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.2** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.3** ISM hot work, Confined Space entry, and fall protection procedures are to be strictly enforced.
- 2.2.4** All welding must be as per specification preamble.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

2.2.5 CG Lockout Procedure.

2.3 Regulations

2.3.1 All deck covering and furniture materials must be non-combustible, approved by ABS for its intended usage, and must comply with the requirements of hull construction Regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C. ABS Rules and Regulations.

2.3.2 Canada shipping Act

2.3.3 Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 Senior Program Officer Cabin - The Contractor must perform the below listed work:

- Remove and replace approx. 170 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 24 panels
- Supply and install all new non perforated white deckhead panels, approx 25 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75”long x 38”wide).
- Supply and install new computer desk and book shelf as identified in section 1.3.
- Replace existing shelf above computer desk with a new lockable cabinet of similar length and approx 16” high.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- The Contractor must add an additional 2 dual electrical outlets to the above the computer desk. At least one outlet must have a USB port for charging of electronics.
- Replace existing lockers with new lockable cabinet with adjustable shelves.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.2 Chief Officer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 160 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 22 panels
- Supply and install all new non perforated white deckhead panels, approx 21 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.3 Chief Engineer Day Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 231sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 40 panels
- Supply and install all new non perforated white deckhead panels, approx 35 panels.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- ~~The Contractor must supply and install 1 fixed glass Class approved marine window to be installed in fwd bulkhead. Window must be consistent with the size of other cabin windows onboard and installed at same height as other cabin windows. Class approval for window must be for vessels operating conditions.~~
- The Contractor must supply and install 1 Class approved marine fixed glass (non-opening) porthole to be installed in the fwd bulkhead. Porthole must come complete with deadlight and tools for securing deadlight dogs. Window must be installed at same height as other cabin windows. Class approval for windows must be for vessels operating conditions.

Chief Engineer Night Cabin

- Remove and replace approx. 76 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx. 12 panels.
- Supply and install all new non perforated white deckhead panels, approx. 8 panels.
- Supply and install new book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01

3.1.4 Captains Day Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 252 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 40 panels
- Supply and install all new non perforated white deckhead panels, approx 38 panels.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- ~~The Contractor must supply and install 1 fixed glass Class approved marine window to be installed in fwd bulkhead. Window must be consistent with the size of other cabin windows onboard and installed at same height as other cabin windows. Class approval for window must be for vessels operating conditions.~~
- The Contractor must supply and install 1 Class approved marine fixed glass (non-opening) porthole to be installed in the fwd bulkhead. Porthole must come complete with deadlight and tools for securing deadlight dogs. Window must be installed at same height as other cabin windows. Class approval for windows must be for vessels operating conditions.

Captains Night Cabin

- Remove and replace approx. 76 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx. 10 panels.
- Supply and install all new non perforated white deckhead panels, approx. 10 panels.

3.1.5 Senior Engineer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 126 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 24 panels
- Supply and install all new non perforated white deckhead panels, approx 20 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and tv stand as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

3.1.6 First Engineer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 135 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 25 panels
- Supply and install all new non perforated white deckhead panels, approx 20 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.7 First Officer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 157 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 22 panels
- Supply and install all new non perforated white deckhead panels, approx 22 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk, book shelf and corner shelf/table to fit mini fridge beneath as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.8 Jr Program Officer Cabin – The Contractor must perform the below listed work:

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Remove and replace approx. 105 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 17 panels
- Supply and install all new non perforated white deckhead panels, approx 18 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.9 Second Officer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 123 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 22 panels
- Supply and install all new non perforated white deckhead panels, approx 18 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.10 Second Engineer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 122 sqft of deck material as per section 3.2 below.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install all new bulkhead panels, approx 24 panels
- Supply and install all new non perforated white deckhead panels, approx 21 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new night stand and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.11 Second Program Officer Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 123 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 20 panels
- Supply and install all new non perforated white deckhead panels, approx 18 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.12 Boatswain Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 126 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 20 panels

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install all new non perforated white deckhead panels, approx 19 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk, storage locker for clothing, tv stand and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.13 Chief Cook Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 123 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 20 panels
- Supply and install all new non perforated white deckhead panels, approx 18 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new corner shelf and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.14 Leading Seaman Number 1 Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 123 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 20 panels

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install all new non perforated white deckhead panels, approx 18 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk, tv stand and corner shelf to fit mini fridge beneath as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.15 Leading Seaman Number 2 Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 140 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 22 panels
- Supply and install all new non perforated white deckhead panels, approx 21 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new tv stand and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.16 Seaman Number 1 Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 123 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 18 panels

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install all new non perforated white deckhead panels, approx 15 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new corner shelf to fit a mini fridge beneath as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.17 Seaman Number 2 Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 120 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 17 panels
- Supply and install all new non perforated white deckhead panels, approx 16 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new corner shelf and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.18 Second Cook Cabin – The Contractor must perform the below listed work:

- Remove and replace approx. 123 sqft of deck material as per section 3.2 below.
- Supply and install all new bulkhead panels, approx 19 panels

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install all new non perforated white deckhead panels, approx 20 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new corner shelf and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.19 Cabin Number 1 – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 126 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 23 panels
- Supply and install all new non perforated white deckhead panels, approx 24 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new corner shelf and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.20 Cabin Number 2 – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 117 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 19 panels

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install all new non perforated white deckhead panels, approx 22 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new corner shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.21 Cabin Number 3 – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 144 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 23 panels
- Supply and install all new non perforated white deckhead panels, approx 24 panels.
- Supply and install new custom made bunk beds with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunks must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new two person computer desk and new corner shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.1.22 Cabin Number 4 – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 153 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 23 panels
- Supply and install all new non perforated white deckhead panels, approx 25 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install new custom made bunk beds with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunks must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new two person computer desk and corner shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.23 Clerk Cabin – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 107 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 17 panels
- Supply and install all new non perforated white deckhead panels, approx 14 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and corner shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.24 Oiler Cabin – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 110 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 18 panels
- Supply and install all new non perforated white deckhead panels, approx 18 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk, corner shelf and book shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.25 Seaman Number 3 Cabin – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 106 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 12 panels
- Supply and install all new non perforated white deckhead panels, approx 17 panels.
- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and corner shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.1.26 Steward Cabin – The Contractor must perform the below listed work:

- ~~Remove and replace approx. 110 sqft of deck material as per section 3.2 below.~~
- Supply and install all new bulkhead panels, approx 15 panels
- Supply and install all new non perforated white deckhead panels, approx 17 panels.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

- Supply and install new custom made bunk with marine approved plywood and professional finish similar in appearance and design as originally fitted. Bunk must be made to fit a twin mattress (75"long x 38"wide).
- Supply and install new computer desk and corner shelf as identified in section 1.3.
- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01..

3.2 Deck

- 3.2.1** The Contractor must install temporary dust curtains around the perimeter of work area, sufficient to prevent contamination of adjacent bulkheads, decks, and equipment, with dust and residues produced as a result of the work.
- 3.2.2** Prior to commencement of work The Contractor must remove any interference items attached to the deck that will interfere with the work area.
- 3.2.3** If required, The Contractor must ensure the safe off site storage of furniture, ceiling and bulkhead paneling from the area being worked on. The Contractor will be responsible for any damage that occurs to said items for the duration of the work.
- 3.2.4** On completion of work, The Contractor must ensure all areas/equipment affected by the work to be cleaned of dust and residues.
- 3.2.5** The Contractor must remove the carpet or other deck covering from the entirety of the areas listed above keeping the underlay intact where possible.
- 3.2.6** The Contractor must bid on replacing 300 sqft of damaged dexotec underlay materials. The bid must include removals, prep and application of new underlayment. The Contractor must bid a unit cost per sqft for removal, prep and install of new underlayment. Actual amount required to be adjusted via PSPC 1379 action.
- 3.2.7** The Contractor must supply and install new marine approved vinyl PolyFlor deck coverings in all cabins listed above. The Contractor must supply and install new vinyl base trim in all cabins.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

3.3 Bulkhead and Deck Head Panels

3.3.1 The Contractor must supply and replace all panels and associated tracks, trim, joiner pieces, hangers and new vinyl baseboards. All panel colors must be similar to existing panels fitted and to be approved by CCG. All panels to be prefabricated type with fire rating as approved by ABS/ Administration for their position. They must allow easy removal and re-installation of panel sections without damages to the decorative surfaces as well as to the connection fittings. Sound reduction for partition walls to be at least as per rules and requirements, to give the highest possible comfort. Test certificates to be provided. They are to be elastically mounted, as far as necessary, to avoid vibrations

3.4 Lights and Fixtures

3.4.1 All lights and fixtures to be of the recessed type and arranged in such a way that cables, pipes, ducts and wiring boxes are concealed.

3.5 Location

3.5.1 As per section 3.1

3.6 Interferences

3.6.1 The Contractor must be responsible for the identification of all interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 All welding must be as per specification preamble. Certificates of panels, as required by ABS, to be submitted.

	CCGS Leonard J Cowley	
Spec Item #: H-32	Specification	F7049-210183
CABIN RENEWALS		

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must prepare and supply a report on the ultrasonic shots. This survey report must include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any, to be replaced.

5.1.2 All reports from the work specified must be given to the CG TA.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-33	Specification	F7049-210183
HELICOPTER HANGER FIXED SYSTEM		

H-33 Helicopter Hanger Fixed System..

This spec has been included in H-24 Fixed Foam and Wet Chemical

	CCGS Leonard J Cowley	
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

H-34 Steel Repairs - Forward Engine Room Cofferdam Closure of Rat Holes..



CCGS Leonard J Cowley

Steel Repairs – Forward Engine Room Cofferdam Closure of Rat Holes

Completed By:

Marine Services International Ltd.
P.O. Box 29132
St. John's, NL
Canada, A1A 5B5
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Document Number: 3320-R-002
Issued: April 2022

Revision: 0

	CCGS Leonard J Cowley	Mandatory
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs in way of the rat holes on the cofferdam bulkhead at frame 42. The repairs are based on the inspection of the applicable areas by the vessel Chief Engineer and MSI representative.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3320-D-01-R0 Forward E.R. Cofferdam – Closure of Rat Holes

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

	CCGS Leonard J Cowley	Mandatory
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

	CCGS Leonard J Cowley	Mandatory
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 9.5mm plate

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

3.3.1 All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

	CCGS Leonard J Cowley	Mandatory
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must

	CCGS Leonard J Cowley	Mandatory
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

- 3.5.3** The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

- 3.6.1** The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

- 3.6.2** The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Steel Repairs

3.7.1.1 The Contractor must weld the identified closure plates at the noted locations in way of the existing rat holes. The rat holes are located on the cofferdam bulkhead at frame 42. The new plates are to be positioned on the aft side of the bulkhead plating and welded all around on both sides to the bulkhead plating and the hull bottom plating.

3.7.1.2 For information on the closure plates for the existing rat holes on the bulkhead see supplied MSI drawing No. 3320-D-01-R0 – Forward E.R. Cofferdam – Closure of Rat Holes.

	CCGS Leonard J Cowley	Mandatory
Spec Item #: H-34	Specification	F7049-210183
STEEL REPAIRS – FORWARD ENGINE ROOM COFFERDAM CLOSURE OF RAT HOLES		

3.8 Removals

- 3.8.1** The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.
- 3.8.2** The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.
- 3.8.3** The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.
- 3.8.4** The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.
- 3.8.5** The Contractor must be responsible for getting drawing approvals from ABS, and providing updated as-fitted drawings to CCG as per details mentioned in the General Notes section

	CCGS Leonard J Cowley	
Spec Item #: H-35	Specification	F7049-210183
FWD STAIRWELL LEAD REMOVAL		

H-35 FWD Stairwell Lead Removal..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to remove the existing aluminum bolted down treads, all concrete leveler and coatings on the stair treads leading to the fwd machinery space at frame 82.
- 1.2** These stair treads are known to contain lead paint in high levels and proper removal, abatement and disposal must be used.

Part 2 - Reference

2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act 2001

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, tools and equipment required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

3.1.1 The Contractor must be responsible for cleaning, preparing and coating all areas of the fwd stairwell steps and risers leading to the fwd machinery space. The Contractor must use proper lead abatement and removal techniques to remove all green paint from stair treads and risers. There area total of 12 steps.

3.1.1.1 The Contractor must provide a unit cost per square foot for abatement, preparing, coating and disposal for additional affected areas in this vicinity for 1379 process.

	CCGS Leonard J Cowley	
Spec Item #: H-35	Specification	F7049-210183
FWD STAIRWELL LEAD REMOVAL		

3.1.2 The Contractor must remove the existing aluminum stair treads and any under coating materials present.

3.1.3 The Contractor must remove paint approx. 12" up the sides of the stairwell to remove any possible overcoating or traces of lead paint.

3.1.4 The Contractor must clad weld all holes in the stair treads where the aluminum non skid treads were secured.

3.1.5 Upon completion of preparing the treads, the Contractor must wipe down and clean all areas as per Provincial guidelines.

3.1.6 Upon completion of cleaning and preparation of the areas, the Contractor must perform 5 additional lead samples at locations directed by the CG CE.

3.1.7 The Contractor must apply two coats of International Interbond 808, each coat of contrasting color and one coat of International Interthane 990 as per manufacturer data sheet. Top coat must be green in color.

3.1.8 The Contractor must supply and apply new non-skid sheets to each stair tread.

3.2 Location

3.2.1 Fwd Machinery Space Frame 82.

3.3 Interferences

3.3.1 The Contractor is responsible for all interference items that may require attention during the overhaul process.

Part 4: Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

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Spec Item #: H-35	Specification	F7049-210183
FWD STAIRWELL LEAD REMOVAL		

- 4.3.1** The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5: Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

- 5.2.1** N/A

5.3 Training

- 5.3.1** N/A

5.4 Manuals

- 5.4.1** N/A

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Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

H-36 Watertight Door Controls and Hydraulics Upgrades..

CCGS Leonard J Cowley

Completed By:

TRC Hydraulics

Completed For:

DFO Vessel Support

P.O. Box 5667

St. John's, NL

A1C 5X1

	CCGS Leonard J Cowley	
Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

Part 1 - Scope

- 1.1** This specification and associated drawing package describe the work required to be completed by The Contractor to replace the existing hydraulics and controls systems for the 6 watertight door fitted onboard.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the TRC Hydraulic detailed information package covering the scope of work.

- 2.1.1** Set of hydraulic schematics
- 2.1.2** Set of electrical schematics
- 2.1.3** Bill of materials for each set of drawings.

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

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Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

2.4 Owners Requirements

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

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Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This must include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.
- 3.1.5** The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification. All removal and fitting back of the interference items will be the contractor's responsibility
- 3.1.6** The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.
- 3.1.7** There are a total of 6 units. Each unit will consist of a local station to open and close the door at each side of each door. This remote station will have audio and flashing light alarm that will operate during door movement. And emergency stations on each side of the door for opening and closing during a power failure, this will be accomplished through an accumulator. It will have valves which will detent to allow for a single person to operate the door, the valve will automatic switch back to neutral or standby position after to fully closes. Further emergency open and closing can be obtained by hand pump located on each side of the door, using the same valve in combination with an hand pump.
- 3.1.8** This upgrade will also feature an emergency station located on top deck to control all 6 doors. It will have a weather tight enclose for remote operation with indicate lights on the statues of the doors and hand pumps to be able to open and close each door from this location.
- 3.1.9** This upgrade will also include a panel to be located in the wheelhouse to remotely operate the doors. It will also have indicator lights to give statues of each door. It will also have an all door close or all doors open button.

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Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

3.2 Materials

- 3.2.1** The Contractor must supply materials listed in the BOM provided by TRC Hydraulics. Any proposal for material substitution must be made in writing and must be approved by the Owner/ ABS prior to fabrication.
- 3.2.2** All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.
- 3.2.3** All materials used must be approved by A.B.S. or equivalent Classification Society.
- 3.2.4** Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

- 3.3.1** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.2** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.3** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.4** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The

	CCGS Leonard J Cowley	
Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

- 3.5.3** The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

- 3.6.1** The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

- 3.6.2** The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

	CCGS Leonard J Cowley	
Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

- 3.7.1** The Contractor must use provided hydraulic and electrical drawings to replace existing watertight door controls and hydraulic system.
- 3.7.2** The Contractor must follow existing systems where possible for hydraulic lines and cabling routing.
- 3.7.3** The Contractor must provide all materials for this work package.
- 3.7.4** The Contractor must be responsible for any new penetrations required in the completion of this spec.
- 3.7.5** The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by The Contractor unless otherwise directed by the CG CE.
- 3.7.6** The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.
- 3.7.7** The Contractor must perform hydrostatic or other acceptable test method on all fabricated new piping to 4 bar for 20 mins and must be witnessed by ABS Class Surveyor and CG TA.
- 3.7.8** All new piping must be proven its correctly hooked up.
- 3.7.9** The Contractor must operate the system in the presence of the CG CE and ABS Class Surveyor upon completion. All local and remote controls must be checked for correct operation.
- 3.7.10** The Contractor must supply new as fitted hydraulic and electrical drawings for this system upon completion. The drawings must be provided in CAD and PDF format. The drawing must include details of components and parts used during the installation.

	CCGS Leonard J Cowley	
Spec Item #: H-36	Specification	F7049-210183
WATERTIGHT DOOR CONTROLS AND HYDRAULICS UPGRADES		

- 3.7.11** The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE. The Contractor must deliver one (1) electronic copy of all reports to the CG TA. All checklists and reports must be delivered at least 14 days prior to the scheduled refit end date.
- 3.7.12** The Contractor must submit all as fitted drawings to ABS for approval. ABS approvals must be provided for the complete system and the operation of the watertight doors as applicable.
- 3.7.13** The Contractor must provide a final ABS acceptance certificate for the complete system and operation of Watertight Doors as required.

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Spec Item #: H-37	Specification	F7049-210183
WATERTIGHT DOOR SEALING SURFACE MACHINING		

H-37 Watertight Door Sealing Surface Machining – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is to repair the brass sealing surfaces on the watertight doors onboard the vessel.
- 1.2** There are a total of ~~2~~ **3** watertight doors to be completed in the following order:
 - ~~**1.2.1** Steering flat door~~
 - ~~**1.2.2** Shaft tunnel door.~~
 - 1.2.1 Bow Thruster Door**
 - 1.2.2 Fwd Lounge Door**
 - 1.2.3 Main Deck Accommodation Door**
- 1.3** The Contractor must provide a unit cost per door for removal, machining, reinstall and testing in the event additional doors are required to be machined. This amount to be adjusted up or down via PSPC 1379 action as required.

Part 2 - Reference

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** General Arrangement Diagrams: Dwg 590-70, Sheets 1-3
 - 2.1.2** Watertight Door Manual: Number 35
- 2.2 Standards**
 - 2.2.1** See General Notes
- 2.3 Regulations**
 - 2.3.1** Canada Shipping Act 2001
- 2.4 Owner Furnished Equipment**
 - 2.4.1** The Contractor must supply all materials, tools and equipment required to perform the specified work unless otherwise stated.

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Spec Item #: H-37	Specification	F7049-210183
WATERTIGHT DOOR SEALING SURFACE MACHINING		

2.4.2 All parts required for overhaul must be supplied by The Contractor.

Part 3 - Technical Description

3.1 General

3.1.1 Before starting any work on the doors, The Contractor must witness a function test of both doors and record any observations or deficiencies and record the time required to open/close each door.

3.1.2 The Contractor must ensure the hydraulic system is locked out prior to the hydraulic ram and hoses being removed. The ram fittings and any open hydraulic connection must be properly capped to prevent dirt or water from entering the system. The hydraulic ram must be stored to prevent any damage.

3.1.3 The Contractor must remove the upper rollers and the lifting eyes must be secured here. These are secured with ¾" UNC bolts.

NOTE: NO WELDING OF LIFTING EYE ON DOORS. ONLY BOLT HOLES FOR THE ROLLERS MUST BE USED.

3.1.4 The Contractor must measure the angle of taper on the top and bottom of the door to ensure correct angle of brass taper.

3.1.5 The weight of the door to be taken on the lifting arrangement and 39 of the 1" UNC nuts must be removed from the door frame and 4 bolts from the side pillar of the door. The door securing frame can now be moved out of the way and the door lifted up.

3.1.6 The door can be removed to The Contractors facility.

3.1.7 The Contractor must sand blast the steel surfaces of the door taking care not to damage the brass sealing surfaces.

3.1.8 The inside of the door has a row of bolts that are used to adjust the sealing surface of the square to the rest of the door. These bolts must be checked for tightness if not required for adjusting door straightness.

3.1.9 The steel surfaces of the doors must be coated with one coat of primer, one tie coat and a final top coat of white; all applied as per manufactures recommendations.

	CCGS Leonard J Cowley	
Spec Item #: H-37	Specification	F7049-210183
WATERTIGHT DOOR SEALING SURFACE MACHINING		

- 3.1.10** The door must be set up on a milling table with door aligned for a straight cut.
- 3.1.11** The thickness of the brass must be measured before and after cutting.
- 3.1.12** The Contractor must mill the brass sealing strip to remove the minimum amount of material required to bring the sealing surface back to original profile and ensure a seal. CG CE and ABS Surveyor must inspect each door prior to being removed from the table.
- 3.1.13** The other side of the door with brass taper strips to be measured and compared to the angle measured when the door was in place. Surface of the taper to be inspected by CG CE and ABS Surveyor. Any repairs to the brass taper strip to be actioned via PSPC 1379 action.
- 3.1.14** The Contractor must clean all 39 of the 1" UNC alignment studs so the nuts are free to turn. The Contractor must apply a coat of anti – seize on all bolts prior to reinstall.
- 3.1.15** The door frame sealing surfaces must be cleaned of all grease and dirt. The surfaces must be inspected by CG CE and ABS Class Surveyor. Any repairs required to be addressed via 1379 action.
- 3.1.16** The Contractor must apply a light coat of grease to all door frame sealing surfaces.
- 3.1.17** The door must be transported back to the ship and remounted in the frame. Door securing frame must be remounted and all bolts hand tightened until door is able to slide but not too much clearance.
- 3.1.18** Hydraulic ram to be installed and connected to the hydraulic system.
- 3.1.19** Hydraulic system must be unlocked and run up. The door must be operated until all air is out of the system and door moves freely.
- 3.1.20** The Contractor must now adjust door clearance until a maximum clearance of 0.003" is achieved. Door movement must be checked upon completion of adjustment to ensure the door does not jam.
- 3.1.21** The door clearance and operation must be witnessed and accepted by CG CE and ABS Class Surveyor.

3.2 Location

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Spec Item #: H-37	Specification	F7049-210183
WATERTIGHT DOOR SEALING SURFACE MACHINING		

3.2.1 Steering flat and shaft tunnel.

3.3 Interferences

3.3.1 The Contractor is responsible for all interference items that may require attention during the overhaul process.

Part 4: Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.1.2 A copy of all door clearances and brass sealing surfaces thickness measurements must be provided to the CG TA and CG CE.

4.2 Testing

4.2.1 Function testing must be to the satisfaction of and witnessed by diesel FSR, generator overhaul representative, CG TA and ABS Class Surveyor.

4.2.2 The Contractor must measure the gaps all around the perimeter of the door in the presence of the CG CE. The door must be adjusted to ensure there are no gaps larger than 0.003".

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5: Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All

	CCGS Leonard J Cowley	
Spec Item #: H-37	Specification	F7049-210183
WATERTIGHT DOOR SEALING SURFACE MACHINING		

checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

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Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

H-38 Deck Hatch Replacement..



CCGS Leonard J Cowley

Modifications To Engine Room Escape Hatch

Completed By:

Marine Services International Ltd.
P.O. Box 29132
St. John's, NL
Canada, A1A 5B5
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Completed For:

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Document Number: 3340-R-002
Issued: September
2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of modifications to be completed for the replacement of the existing engine room escape hatch with a new larger escape/access hatch at the main deck level on starboard side frames 30 to 32. Once new hatch has been installed and accepted by Class, The Contractor must dispose of existing hatch.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3340-D-01-R1 Modifications to ER Escape Hatch

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide To Structural Fire Protection TP11469

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

2.4 Owners Requirements

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractors responsibility to follow all applicable federal, provincial and local regulations. The Contractor is to adhere to all DFO-Coast Guard/PWGS work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor, including any drawings required to be modified and approved by ABS and any other authorities
- 3.1.2** The Contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor shall supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work and all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, the Contractor shall ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

3.1.4 The Contractor shall be responsible for protecting the vessel's interior from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages.

Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor shall be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor shall use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs shall follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used shall be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor shall ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The Contractor must supply and install the new hatch as listed below. The details of the new hatch to be fitted, including all its required parts are as follows:

3.2.5.1 One (1) Nabrico Quick Acting Hatch – Model No: DF-615-3636

3.2.6 Linings and insulation material that may be required to replace any non-reusable removed items as noted in section 3.1.4 must be supplied and installed by the Contractor and meet the noted standard listed in that section. All such materials

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

and their install shall also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative.

3.3 Welding

- 3.3.1** All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.6.2.7 ABS approved drawings

3.7 Scope of Work

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

3.7.1 Installation of new Escape/Access Hatch on Soft Patch

3.7.1.1 The Contractor must crop and remove the existing 24"x 24" escape hatch from the soft patch plate located on the main deck starboard side between frames 30 and 32.

3.7.1.2 The Contractor must then install the new Nabrico 36"x 36" escape/access hatch (Model:DF-615-3636) in the soft patch. Prior to the new installation The Contractor must reduce the coaming height of the new hatch from 24" to 12" approximately. In addition to maintaining a similar coaming height to the existing hatch, the coaming height reduction is also required to allow for proper access on the underside of the soft patch for welding. The CG TA and ABS Class Surveyor will determine the exact new coaming height at the time of the installation.

3.7.1.3 The Contractor is to fit a securing device on the outboard bulkhead to provide a secondary means of keeping the hatch cover in the open position when exiting/entering the engine room through the hatch. Final details to be determined at time of installation.

3.7.1.4 It is assumed that the soft patch plate thickness is at least equal to the surrounding deck which is 6.5mm. The decision to remove the soft patch from its bolted position or keep it in place prior to the commencement of hot work for the cropping of the existing hatch and installation of the new hatch is to be determined on site by the contractor and vessel representative.

3.7.1.5 For details of work see supplied MSI drawing no. 3287-D-07-R0.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-38	Specification	F7049-210183
DECK HATCH REPLACEMENT		

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-39	Specification	F7049-210183
REPLACE MAIN ENGINE SILENCER INSULATION		

H-39 Replace Main Engine Silencer Insulation..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to remove the existing insulation on the Port and Stbd Main Engine Exhaust Silencer and replace with new insulation.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Exhaust System Piping As Fitted, Drawing #590-52 ½

2.1.2 Silencer Dimensions – without insulation

- Height 101 inches

- Diameter 56 inches

- There is a section on the top of the silencer that is shaped like a half circle that is attached to the silencer. The dimensions of this section are below.

- Length 45 inches

- Radius 8 inches

- The main exhaust piping going into and out of the silencer is 18 inches diameter.

2.2 Standards

2.2.1 See General Notes

2.2.2 Fleet Safety and Security Manual

2.3 Regulations

2.3.1 See General Notes

2.3.2 Marine Machinery Regulations (SOR/90-264)

2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: H-39	Specification	F7049-210183
REPLACE MAIN ENGINE SILENCER INSULATION		

- 2.4.1** The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must inform Chief Engineer prior to starting work.
- 3.1.2** The Contractor must confirm with the Chief Engineer that the controls and air supply to both main engines is isolated, locked out and tagged prior to work being starting and there is no machinery running.
- 3.1.3** The Contractor must complete all forms required for lock out – tag out and working aloft as per the latest of the Provincial Regulations.
- 3.1.4** The Contractor must have scaffolding/staging erected by a qualified person under the latest edition of the Provincial Occupational Health and Safety Regulations. The Contractor must have scaffolding/staging from the engine room deck to the Navigation Deck.
- 3.1.5** When the staging is in place the contractor must use qualified personal under the Provincial Occupational Health and Safety Regulations the latest edition. The qualified personal are to remove and dispose of existing insulation material (Calcium Silicate) as per Provincial Environmental Regulations.
- 3.1.6** The Contractor must make sure all the insulation and debris is cleaned up in the immediate area and the area below in the engine room after the insulation is removed.
- 3.1.7** The Contractor must leave the staging in place so that the silencer can be checked for leaks by the Chief Engineer and repairs made if required.
- 3.1.8** The Contractor must use qualified personal under the Provincial Occupation Health and Safety Regulations of the latest edition to install the new removable insulation covers which are to be secured to the silencer surface with 10 gauge steel weld pins and washers to prevent movement.
- 3.1.9** The Contractor must supply the insulation material and fabricate from the material two layers of inch thick removable blankets.
- 3.1.10** The Contractor must install the new two layers of removable insulation blankets. The inner layer blanket shall consist of a high temperature insulation core

	CCGS Leonard J Cowley	
Spec Item #: H-39	Specification	F7049-210183
REPLACE MAIN ENGINE SILENCER INSULATION		

(Superwool 607 blanket by Morgan Thermal Ceramics) with stainless steel mesh on both faces. The outer layer blanket shall consist of insulation core (Tri-L vitreous silicate needled blanket insulation) with stainless steel mesh on the inner face and silicone cloth on the outer face.

3.1.11 The Contractor when installing must make sure that all covers can be sewn stapled or hog ringed. Sewn seams are to be of a heavy high temperature tread. All covers to fit snugly around the equipment being insulated.

3.1.12 The Contractor must make sure that all covers to be made are to include, all openings including pipe, packing glands, valve stems and handles, hangers and other obstacles.

3.1.13 The Contractor must make sure to fabricate the covers so that no force bending or folding is required for the installation and no visible strain is on the fabric once the blankets are in place.

3.1.14 The Contractor must ensure that a minimum of 2 inch overlap seam where joining to other covers or insulation and where a cover has to be made in more than one piece.

3.1.15 The insulation covers must be drawn together with stainless steel wire secured through lacing anchors that are placed no less than 25 mm away from any seam edge and secured through the entirety of the pad with a backing plate. Wire shall be woven through the anchors to draw the pad together and allow the overlap to fall in place around the seams.

3.1.16 Once the insulation is complete the Chief Engineer and ABS Surveyor is to witness the installation.

3.1.17 Upon completion The Contractor must use qualified personal under the Provincial Health and Safety Regulations latest edition to disassemble the scaffolding /staging and remove it.

3.1.18 The Contractor and the Chief Engineer shall remove the lock out- tag out locks and complete the necessary forms for the vessels ISM book.

3.1.19 All work to be witnessed by the Chief Engineer

3.2 Location

3.2.1 Frames 27 - 42

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: H-39	Specification	F7049-210183
REPLACE MAIN ENGINE SILENCER INSULATION		

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 Exhaust insulation material must be Class Approved and acceptable to ABS.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

4.3.3 The Contractor must supply the certificate for each of the insulation material showing that it contains no asbestos and shows the temperature rating of each of the insulation materials.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date. The report must include all measurements of the total area that was covered on the silencer. The types of insulation used for each layer and temperature rating for each and their certificate.

5.2 Spares

5.2.1 N/A

5.3 Training

	CCGS Leonard J Cowley	
Spec Item #: H-39	Specification	F7049-210183
REPLACE MAIN ENGINE SILENCER INSULATION		

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

H-40 HVAC System Modification..

CCGS Leonard J Cowley

Completed By:

Bronswerk Alscott

Completed For:

DFO Vessel Support
P.O. Box 5667
St. John's, NL
A1C 5X1

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

Part 1 - Scope

- 1.1** The Canadian Coast Guard Ship (CCGS) Leonard J. Cowley in a recent survey identified several areas of the heating, ventilation, and air conditioning (HVAC) system which require repair, replacement, or redesign.

The intent of this specification is to provide philosophy and requirements to be used in selection and maintenance activities in relation to HVAC equipment aboard the CCGS Leonard J Cowley as identified in the recent survey.

Part 2 - References

2.1 Normative References

The following alphabetical list of documents is normatively referenced in this specification, in whole or in part, and is essential for its application. The latest edition of each document, including any amendments, must be considered as normative to this specification.

REFERENCE	DESCRIPTION
Classification Society Rules and Regulations For The Classification Of Ships	-
SOR/2003-289	Federal Halocarbon Regulations 2003
SOR/2010-120	Maritime Occupational Health And Safety Regulations
TP 127E	Ships Electrical Standards
IEEE 45	Recommended Practise For Electrical Installations On Shipboard
SC 2001, c. 26	Canada Shipping Act, 2001
SOR/2012-69	Vessel Pollution And Dangerous Chemicals Regulations

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

MARPOL 73/78	IMO International Convention For The Prevention of Pollution From Ships
SOR/90-264	Marine Machinery Regulations
IEC 60529	Degrees Of Protection Provided By Enclosures (IP Code)
ASME B31.3	Process Piping
ASME B31.5	Refrigeration Piping And Heat Transfer Components
NSF 7	Commercial Refrigerators And Freezers
ULC S102	Standard Method Of Test For Surface Burning Characteristics Of Building Materials And Assemblies
ULC S127	Standard Corner Wall Method Of Test For Flammability Characteristics Of Non-Melting Building Materials
ASHRAE 15	Safety Standard For Refrigeration Systems
ISO 7547	Ships And Marine Technology – Air Condition And Ventilation Of Accommodation Spaces – Design Conditions And Basis Of Calculations
ISO 8864	Air-Conditioning And Ventilation Of Wheelhouse On Board Ships – Design Conditions And Basis Of Calculations
ISO 8862	Air-Conditioning And Ventilation Of Machinery Control Rooms On Board Ships – Design Conditions And Basis Of Calculations
SMACNA	HVAC Duct Construction Standards Metal and Flexible

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

SOLAS	The International Convention For The Safety Of Life At Sea
IMO Resolution A.468(XII)	Code On Noise Levels On Board Ships

2.2 Drawings and Documents

Drawing/Document Number	Description
30001-001-FR-001	HVAC Survey Report

2.3 Order Of Precedence

2.3.1 In the event of any conflict between this specification and other referenced documents, data sheets, codes and standards, the order of precedence shall be as follows (highest first):

2.3.1.1 Canadian Statutory Regulations and Referenced Codes and Standards

2.3.1.2 Data Sheets

2.3.1.3 Project Specifications

2.3.1.4 Other National and International Codes and Standards.

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 Overview

3.1.1 Alscott has been contracted by CCGS to prepare a specification defining requirements for the modifications to the Leonard J. Cowley HVAC systems recommended in Alscott HVAC Survey Report 3001-001-FR-001. Please refer to 3001-001-FR-001 report for additional details on replacement scope as required.

3.2 Design Life

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

- 3.2.1** Equipment shall be required to operate continuously in a marine environment. The equipment and materials offered shall be of proven, well-established design and robust construction using materials which are inherently non-corroding, with a high standard of efficiency and reliability.

Equipment shall be designed for continuous service in a marine environment for a life of 10 years minimum.

3.3 Environmental Design Conditions

- 3.3.1** All new equipment sizing shall be based on the below external conditions:

Summer Outdoor Air: +35°C and 70% relative humidity
Winter Outdoor Air: -20°C

3.4 Bridge Deck Cooling

- 3.4.1** The Bridge Deck is to be updated to include a cooling system. The bridge deck is currently served by AHU 1. This unit is for heating and supply air only and has inadequate space for addition of a cooling coil to the unit.

The bridge deck is to have two ductless mini splits installed on the bridge wings. These units to be a cassette style system, recessed into the ceiling tiles. These units to be standalone systems, each with a capacity of 24,000 BTU/hr (2 ton) and remote condensing units mounted on top of the bridge wings. The condensing units should have a barrier erected in front of them to reduce the amount of salt spray on the coils. Unit to be Fujitsu 24RGLX (or equivalent) heat pump unit that provide both heating and cooling to the bridge.

Both units would have all field piping insulated with Armaflex insulation and have wall mounted wired thermostats.

The indoor evaporator sections to consist of 4-way ceiling cassette style that will come complete with a condensate drain pump for discharge of condensate outside. It also has a flap control system that allows four different directions of airflow based on internal room

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

temperature conditions. The complete evaporator unit assembly shall be readily accessible for maintenance and cleaning. Evaporator coils shall be provided with a thermostatic expansion valve on each suction end.

Each unit will be provided with a remote controller that will be wall mounted locally within the space for local control.

Drain lines from the condensate drain pan shall include a suitable drain trap where necessary and be led to an approved discharge location.

Direct expansion refrigeration system to use R-410A refrigerant.

Power supply to unit to be 230V, single phase, 60 hz.

3.5 Bridge Deck Condensing Unit

3.5.1 The Bridge Deck indoor cassette units will be piped to an externally mounted air-cooled condensing units.

Condensing units shall be self-contained complete with compressors, motors, pressure relief valves, suction accumulators, dynamic discharge valves, oil separators, and all other necessary controls and components mounted in a flexible manner on a common base frame.

All condensing unit service valves and controls shall be readily accessible and easily serviceable.

Final location of the condenser unit shall take into consideration salt water spray and be shielded as much as possible to maximize the life of the unit.

Modifications to the Fujitsu (or equivalent) condensing unit to improve the life expectancy of the condensing unit to be considered as required (i.e. additional coil coatings, alternate materials, increase IP rating for enclosures).

3.6 AHU 2 – Forward Decks

3.6.1 The existing AHU to be replaced with a packaged seawater cooled AHU, Carrier model 10 ton, 90MA suitable for R-407C (or equivalent) with minimum 17.5kW electric heating option.

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

The existing unit heater has a 24kW capacity. The existing AHU acts as a secondary source of heating along with the radiant heat in the crew's quarters. Fresh air load to be adjusted in the winter as required to accommodate the reduced heating load during final commissioning as needed.

Installation of additional duct heater to also be reviewed as necessary.

The condensing unit shall be skid mounted with the AHU complete with compressors, motors, pressure relief valves, suction accumulators, dynamic discharge valves, oil separators, and all other necessary controls and components mounted in a flexible manner on a common base frame. All outdoor unit service valves and controls shall be readily accessible and easily serviceable.

The complete AHU section assembly shall consist of a filter, fan assembly, mixing and discharge plenum and thermostatic expansion valve. Rated airflow for the system shall not be less than existing design of 3220 cfm.

The complete assembly shall be readily accessible for maintenance and cleaning.

The condensate drain will require an external trap and be tied into an external drain point.

The seawater piping shall tie into the existing seawater system and be piped through the louvre ventilation area adjacent to the AHU room. Piping to be insulated as per vessel specifications.

All existing supply ductwork to have insulation installed to vessel specification to avoid condensation forming on the ductwork inside the LQ.

Power supply to unit to be 460V, 3 phase, 60 hz.

3.7 AHU 3 – Main Accommodation

- 3.7.1** A new 30 ton, 10,270 cfm rated cooling coil and drain pan to be installed inside the existing AHU section. The cooling coil to be mounted on the discharge of the existing intake to the fan room.

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

The cooling coil discharge is to have a droplet separator installed to minimize water carry over and to minimize the size of the associated drain pan. Final arrangement inside the AHU section to be determined based on final coil sizing. The intent is to leave the overall intake ductwork, heater and filter arrangement left as currently installed. If there is inadequate space for the drain pan to capture all condensate carry over, then fan design to be reviewed and updated as required to account for condensate spray and AHU fan section to be modified to accommodate drainage as required. All existing supply ductwork to have insulation installed to avoid condensation forming on the ductwork inside the LQ.

3.8 AHU 3 – Remote Seawater Condensing Unit

3.8.1 The condensing unit to be a seawater cooled remote mount type with minimum 30 Ton capacity, KeepRite Model 4DJNR28METSKC00 (or equivalent) and installed in the space next to the AHU 3 Fan room.

Condenser to be rated for marine duty and come complete with discharge line temperature sensor, liquid line filter, sight glass, oil separator, oil filter, suction accumulator, suction filter and water regulating valve (loose shipped as required).

The seawater piping shall tie into the existing seawater system and be piped through the large engine room exhaust stack void adjacent to the AHU room. Piping to be insulated as per vessel specifications.

All refrigerant field piping between the condenser and evaporator will be insulated with Armaflex insulation.

Power supply to unit to be 460V, 3 phase, 60 hz.

3.9 Control Panels

3.9.1 All three AHU's have control panels with Reliable Controls controllers mounted inside.

These controllers are user friendly and work well. The thermostat for AHU 1 is located in a mechanical space located above the bridge. The thermostat for AHU 2 is located under a duct and the operator has to

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

crouch to access it. The thermostat for AHU 3 is located above the filter rack and requires a ladder to access. These panels are to be integrated with new systems and have the thermostats removed and installed in a nearby user friendly area. This will allow the area operators to change settings more easily.

3.10 Electronics Room Cooling Units

3.10.1 The new electronics room have a packaged seawater cooled AHU, Carrier model 5 ton, 90MA suitable for R-407C (or equivalent) with minimum 5.25kW electric heating option.

Wall mounted thermostat to be provided for control of the unit.

A new dedicated marine rated pump sized for the required flow rate of the final selected packaged AHU to be provided for system.

All service valves and controls shall be readily accessible and easily serviceable.

New field piping to be insulated as per vessel specifications.

Power supply to unit and associated pump to be 230V, single phase, 60 hz.

3.11 Additional Galley Cooling Unit

3.11.1 Currently there is one 24,000 BTU/hr (2 ton) Panasonic mini split located in the galley. This unit operates correctly but is unable to provide cooling to the opposite side of the galley, as most or all of the cooled air is removed by the range hood (exhaust) in the center of the room.

A second 24,000 BTU/hr cassette style unit is to be installed on the opposite side of the room to provide cooling to that half of the room.

The existing outdoor unit to be replaced by a larger unit designed for operation of a dual head indoor unit system.

Suitable brands for this unit are Daikin, Fujitsu, Panasonic, or Mitsubishi.

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

Piping and communication wiring will follow the same routing as the existing AC unit when possible. All field piping between the indoor and outdoor heads will be insulated with

Armaflex insulation. The condensate drain will need to go to a drain with an air gap or piped outside. If no suitable drain is nearby, a condensate pump will be installed on the indoor head.

The outdoor units shall be self-contained complete with compressors, motors, pressure relief valves, suction accumulators, dynamic discharge valves, oil separators, and all other necessary controls and components mounted in a flexible manner on a common base frame.

All outdoor unit service valves and controls shall be readily accessible and easily serviceable.

The indoor evaporator sections to consist of 4-way ceiling cassette style that will come complete with a condensate drain pump for discharge of condensate outside. It also has a flap control system that allows four different directions of airflow based on internal room temperature conditions. The complete evaporator unit assembly shall be readily accessible for maintenance and cleaning. Evaporator coils shall be provided with a thermostatic expansion valve on each suction end.

Each unit will be provided with a remote controller that will be wall mounted locally within the space for local control.

Direct expansion refrigeration system to use R-410A refrigerant.

Power supply to unit to be 230V, single phase, 60 hz.

3.12 Ductwork

3.12.1 Ductwork to be reused where possible. All ductwork with signs of corrosion that is impacted by the new equipment installation shall be blasted and prepared for coating in accordance with ISO 8504 Surface preparation methods and ISO 8502 Tests of the assessment of surface cleanliness.

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

Ductwork to be painted in accordance with approved paint manufacturers application procedure.

New ductwork where required shall be fabricated in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible and painted in accordance with approved paint manufacturers application procedure.

All supply ductwork on system that are having cooling added require insulation to project specifications to avoid condensation forming on the duct.

3.13 Louvers

3.13.1 Existing louvres to be reused where possible. Louvres with signs of corrosion shall be blasted and prepared for coating in accordance with ISO 8504 Surface preparation methods and ISO 8502 Tests of the assessment of surface cleanliness.

Replacement louvres shall have frame and blades fabricated of 316L stainless steel and be of fully welded construction. Marine grade aluminum may be used with approval from project. Each blade shall be fabricated with drain lips to limit the cascading effect of water down the front face of the louver. The frame shall include an integrated drain system and all louvres shall include a bird mesh guard. The water removal efficiency of each louver shall be rated (99% effectiveness) in accordance with AMCA 511-99 (or equivalent).

New closeable louver covers shall have a closing mechanism frame that is permanently fixed to the louver penetration and has a hand wheel mounted to the cover face that opens and closes the louver. The cover frame shall be fabricated of 1/8" thick 5051 aluminum.

The hand wheel shall be a 12" diameter aluminum straight spoke style. Mechanism and hardware to be fabricated of 316L stainless steel and include Thorplas Blue bushings.

3.14 Volume Control Dampers

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

3.14.1 Existing volume control dampers to be resused where possible.

Where new dampers are required, volume control dampers shall be the manually adjustable type complete with all required components and accessories.

Dampers shall have aerofoil section, opposed action blades having a high aerodynamic efficiency to minimize turbulence, air-stream pressure loss and regenerative noise.

Bearings shall be maintenance free type.

Volume control dampers shall be designed and constructed to operate in ventilation systems with an air velocity up to 25m/s.

All dampers shall be equipped with a manually operated locking quadrant and handle. The handle shall be lockable in any position and a back plate shall give blade position indication.

Damper casing, blades, shafts, flanges, linkages and levers shall be fabricated from 316L stainless steel when exposed to untreated fresh air. Galvanized steel may be used for dampers not exposed to fresh air.

3.15 Electrical Design

3.15.1 The electrical installation shall be designed and installed strictly in accordance with the Canadian Electrical Code, Part 1 and the Safety Standard for Electrical Installations (CSA 22.1-09).

All electrical components, as well as the overall package electrical installation, shall be certified to CSA Standards.

3.16 Dissimilar Metals

3.16.1 Where metallic components of the equipment are in contact, they should be constructed from the same material. Where this is not possible and dissimilar materials are required to be in contact, an effective insulating barrier shall be fitted to prevent dielectric corrosion.

3.17 Name Plate Data

	CCGS Leonard J Cowley	
Spec Item #: H-40	Specification	F7049-210183
HVAC SYSTEM MODIFICATIONS		

3.17.1 Name plates for equipment should if applicable include the following:

Equipment tag

Model no.

Manufacturer

PO no. / Serial no.

Power rating (kW)Power supply (V / Ph / Hz / A)

Refrigerant

	CCGS Leonard J Cowley	
Spec Item #: H-41	Specification	F7049-210183
EXHAUST PIPE INSULATION REPLACEMENT		

H-41 Exhaust Pipe Insulation Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to repair damaged exhaust pipe insulation from Engine Room Level to Funnel Top.
- 1.2** The below exhaust piping must be inspected:
 - 1.2.1** Port Main Engine
 - 1.2.2** Stbd Main Engine
 - 1.2.3** #1 Ship Service Generator
 - 1.2.4** #2 Ship Service Generator
 - 1.2.5** #3 Ship Service Generator
 - 1.2.6** Emergency Generator
 - 1.2.7** Incinerator
 - 1.2.8** Dead Start Air Compressor

Part 2 - References

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** Exhaust Piping – 590-52
- 2.2 Standards**
 - 2.2.1** See General Notes
- 2.3 Regulations**
 - 2.3.1** Canada Shipping Act
 - 2.3.2** Maritime Occupational Health and Safety Regulations (SOR/87-183)
 - 2.3.3** ABS Rules and Regulations
- 2.4 Owner Furnished Equipment**

	CCGS Leonard J Cowley	
Spec Item #: H-41	Specification	F7049-210183
EXHAUST PIPE INSULATION REPLACEMENT		

2.4.1 N/A

Part 3 – Technical Description

3.1 General

- 3.1.1** All electrical boxes, motor junction boxes, lighting, FM 200 fire suppression system and nozzles must be covered and/or protected to prevent any damage and to prevent dust and debris from entering components. The protective covering is not limited to the above. The Chief Engineer must inspect the areas listed in section 1.2 above upon completion. The engine room area under the casing must be sealed off to prevent debris from falling into engine room work space below.
- 3.1.2** Scaffolding and or staging must be erected to gain access for the specified work. Access to the funnel and casing areas are from the main deck engine room entrances.
- 3.1.3** Mechanical ventilation must be provided to exhaust fumes to the exterior of the vessel and shall remain operational for the duration of the work.
- 3.1.4** All heavy debris that is lodged on stringers, ledges and structure must be removed from the spaces and discarded.
- 3.1.5** The lagging on the exhaust pipes must be cleaned with dry methods i.e. vacuum or brooms.
- 3.1.6** Inspection of all exhaust gas pipe insulation must be carried out by a qualified insulation technician and all damaged areas must be repaired or replaced based on inspection by CG CE and ABS Class Surveyor. All insulation work must be performed by qualified insulators. The Contractor must quote on repairing 20 m² and replacing 20m² of damaged insulation and lagging. The Contractor must include a unit cost per 1m² for repair and a unit cost per 1m² for insulation replacement. These amounts to be adjusted via PSPC 1379 action based upon invoice.
- 3.1.7** Repairing of damaged areas must include removing old damaged insulation and lagging and replacing with new. The insulation is a solid chalk style material and

	CCGS Leonard J Cowley	
Spec Item #: H-41	Specification	F7049-210183
EXHAUST PIPE INSULATION REPLACEMENT		

covered with soft lagging. The installation of the insulation system must be of equal or better quality than the existing insulation.

3.1.8 All debris resulting from the repair work must be removed and discarded.

3.1.9 The Contractor must provide certificates for all insulation materials used.

3.1.10 The CG CE must inspect and approve prior to removal of scaffolding.

3.2 Location

3.2.1 Refer to drawings listed in Section 2.1.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to the vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected by CG TA or CG CE prior to completion.

4.2 Testing

4.2.1 The Contractor must operate all dampers a minimum of two (2) times in the presence of the CG CE. All work must be completed and shown as operational to the satisfaction of the CG CE and ABS.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

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Spec Item #: H-41	Specification	F7049-210183
EXHAUST PIPE INSULATION REPLACEMENT		

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

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Spec Item #: H-42	Specification	F7049-210183
MISC PUMP INSPECTIONS AND OVERHAULS		

H-42 Misc Pump Inspections and Overhauls - UPDATED

Part 1 - Scope

1.1 ~~The intent of this specification is for The Contractor to carry inspection/ overhaul of the pumps listed and described in Section 3 for each vessel.~~

1.1 The intent of this specification is for The Contractor to carry out inspection/ overhaul/replacement of the pumps listed and described in Section 3 below.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

2.2 Standards

2.2.1 Fleet Safety and Security Manual (DFO/5737)

2.2.2 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act 2001

2.3.2 Maritime Health and Safety Regulations

2.3.3 ABS Rules and Regulations

2.3.4 See General Notes

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials and equipment required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must isolate the pump both electrically and hydraulically and use proper lockout / tagout procedures as identified per the Fleet Safety and Security Manual.

3.1.2 ~~Pumps requiring inspection/ overhaul are:~~

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Spec Item #: H-42	Specification	F7049-210183
MISC PUMP INSPECTIONS AND OVERHAULS		

3.1.2 The Contractor must supply and install new direct replacement Class approved pumps and motor sets for the below listed pumps. Any piping modification or electrical changes are the responsibility of The Contractor.

3.1.2.1 Ballast and General Service Pump

3.1.2.1.1 Manufacturer – Iron A/S Copenhagen

Pump #: 44.367 1 & 2

Model #: QVP – 4 /300

1750 RPM

60 cubic meters / hour @ 80 P.S.I.

41 Meter Head

14.5 kW

3.1.2.2 Main Fire Pump

3.1.2.2.1 Manufacturer – Iron A/S Copenhagen

Pump #: 44.367 1 & 2

Model #: QVP – 4 /300

1750 RPM

60 cubic meters / hour @ 80 P.S.I.

41 Meter Head

14.5 kW

3.1.3 The Contractor must overhaul/inspect the below listed pumps:

3.1.3.1 Gearbox Driven Oil Pump

3.1.3.1.1 Manufacturer – Lohmann & Stolterfoht Gearbox

Model – KF4/180

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Spec Item #: H-42	Specification	F7049-210183
MISC PUMP INSPECTIONS AND OVERHAULS		

Assembly Drawing – 0/4598/1078/0

3.1.3.2 Steering Gear Pumps (x2)

3.1.3.1.2 TYPE PU 50 T6C B14

SER #684, 1992.

CAPACITY 77 LITRES/MINUTE.

- 3.1.4** The Contractor must disassemble the pump and clean the internals prior to taking measurements. All parts are to be examined for wear, corrosion, cracks, distortion or any other damage and be renewed as necessary (also see 3.1.7 for renewal of parts). All components must be marked with locating marks prior to disassembly to ensure proper reassembly.
- 3.1.5** Removal of the pump and transportation to the Contractor's facility, if required, must be the responsibility of the contractor.
- 3.1.6** Measurements to be taken are outlined in section 4.1 of this specification.
- 3.1.7** After inspection, the pump must be reassembled to original configuration using new, Contractor supplied, gaskets and seals. Any further additional parts requiring renewal/ replacement to be addressed via PSPC 1379 action. Pumps must be connected to their respective prime movers, piping and any other fittings that may have been removed to as found condition using owner supplied seals and gaskets. Any new bolts and nuts to be of the original material and contractor supply.

3.2 Location

3.2.1 Engine Room

3.3 Interferences

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** The following measurements are to be taken:

a) shaft and housing diameter

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Spec Item #: H-42	Specification	F7049-210183
MISC PUMP INSPECTIONS AND OVERHAULS		

b) impeller diameter

c) internal housing (wear ring) diameter

d) impeller thickness

4.1.2 All pumps are to be laid out by the shipyard for the inspection by ABS Surveyor, at which time a Hard Report detailing the Measurements as detailed in 4.1.1 are to be presented to the Surveyor and CCG C/E. All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor

4.1.3 The Contractor must ensure that ABS Class credit is obtained for this item prior to acceptance.

4.2 Testing

4.2.1 Pumps must be run during seatrials for 30 mins and be acceptable to ABS and to the satisfaction of CCG TA.

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver 1 hard copy of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor shall deliver 3 electronic copies of all reports to SVMM.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

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Spec Item #: H-42	Specification	F7049-210183
MISC PUMP INSPECTIONS AND OVERHAULS		

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Spec Item #: H-43	Specification	F7049-210183
FIRE DAMPER REPLACEMENT		

H-43 Fire Damper Replacement..

Part 1 - Scope

1.1 The intent of this specification is for The Contractor to carry out an inspection on all dampers listed in Section 2.1 as described below.

1.1.1 All dampers in Section 2.1.1 will require replacement or overhaul at the discretion of The Contractor and CG TA.

1.1.2 All dampers in Section 2.1.2 will require a new access hatch installed for quick and easy access. These dampers will require inspection to ensure correct operation.

1.1.3 All dampers in Section 2.1.3 will require inspection to ensure correct operation.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1

Location Of Fire Damper Resets	Location Of Fire Damper Pull Station	Area Closed Off
Inside Stack on Bottom Louver (Bridge Deck)	Outside of Stack Port Side	Ventilation to Stack Area
Inside Stack on Bottom of Louver (Bridge Deck)	Outside of Stack Port Side	Ventilation to Stack Area
Inside Stack on Bottom of Louver (Top of E/R Casing)	Outside of Stack Port Side	Ventilation to Casing and Engine Room
Inside Stack on Bottom of Louver (Top of E/R Casing)	Outside of Stack Port Side	Ventilation to Casing and Engine Room
Heating and Ventilation Room (Focsle Deck)	Cross Passageway Focsle Deck	Focsle Deck Supply
Heating and Ventilation Room (Focsle Deck)	Cross Passageway Focsle Deck	FWD Focsle Deck and Humidifier Suction
Open Deck Forward Of Hanger	Same Location As Damper	Emerg Gen Compt and Incinerator Room

	CCGS Leonard J Cowley	
Spec Item #: H-43	Specification	F7049-210183
FIRE DAMPER REPLACEMENT		

Fwd Engineers Store	Same Location As Damper	Bow Thruster Compt
Outside Bosuns Workshop	Same Location As Damper	Bow Thruster Compt
Emergency Generator Room	Same Location As Damper	Incinerator Room

2.1.2

Outside Chief Cooks Cabin	Same Location As Damper	Fwd Accom Main Deck
Port Hallway Upper Deck	Same Location As Damper	Vent To Galley, Crews Lounge and Crews Mess
Upper Deck Entrance Port Side	Same Location As Damper	Main and Upper Decks Fwd Supply
Entrance To Galley	Same Location As Damper	Accom Vent & Aft Main Deck Accommodations
Aft End Of Galley	Same Location As Damper	Engine Room Workshop
Middle Of Galley	Same Location As Damper	Engine Room Workshop
Gym Washroom	Aft Accommodations Outside Gym	Aft Accommodations

2.1.3

Air Handling Unit Room #2(Bridge Deck)	Outside Air Handling Unit Room #2	Bridge Deck Recirc
Air Handling Unit Room #2	Outside Air Handling Unit Room #2	Bridge Deck Supply
Fwd Machinery Space	Same Location As Damper	Fwd Machinery Space
Middle Of Stairs To Water Fwd Machinery Space	Same Location As Damper	Fwd Machinery Space
Outside Bosuns Workshop	Same Location As Damper	Bosuns Workshop

	CCGS Leonard J Cowley	
Spec Item #: H-43	Specification	F7049-210183
FIRE DAMPER REPLACEMENT		

Aft Deck Cofferdam Ventilation Trunking	Same Location As Damper	AV Gas Compartment
Aft Deck Cofferdam Ventilation Trunking	Same Location As Damper	AV Gas Pump Room
Water Maker Parts Store	Water Maker Parts Store	Water Maker Compartment
Outside Electrical Stores	Same Location As Damper	Electrical Stores
Harbour Generator Room Fwd	Same Location As Damper	Harbour Gen Room
Harbour Generator Room Aft	Same Location As Damper	Harbour Gen Room

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.3 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must ensure this work is scheduled around working hours of the vessels galley(if operational). Advance notice must be given and a time agreed upon with the CG CE.

3.1.2 The Contractor must carry out the lock out procedure with the ships CG CE for isolation of any fans and blowers in ductwork.

	CCGS Leonard J Cowley	
Spec Item #: H-43	Specification	F7049-210183
FIRE DAMPER REPLACEMENT		

3.1.3 The Contractor must be responsible for removal and reinstall of any interference items and for removal of any ductwork as required.

3.1.4 The Contractor must remove and replace all dampers in Section 2.1.1. The dampers must be inspected by CG CE and The Contractor to view any damage. All replacement dampers must be of same materials and design as existing. The Contractor must be responsible for reinstall of replacement dampers.

3.1.4.1 The Contractor must operate all dampers in presence of CG CE upon completion to prove correct operation.

3.1.5 The Contractor must fabricate and install new access hatches for all dampers listed in Section 2.1.2. The access hatches are required for resetting the damper and are approx. 16" x 16" and hinged on one side. The access hatch must have a means to secure in the closed position.

3.1.6 The Contractor must remove, inspect and reinstall the dampers listed in Section 2.1.3 with the CG CE to determine correct operation.

3.1.6.1 The Contractor must bid an allowance of \$5,000 for the fabrication of any dampers determined to be damaged and require replacement. Actual amount to be adjusted up or down via PSPC 1379 action.

3.1.7 The Contractor must ensure that the condition of all spaces are left in a clean condition upon completion of the work in this specification.

3.2 Location

3.2.1 Refer to drawings listed in Section 2.1.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to the vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected by CG TA or CG CE prior to completion.

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Spec Item #: H-43	Specification	F7049-210183
FIRE DAMPER REPLACEMENT		

4.2 Testing

4.2.1 The Contractor must operate all dampers a minimum of two (2) times in the presence of the CG CE. All work must be completed and shown as operational to the satisfaction of the CG CE and ABS.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

H-44 Bilge Piping Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to bid on replacing all bilge system piping as listed in Part 3 – Technical Description. Upon removal of bilge piping, CG CE and CG TA will inspect to determine if replacement is required.
- 1.2** The Contractor must provide a unit cost of all piping sizes listed and any not replaced must be adjusted via PSPC 1379 action.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Bilge, Ballast and Fire Piping In Engine Room – 590-44 sheets 1 and 2
- 2.1.2** Bilge, Ballast and Fire Piping – 590-45 sheets 1 and 2

2.2 Standards

- 2.2.1** CCG Fleet Safety Manual (DFO/5737). The ships ISM Hot Work, Confined Space, Fall Protection and Lockout Procedures shall be adhered to at all times.
- 2.2.2** CCG Welding Specifications
- 2.2.3** See General Notes
- 2.2.4** IACS – No.47 – Part “B” Shipbuilding and Repair Quality Standard.

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Canada Shipping Act
- 2.3.3** Maritime Occupational Health and Safety Regulations
- 2.3.4** ABS Rules and Regulations

2.4 Owner Furnished Equipment

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Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated

Part 3 – Technical Description

3.1 General

- 3.1.1** Prior to commencement of work, The Contractor must inform the CG TA.
- 3.1.2** The Contractor must ensure, with the assistance of the Chief Engineer that all systems have been locked out and drained before commencement of any work. Fire watch to be kept at all times during hot work.
- 3.1.3** The Contractor must ensure all work areas are neat and tidy before the end of the work day and all deckhead/bulkhead panels are marked and stored to prevent damage while removed. Any disturbed insulation must be replaced at Contractor expense.
- 3.1.4** The Contractor must remove all sharp edges and grind all burrs smooth.
- 3.1.5** The Contractor must repaint any disturbed coatings as per specs.
- 3.1.6** All new piping, fitting and penetration must be supplied by The Contractor and all sizes to be as per original systems. Piping must be seamless steel. Galvanized after fabrication. 1-1/2" - and smaller Schedule 80, 2" - and larger Schedule 40. Material test certificate to be provided for all new piping used.
- 3.1.7** Below are lists of estimated piping lengths, sizes and fittings per system. The Contractor is responsible for verifying this information prior to bidding.

3.1.7.1 Fwd Manifold

- 3.1.7.1.1** Fwd pipe tunnel suction: 24m of 2" pipe. 1 – 90 degree elbow
- 3.1.7.1.2** Aft pipe tunnel suction: 3m of 2.5" pipe. 3 – 90 degree and 2 – 45 degree elbows. One welded penetration through deck into cofferdam on aft end of pipe tunnel.
- 3.1.7.1.3** Fwd engine room suction: 3m of 4" pipe. 1 – 90 degree elbow.

	CCGS Leonard J Cowley	
Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

3.1.7.1.4 Harbour generator room suction: 6m of 2" pipe. 5 – 90 degree elbows. Welded penetration through frame 42, welded penetration through #3 FO tank from pipe tunnel at frame 44, welded penetration through tank to harbour generator room.

3.1.7.2 Aft Manifold

3.1.7.2.1 Steering gear suction: 16m of 2" pipe. 3 – 90 degree elbows. Welded penetration through engine room bulkhead at frame 28 and gland penetration through steering flat bulkhead at frame 5.

3.1.7.2.2 Purifier room suction: 2m of 2" pipe. 1 – 45 degree and 3 – 90 degree elbows. Welded penetration through bulkhead at frame 28.

3.1.7.2.3 Engine room aft suction: 3m of 3" pipe. 1 – 45 degree and 1 – 90 degree elbow.

3.1.7.2.4 Shaft tunnel suction: 9m of 2.5" pipe. 2 – 45 degree and 1 – 90 degree elbows. Welded penetration through frame 28.

3.1.7.2.5 Engine work shop: 4m of 2" pipe. 2 – 45 degree and 2 – 90 degree elbows.

3.1.7.3 Bilge Main

3.1.7.3.1 In engine room between fwd and aft manifold: 7m of 4" pipe. No elbows.

3.1.7.3.2 In engine room going fwd to bow thruster. 27m of 4" pipe. 1 – 90 degree elbow in engine room. In tunnel the main has a tee to 2" and this penetrates the fwd machinery space for that bilge suction. Another 2m pipe with 1 – 90 degree elbow.

3.1.7.3.3 The bilge main penetrates frame 42 with welded penetration and through frame 82 with gland.

	CCGS Leonard J Cowley	
Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

3.1.7.3.4 In bow thruster space: 1m of 4" pipe with 1 – 90 degree elbow and reducer to 2". There is 9m of 2" pipe with one going to bilge and tee going to fwd peak tank.

3.1.7.4 Bilge Pump

3.1.7.4.1 Direct engine room suction: 3m of 4" pipe. 3 – 90 degree elbows.

3.1.7.4.2 To sludge tank: 12m of 2" pipe. 6 – 90 degree and 2 – 45 degree elbows. Welded penetration through frame 28.

3.1.7.4.3 To overboard: 6m of 4" pipe. 4 – 90 degree elbows and 1 tee going to 2" to sludge tank.

3.1.7.5 Bilge Eductor

3.1.7.5.1 From bilge main to eductor: 2m of 4" pipe. 2 – 45 degree elbows. 1 reducer to 3.5" at eductor.

3.1.7.5.2 From eductor to overboard. 6m of 4" pipe. 2 – 45 degree and 2 – 90 degree elbows.

3.1.7.5.3 Supply from fire or ballast pump. 16m of 2.5" piping. 7 – 90 degree elbows and 2 – 45 degree elbows.

3.1.7.6 Emergency Bilge Suction

3.1.7.6.1 From ballast pump. 1.5m of 4" pipe. 1 – 90 degree and 1 – 45 degree elbow.

3.1.7.7 Control Room Drain

3.1.7.7.1 1.5m of 2" pipe. 3 – 90 degree elbows. Welded penetration through pipe tunnel to control room at frame 44.

3.1.8 All welding must be completed as per General Notes Spec.

3.1.9 The maximum length of pipe that can be safely maneuvered within the vessel is 6 feet, however 8 foot lengths of pipe can be maneuvered within the engine room via the workshop cargo hatch.

	CCGS Leonard J Cowley	
Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

- 3.1.10** The Contractor must store all materials as instructed by Chief Engineer.
- 3.1.11** The Contractor must paint all new piping with two coats of Amercoat 385 Epoxy to 5 mil DFT. Contractor must also label all pipes as per ASME A13.1 color coding no more than 4 ft apart.
- 3.1.12** The Contractor must temporarily remove all deck plating as required. Anytime deck plating is removed, caution tape is to be in place.
- 3.1.13** The Contractor must unbolt all valves, strainers, filters and any other items located in bilge/ballast piping.
- 3.1.14** The Contractor must remove all isolation valves from systems and replace gasket material with new oil rated material. See 3.1.14 also.
- 3.1.15** The Contractor must remove all valves and open for inspection. Inspection must include lapping seats to ensure proper sealing and replacing packing materials with oil rated material. The valves to be boxed back thereafter.
- 3.1.16** The old pipes and fittings must be dismantled, removed from the vessel and disposed of safely ashore as per regulations. The Contractor must install Contractor supplied new piping and fittings following the same route as the removed piping.
- 3.1.17** The Contractor must reuse existing hangers and pipe supports where possible and replace any deemed to be unusable by CG TA or ABS Class Surveyor. The Contractor to quote for renewal of 20 pipe supports and give a unit cost for renewal of one (for adjustment purposes by PSPC 1379 action)
- 3.1.18** For details on piping cleaning and treatment methods, refer to General Notes Section 17.
- 3.1.19** The Contractor must pressure test each new section of pipe and provide a report/certificate to CG TA and ABS Class Surveyor. All new welds must be 100% MPI tested by a certified technician and report/cert provided to CG TA and ABS Class Surveyor.
- 3.1.20** The Contractor must reinstall any removed valves, strainers, filter and other equipment removed in their original designated positions. Contractor must

	CCGS Leonard J Cowley	
Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

replace all nuts, bolts and washers with new Grade B ASTM A307 Heavy Steel. The Contractor must replace all gaskets with new contractor supplied gaskets.

3.1.21 The Contractor must reinstall any removed deck plating to the satisfaction of the CG TA. Deck plates must be reinstalled with new SS screws as per existing.

3.1.22 The Contractor must update CG supplied drawing to as currently fitted. Drawing must be provided back to CG in AutoCad and PDF format.

3.2 Location

3.2.1 Various throughout vessel.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.1.2 Visual inspection of all welding 100%.

4.1.3 The Contractor must check piping system for leaks once system is put back in service and will be responsible for repairs all leaks on disturbed piping.

4.2 Testing

4.2.1 Pneumatic and Hydrostatic test must be carried out on all fabricated new piping to 6.5 bar for 1 hour and must be witnessed by ABS Class Surveyor and CG TA.

4.2.2 All new piping to be proven it's correctly hooked up by The Contractor. If any changes/modifications are required it will be at The Contractors expense.

4.1.3 All new welds must be 100% tested by Magnetic Particle Inspection.

4.3 Certification

4.3.1 As per General Notes Section and ABS surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-44	Specification	F7049-210183
BILGE PIPING REPLACEMENT		

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE. The Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 The Contractor must update CG supplied drawing to as currently fitted. Drawing must be provided back to CG in AutoCad and PDF format.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-45	Specification	F7049-210183
STACK LOUVER REPLACEMENT		

H-45 Stack Louver Replacement..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to crop the below exterior louvers and frames and replace with new Contractor supplied louvers, frames, sealings, gaskets and any other material required to complete the work as specified.
- 1.2** This work must be carried out in conjunction with the following:
 - 1.2.1** HD-12 Weather Deck, Superstructure and Flight Deck Paint

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Ventilation Louvers – Arrangements and Details 590 – SK13

2.2 Standards

- 2.2.1** N/A

2.3 Regulations

- 2.3.1** N/A

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must remove and replace the below ten (10) weathertight doors:
 - 3.1.1.1** Port and Stbd Engine Room Exhaust
 - 3.1.1.2** Port and Stbd Engine Room Supply
 - 3.1.1.3** Port and Stbd Bridge and Foc'sle Deck Supply
 - 3.1.1.4** Stbd Navigation Bridge Deck Supply

	CCGS Leonard J Cowley	
Spec Item #: H-45	Specification	F7049-210183
STACK LOUVER REPLACEMENT		

3.1.2 The Contracture must ensure new supplied louvers meet the below requirements:

3.1.2.1 ABS or other recognized class society approved for the location being installed

3.1.2.2 Means of operation must be the same as originally installed

3.1.3 The Contractor must temporarily remove any interference items in the vicinity of the doors. This includes wire mesh, insulation, lights, switches, etc. and provide a fire watch and protective material/ barricades to prevent cutting and welding debris from spreading around the interior of the ship while the hot work is being done. Cleaning the affected areas after finishing the work to 'as found' to be included.

3.1.4 The Contractor must disconnect any remote operating mechanisms and set aside for reconnection upon completion of installation of new louvers.

3.1.5 The Contractor must remove the existing louvers and frames and dispose of ashore.

3.1.6 Details of each louver are listed below:

3.1.6.1 Port and Stbd Engine Room Exhaust

3.1.6.1.1 2200mm x 1370mm each

3.1.6.1.2 2.304m² free area

3.1.6.2 Port and Stbd Engine Room Intake

3.1.6.2.1 2600mm x 1900mm each

3.1.6.2.2 3.877m² free area

3.1.6.3 Port and Stbd Bridge and Foc'sle Deck Supply

3.1.6.3.1 Port Side 914mm x 2134mm

3.1.6.3.1.1 1.911m² free area

3.1.6.3.2 Stbd Side 914mm x 609mm

	CCGS Leonard J Cowley	
Spec Item #: H-45	Specification	F7049-210183
STACK LOUVER REPLACEMENT		

3.1.6.3.2.1 0.548m² free area

3.1.6.4 Navigation Bridge Deck Supply (stbd side only)

3.1.6.4.1 914mm x 355mm

3.1.6.4.2 0.318m² free area

3.1.7 The Contractor must ensure all areas to be welded including mating areas of bulkhead and angle frame, are cleaned and free of paint, dirt grease and other contaminants.

3.1.8 Existing aluminum bulkhead must be sufficiently strengthened and must align in the same vertical plane.

3.1.9 Frame must be fitted into bulkhead cut-out opening of appropriate size as indicated on supplier drawings and made square and true.

3.1.10 The frame must be welded or bolted as per suppliers drawings all around the frame on the outside of the bulkhead surface until framework is fully attached, such that no water can enter between the frame and bulkhead. If welding, welding must be done intermittently to avoid excessive heat, which can distort the frame. Stich welding, 25mm long, on the interior side of the bulkhead wall should be staggered every 300-400mm.

3.1.11 The Contractor must perform NDT testing on all welds and provide a report to the CG TA and ABS Class Surveyor.

3.1.12 The Contractor must prime and coat all bare material as outlined in HD-12 Weather Deck, Superstructure and Flight Deck Paint

3.1.13 The Contractor must perform a water hose test for 10 minutes all around the frame to ensure watertightness.

3.1.13.1 Any areas not passing a water hose test must be addressed and corrected by The Contractor prior to acceptance by CG TA.

3.1.14 The Contractor must reconnect any remote operating mechanisms.

	CCGS Leonard J Cowley	
Spec Item #: H-45	Specification	F7049-210183
STACK LOUVER REPLACEMENT		

3.1.15 The Contractor must perform a 3 function tests per operating method for each louver in the presence of the CG TA and ABS Class Surveyor. Louvers must open and close as per suppliers specifications.

3.1.16 The Contractor must reinstall all removed interference items and replace any disturbed insulation with new the same as existing.

3.2 Location

3.2.1 As indicated in 3.1.1

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 NDT testing required on all welds and reports provided to CG TA and ABS Class Surveyor.

4.2.2 Hose test must be performed in the presence of ABS Class Surveyor to prove water tightness.

4.2.3 Function testing of each operating method 3 times per louver in presence of ABS Class Surveyor and CG TA.

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: H-45	Specification	F7049-210183
STACK LOUVER REPLACEMENT		

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG TA outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and one (1) electronic copy to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 The Contractor must supply all Class approval certs, manuals, drawings for the supplied louvers.

	CCGS Leonard J Cowley	
Spec Item #: H-46	Specification	F7049-210183
RELIEF VALVE CERTIFICATION		

H-46 Relief Valve Certification – UPDATED

Part 1 - Scope

- 1.1 The Contractor must remove and transport the ~~14~~ 17 safety relief valves to and from an authorized service center for servicing, testing and re-install.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1

2.1 LOCATION	PRESS SET	SIZE	MFG.	TYPE	SERIAL #
Control Air station	8.5 bar	½" BSP	Nuova General	A001-D10	016510172
# 1 Air comp H.P.	31.5 bar	½" BSP	Goetze	810SGK	411915098
# 1 Air comp L.P.	7 bar	½" BSP	Seetru	4421	165749
# 2 Air comp H.P.	31.5 bar	½" BSP	Sperre	4420	341612173
# 2 Air comp L.P.	9 bar	½" BSP	Seetru	4421	NV6240
Deck Air receiver	125 PSI	¼" NPT	Kingston	112C	NV4809
Window Washer tank AHU 1 space	50 PSI	½" NPT	Aquatrol	69A1AH	826331
No. 1 Hot water tank	100 PSI	1" NPT	Apollo	RVW60	NV5093
No. 2 Hot water tank	100 PSI	1" NPT	Apollo	10-605	NV5129
Control Air receiver	8.5 bar	½" BSP	Lorch	2110	NV1193
Emergency Air Compressor	6.9 bar	¼" BSP	Seetru	319000188	242641
Emergency Air Compressor	28 bar	3/8" BSP	Seetru	319000189	229886
Fwd Lower Reducing Station	112 PSI	1" NPT	Kunkle	618FEM01-KM	V15-5045
Aft Lower Reducing Station	50 PSI	1" NPT	Kunkle	6010EEM01	214525512A
Upper Air Receiver	479 PSI	1" NPT	Kunkle	913BDEM03-KE	V-15-5045-1
Lower Air Receiver	479 PSI	1" NPT	Kunkle	913BDEM03-KE	V-15-5045-2
Reducing station	7.7 bar	1" NPT	Kunkle	82-4	NV2377

2.2 Standards

	CCGS Leonard J Cowley	
Spec Item #: H-46	Specification	F7049-210183
RELIEF VALVE CERTIFICATION		

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.3 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must be responsible for all inspections and must arrange for ABS Class Inspector to witness testing as required.

3.1.2 The Contractor must install suitable blanks/plugs in the piping/receivers while the safety valves are removed. The CG TA or CE must witness the removal of the blanks/plugs upon reinstallation of the relief valves.

3.1.3 The Contractor must supply and install thread sealant or new gasket material to be used on re-installation. The Contractor must ensure that all mentioned relief valves in 2.1, after re-installation, be proven leak free, using a medium normally contained in the receiver/piping at operating pressure.

3.1.4 An allowance of \$2500.00 must be included in the bid for this specification item for any replacements or repairs; this cost to be adjusted up or down via PSPC 1379 action on proof of invoice.

3.1.5 Certification for the relief valves must be dated so that the expiry date will be on or after the first week of January 2024.

3.2 Location

3.2.1 Engine Room

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: H-46	Specification	F7049-210183
RELIEF VALVE CERTIFICATION		

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 ABS witnessing/ inspection as required

4.2 Testing

4.2.1 Testing must be completed as per OEM service center.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-47	Specification	F7049-210183
SHIPS OFFICE UPGRADES		

H-47 Ships Office Upgrades..

Part 1 – Scope

- 1.1** The Contractor must supply and replace all the deck coverings, bulkhead, deckhead panels, and all tracks, joiners, trim where required for both bulkhead and deckhead panels in the Ships Office. The Contractor must dispose of all removed panels, tracks and trim. The Contractor must remove all furnishings and dispose of any that are not required for reinstallation.
- 1.2** The Contractor must supply and install all new furniture, lights, desks and shelves as listed in section 3.1 Any furnishings not listed for renewal must be removed and reinstalled.
- 1.3** The Contractor must bid an allowance of \$20,000 for the fabrication of computer desks and book shelves .Drawings and locations of desks and shelves to be provided and discussed upon vessel arriving at yard. The Contractor must be responsible for installing new desk and book shelves.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** 590-82-1 Fire Fighting Plan
- 2.1.2** 1512-001-01/02 General Arrangement
- 2.1.3** 590-77-01/02/03 Insulation Plan

2.2 Standards

- 2.2.1** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.2** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.3** ISM hot work, Confined Space entry, and fall protection procedures are to be strictly enforced.
- 2.2.4** All welding must be as per specification preamble.
- 2.2.5** CG Lockout Procedure.

2.3 Regulations

	CCGS Leonard J Cowley	
Spec Item #: H-47	Specification	F7049-210183
SHIPS OFFICE UPGRADES		

2.3.1 All deck covering and furniture materials must be non-combustible, approved by ABS for its intended usage, and must comply with the requirements of hull construction Regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C. ABS Rules and Regulations.

2.3.2 Canada shipping Act

2.3.3 Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must perform the below listed work:

- Remove, dispose safely the old and replace approx. 134 sqft of deck material as per section 3.2 below.
- Remove, dispose safely the old ones and Supply and install all new bulkhead panels, approx 30 panels
- Remove, dispose safely the old ones and Supply and install all new non perforated white deckhead panels, approx 25 panels.
- Supply and install new custom made L-shaped desk with marine approved plywood and professional finish similar in appearance and design as originally fitted.
- Supply and install two (2) new custom made wooden bookshelves with two (2) shelves.
- The Contractor must add an additional 2 dual electrical outlets above the computer desk. At least one outlet must have a USB port for charging of electronics.
- Supply and install two (2) new custom made wooden cabinets.

	CCGS Leonard J Cowley	
Spec Item #: H-47	Specification	F7049-210183
SHIPS OFFICE UPGRADES		

- Supply and install new LED lighting fixtures with bulkhead mounted dimmers as per Spec Item L-01.

3.2 Deck

- 3.2.1** The Contractor must install temporary dust curtains around the perimeter of work area, sufficient to prevent contamination of adjacent bulkheads, decks, and equipment, with dust and residues produced as a result of the work.
- 3.2.2** Prior to commencement of work The Contractor must remove any interference items attached to the deck that will interfere with the work area.
- 3.2.3** If required, The Contractor must ensure the safe off site storage of furniture, ceiling and bulkhead paneling from the area being worked on. The Contractor will be responsible for any damage that occurs to said items for the duration of the work.
- 3.2.4** On completion of work, The Contractor must ensure all areas/equipment affected by the work to be cleaned of dust and residues.
- 3.2.5** The Contractor must remove the carpet or other deck covering from the entirety of the areas listed above keeping the underlay intact where possible.
- 3.2.6** The Contractor must bid on replacing 134 sqft of damaged dexotec underlay materials. The bid must include removals, prep and application of new underlayment. The Contractor must bid a unit cost per sqft for removal, prep and install of new underlayment. Actual amount required to be adjusted via PSPC 1379 action.
- 3.2.7** The Contractor must supply and install new marine approved vinyl PolyFlor deck coverings. The Contractor must supply and install new vinyl base trim.

3.3 Bulkhead and Deck Head Panels

- 3.3.1** The Contractor must supply and replace all panels and associated tracks, trim, joiner pieces, hangers and new vinyl baseboards. All panel colors must be similar to existing panels fitted and to be approved by CCG. All panels to be prefabricated type with fire rating as approved by ABS/ Administration for their position. They must allow easy removal and re-installation of panel sections without damages to the

	CCGS Leonard J Cowley	
Spec Item #: H-47	Specification	F7049-210183
SHIPS OFFICE UPGRADES		

decorative surfaces as well as to the connection fittings. Sound reduction for partition walls to be at least as per rules and requirements, to give the highest possible comfort. Test certificates to be provided. They are to be elastically mounted, as far as necessary, to avoid vibrations

3.4 Lights and Fixtures

3.4.1 All lights and fixtures to be of the recessed type and arranged in such a way that cables, pipes, ducts and wiring boxes are concealed.

3.5 Location

3.5.1 As per section 3.1

3.6 Interferences

3.6.1 The Contractor must be responsible for the identification of all interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 All welding must be as per specification preamble. Certificates of panels, as required by ABS, to be submitted.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 All reports from the work specified must be given to the CG TA. All drawings required to be updated must be done by The Contractor and approved by ABS as

	CCGS Leonard J Cowley	
Spec Item #: H-47	Specification	F7049-210183
SHIPS OFFICE UPGRADES		

required. Copies of the updated drawings to be submitted as per the requirement of CG TA and as specified in General Notes

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-48	Specification	F7049-210183
ESCAPE HATCH REPLACEMENT		

H-48 CANCELLED..

	CCGS Leonard J Cowley	
Spec Item #: H-49	Specification	F7049-210183
WHEELHOUSE UPGRADES		

H-49 Wheelhouse Upgrades

Part 1 – Scope

- 1.1** The Contractor must supply and replace all the deck coverings, bulkhead, deckhead panels, and all tracks, joiners, trim where required for both bulkhead and deckhead panels in the Wheelhouse. The Contractor must dispose of all removed panels, tracks and trim. The Contractor must remove all furnishings and dispose of any that are not required for reinstallation.
- 1.2** The Contractor must supply and install all new furniture, lights, desks and shelves as listed in section 3.1 Any furnishings not listed for renewal must be removed and reinstalled.
- 1.3** The Contractor must bid an allowance of \$40,000 for the fabrication of computer desks and book shelves. Drawings and locations of desks and shelves to be provided and discussed upon vessel arriving at yard. The Contractor must be responsible for installing new desk and book shelves.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** 590-82-1 Fire Fighting Plan
- 2.1.2** 1512-001-01/02 General Arrangement
- 2.1.3** 590-77-01/02/03 Insulation Plan

2.2 Standards

- 2.2.1** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.2** Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.3** ISM hot work, Confined Space entry, and fall protection procedures are to be strictly enforced.
- 2.2.4** All welding must be as per specification preamble.
- 2.2.5** CG Lockout Procedure.

2.3 Regulations

	CCGS Leonard J Cowley	
Spec Item #: H-49	Specification	F7049-210183
WHEELHOUSE UPGRADES		

2.3.1 All deck covering and furniture materials must be non-combustible, approved by ABS for its intended usage, and must comply with the requirements of hull construction Regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C. ABS Rules and Regulations.

2.3.2 Canada shipping Act

2.3.3 Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must perform the below listed work:

- Remove, dispose of safely the old and replace approx. 1700 sqft of deck material as per section 3.2 below. Color of materials to be determined by CCG upon vessel arrival at Contractors facility.
- Remove, dispose safely the old ones and supply and install all new bulkhead panels, approx. 75 full and/or partial panels and associated trim, joining strips and tracks. Color of materials to be determined by CCG upon vessel arrival at Contractors facility.
- Remove, dispose safely the old ones and Supply and install all new non perforated deckhead panels, approx. 130 panels and associated trim, joining strips and tracks. Color of materials to be determined by CCG upon vessel arrival at Contractors facility.
- Supply and install new custom made desks, cabinets and shelves with marine approved plywood and professional finish similar in design as originally fitted. Color of materials to be determined by CCG upon vessel arrival at Contractors facility.

	CCGS Leonard J Cowley	
Spec Item #: H-49	Specification	F7049-210183
WHEELHOUSE UPGRADES		

3.2 Deck

- 3.2.1** The Contractor must install temporary dust curtains around the perimeter of work area, sufficient to prevent contamination of adjacent bulkheads, decks, and equipment, with dust and residues produced as a result of the work.
- 3.2.2** Prior to commencement of work The Contractor must remove any interference items attached to the deck that will interfere with the work area.
- 3.2.3** If required, The Contractor must ensure the safe off site storage of furniture, ceiling and bulkhead paneling from the area being worked on. The Contractor will be responsible for any damage that occurs to said items for the duration of the work.
- 3.2.4** On completion of work, The Contractor must ensure all areas/equipment affected by the work to be cleaned of dust and residues.
- 3.2.5** The Contractor must remove the existing small circle vinyl deck material in its entirety in the areas listed above keeping the underlay intact where possible.
- 3.2.6** The Contractor must bid on replacing 134 sqft of damaged dexotec underlay materials. The bid must include removals, prep and application of new underlayment. The Contractor must bid a unit cost per sqft for removal, prep and install of new underlayment. Actual amount required to be adjusted via PSPC 1379 action.
- 3.2.7** The Contractor must supply and install new marine approved vinyl deck coverings with raised circular patten. The Contractor must supply and install new vinyl base trim. Color of materials to be determined by CCG upon vessel arrival at Contractors facility.

3.3 Bulkhead and Deck Head Panels

- 3.3.1** The Contractor must supply and replace all panels and associated tracks, trim, joiner pieces, hangers and new vinyl baseboards. Color of materials to be determined upon arrival at Contractors facility. All panels must be prefabricated type with fire rating as approved by ABS for their position. They must allow easy removal and re-installation of panel sections without damages to the decorative surfaces as well as to the connection fittings. Sound reduction for partition walls

	CCGS Leonard J Cowley	
Spec Item #: H-49	Specification	F7049-210183
WHEELHOUSE UPGRADES		

to be at least as per rules and requirements, to give the highest possible comfort. Test certificates to be provided. They are to be elastically mounted, as far as necessary, to avoid vibrations. Removal and reinstall of all mounted equipment and interference items must be the responsibility of The Contractor.

3.4 Lights and Fixtures

3.4.1 All recessed deckhead lighting must be removed, disposed and replaced with new Contractor supplied Marine Approved LED lights with Classification Society approval for location being installed.

3.4.1.1 Existing switches for new lights must be removed and replaced with sliding dimmer switches.

3.5 Cabinets, Desk and Doors

3.5.1 The Contractor must bid an allowance of \$40,000.00 for the fabrication of computer desks, book shelves, cabinets and cabinet doors (also mentioned in section 1.3) to be adjusted up or down via PSC 1379 action based on invoice. Drawings and locations of items to be provided and discussed upon vessel arriving at yard. The Contractor must be responsible for installing new desk and book shelves. Where practicable and upon approval by CG CE, only the doors may be replaced on cabinets and lockers. The Contractor must be responsible for removal of existing furniture and reinstallation of new. The allowance is for the fabrication of new furniture only.

3.5 Location

3.5.1 As per section 3.1

3.6 Interferences

3.6.1 The Contractor must be responsible for the identification of all interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-49	Specification	F7049-210183
WHEELHOUSE UPGRADES		

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 All welding must be as per specification preamble. Certificates of panels, as required by ABS, to be submitted.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 All reports from the work specified must be given to the CG TA. All drawings required to be updated must be done by The Contractor and approved by ABS as required. Copies of the updated drawings to be submitted as per the requirement of CG TA and as specified in General Notes

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-50	Specification	F7049-210183
IMMERSION SUIT ANNUAL SERVICE		

H-50 Immersion Suit Annual Service..

Part 1 - Scope

1.1 The Contractor must remove and transport 49 Fitzwright Model 9700 immersion suits to and from an authorized service center for servicing as required by ABS.

1.1.1 Upon completion of servicing, the immersion suits must be returned to the vessel and installed in original location. The Contractor must bid on servicing 49 immersion suits and any additional items required for replacement or repair must be covered under PSPC 1379 action.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 1512-003 Life Saving Equipment Plan

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.3 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must remove the immersion suits from the ship and transport them to and from the OEM service center for annual inspection and recertification. Upon return of the immersion suits, The Contractor must install

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Spec Item #: H-50	Specification	F7049-210183
IMMERSION SUIT ANNUAL SERVICE		

and secure them on board the vessel in the correct locations as confirmed by Chief Officer.

3.1.1.1 Fitzwright Model 9700 Size R - 38

3.1.1.2 Fitzwright Model 9700 Size S – 5

3.1.1.3 Fitzwright Model 9700 Size L - 6

3.1.2 An allowance of \$3000.00 must be included in the bid for replacement and/or repair for this specification item; this cost to be adjusted up or down via PSPC 1379 action on proof of invoice.

3.1.3 Certification for the immersion suits must be dated so that the expiry date will be on or after the first week of January 2024.

3.2 Location

3.2.1 Various

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 ABS witnessing/ inspection as required

4.2 Testing

4.2.1 Testing must be completed as per OEM service center.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

	CCGS Leonard J Cowley	
Spec Item #: H-50	Specification	F7049-210183
IMMERSION SUIT ANNUAL SERVICE		

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-51	Specification	F7049-210183
AIR RECEIVER INSPECTION		

H-51 Air Receiver Inspection..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to open up and clean both Main Air Receivers and the Clutch Control Air Receiver for inspection by the attending ABS Surveyor.
- 1.2** All three Air Receivers must be Hydrostatically Tested to 1.5 times their working pressure; test pressure shall be confirmed by ABS Surveyor.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Compressed Air System Diagram 590-39
- 2.1.2** Main Air Receivers Working Pressure 30 BAR
- 2.1.3** Clutch Control Air Receiver Working Pressure 8 BAR

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet Safety and Security Manual

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Marine Machinery Regulations (SOR/90-264)
- 2.3.3** Maritime Occupational Health and Safety Regulations (SOR/87-183)
- 2.3.4** ABS Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

	CCGS Leonard J Cowley	
Spec Item #: H-51	Specification	F7049-210183
AIR RECEIVER INSPECTION		

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must ensure all required electrical and mechanical equipment is locked out before commencement of any work. CG CE must confirm.

3.1.2 Main Air Receivers

3.1.2.1 The Contractor must open up (2) main air receivers for a visual inspection by attending ABS Surveyor and CG CE.

3.1.2.2 Access for the inspection must be gained by removing the main stop isolation valve and associated pipework on each unit. Care must be exercised while dismantling and re-installing the pipework.

3.1.2.3 Internals must be ragged out with lint free rags and cleaned before arranging ABS Surveyor for inspection.

3.1.2.4 Receivers are fitted with a pipe plug at the top of the receiver on the forward end. Plug can be removed to facilitate hydrostatic testing.

3.1.2.5 Hydrostatic testing is to be carried out at 1.5 times the working pressure. Test pressure to be confirmed with the attending ABS Surveyor.

3.1.2.6 The Contractor must drain receivers and dry with lint free rags prior to reassembling.

3.1.3 Clutch Control Air Receiver

3.1.3.1 The Contractor must open up clutch control air receiver for a visual inspection by attending ABS Surveyor and CG CE. Inspection will have to be carried out using a borescope through one of two pipe connections fitted to the receiver.

3.1.3.2 Internals must be flushed and cleaned before arranging ABS Surveyor for inspection.

3.1.3.3 Receiver will require removal from bulkhead to facilitate hydrostatic testing and cleaning.

	CCGS Leonard J Cowley	
Spec Item #: H-51	Specification	F7049-210183
AIR RECEIVER INSPECTION		

3.1.3.4 Hydrostatic testing must be carried out at 1.5 times the working pressure. Test pressure to be confirmed with the attending ABS Surveyor.

3.1.3.5 Once testing is complete, receiver connections must be re-installed and receiver placed back in service.

3.1.4 The Contractor must perform non-destructive thickness testing on each receiver as per discretion of attending ABS Surveyor and CG CE. For bidding purposes The Contractor must bid 60 UT Shots and include a unit price per shot. The total cost to be adjusted via PSPC 1379 action.

3.2 Location

3.2.1 Engine Room, AFT Port Side

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG CE and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 All three air receivers must be hydrostatically tested to 1.5 times their working pressures; test pressure must be confirmed by attending ABS Surveyor. Working pressure of Main Air Receivers is 30 BAR and working pressure of Clutch Control Air Receivers is 8 BAR.

4.3 Certification

4.3.1 A survey credit from ABS is required.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

	CCGS Leonard J Cowley	
Spec Item #: H-51	Specification	F7049-210183
AIR RECEIVER INSPECTION		

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-52	Specification	F7049-210183
GALLEY FIRE DOOR REPLACEMENT		

H-52 Galley Fire Door Replacement – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to remove existing fire doors and frames in both galley entrances and install new Contractor supplied fire rated doors.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Fire Zone Plan 590-78 Sheet 2

2.2 Standards

- 2.2.1** See General Notes
2.2.2 Fleet Safety and Security Manual

2.3 Regulations

- 2.3.1** See General Notes
2.3.2 Marine Machinery Regulations (SOR/90-264)
2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)
2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** Insulation contained in all doors may contain amosite asbestos therefore doors must be properly disposed according to provincial regulations. Insulation is sealed inside doors therefore The Contractor will not come into direct contact with the amosite asbestos insulation. The Contractor must include the costs for transportation and disposal of the mentioned doors according to the provincial regulations.

	CCGS Leonard J Cowley	
Spec Item #: H-52	Specification	F7049-210183
GALLEY FIRE DOOR REPLACEMENT		

3.1.2 Prior to removal of doors and frames, The Contractor must confirm measurements and swings of existing doors.

3.1.2.1 The Contractor must supply two new doors to the below standards:

~~**3.1.2.1.1** Fire rated to A0 and provide class certificate.~~

3.1.2.1.1 Fire rated to A60 and provide class certificate.

3.1.2.1.2 Clear opening of existing doors is 29 ½" x 75". The new inboard side door must be replaced with a 32" x 75" clear opening.

3.1.2.1.3 New doors must be fitted with fire rated glass window, std lockset, hose port and mag door holder and door closer. Finish color to be determined after discussing with CCG TA prior to ordering.

3.1.3 The Contractor must be responsible for removal of all interference items and the reinstall and/or modification upon completion of work. The Contractor must remove both doors and frames. Cuts to be completed with grinder and cutting disc to minimize damage to bulkheads. The Contractor must replace any disturbed deck material and stainless bulkhead sheeting.

3.1.4 The Contractor must provide adequate fire watches for all cutting and possible welding operations.

3.1.5 The Contractor must provide appropriate barricades to prevent cutting and welding debris from spreading around the interior of the ship. The affected areas must be cleaned after finishing of work to as found.

3.1.6 The Contractor must fit up doors and tack in position for viewing by CG TA and ABS Class Surveyor.

3.1.7 The Contractor must fit and weld the new door frames in accordance with the manufacturer's specifications and suggested welding procedures to ensure no warpage of the door frames occurs. All welds must be 100% NDT tested by Certified Level 2 NDT Technician. Reports must be provided to CG TA and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-52	Specification	F7049-210183
GALLEY FIRE DOOR REPLACEMENT		

3.1.7.1 The Contractor must be responsible for all materials and labor required to complete the installs.

3.1.8 The Contractor must provide a unit cost for welding an individual door for replacement in the event additional doors require replacement. Amount to be adjusted up or down via PSPC 1379 action.

3.1.9 The Contractor is responsible to arrange ABS Class Surveyor to inspect fit up of doors before final welding or bolting.

3.2 Location

3.2.1 Main Deck Galley

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG CE and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 All testing must be completed with the presence of the CG CE and ABS Class Surveyor and to their satisfaction.

4.2.2 Doors must be opened and closed 5 times to ensure proper operation.

4.3 Certification

4.3.1 Fire door class certificates must be provided to CG TA.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: H-52	Specification	F7049-210183
GALLEY FIRE DOOR REPLACEMENT		

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

H-53 Fuel Monitoring System Install..

Part 1 - Scope

- 1.1** The Contractor must review the entirety of this specification, including all documents listed in Section 2.1 for the install of the Fuel Monitoring System (FMS) onboard the CCGS Leonard J. Cowley.
- 1.2** The system consists of fuel flowmeters on the main engines and ship service generators, torque strain gauge on the propulsion shaft, computer data monitoring systems and displays, along with various other components to collect the data from the measurement devices. Included in this system is an automatic bypass system consisting of two panels and a pneumatic valve around each flowmeter.
- 1.3** The Contractor must be responsible for the installation of hardware, routing of all cabling/tubing, and any changes/repairs required by the OpDAQ or Coast Guard Technical Authority (CGTA) during commissioning/testing.
- 1.4** The Contractor must be responsible for arranging and contracting OpDAQ for final termination of cabling for FMS, installation of strain gauge, and commissioning of the FMS system. The cost of contracting OpDAQ will be the responsibility of the Contractor to pay.
- 1.5** The Contractor must be responsible for deliverables as defined in Section 5.
- 1.6** System components provided by the Canadian Coast Guard (CCG) are outlined in Section 2.4.
- 1.7** All remaining system components, including tools and materials required for the system install are the sole responsibility of the Contractor to supply.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1

Technical Drawing Package CCGS Leonard J. Cowley R1-.pdf
TorqueTrak TPM2 Manual 866600-9_B.pdf
Torque Meter Mounting Brackets.pdf
OP-Torq Advance 160725.pdf

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

Fuel Oil System (FMS).pdf
OpDAQ Automatic Bypass System
Redline Standard CCG
Flowmeter Manual Technical Manual OpGI-V - 160330.pdf
J16051-M02- 1100 ClassR0- Torque Monitor Arrangement.pdf
Compressed Air System Diagram
DataView_manual.pdf
Flowmeter Manual OIO 23en.pdf
Flowmeter Installation Arrangement.pdf
FMS Ship Survey.pdf
Allswater FMS Ship Survey.pdf

2.2 Standards

2.2.1 See General Notes

2.2.2 Fleet Safety and Security Manual

2.3 Regulations

2.3.1 See General Notes

2.3.2 Marine Machinery Regulations (SOR/90-264)

2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 OpDAQ Performance Monitoring System

2.4.1.1 KRAL Flowmeters which include;

(4) KRAL OMP32 Flowmeters for M/E With Secondary Y Strainer

(6) KRAL OMP20 Flowmeters for SSG With Secondary Y Strainer

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

(20) KRAL Pickups With Wiring

(10) KRAL Flowmeter Temperature Sensors With Wiring

2.4.1.2 TorqueTrak TPM2 which includes;

(1) Stationary Ring

(1) Rotating Collar and Transmitting Module with pre-wired Strain Gauge

(1) Mounting Flange

(1) Stationary Interface

(1) Power Supply Panel

2.4.1.3 Data Monitoring System which includes;

(10) OpGI-V Modules

(10) OpGI-V Mounting Plates

(1) Main Terminal

(1) Main Terminal Touch-screen Computer

(1) Wheelhouse Repeater

(1) USB Port

2.4.1.4 Automatic Bypass System

(4) 32mm Pneumatic Valves

(6) 20mm Pneumatic Valves

(1) Control Panel

(1) Solenoid Panel

2.4.1.5 Electrical / Wiring

12DMA-3X2.5 (POWER)

Belden 1300SB (Ethernet-CAT-5E)

Belden 8723SB (RS-422)

Belden 1502SB (RS-485 +24DC)

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

2.4.2 The Contractor must supply all other materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The OEM Contact for the fuel monitoring equipment is:

OPDAQ Systems Inc.

Charles Massicotte

(418) 732 2407

cmassicotte@opdaq.com

3.1.2 Installation Requirements

3.1.2.1 The Contractor must install the system according to the provided installation manuals in Section 2.1 and the installation specification.

3.1.2.2 The Contractor must coordinate with the Chief Engineer prior to starting any work in regard to scheduling and permits.

3.1.2.3 Should an issue arise with the installation, the Contractor must work with the CGTA for an approved change prior to deviating from work in this specification or provided manuals. Any approved changes to be addressed via PSPC 1379 action.

3.1.2.4 The Contractor must be responsible to arrange all ABS surveys as required. All costs associated with ABS surveys will be paid for by the CCG.

3.1.3 Electrical Requirements

3.1.3.1 The Contractor must use all supplied cabling that matches Section 2.1 unless otherwise specified, with no substitutes accepted. No splicing of wire shall be accepted. If additional cabling is required this will be addressed via PSPC 1379 action.

3.1.3.2 The Contractor must ensure 1 meter of excess cabling is available at each termination location.

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

3.1.3.3 The Contractor must ensure that all specified wiring shall follow existing cableways and transits in the vessel. New wires shall be secured in these cable trays in accordance with the Canada Shipping Act, 2001 - Ships Electrical Standards (2018) TP 127 E. (Sect 3.2.5)

3.1.3.4 The Contractor must not run ethernet cables parallel to power cables or noise producing equipment, and shall not bend, deform, or staple the cable.

3.1.3.5 The Contractor must coordinate with the CGTA to determine all power connection locations.

3.2 Preparation

3.2.1 The Contractor must coordinate with ship personnel to ensure that all fuel supply and return line valves to/from main engines and ship service generators have been closed and secured using the established lock-out/tag-out procedures prior to starting work. The system lines connecting the main engine shall be drained as directed by the CGTA. No fuel shall be allowed to spill the bilge.

3.3 Fuel Oil Piping

3.3.1 All required piping/fittings/components not specified in Section 2.4 to be Contractor supplied and costs for this and any other costs from below points to be included in the pricing of this spec item

3.3.2 Main Engine and Generator supply and return piping to be modified to accept pre-fabricated FMS skids and automatic bypass components in locations designated in Table 2.1.1. Chief Engineer to approve any modifications.

3.3.3 The Contractor must verify isolation valves exist on the supply and return lines for each engine/genset so that the flowmeter skid can be completely removed. If no isolation valves exist the Contractor must install an ABS approved valve in location designated by CGTA.

3.3.4 The Contractor must orient piping changes so that flowmeter backpressure requirements are met as defined on page 23 of Ref. 3.1.16 in Table 2.1.1.

3.3.5 The Contractor must ensure filtration requirements on page 27 of Ref. 3.1.16 in Table 2.1.1 are met for each flowmeter. Note that filtration requirement is flowmeter size dependant. Should insufficient filtration be present, The Contractor must supply and install CGTA approved duplex filter in location designated by CGTA. Pre-installed strainer is not to be included in this check.

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

3.3.6 The Contractor must ensure sufficient room is provided to remove the flowmeter and bypass assemblies for cleaning, maintenance, and repair.

3.3.7 The Contractor must clean the piping system thoroughly prior to any further work but shall not use water to clean the pipe system Ref. 3.1.16 (pg. 25) in Table 2.1.1

3.4 Automatic By Pass

3.4.1 Pre-fabricated Fuel Meter assemblies are to be modified to remove the manual bypass valve and install new air actuated valves. All other equipment to remain in the system. Any piping, or otherwise, that requires replacement is to be of same material type as original. Chief Engineer and ABS surveyor to approve of any modifications.

3.4.2 FMS skid to be cleaned/flushed after addition of pneumatic valve.

3.4.3 The Contractor must coordinate with the Chief Engineer prior to starting work to ensure compressed air system is locked out and tagged out as per CCG regulations.

3.4.4 All required piping/fittings/components not specified in Section 2.4 must be contractor supplied.

3.4.5 The Contractor shall coordinate with CGTA to determine installation location of the control panel and install.

3.4.6 The Contractor shall coordinate with CGTA to determine the installation location of the pneumatic control panel and install. Pneumatic Control panel to be installed as to minimize pneumatic tubing runs.

3.4.7 The Contractor must survey vessel compressed air system Ref. 3.1.13 Section 2.1.1 and coordinate with CGTA to determine required components to connect the OpDAQ pneumatic bypass system. All materials shall be contractor supply unless otherwise stated.

3.4.8 The Contractor coordinate with CGTA to determine system power panel connection to ship board power source.

3.4.9 The Contractor shall route and install all OpDAQ Pneumatic bypass system electrical and compressed air connections as per Ref. 3.1.9 in Section 2.1.1.

3.5 FMS KRAL Flowmeter Skids

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

3.5.1 A secondary y-strainer fuel filter is included with the flowmeters and The Contractor must ensure it is clean and installed with the flowmeter.

3.5.2 The Contractor must install (4) KRAL OMP32 flowmeter skids to the M/E supply and return lines as defined in Ref. 3.1.16 in Table 2.1.1.

3.5.3 The Contractor must install (6) KRAL OMP20 flowmeter skids to the SSG supply and return fuel lines as defined in Ref. 3.1.16 in Table 2.1.1.

3.6 TorqueTrak

3.6.1 The Contractor must fabricate and install one (1) TPM2 mount as per Ref. 3.1.6 & Ref. 3.1.12, subject to CGTA approval

3.6.2 The Contractor must ensure OpDAQ installs the strain gauge.

3.6.3 The Contractor must install a power supply panel near the TPM2 torque meters in location approved by CGTA and route cabling to connect TPM2 to power supply.

3.7 OpDAQ Data Monitoring System

3.7.1 The Contractor must mount and install (10) OpGI-V modules near the flowmeters in location approved by CGTA. Note the OpGI-V modules are labeled to match the appropriate flowmeter. The Contractor must fabricate CGTA approved mounts if required.

3.7.2 The Contractor must coordinate with the CGTA to install the main terminal in the Engine Control Room. This system is a stand alone system and will not be connected to the ships Alarm Monitoring System.

3.7.3 The Contractor must coordinate with the CGTA to install the repeater in the Wheelhouse.

3.8 Electrical/Wiring

3.8.1 The Contractor must run all specified cabling in the FMS as defined in Ref. 3.1.1. 1m of excess cabling to be made available at each termination point.

3.8.2 The Contractor must install the pickups to the flowmeters and OpGI-V modules while also referencing Ref. 3.1.16.

3.8.3 The Contractor must install the temperature sensors to the flowmeters and OpGI-V modules while also referencing Ref. 3.1.16.

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

3.8.4 The Contractor must install CCG supplied uninterrupted power supply in the MCR. Location to be confirmed between MCR power panel and master control panel on the MCR console.

3.8.5 The Contractor must ensure OpDAQ completes final termination of all cabling.

3.9 Location

3.9.1 Engine Room

3.9.2 Control Room

3.10 Interferences

3.10.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and the attending ABS Class Surveyor.

4.2 Testing/Commissioning

4.2.1 The commissioning of the new vessel performance monitoring system must be done under the direction of the OpDAQ FSR in accordance with the manufacturer's recommended practices as defined in. Ref. 3.1.7 (Commissioning). The Contractor is responsible for subcontracting OPDAQ for the commissioning of the system.

4.2.2 Any troubleshooting will be the responsibility of the Contractor to complete with OpDAQ to ensure the system operates properly.

4.2.3 The Contractor must 'prefill' all flowmeters with vessel fuel prior to proceeding.

4.2.4 All new and reinstalled piping shall be pressure tested after installation to ensure no leaks are present. Any required repairs to the installed piping will be the responsibility of the Contractor.

4.2.5 Dock trials must be conducted to verify the operation of all components fitted to the propulsion equipment for a period of one (1) hour at varying conditions, not

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

to exceed 25% load on the propulsion system. Each engine shall be checked individually and together to verify system operation.

4.2.6 Sea trials must be conducted for a period of four (4) hours to verify the operation of the new system at higher rated loads not to exceed 100% load on the propulsion system. Each engine shall be checked individually and together to verify system operation when the vessel is underway.

4.2.7 Testing associated with the system components installed on the ship service generators shall be trialed concurrently with the dock and sea trials.

4.2.8 Testing of the autobypass system along with the full suite of other FMS equipment will be as directed by the OpDAQ FSR. Contractor must work with OpDAQ to resolve any issues found.

4.3 Certification

4.3.1 A survey credit from ABS is required.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to SVMM. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 The Contractor must redline the below drawings using the CCG redline standard to as-fitted. The Contractor must redline any changes including; new piping, pneumatic connections, valves, flowmeters, etc. not already included in the drawings. Any modified drawings requiring ABS approval must be submitted by the shipyard, and a copy the approved drawings provided to the vessel

5.1.2.1 Ref. 3.1.8 Fuel Oil System (FMS)

5.1.2.2 Ref. 3.1.12 Torque Monitor Installation Arrangement

	CCGS Leonard J Cowley	
Spec Item #: H-53	Specification	F7049-210183
FUEL MONITORING SYSTEM INSTALL		

5.1.2.3 Ref. 3.1.17 Flowmeter Installation Arrangement

5.1.2.4 Ref. 3.1.13 Compressed Air System Diagram

5.2 Spares

5.2.1 The Contractor must ensure all operations, maintenance, and installation manuals are submitted to the owner prior to the acceptance of this item.

5.3 Training

5.3.1 The Contractor must ensure vessels crew (6 employees/course x 2 courses) have been provided comprehensive training on the FMS's operation, maintenance and troubleshooting through OpDAQ. The Contractor must bid on providing the arranging for this course, all travel/labour costs for the course presenter, course materials and classroom setting (if required).

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

H-54 Sewage Compartment Vent Modification – ADDED

CCGS Leonard J. Cowley

70.0m Fisheries Patrol Vessel

Sewage Compartment Vent Modification

Outline Scope of Work

Doc. No. 21-176-003

Rev. 0

30 May 2022

Prepared For:

CCG Supervisor / Engineering - St. John's

P.O. Box 5667

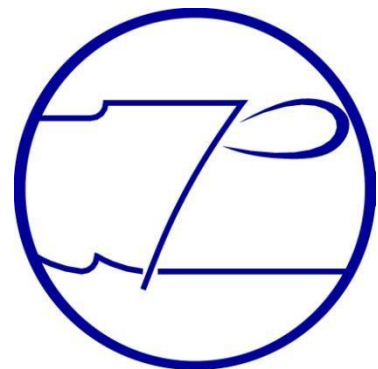
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DOCUMENT INFORMATION

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

Rev	Date	Description	Prepared	Checked	Approved
0	30 May 2022	Issued to CCG for Review	LAB	DDD	-

REVISION SUMMARY

<u>Rev</u>	<u>Affected Sections</u>	<u>Remarks</u>	<u>By</u>

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

Part 1 - Scope

- 1.1** This document is intended to describe the scope of work to be completed by a qualified Contractor with respect to modification of the sewage compartment's ventilation system. Generally, the modification includes converting the existing exhaust to a supply and converting the existing supply to an exhaust with ducting, piping, fan, and vent routed to exterior location on forecastle deck above.

Part 2 - References

2.1 Supplied Drawings

590-70	General Arrangement Upper, Main Deck and Hold
S-111-6	Ventilation Arrangement Main Deck Forward
S-111-4	Ventilation Arrangement Upper Deck

2.2 Definitions and Abbreviations

Contractor	TBA	Refit/Repairer
CCG	Canadian Coast Guard	Vessel Owner
PMC	Poseidon Marine Consultants Ltd.	Naval Architect/Technical Consultant
ABS	American Bureau of Shipping	RO on Behalf of Transport Canada

Part 3 – General Requirements

3.1 Acceptance of the Work

All work must be completed to the satisfaction of CCG and ABS. The Contractor must provide appropriate material certificates and welding procedures to ABS, in accordance with the criteria listed below. The Contractor must establish critical milestones at which the work may be inspected.

3.2 Materials and Welding

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

Unless otherwise specified, all new steel plate and profiles to be grade 44W, or an equivalent as approved by the attending ABS surveyor. All new pipe shall be ASTM A53 Grade B or approved equivalent.

All hot work shall be carried out under vessel work permit system. Welding shall be executed in accordance with CSA W59 and CSA W47.1. CWB approved welding procedure specification shall be developed by the contractor along with supporting documentation and supplied to ABS prior to commencing the work. All welders to have proper CWB certification for work being completed.

3.3 Execution Of The Work

In general, the Contractor must progress work in a manner that does not compromise the structural integrity of the vessel and enables periodic inspections of ongoing and completed work by CCG and ABS

3.3.1 In preparation for work, The Contractor must:

3.3.1.1 Provide all ancillary services necessary to complete the subject work. These may include, but are not limited to temporary removal of interference items, craneage, staging, cleaning, debris removal, shore power, etc.

3.3.1.2 Provide all appropriate permits for entrance into and completion of welding in confined spaces where necessary

3.3.1.3 Clean and certify for hot work all adjacent spaces and tanks where necessary

3.3.1.4 Ensure new steel is shot blasted and coated with weldable primer prior to placement onboard

3.3.2 During the completion of hot work, the Contractor must:

3.3.2.1 Supply fire watch while hot work is ongoing, with appropriate class portable fire extinguisher and charged fire hose ready for use

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

3.3.2.2 Subject work inspection to be coordinated with ABS and CCG personnel

3.3.3 Following the completion of hot work in specific areas of the vessel, the Contractor must:

3.3.3.1 Ensure all welding is 100% visually inspected or as otherwise required by ABS. Ensure NDT personnel are certified CGSB, Level II or greater for the technique being used. NDT to be completed using Class evaluation standards.

3.3.3.2 Subject work to final inspections by CCG and ABS

3.3.3.3 Clean affected spaces and remove debris from vessel

3.3.3.4 Clean and apply primer to welded seams and other disturbed areas. Apply internal and external coatings in accordance with original paint scheme or as directed by CCG personnel.

3.3.3.5 Replace furnishings, fittings, fixtures, linings, deck coverings, machinery, etc. that were removed to complete the work.

Part 4 – Scope of Work

4.1 Areas and offsets indicated are approximate and must be confirmed onsite by the Contractor prior to commencement of work, in conjunction with CCG or their designate.

See photographs in **Appendix A**.

4.2 The following work must be completed by the Contractor:

4.2.1 Reconfiguration of Existing Ventilation Exhaust to New Ventilation Supply

4.2.1.1 The existing exhaust line located outside of the aft bulkhead (Fr. 54) of sewage compartment is to be converted to the new ventilation supply line. Contractor is to detach the 8" diameter flex line from the rectangular ducting and cap and secure the loose end.

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

4.2.1.2 The existing rectangular ducting passes through bulkhead at frame 54 and is to be cut off at the bulkhead, with any ducting outside the space removed and disposed of, and remaining portion properly secured at bulkhead. The ducting remaining within the space will now form the air supply for the sewage compartment.

4.2.2 Reconfiguration of Existing Ventilation Supply to New Ventilation Exhaust

4.2.2.1 The existing ventilation supply for the sewage compartment is located on the starboard bulkhead of the space at approx. Fr. 54½ and the bulkhead penetration is currently capped. The contractor is to remove the cap and this penetration is to be used to reroute the new exhaust line for the space.

4.2.2.2 The Contractor is to supply and install ducting from the sewage compartment starboard bulkhead (frame 54 ½) up through an existing ventilation trunk to new location on exposed forecastle deck (frame 51 ½).

4.2.2.3 The Contractor to supply and install all flexible ducting including dampers and bulkhead/deck penetrations as required.

4.2.2.4 Ducting to be 8" diameter circular or 8" x 6" rectangular or as approved by the Chief Engineer.

4.2.2.5 Ducting must be fitted with minimal bends or transitions. Ducting must be adequately supported. Approximate length of ducting is 7m.

4.2.3 New Exhaust Fan and Vent Head Installation

4.2.3.1 The Contractor must supply and install a new vent on the exposed forecastle deck complete with an inline exhaust fan, vent head and damper for exhaust ventilation of the sewage compartment.

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

4.2.3.2 Arrangement of the new sewage compartment vent is to be similar to existing (see Figure 4). Vent head and exhaust fan are to be 8" diameter Sch. 40 pipe which penetrates the deck. Inline fan to be installed approx. 25" above deck. Vent head to terminate approx. 56" above deck. Vent head to be of similar size and capacity as existing for ventilation exhaust.

4.2.3.3 New inline fan to be installed to be of similar specification of existing units: 1 Phase, 115 Volts, 60 Hz, 1.9 Amps, 3450 RPM. New fan to be installed to be approved by the Chief Engineer. New location of ventilation fan exhaust to be per PMC Dwg. 21-176-101.

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

APPENDIX A

PHOTOGRAPHS

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		



Figure 1: Sewage Compartment - View Looking Aft

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		



Figure 2: Sewage Compartment Entrance – View Looking Aft

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

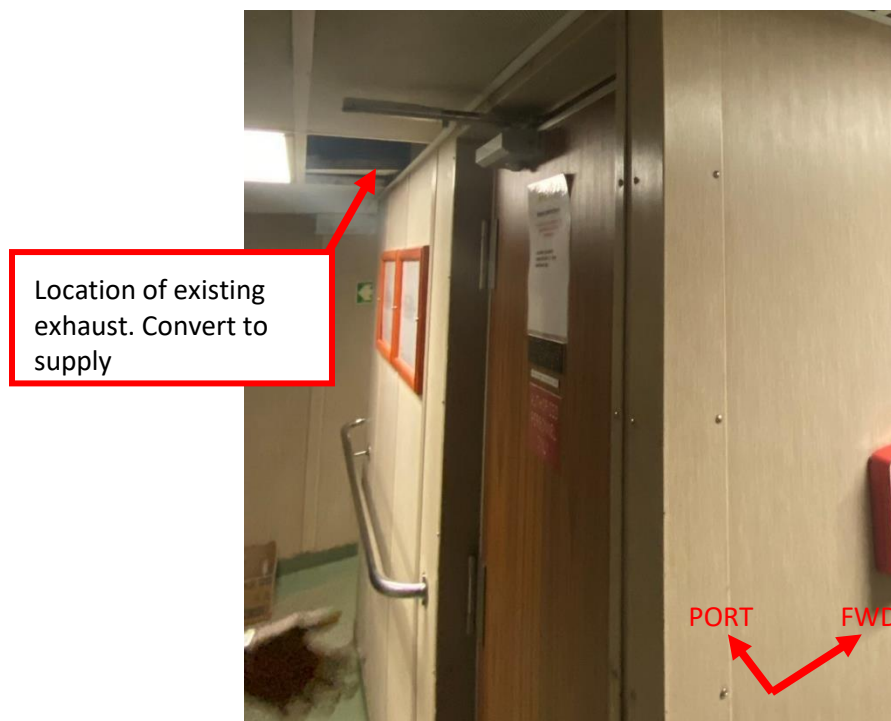


Figure 3: Entrance to sewage compartment

	CCGS Leonard J Cowley	
Spec Item #: H-54	Specification	F7049-210183
SEWAGE COMPARTMENT VENT MODIFICATION		

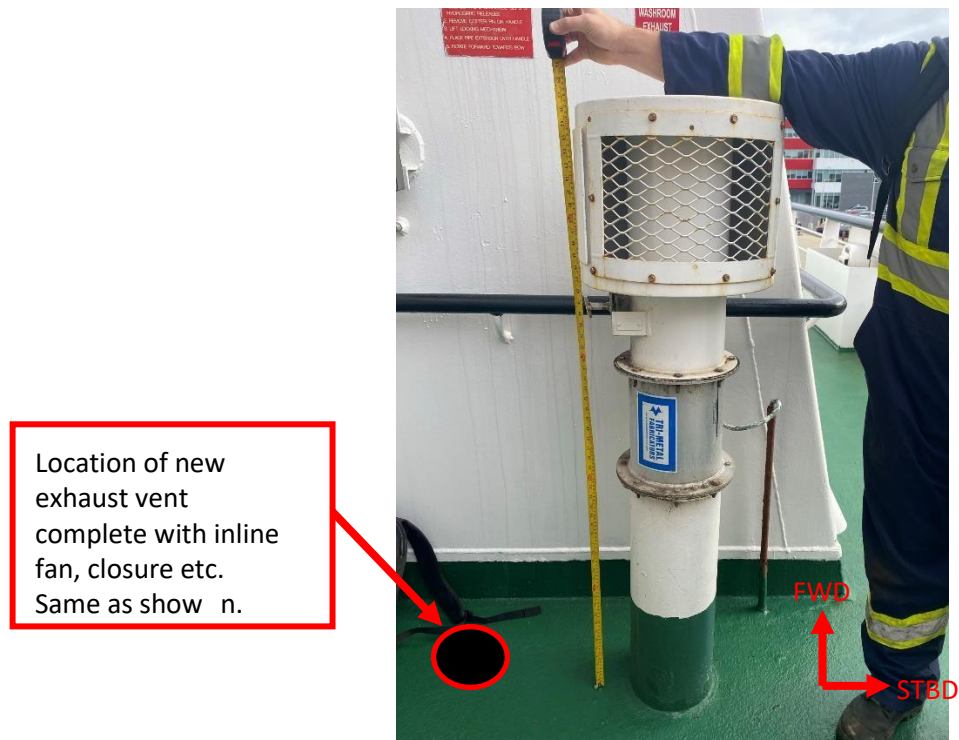


Figure 4: New exhaust vent to be configured and installed same as shown

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

H-55 #2 Port Water Ballast Tank – Removal Of Doubler Plates – ADDED



CCGS Leonard J Cowley

#2 Port Water Ballast Tank – Removal of Doubler Plates

Completed By:

Marine Services International Ltd.
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Phone: 709 782 2700
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Completed For:

DFO Vessel Support
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Document Number: 3382-R-002
Issued: December 2022

Revision: 0

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

Part 1 - Scope

- 1.1** This specification and associated drawing note the side frame locations in the No.2 Port WB tank with doubler plates to be cropped and removed.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3382-D-01-R0 No.2 Port WB Tank – Removal of Doubler Plates

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469
- 2.2.7** SOLAS – Chapter 11-2: Construction – Fire Protection, Fire Detection and Fire Extinction.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The contractor must use approved marine grade fire insulation, panels and wire/cable sealing systems. The Contractor shall use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All steel work must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 For this work no new materials are required in way of plating or structural members.

3.3 Welding

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

- 3.3.1** All welding associated with plating must be double continuous fillet welding.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor must supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Cropping of Doubler Plates From Side Frames in No.2 Port WB Tank

3.7.1.1 The Contractor must crop the existing flat bar doubler plates from the side frames in the No.2 Port Water Ballast tank. The doubler plates are located on the side frames and intermediate side frames from frame 67 to frame 69. There are five doubler plates located on the side frames above the tank side stringer and five doubler plates located on the side frames below the side stringer.

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

3.7.1.2 The Contractor must ensure that all weld has been removed from the side frames after the doubler plates have been cropped. The side frame flanges are to then be visually inspected for any areas of corrosion and/or pitting. If there are signs of corrosion and/or pitting on the flanges in way of the cropped doubler plates then the noted areas are to have plate thickness readings taken. If any of the readings in way of the side frame flanges record plate thickness measurements of at least 25% diminution then structural renewals of these areas will be required.

3.7.1.3 This document does not include details for the repair of the noted side frames where the doubler plates are to be cropped. The level of repairs required (if any) cannot be determined until such time as the doubler plates have been removed from the side frames.

3.7.1.4 For information on the removal of the doubler plates see MSI drawing No. 3382-D-01-R0 – No.2 Port WB Tank – Removal of Doubler Plates.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-55	Specification	F7049-210183
#2 PORT WATER BALLAST TANK – REMOVAL OF DOUBLER PLATES		

- 3.8.5** The Contractor must be responsible for getting drawing approvals from ABS, and providing updated as-fitted drawings to CCG as per details mentioned in the General Notes section.

	CCGS Leonard J Cowley	
Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

H-56 Steel Renewals – Heli Deck Structure – ADDED



CCGS Leonard J Cowley

Steel Renewals – Heli Deck Structure

Completed By:

Marine Services International Ltd.
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Completed For:

DFO Vessel Support
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Document Number: 3373-R-002
Issued: November 2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel renewals to be completed on the heli-deck structure at the forecastle deck level. The renewals are based on the inspection of the applicable area by the vessel representative and MSI. This specification will also cover the removal of various fittings connected to the helideck structural members between the aft end of the heli-deck and the aft deckhouse bulkhead at frame 5.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3373-D-01-R0 Heli Deck Structure Renewals

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469
- 2.2.7** SOLAS – Chapter 11-2: Construction – Fire Protection, Fire Detection and Fire Extinction.

2.3 Regulations

	CCGS Leonard J Cowley	
Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

The following Regulations are to be adhered to during the completion of the work scope:

2.3.1 Canada Shipping Act 2001

2.3.2 Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.

3.1.3 Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet

	CCGS Leonard J Cowley	
Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.
- 3.1.5** The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.
- 3.1.6** The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

- 3.2.1** The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.
- 3.2.2** All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.
- 3.2.3** All materials used must be approved by A.B.S. or equivalent Classification Society.
- 3.2.4** The Contractor must ensure that all steel plates are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.
- 3.2.5** The following scantlings of steel renewals are as follows:
 - 3.2.5.1** Deck Beam – 125 x 75 x 9.0 O.A. (original), 5" x 3" x 3/8" O.A. (new)
- 3.2.6** Linings and insulation material that may be required to replace any non-reusable removed items as noted in section 3.1.4 must be supplied and installed by The Contractor and meet the noted standard listed in that section. All such materials and their install shall also be to the satisfaction of the vessel's Chief Engineer

	CCGS Leonard J Cowley	
Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

and/or the Vessel's Representative.

3.3 Welding

- 3.3.1** All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor must supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is

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Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified structural member at the noted location in way of the Heli-deck on the forecastle deck level at frame 'A'.

3.7.1.2 The Contractor must crop and remove the existing deck beam below the Heli-Deck at frame 'A'. The existing brackets fitted in way of the deck girders on centerline, 1500mm and 3000mm on port and starboard are to remain in place. The Contractor must then fit a new deck beam in place

	CCGS Leonard J Cowley	
Spec Item #: H-56	Specification	F7049-210183
STEEL RENEWALS – HELI DECK STRUCTURE		

of the cropped deck beam. The approximated length of the new 5"x 3"x 3/8" deck beam is 7.5 meters.

3.7.1.3 For the purpose of inspecting and recoating the underside of the Heli-Deck plating and structural members, all fittings secured to the deck head of Heli-Deck must first be cropped. These fittings include any/all padeyes, steel plates(including mounting plates & miscellaneous plates), deck lights, emergency lights, cameras, electrical fixtures, wiring and piping. These cropped/removed fittings will then be stored by the vessel representative and contractor until such time the noted fittings will be reinstalled.

3.7.1.4 The existing aviation fuel ventilation system fitted on the deck head of the Heli-Deck on the starboard side is also to be cropped and removed from vessel. The existing system is to be replaced with a new ventilation system in 2023. The contractor is to store the cropped ventilation system in case any components of the existing system should be reutilized.

3.7.1.5 For information on the Heli-Deck structural renewals see supplied MSI drawing No. 3373-D-01-R0 – Heli-Deck Structure Renewals.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

H-57 Replacement of Forepeak Void Vent – ADDED



CCGS Leonard J Cowley

Replacement of Forepeak Void Vent

Completed By:

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Completed For:

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Document Number: 3371-R-002
Issued: November 2022

Revision: 0

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of modifications to be completed for the complete replacement of the existing forepeak void vent on starboard side from forepeak void top at the Upper Deck to above the forecastle deck between frames 91 and 92.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3371-D-01-R0 Replacement of Forepeak Void Vent

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 8.0mm Plate

3.2.5.2 Vent Piping – 2.5" Nominal Dia. Sch 80 Black Pipe

3.2.5.3 Pipe Sleeve – 3.0" Nominal Dia. Sch 80

3.2.5.4 Pipe Flange – Class 150 for 2.5" Nominal Dia. Vent Pipe Flange to correspond with void vent check valve.

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

3.2.5.5 Vent Check Valve – Manufacturer: Winel, Type RM PN10 – DN 40-175.
Specifications to be confirmed by Contractor.

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

3.3.1 All welding associated with installation of the new forepeak void vent must be double continuous fillet welding.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Replacement of Forepeak Void Vent

3.7.1.1 The Contractor must crop and remove the existing vent fittings from the Forecastle deck to the Upper deck between frames 91 and 92 on the stbd side. The existing fittings include the vent check valve and vent piping with pipe flange connections to each deck.

3.7.1.2 The Contractor must install the new vent with installation details and routing of new vent piping similar to the existing arrangement. Pipe flanges at each deck must be replaced as well. The new Winel vent check valve type RM PN10 – DN40-175 is to be confirmed by the vessel representative.

3.7.1.3 The Contractor must apply coatings to the newly fitted vent piping and fittings. Damaged areas of plating and structure in way of the new vent installation to be reapplied. All coatings must follow the vessels paint system.

3.7.1.4 For details of work see supplied MSI drawing No. 3371-D-01-R0.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals must be disposed of by The Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage and reinstallation of any/all electrical components (wiring, junctions and panels) deemed to interfere with the renewals as outlined.

	CCGS Leonard J Cowley	Added In Amendment #1
Spec Item #: H-57	Specification	F7049-210183
REPLACEMENT OF FOREPEAK VOID VENT		

- 3.8.4** The Contractor must be responsible for the removal, storage and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

H-58 Weld Repairs – Upper Deck Pipe Penetrations at Frame 5 – ADDED



CCGS Leonard J Cowley

Weld Repairs – Upper Deck Pipe Penetrations at Frame 5

Completed By:

Marine Services International Ltd.
P.O. Box 29132
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Completed For:

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Document Number: 3357-R-002
Issued: January 2023

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

Part 1 - Scope

- 1.1** This specification and associated drawing not the weld repairs to be completed in way of the pipe penetrations on the exterior upper deck aft of the deck house bulkhead at Frame 5.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3357-D-01-R0 Weld Repairs – Upper Deck Pipe Penetrations @ Frame 5

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.
- 2.2.7** SOLAS – Chapter II-2: Construction – Fire Protection, Fire Detection and Fire Extinction.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.

3.1.3 Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.

3.2.5 For this work no new materials are required.

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

- 3.3.1** All welding associated with plating must be double continuous fillet welding.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Weld Repairs to Upper Deck Pipe Penetration at Frame 5

3.7.1.1 The Contractor must disconnect and remove the electrical wiring/cables from the existing pipe sleeves prior to completion of hot work for the noted six (6) ¾" nominal diameter pipe penetrations. The pipe penetrations are located on the upper deck approximately 50mm aft of the deck house bulkhead at frame 5.

3.7.1.2 The Contractor must prepare the areas in way of the existing six (6) pipe penetrations on the underside of the deck for welding. The Contractor

	CCGS Leonard J Cowley	
Spec Item #: H-58	Specification	F7049-210183
WELD REPAIRS – UPPER DECK PIPE PENETRATIONS AT FRAME 5		

must then complete welding in way of the pipe penetrations between the pipe and the underside deck plating surface.

3.7.1.3 The Contractor must ensure that the new welds are subjected to 100% visual inspection and 100% MPI testing.

3.7.1.4 For information on the repairs to pipe penetration welds see supplied MSI drawing No. 3357-D-01-R0 – Weld Repairs – Upper Deck Pipe Penetrations at Frame 5.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals must be disposed of by The Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage and reinstallation of any/all electrical components (wiring, junctions and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-59	Specification	F7049-210183
STEEL REPAIRS – FRAME 85 (Bow Thruster Compt)		

H-59 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

H-60 General Guide For Conversion of Aft Main Deck Cabins (Frames 5 to 21) – ADDED



CCGS Leonard J Cowley

General Guide For Conversion Of Aft Main Deck Cabins (Frames 5 To 21)

Completed By:

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Document Number: 3319-R-002
Issued: March 2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

Part 1 - Scope

- 1.1** This specification and associated key plan drawing note the conversion of the aft main deck crew cabins and gym (frames 5 – 21). This section of the aft main deck currently contains 4 cabins for a total of 8 program officers and a crew gym. All program officer cabins to become spaces for storage of equipment and supplies for vessel operations while the gym will remain.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3319-D-01-R0 Key Plan – Conversion of Aft Main Deck Cabins

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.
- 2.2.7** SOLAS – Chapter II-2: Construction – Fire Protection, Fire Detection and Fire Extinction.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

2.3.2 Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.

3.1.3 Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use approved marine grade fire insulation, panels and wire/cable sealing systems. The Contractor must use new Lloyd's Grade A or equivalent steel as per ABS approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.

3.2.5 The following materials required are as follows:

3.2.5.1 "B" Class bulkhead panels and fittings

3.2.5.2 "C" Class bulkhead panels and fittings

3.2.5.3 Flooring and deckhead materials

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

3.2.5.4 Wire rack shelving and fittings

3.2.5.5 Vidmar storage cabinets (x2)

3.2.5.6 Safety storage lockers (x2)

3.3 Welding

3.3.1 All welding associated with plating must be double continuous fillet welding.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Conversion of Aft Main Deck Cabins (Frames 5-21)

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

3.7.1.1 The Contractor must modify the existing arrangement of the aft main deck program cabins and crew gym. The cabins will be converted to storage compartments for various types of equipment and supplies. The gym is to remain and will be increased in size.

3.7.1.2 The Contractor must remove the existing “B” and “C” class bulkheads, flooring materials and deckhead paneling where required. Requirements for new electrical and plumbing installations to be determined by vessel representative and Contractor(s). The Contractor(s) must install bulkheads, flooring, deckhead paneling, electrical and plumbing components followed by new cabinets and shelving based on the new proposed key plan arrangement. Where possible, existing materials are to be reused for the new arrangement.

3.7.1.3 This document does not include the installation details for the re-arrangement/fabrication of the required new “B” and “C” class bulkheads, new flooring, deckhead panels, electrical components, plumbing, shelving and cabinets. This document serves as a guide only for determining the available area for each new component for the purpose of storing equipment and supplies.

3.7.1.4 For information on the conversion of cabins see supplied MSI drawing No 3219-D-01-R0 Key Plan Conversion of Aft Deck Main Deck Cabins.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals must be disposed of by The Contractor unless otherwise directed by the vessel’s Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage and reinstallation of any/all electrical components (wiring, junctions and panels) deemed to interfere with the renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-60	Specification	F7049-210183
GENERAL GUIDE FOR CONVERSION OF AFT MAIN DECK CABINS (FRAMES 5 To 21)		

- 3.8.4** The Contractor must be responsible for the removal, storage and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

H-61 Relocation of LAN Equipment To Engineer's Store – ADDED



CCGS Leonard J Cowley

Relocation of LAN Equipment To Engineer's Store

Completed By:

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Canada, A1A 5B5
Phone:709 782 2700
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Completed For:

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P.O. Box 5667
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Document Number: 3383-R-002
Issued: December 2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

Part 1 - Scope

- 1.1** This specification and associated key plan drawing note the new arrangement of the LAN equipment cabinet and air conditioning (A/C) system in the Engineer's Store on the upper deck starboard side. Locations of A/C system components including copper piping from the Engineer's Store down to the Forward Machinery Room are also noted.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3382-D-01-R0 Key Plan – LAN Arrangement – Engineer's Store

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469.
- 2.2.7** SOLAS – Chapter II-2: Construction – Fire Protection, Fire Detection and Fire Extinction.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

3.1.2 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.

3.1.3 Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.

3.2.5 The following scantlings of steel renewals are as follows:'

3.2.5.1 Air Conditioning (A/C) unit and associated fittings.

3.2.5.2 Marine cooling pump (x1) and associated fittings – details to be confirmed

3.2.5.3 Condenser (x1) and associated fittings – details to be confirmed

3.2.5.4 ½" Copper piping

3.2.5.5 ¾" Copper piping

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

3.2.5.6 1 ½" Nominal diameter Sch 40 piping

3.2.5.7 Steel caps (x12) threaded for 1 ½" Nominal diameter piping

3.2.5.8 Minimum A0 class fire rated sealing system for copper piping penetrations.

3.2.5.9 Approved type thermal insulation for copper piping.

3.2.5.10 Plating – 3/8"

3.3 Welding

3.3.1 All welding associated with plating must be double continuous fillet welding.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.
- 3.5.3** The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

- 3.6.1** The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.
- 3.6.2** The Contractor must ensure that the following documents are included in the final report for this specification item:
- 3.6.2.1** Material Certificates for Plate & Sections
 - 3.6.2.2** CWB Certificates for Welders
 - 3.6.2.3** CWB Certificates for Weld Supervisors
 - 3.6.2.4** CWB Weld Procedures
 - 3.6.2.5** CWB Weld Data Sheets
 - 3.6.2.6** NDT Testing Documentation

3.7 Scope of Work

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

3.7.1 Relocation of LAN Equipment to Engineer's Store

3.7.1.1 The Contractor must remove the LAN equipment cabinet from the LAN room at frames 80 – 82 on the upper deck starboard side and relocate it to the Engineer's Store at frames 82 – 88 on the upper deck. The new position of the LAN cabinet indicated on the key plan drawing may change pending any additional installation requirements.

3.7.1.2 The Contractor must fit a new air conditioning (A/C) unit in the Engineer's Store. The position of the new A/C unit indicated on the key plan drawing may change pending any additional installation requirements. The A/C unit will have both ½" and ¾" copper piping lines running between the A/C unit and the new condenser. The ½" line will be for gas and the ¾" line will be for high pressure liquid(freon). Bulkhead and deck penetrations will be required for the routing of the piping. The locations for pipe penetrations in the key plan drawing may change pending any additional installation requirements. Details for pipe penetrations are found on the key plan drawing. The electrical installation requirements for the new LAN equipment arrangement are to be determined.

3.7.1.3 The Contractor must fit a new condenser with marine rated pump in the Forward Machinery Room on the port side forward. The position of the new condenser and pump indicated on the key plan drawing may change pending any additional installation requirements. A new overboard discharge is to be installed with piping going to the condenser. Details for the installation of new overboard discharge to be determined.

3.7.1.4 This document does not include the installation details for the existing and new equipment for the new LAN arrangement. This document serves as a guide only for the positioning of the equipment and providing general details and direction for the routing of the A/C unit copper piping.

3.7.1.5 For information on the relocation of LAN equipment see supplied MSI drawing No. 3383-D-01-R0 Key Plan – LAN Arrangement – Engineer's Store.

3.8 Removals

	CCGS Leonard J Cowley	
Spec Item #: H-61	Specification	F7049-210183
RELOCATION OF LAN EQUIPMENT TO ENGINEER'S STORE		

- 3.8.1** The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals must be disposed of by The Contractor unless otherwise directed by the vessel's Owner.
- 3.8.2** The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.
- 3.8.3** The Contractor must be responsible for the removal, storage and reinstallation of any/all electrical components (wiring, junctions and panels) deemed to interfere with the renewals as outlined.
- 3.8.4** The Contractor must be responsible for the removal, storage and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-62	Specification	F7049-210183
STEEL REPAIRS – FORE PEAK VOID		

H-62 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: H-63	Specification	F7049-210183
STEEL REPAIRS – NO 2 PORT WATER BALLAST TANK		

H-63 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

H-64 Installation Of New Tank Top Manhole Frames 34 To 35 – ADDED



CCGS Leonard J Cowley

Steel Repairs – Installation of New Tank Top Manhole Frames 34 - 35

Project Number: 3356-D-01
Issued: Sept 2022

Revision: 1

Part 1 - Scope

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

- 1.1** This specification and associated drawing describe the extent of work required to add an additional manhole to No 4 Center Double Bottom Tank from frames 34 - 35. The repairs are based on the inspection of the applicable areas by the vessel Chief Engineer and MSI representative.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3316-D-01 Installation Of New Tank Top Manhole Frames 34 – 35.

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 For this work no new materials are required in way of plating or structural members.

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

3.3.1 All welding associated with plating renewals must be as per original specification. All welding of stiffeners and brackets must be double continuous fillet welding.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Steel Repairs

3.7.1.1 The Contractor must perform repairs to welds as identified in MSI Drawing 3316-D-01 Installation Of New Tank Top Manhole Frames 34 – 35.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-64	Specification	F7049-210183
INSTALLATION OF NEW TANK TOP MANHOLE FRAMES 34 - 35		

- 3.8.3** The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.
- 3.8.4** The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.
- 3.8.5** The Contractor must be responsible for getting drawing approvals from ABS, and providing updated as-fitted drawings to CCG as per details mentioned in the General Notes section

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

**H-65 Steel Renewals – Forecastle Deck Save Alls – Frames 55 To 64 –
ADDED**



CCGS Leonard J Cowley

Steel Renewals – Forecastle Deck Save Alls – Frames 55 To 64

Completed By:

Marine Services International Ltd.
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Completed For:

DFO Vessel Support
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A1C 5X1

Document Number: 3358-R-002
Issued: Sept 2022

Revision: 2

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel renewals to be completed on the forecastle deck port and starboard fuel oil save-alls between frames 55 and 64. The repairs are based on the inspection of the applicable areas by the vessel representative.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3358-D-01-R2 Steel Renewals – Forecastle Deck Save Alls Frames 55 To 64.

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469
- 2.2.7** SOLAS – Chapter 11-2: Construction – Fire Protection, Fire Detection and Fire Extinction.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.

- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.
- 3.1.5** The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.
- 3.1.6** The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

- 3.2.1** The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Deck Plating – 9.5mm Plate

3.2.5.2 Save All Plating – 8.0mm Plate

3.2.5.3 Pipe Flange Plating – 9.5mm Plate

3.2.5.4 Piping(Drains) – 1” Nominal Dia Sch 40

3.2.6 Linings and insulation material that may be required to replace any non-reusable removed items as noted in section 3.1.4 must be supplied and installed by The Contractor and meet the noted standard listed in that section. All such materials and their install shall also be to the satisfaction of the vessel’s Chief Engineer and/or the Vessel’s Representative.

3.3 Welding

3.3.1 All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor’s welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The Contractor must supply all coatings.

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at the noted locations for each fuel oil save-all on port and starboard between frames 55 and 64 on the forecastle deck, as per the supplied MSI drawing No 3358-D-01. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing deck plating and save-all plating at the inboard side and forward/aft ends for each save-all. All save-all drawings must be renewed as per original. Details for new save-all drain plugs with threaded caps to be determined by the Contractor. The new replacement aft side drain plugs for each save-all must be fitted in similar positions as the existing plugs while being as low as practicable to the deck.

3.7.1.3 The approximated size of the new deck insert plates are 1500mm x 500mm with a 9.5mm (3/8") thickness. The save -all inboard side and forward/aft end plates are 300mm in height with 8.0mm(5/16") thickness.

3.7.1.4 The Contractor must replace all drain plugs for all save-alls. Drain piping is 1" nominal diameter sch 40. Threaded drain plugs must be fitted by the Contractor as per original.

3.7.1.5 The Contractor must replace each pipe flange for vents and sounding pipes in all save-alls on the forecastle deck. Flange plates are 9.5mm (3/8") thickness.

3.7.1.6 All insert plates must have round corners with a 100mm radius.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-65	Specification	F7049-210183
STEEL RENEWALS – FORECASTLE DECK SAVE ALLS – FRAMES 55 TO 64		

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: H-66	Specification	F7049-210183
FUEL STATION RENEWALS		

H-66 Fuel Station Renewals – ADDED

Part 1 - Scope

- 1.1** The intent of this specification item is to renew the catch-all basins for both fuel stations in their entirety on the vessel's port and stbd sides.
- 1.2** To be included with the renewal of the catch-all basins; new piping contained there-in, valves for each respective deck connection, securing bracket, fittings and fasteners of Contractor supply.
- 1.3** The only fitting to not be replaced is the fuel oil bunkering connection.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Lube Oil Diagram Dwg No. 590-33
- 2.1.2** Fuel Oil Diagram Dwg No. 590-35
- 2.1.3** General Arrangement Diagrams Dwg No. 590-70 Sheets 1-3

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet Safety and Security Manual

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Canada Shipping Act 2001
- 2.3.3** Maritime Occupational Health and Safety Regulations
- 2.3.4** Lloyds Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

	CCGS Leonard J Cowley	
Spec Item #: H-66	Specification	F7049-210183
FUEL STATION RENEWALS		

Part 3 – Technical Description

3.1 General

- 3.1.1** Prior to any cutting or welding commencement, Contractor is responsible for isolation of all associated piping. Contractors must adhere to vessels Lockout and Tagout procedures. Where valve isolation is not possible, piping may be removed to facilitate safety. Where piping has been removed, some means of appropriate isolation to the associated tanks/manifolds shall be made.
- 3.1.2** Flange fasteners shall be stainless steel, of appropriate dimension.
- 3.1.3** Valves shall be stainless steel, screw-down screw-lift globe type with flanged connections rated for 150 psi. Sized to match original piping
- 3.1.4** The catch-all's shall be made of the same material as the original, with same dimension.
- 3.1.5** Any corroded brackets will be removed and new ones will fabricated to fit in the same locations as the old.
- 3.1.6** STBD Fueling station consists of the following connections; Gear Oil Tank Fill, Hydraulic Oil Tank Fill, Engine Oil Tank Fill, Fuel Oil Filling. All piping to be renewed with steel seamless pipe rated for 150 psi with flanged connections to the valves. All new piping must be of the same dimension as the original that they're replacing. The blanked flange connection on the Fuel Fill pipe shall not be duplicated on the replacement.

3.1.7 Stbd Side

Line	FO Fill	Engine Oil Fill	Gear Oil Fill	Hyd Oil Fill	FRC
Pipe	41" x 3" Pipe	35" x 2" pipe	40" x 1.5" pipe	40" x 1.5" pipe	25" x ¾"
Fittings	1 x 90	1 x 2" 90	1.5" 90	1.5" 90	¾" union
Fittings	1 x 45		2" to 1.5" Reducing bushing	2" to 1.5" Reducing bushing	2 x ¾" 90

	CCGS Leonard J Cowley	
Spec Item #: H-66	Specification	F7049-210183
FUEL STATION RENEWALS		

Fittings	3" to 4" welded pipe Reducer				1 x 45
Flanges	2 x 4 bolt 3" Flange 1 x 8 bolt 4" Flange	2 x 4 bolt Flanges	2 x 4-bolt 1.5" Flanges	2 x 4-bolt 1.5" Flanges	
Cam-Lok Fittings	No	2" female	2" Female	2" Female	¾" male
Valve	3" SDSL	2" globe valve	1.5" globe	1.5" globe	
Brackets	1	1	1	1	1

3.1.8 Stbd Catch All Plate

Catch all Plate	Fore End	Outboard Side	Aft End	Bottom
	20" x 32"	70" x 32"	20" x 32"	70" x 20"

3.1.9 For the STBD Station, Fuel Fill connection to be reused, but all other connections to be replaced with new, female stainless steel camlock fittings and plugs.

3.1.10 PORT Fueling station consists of the following connections; Lube Oil Filling and Port Fuel Oil Filling. All piping to be renewed with steel seamless pipe rated for 150 psi with flanged connections to the valves. All new piping must be of the same dimension as the original that they're replacing. The blanked flange connection on the Fuel Fill pipe shall not be duplicated on the replacement.

3.1.11 Port Side

Line	Fuel Fill/Discharge Line	Lube Oil fill line	FRC Fueling line:
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	CCGS Leonard J Cowley	
Spec Item #: H-66	Specification	F7049-210183
FUEL STATION RENEWALS		

Pipe	40" of 3" pipe	42" x 2" pipe	90" of ¾" pipe
Fittings	1 x 3" 90 ⁰	1 x 2" 90 ⁰	2 x ¾" 90 ⁰
	1 x 3" 45 ⁰	2 x 2" 45 ⁰	
Flanges	2 x 3" 4-bolt flange	2 x 4 bolt 2" pipe Flange	1 x ¾" Union
Cam-Lok Fittings	3" Male	2" Female Cam-Lok fitting	¾" Cam-Lok male
Valve	3" SDSL valve	2" SDSL valve	1 x ¾" valve
Brackets	1	1	2

Catch all Plate	Fore End	Outboard Side	Aft End	Bottom
	20" x 32"	51" x 32"	20" x 32"	51" x 20"

3.1.12 For the PORT station, all connections to be replaced with new, female stainless steel camlock fittings and plugs of the original size.

3.1.13 Orientation of all valves for both fueling stations shall be the same as the original.

3.1.14 As with the original catch-all's, round bar must be welded to the entire length of top rim.

3.1.15 Once work is completed, all new piping must be flushed cleared of any debris.

3.1.16 The Contractor must prime and paint the sections of carbon steel piping upon completion of testing in accordance with the General Notes in the preamble.

	CCGS Leonard J Cowley	
Spec Item #: H-66	Specification	F7049-210183
FUEL STATION RENEWALS		

3.2 Location

3.2.1 Upper Deck Port and Stbd Side, Frames 32-35.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, including those to facilitate fire watch, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be inspected by the CG Technical Authority or Chief Engineer.

4.1.2 All work must be completed to the satisfaction of the Chief Engineer.

4.2 Testing

4.2.1 All new welds must be tested by Magnetic Particle Inspection.

4.2.2 Any new piping must be pressure tested to 150psi.

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 N/A

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

	CCGS Leonard J Cowley	
Spec Item #: H-66	Specification	F7049-210183
FUEL STATION RENEWALS		

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATIONS		

H-67 Fresh Water System Modifications – ADDED

CCGS Leonard J. Cowley

70.0m Fisheries Patrol Vessel

Fresh Water System Modifications

Outline Scope of Work

Doc. No. 21-223-001

Rev. 1

14 March 2022

Prepared For:

CCG Supervisor / Engineering - St. John's

P.O. Box 5667

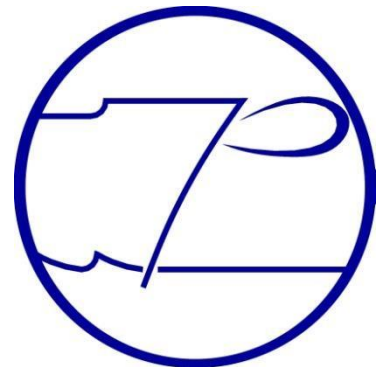
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DOCUMENT INFORMATION

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

Rev	Date	Description	Prepared	Checked	Approved
0	10 Mar 2022	Issued To CCG For Review	MDP	AJM	-
1	14 Mar 2022	Issued For Bidding Purposes	MDP	AJM	

REVISION SUMMARY

<u>Rev</u>	<u>Affected Sections</u>	<u>Remarks</u>	<u>By</u>
1	2.0	Updated reference 21-223-100 R0 to 21-223-100 R1	MDP
1	5.2	Added "Pipe to be insulated throughout accommodation spaces" to section	MDP
1	Appendix B	Updated Sketch 5	MDP

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

Part 1 - Scope

- 1.1** This document is intended to describe the scope of work to be completed by a qualified Contractor with respect to supply and installation of new equipment for the domestic fresh water system on board the vessel.
- 1.2** Described modifications are intended to follow modifications to split the existing fresh water tank into two separate tanks. This work is referenced in the MSI Document 3285-R-002-R0 Specification – Modifications to Fresh Water Tank.

Part 2 - References

2.1 Supplied Drawings

3285-R-002-R0	Modifications to Fresh Water Tank (MSI)
590-37-R9	Domestic Fresh Water Diagram (RivTow Industries Ltd)
21-223-100-R1	Domestic Fresh Water Modification (PMC)

2.2 Definitions and Abbreviations

Contractor	TBA	Refit/Repairer
CCG	Canadian Coast Guard	Vessel Owner
PMC	Poseidon Marine Consultants Ltd.	Naval Architect/Technical Consultant
ABS	American Bureau of Shipping	RO on Behalf of Transport Canada

Part 3 – General Requirements

3.1 Acceptance of the Work

All work must be completed to the satisfaction of CCG and ABS. The Contractor must provide appropriate material certificates and welding procedures to ABS, in accordance with the criteria listed below. The Contractor must establish critical milestones at which the work may be inspected.

3.2 Materials and Welding

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

Unless otherwise specified, all new steel plate and profiles to be grade 44W, or an equivalent as approved by the attending ABS surveyor. All new pipe shall be ASTM A53 Grade B or approved equivalent.

All hot work must be carried out under vessel work permit system. Steel welding must be executed in accordance with CSA W59 and CSA W47.1 using E-7018 electrodes. All aluminum welding must be executed in accordance with CSA 59.2 and CSA W47.2, using E-4043 filler alloy or approved equivalent, with approved procedures for the alloys used.

CWB approved welding procedure specification must be developed by The Contractor along with supporting documentation and supplied to ABS prior to commencing work. All welders must have proper CWB certification for the work being completed.

Pre-fabrication of pipe spools to be welded in shop as far as practical. On site connections to use Straub couplings or equivalent, approved for use in potable water systems.

Unless otherwise specified, all new aluminum plate must be alloy 5083 or 5086 or equivalent as approved by attending ABS surveyor.

3.3 Execution Of The Work

In general, the Contractor must progress work in a manner that does not compromise the structural integrity of the vessel and enables periodic inspections of ongoing and completed work by CCG and ABS

3.3.1 In preparation for work, The Contractor must:

3.3.1.1 Provide all ancillary services necessary to complete the subject work. These may include, but are not limited to temporary removal of interference items, craneage, staging, cleaning, debris removal, shore power, etc.

3.3.1.2 Provide all appropriate permits for entrance into and completion of welding in confined spaces where necessary

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

3.3.1.3 Clean and certify for hot work all adjacent spaces and tanks where necessary

3.3.1.4 Ensure new steel is shot blasted and coated with weldable primer prior to placement onboard

3.3.2 During the completion of hot work, the Contractor must:

3.3.2.1 Supply fire watch while hot work is ongoing, with appropriate class portable fire extinguisher and charged fire hose ready for use

3.3.2.2 Subject work inspection to be coordinated with ABS and CCG personnel

3.3.3 Following the completion of hot work in specific areas of the vessel, the Contractor must:

3.3.3.1 Ensure all welding is 100% visually inspected or as otherwise required by ABS. Aluminum welding must be subject to 100% LPI and steel welding must be subject to 100% MPI. Ensure NDT personnel certified CGSB, Level II or greater for the technique being used. NDT to be completed using Class evaluation standards.

3.3.3.2 Piping system must be pressure tested per ABS requirements.

3.3.3.3 Affected tanks must be pressure tested per ABS requirements.

3.3.3.4 Subject work to final inspections by CCG and ABS

3.3.3.5 Clean affected spaces and remove debris from vessel

3.3.3.6 Clean and apply primer to welded seams and other disturbed areas. Apply internal and external coatings in accordance with original paint scheme or as directed by CCG personnel.

3.3.3.7 Replace furnishings, fittings, fixtures, linings, deck coverings, machinery, etc. that were removed to complete the work.

3.3.3.8 All piping must be flushed and cleaned to potable water standards.

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

Part 4 – Scope of Work

- 4.1** Areas and offsets indicated are approximate and must be confirmed onsite by the Contractor prior to commencement of work, in conjunction with CCG or their designate.

The Contractor is responsible for final piping arrangement and location meeting Owners requirement.

- 4.2** The following work must be completed by the Contractor:

4.2.1 REMOVALS

4.2.1.1 Two existing hot water calorifiers along with their respective control panels are to be removed ashore and disposed of as directed by CCG.

4.2.1.2 Two existing fresh water filling stations located on the forecastel deck to be blanked.

4.2.2 New Central Filling Station and Associated Equipment

4.2.2.1 New single fresh water filling station to be installed on centerline in the forward accommodation bulkhead on the Forecastle Deck, Frame 77. New filling station to include ball valve, cam lock and similar in design to existing, with the following additional equipment located inside the compartment:

- pressure reducing station (rated at 0-5 bar)
- 10 micron particle filter
- metal absorbent filter (similar to as fitted)
- drip tray

4.2.2.2 A drain line to be installed at the low point of the filling station to prevent freezing.

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

4.2.2.3 New filling station to be connected to the existing starboard side fill piping below the forecastle deck, as close to the original fill point as practical.

4.2.2.4 Pipe to be insulated throughout accommodation spaces and where in contact with the shell or where freezing is possible.

4.2.2.5 See Photos 3 & 4 in Appendix A of existing Stbd fresh water filling station and location of new central filling station installation.

4.2.2.6 See Sketch 1 in Appendix B for location of new central filling station.

4.2.2.7 See Sketch 2 in Appendix B for detail of aluminum coupling and gasket through forecastle bulkhead penetration.

4.2.3 New Tankless Water Heaters

4.2.3.1 The Contractor must supply and install a 2 unit – Tankless on Demand Water Heater system, including all piping, electrical and control components required. New units shall be suitable for a maximum complement of 40 persons and be incorporated into existing ship domestic water treatment and distribution system.

See Appendix C for example of typical heater unit.

4.2.4 New Sight Gauge Installation

4.2.4.1 The Contractor to supply and install a new sight gauge on each fresh water storage tank per manufacturers recommendations. Sight gauges to be tubular level type, suitable for potable water in marine application.

Port side sight gauge to use existing tank penetrations at approximately 1900mm off center if practical.

See Appendix B for installation location.

See Appendix C for typical gauge.

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

4.2.5 Transducer, Suction and Sample Point (Port Fresh Water Tank)

4.2.5.1 The Contractor to supply and install new sounding transducer, suction pipe and sample point in port side fresh water tank. Equipment, connections, and piping to be suitable for potable water and be similar to existing in starboard side tank.

See Photo 2 in Appendix A showing existing transducer, suction and sample point.

4.2.6 Overboard Discharge

4.2.6.1 The Contractor to supply and install pipe and fittings for connection of domestic fresh water system to existing overboard concentrate discharge. Existing discharge line is located between frame 78 and 79 on port side, approximately 4900 mm above base. Design of system connections to overboard discharge shall provide ability to use one tank for ship service while draining or otherwise performing maintenance on the other.

See PMC dwg. 21-223-100 R0 Leonard J Cowley – FW System Modification.

4.2.7 Piping

4.2.7.1 New equipment must be installed using existing ship piping where possible. The Contractor is responsible for connection of new piping.

New pipe connections to be:

Location	Size	Approx Length
From existing fill pipe to port tank	50 Ø Sch. 40 (2")	1.0m
Port tank suction to pumps	50 Ø Sch. 40 (2")	3.0m

	CCGS Leonard J Cowley	
Spec Item #: H-67	Specification	F7049-210183
FRESH WATER SYSTEM MODIFICATION		

Between port tank suction pipe and stbd tank suction pipe	50 Ø Sch. 40 (2")	2.0m
From pumps to overboard discharge	12 Ø Sch. 40 (½")	8.0m
From pumps to UV filter	38 Ø Sch. 40 (1 ½")	2.0m
Connection to new tankless water heaters	38 Ø Sch. 40 (1 ½")	4.0m
New central fill station to existing stbd piping	50 Ø Sch. 40 (2")	5.0m

Pipe size and lengths to be verified at vessel prior to fabrication.

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

HD-01 Services..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to supply the listed services to the vessel for the entire refit period. The Contractor must supply all material, equipment and tools to the point of connection on the vessel.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** General Arrangement Drawings

2.2 Standards

- 2.2.1** All connections made to the ship and terminations made must be performed in a manner so as to not cause any hazards or safety concerns to the personnel working onboard.

2.3 Regulations

- 2.3.1** All electrical and plumbing connections to the ship must be in accordance with local and federal regulations, including the Canada Shipping Act and TC Regulations. The Contractor must ensure all connections are secure and that no pollutants are released from the ship.

2.4 Owner Furnished Equipment

- 2.4.1** N/A

Part 3 – Technical Description

3.1 General

- 3.1.1** The following services must be supplied and connected upon arrival at The Contractor's facilities. The services must be maintained throughout the contract period and removed/disconnected from the vessel on completion of the work period. The Contractor is responsible for any additional connections and disconnections required when the ship is moved between the dry-dock and alongside a berth at contractor's premises or when required by Contractor. The

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

cost of services must include all connections, disconnections, consumptions and any interim arrangements required for the duration of the refit.

- 3.1.2** The Contractor must include in the bid, daily rates and /or unit rates for all services supplied to the vessel and for any consumptions during the dry-dock period.
- 3.1.3** Garbage Storage and Removal: One garbage container of 6m³ (215 ft³) minimum capacity must be provided for the ship's use. Garbage container must have a lid capable of being secured when closed to prevent debris from blowing around vessel and yard. The Contractor must remove garbage from the container on a daily basis. Cost of crange and disposal to be included in quotation. The garbage container must be placed in a suitable location onboard as agreed upon by The Contractor and the CG TA. This is for the period while the vessel is crewed and staying onboard. Any garbage generated by the contractor otherwise is to be to their own account
- 3.1.4** Fire Main: Water must be supplied to the vessel's fire main system at a continuous pressure of 4.13 bar (80psi) 24 hours a day. The hose must be connected to the ship's international shore connection immediately following the docking. A pressure reducing station with an isolation valve and pressure gauge must be fitted before the International Shore Connection onboard the ship. A leak off connection must be installed to prevent freezing. The connection is to be such that fully opening any 2 hydrants on the vessel will result in no noticeable decrease in the flow of water. There must be no interruption of this supply until vessel delivery and acceptance. The consumption will be on an as-required basis for firefighting and cleaning purposes. A calibrated flow meter must be connected and must be read by The Contractor at the beginning and end of the contract period, on a weekly basis and as well as before and after any vessel movement in the presence of CG TA. All costs for this during the vessel being in custody of the shipyard must be on the shipyard and included in the bid.
- 3.1.5** Water Supply: Fresh Potable water, including sanitary water supply must be continuously (24 hours per day) supplied to the vessel's fresh water systems at 3.44 bar (50psi). The connections for domestic services, fridge cooling system and filling of tanks must be maintained throughout entire docking period and while secured at the shipyard wharf. A pressure reducing station with isolation valve and pressure gauge must be fitted before the shore connection on board the ship.

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

The Contractor must bid on supplying 10m³ of water per day for 365 days and must be monitored by The Contractor supplied and installed meter on hydrant. The Contractor must supply proof of meter being calibrated within past 3 months to CG TA. Readings will be recorded in Chief Engineers Daily Log Book at beginning of refit prior to turning on water and daily throughout refit period. The Contractor must provide a unit cost per 1 m³ to be adjusted up or down via PSPC 1379 action upon completion of docking. If during the refit period, the vessel is unmanned by crew, then this will be required after arrival of the crew for trials. All costs for this during the vessel being in custody of the shipyard must be on the shipyard and included in the bid.

For all water lines connected and servicing the vessel, The Contractor must be responsible to take all necessary precautions to ensure that the water lines do not freeze during cold weather. The Contractor must repair any damage caused by frozen pipe at their own expense.

The bidder must submit a written bid on a per cubic meter consumption of potable, non-potable and raw/ sea water

3.1.6 Gangways: The Contractor must supply and erect two separate and independent gangways, one forward and one aft, with safety nets and hand rails to the satisfaction of the Commanding Officer and as per compliance with Canada Labour Code. One gangway must be erected from each side of the vessel. One gangway is to be considered as an alternate escape route in case of emergency. Access to both gangways is to be constantly maintained in a safe and secure manner and clear of all obstacles. Both gangways are to be illuminated for use at night. All costs for this during the vessel being in custody of the shipyard must be on the shipyard and included in the bid.

3.1.7 Overboard Discharge: The Contractor must supply labour and materials to connect, for the duration of the dry-docking, the following drainage hoses on the shell in order to protect the hull from leaks while painting:

3.1.7.1 Sewage (Midships Stbd Side) – one 3” sewage discharge.

3.1.7.2 Refrigeration (Midships Stbd Side) – one 3” discharge.

3.1.7.3 Galley Grey Water (Aft Stbd Side) – one 3” grey water discharge.

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

Sewage discharge from the vessel will be intermittent daily. Any onsite holding tanks or disposal charges must be the responsibility of The Contractor. When the vessel is unmanned by crew during the refit, then The Contractor must include the cost for arranging portable toilets of their own. All costs for this during the vessel being in custody of the shipyard must be on the shipyard and included in the bid.

- 3.1.8** Electrical Power: The Contractor must supply manpower and material to connect one electrical shore power cable to the ship's electrical system. Correct phase rotation on the 3-phase system to be established prior to energizing the ship's system. Power required is listed below and must be supplied for the entire refit period. Any changes to the shipyard cable arrangement to accommodate vessel shore power plug arrangements must be included in the bid. A ground cable is to be solidly attached to the ships hull. Any connection/disconnection required for known work to be included in the bid. Actual power consumption to be prorated up or down as per power used, as indicated by vessel's meter. The meter must be read and recorded by the CG TA and The Contractor at the beginning and end of the refit period. The Contractor must provide a unit cost per kWh for adjustment purposes. The Contractor must bid on average 5500 kWh/day . The Contractor must supply separate electrical service for Contractor items in this specification. All costs for this during the vessel being in custody of the shipyard must be on the shipyard and included in the bid.

3.1.8.1 600VAC, 3 Phase at source, stepped down to 460VAC, 3 Phase, 400 Amp through the vessels transformer located in the Emergency Generator Compartment.

- 3.1.9** Cleaning: The Contractor must ensure all spaces, compartments and areas of the ship where work was done are left in an "as clean as found condition" The cost of clean up must be included in each specification item. This cleanup must occur as spaces and compartments are being reassembled and prior to final professional cleaning. At completion of VLE and before seatrials, all accommodation spaces must be professionally cleaned from Lower Deck to the Wheelhouse.

3.1.9.1 The cleaning of the vessel must follow the below stages:

3.1.9.1.1 Daily Cleaning – Cleanup must occur daily at each work site where possible to prevent the accumulation of debris.

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

3.1.9.1.2 Deck Coverings – The Contractor must replace deck coverings as required throughout the duration of the VLE. All deck coverings (unless agreed with CG TA) must be replaced 6 months from date of docking.

3.1.9.1.3 Rough Cleanup – The Contractor must perform a rough clean up of each area upon completion of work. This includes but not limited to removal of all debris, wiping down of all bulkhead/deckhead panels with warm soapy water, shop vacuuming behind any removed bulkhead panels or furnishings, wiping down of any surfaces with warm soapy water and cleaning the decks with mop and cleaning liquid.

3.1.9.1.4 Final Cleanup – The Contractor must arrange for a 3rd party cleaning company to perform a hotel quality cleaning of all areas of the vessel, even if no work performed in this area. This includes mopping and waxing all decks. Food services and storage areas must be cleaned and sanitized in order to pass Health Canada Inspections.

3.1.10 Crane: The Contractor must include in their bid, 75 hours of use for the services of a crane, an operator, and a rigger to load/unload stores. The Contractor must include a total hourly rate for crane, operator and rigger to be used for adjustment purposes via PSPC 1379 action. A record must be kept by The Contractor as proof of usage

3.1.11 Berthing: During the contract period, while not on dock, the vessel is to be secured alongside the contractor's wharf to the satisfaction of the Commanding Officer. All fenders must be Contractor supply

3.1.12 The berth must have a minimum of 5.0m depth of water at all conditions of tide.

3.1.13 The Contractor must include in the bid all costs for initial tying up, any movements of the vessel during the refit, including drydocking, letting go of lines from The Contractors wharf of departure after completion of contract. The Contractor must supply all mooring lines and labour required in mooring, docking, undocking, dock trials and casting off for the vessel. The Contractor may use the vessel's lines to tie up the vessel on arrival, but immediately replace these with their own certified

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

lines and remove the vessel's lines to storage. The Contractor must supply all materials and labour required to move the vessel, including any vessel movements, provision of tugs and all line handling personnel.

3.1.14 Maneuvering of the vessel into and out of The Contractor's docking facilities must be the responsibility of The Contractor. Costs for tugs and pilots required for any movements of the vessel during the contract period are to be included in the bid price quoted on, but shown separately. The Crown must have unrestricted access to the vessel at all times.

3.1.15 One gangway is required while alongside The Contractor's jetty. It is to be rigged as directed by vessel's Commanding Officer, complete with safety net. This gangway is to be safe, well-lit and structurally sufficient to support passage of The Contractor's workers and ships' crew.

3.1.16 Oily Bilge Water: The Contractor must bid on removing from the vessel approximately 15 cubic metres of 80/20 % water/oil mixture. The bid is to include craneage, pumping, trucking and disposal of waste mixture. The Contractor must provide documents identifying the licensed firms subcontracted for pumping and disposal of waste oil. The quantities in this item are for the vessel's requirements and are not to be included with Contractor requirements for completion of items in this specification. The Contractor must provide a unit cost per 1m³ to be adjusted up or down via PSPC 1379 action.

3.1.17 Parking: The Contractor must provide 5 parking spaces for ship's personnel and 1 parking space for CG TA for the duration of the contract.

3.1.18 Dock and Sea Trials:

3.1.18.1 On completion of all specification items, dock trials and sea trials must be carried out as a functional test of the ships propulsion system and maneuvering systems. CG will provide all required crew and fuel for trials.

3.1.18.2 The Contractor must include in bid, the cost of having all necessary FSR's on board for 24 hours of dock trials. Any amount above or below this to be adjusted by PSPC 1379 action based on invoice.

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

- 3.1.18.3** The Contractor must include in bid, the cost of having all necessary FSR's onboard for 24 hours of sea trials. Any amount above or below this to be adjusted by PSPC 1379 action based on invoice.
- 3.1.18.4** Trials will include ahead and astern movements at various power levels.
- 3.1.18.5** Trials will be carried out to the satisfaction of the CG TA and ABS Class Surveyor.
- 3.1.18.6** The Contractor must have sufficient supervisory staff on board during these trials to witness the operation of machinery and systems that were worked on during the refit.

3.1.19 The Contractor must bid on taking 1000 UT shots and provide a unit cost per UT shot for adjustment purposed via PSPC 1379 action. This cost must include taking the UT Shot, prepping the steel for the UT Shot, priming disturbed steel upon completion of shot and any materials used/required including person lift and operator.

3.1.20 The Contractor must provide labor and equipment to erect, as necessary, scaffolding/staging/person lift and temporary lighting to facilitate inspection by the CG TA and ABS Class Surveyor for any items in this specification. The scaffolding/staging/person lift and temporary lighting must be removed when work is complete.

3.1.21 Prior to any work commencing, The Contractor must supply, install and secure temporary internal deck covering (fibreboard or Masonite) in all passageways, stairways, control room and wheelhouse deck. Area is approx. 250 m². The Contractor must provide a unit cost per m² for adjustment purposes via PSPC 1379 action. The Contractor will be responsible for maintaining the protective covering in an acceptable condition and repairing any deficiencies as directed by the CG TA. The Contractor will replace, at The Contractor's expense, any decks, including carpeting, damaged due to deficiencies in the temporary protective coating. The Contractor must remove and dispose of the protective covering when directed by the CG TA at the end of the refit.

3.1.22 The Contractor must bid on performing 400 machining hours at a blended rate for all shop equipment, including but not limited to milling machines, lathes,

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

overhead cranes, etc. Amount of hours used to be adjusted up/down via PSPC 1379 action as required.

3.1.23 The Contractor must bid an allowance of \$35,000 for the use of a Professional Engineering Firm for work arising throughout the duration of the refit. Actual amount to be adjusted by 1379 action based on invoice.

3.1.24 The Contractor must be capable of providing at their premises or offsite, rigid, dry and heated (temperature and humidity control) storage for the duration of the refit period as per below. The stored items to be kept at a minimum height of 1 metre above the ground to avoid any damage due to water ingress.

3.1.24.1 Minimum 2000 sqft of storage to be used for holding new equipment to be installed, and/or temporary removed interference items.

3.1.24.2 Minimum 3 000 sqft of storage space must be provided for storage of removed shipboard items by ships crew during demobilization. This is to include but not limited to books, linens, mattresses, electronics, manuals, galley equipment, tools, mooring lines, safety equipment, etc. This storage must be in a locked, secured area with controlled/monitored access and temperature heated to a minimum of 15 degrees C. The ships crew will be responsible for boxing/unboxing onboard. The Contractor must provide labour and transportation of items from the vessel to storage facility and return when required. The Contractor must bid on providing labour for 100 hours to be used to locate items in storage at the request of the CG TA. These hours to be adjusted up or down via PSPC 1379 action based on invoice.

3.1.25 The Contractor must prevent rat and vermin harborage onboard the vessel during the duration of the contract (as the vessel will be unmanned and under the control of The Contractor). It is the responsibility of The Contractor to remove any rats or vermin (and traces) from onboard the vessel if they do come onboard during the contract period

3.1.26 **As the vessel will be unmanned** and under the control of The Contractor (except until the handover and commissioning and sea trial period), the arrangements for the security of the vessel must be provided by the contractor. Security rounds must be conducted at minimum every 4 hours during quiet hours 7 days a week including holidays for the duration of the contract. The Contractor provided

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

Security log books must be placed on the Bridge, Forward, Engine Room and Steering compartment are to be signed during every set of rounds. This must include provisions to prevent damage to the vessel due to wind and wave action, tides, flooding, fire, and ambient conditions. Costs for this to be included in the bid. Damage incurred to the vessel as a result of The Contractor's failure to meet these requirements will have to be repaired at The Contractor's own expense.

3.1.27 If required, The Contractor must supply the heating as required onboard and around the vessel to facilitate specified work. The Contractor must maintain the temperature between 17 and 25 degree Celsius inside the Vessel's accommodations and work areas.

3.1.28 As the vessel will be unmanned and under the control of The Contractor (except until the handover and the commissioning and sea trial period), a temperature controlled office with washroom (to be maintained by The Contractor) for Government personnel must also be provided (to include 2 lockable offices, meeting room, furnishing including desk, chairs, bookcases, telephones, high speed internet, photocopier etc). More details are given in Section 40 of General Notes. Costs for this to be included in the bid.

3.1.29 The Contractor must, with the CG TA, carry out an operational inspection of the vessel (As Delivered Inspection) as the vessel is to be unmanned and under the control of The Contractor during the refit. All parties must sign off on the operational assessment of vessel's equipment and systems. This activity must be carried out before hand-over of the vessel to The Contractor. The Contractor must provide a photographic survey, with notes of any defects of the inspection to the CG TA. A similar inspection to be carried out before the handover of the vessel back to the owner and the CCG TA to sign the acceptance.

3.2 Location

3.2.1 N/A

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

	CCGS Leonard J Cowley	
Spec Item #: HD-01	Specification	F7049-210183
SERVICES		

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 The Contractor must deliver two (2) digital copy of all photos taken during As Delivered Inspection to the CG TA and CG CE within 14 days of Inspection.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-02	Specification	F7049-210183
DRY DOCKING		

HD-02 Dry-Docking..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to dry dock the vessel at its facility.
- 1.2** The vessel must be docked and undocked with the necessary days required to carry out the specified work with reasonable time allowance to deal with any new work arising, as determined by PSPC.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Docking Plan - #590-06 Rev.2

2.1.2	Length O.A.	72.0 m
	Length B.P.	67.0 m
	Breadth Overall	14.0 m
	Depth Moulded	4.9 m
	Mean Draft, Extreme	4.3 m
	Displacement, Extreme	2087 tonnes
	Displacement, Docking	1495 tonnes

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 See General Notes

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

	CCGS Leonard J Cowley	
Spec Item #: HD-02	Specification	F7049-210183
DRY DOCKING		

3.1 General

- 3.1.1** If the ship will not be docked on the first day of the contract period, The Contractor must state this in the bid package, and include in the project schedule.
- 3.1.2** The vessel is not to be docked with any other ship for any part of the contract period in such a way that will interfere with its scheduled refloating. Once set on the blocks in the drydock, The Contractor must ensure that the vessel will not be moved from its location in the drydock until all the underwater work is completed and accepted.
- 3.1.3** A Guidance Docking Plan is available on board the vessel and will be provided to the successful Contractor along with the stability booklet. The Contractor will be responsible to ensure drawings are returned to the vessel upon completion of work. The Contractor is responsible for recording all tank soundings, draft, trim and list of the vessel, and performing the necessary stability calculations for the successful docking of the vessel. These calculations must be forwarded to the CG TA and the Inspection Authority for review 48 hours prior to docking the vessel
- 3.1.4** The Contractor must perform full set of crankshaft deflections for both Main Engines as outlined in item H-12 prior to docking and again within twenty-four hours of undocking.
- 3.1.5** The Contractor must prepare blocks and necessary shoring to maintain true alignment of the vessel's hull and machinery throughout the dry-docking period. The Contractor must dock and undock the vessel and allow sufficient lay days to complete both the work described in this specification as well as a margin of time to cover work arising.
 - 3.1.5.1** The Contractor must give a minimum of 24 hours notice for the CG TA to inspect blocking to ensure correct size, location, no damage and no signs of rotten wood blocks.
- 3.1.6** The vessel must be docked so that all docking plugs, transducers, anodes and sea inlet grids are clear and accessible. A minimum clearance of 1.22 meters (4') must be available below the keel. If any hull fittings are covered, The Contractor is responsible for all labour and materials required for making alternative arrangements to drain tanks or move blocks to gain access to areas of specified work. Blocks must be set under frames and not between. Any damage as a result

	CCGS Leonard J Cowley	
Spec Item #: HD-02	Specification	F7049-210183
DRY DOCKING		

of blocks not set properly is the responsibility of The Contractor and must be repaired back to original at The Contractor's own expense.

3.1.6.1 The Contractor must ensure there is a minimum of 21 meters of unobstructed dock space immediately aft of the propulsion hub to allow for removal of tailshaft. For marine railway operations, this distance must be from the historical high water or winter ice mark for the past 5 years. See also Section 2.6 of General Notes

3.1.7 During docking of the vessel, radio contact must be maintained between the vessel's Commanding Officer and The Contractor's Docking Officer. The Contractors are to include, but show separately, the price of any tug and/or pilot services required. The contractor is responsible for all handling of ships lines during docking and undocking. The Contractor must have a diving company present to assist with lining up the vessel on the blocks. The Contractor must provide a ground cable between the vessel and the dock during the complete period while the vessel is docked, as per ABS Ship Safety Bulletin 6/89.

3.1.8 Within two hours of docking, the underwater hull must be cleaned by high-pressure fresh water washing 420 bar (~6000psi) minimum to remove all marine growth and allow preliminary inspection. The hull above the water line must also be water blasted clean at this time. Total area is approx 1988 square meters. All hull mounted equipment and openings to be protected before hydroblasting is started.

3.1.9 The following information must be recorded in a Ship Condition Report that must be prepared by the Contractor with a typeface copy provided to the CG TA:

3.1.9.1 Prior to docking, all tanks on vessel to be sounded and contents recorded by The Contractor and witnessed by ship's crew. A copy of the Tank Condition Report is to be signed by the Commanding Officer, Chief Engineer and Contractor's Docking Officer.

3.1.9.2 After docking, all tanks emptied to be listed, and copies held by The Contractor and Chief Engineer.

3.1.9.3 At undocking, all tanks to be refilled to obtain same draft and trim as at docking, and condition agreed by The Contractor and CG TA or his representative.

	CCGS Leonard J Cowley	
Spec Item #: HD-02	Specification	F7049-210183
DRY DOCKING		

- 3.1.10** The Contractor must remove or relocate any items (spare tail shafts, propellers, etc.) stored on deck, prior to docking or undocking, that will aid in obtaining the required draft and trim for settling on the docking blocks. All items are to be secured in original locations after vessel has been undocked.
- 3.1.11** Immediately after hydro-blasting, but prior to any grit blasting of the underwater hull coating, The Contractor must mark the frame spacing at 5 frame intervals from the stern post (Fr"0") to aid in the initial hull survey by the CG TA and ABS Class Surveyor. Markings must be a contrasting colour, approx. 6" in height, and are to be at the turn of the bilge, port and stbd.
- 3.1.12** Hydrostatic testing of tanks while vessel is on dock shall be carried out in a manner to ensure excess strain shall not ensue. If hydrostatic testing of deep tanks is required, additional blocking must be fitted.
- 3.1.13** A complete record must be kept by The Contractor of any weight movements, which take place during the dry-docking period. The CG TA must be informed of any adjustments of weights made by the Contractor to the ships docking condition.
- 3.1.14** All underwater valves must be shut and secured prior to undocking and checked for water-tightness during the undocking period by The Contractor.
- 3.1.15** Prior to flooding the dock The Contractor must re-check the security of keel/bilge blocks and docking plugs in the presence of the CG TA. The condition of the vessel must be the same at undocking as at the time of docking.
- 3.1.16** The Contractor is responsible for the safe undocking of the vessel taking into consideration the stability changes, if any, resulting from the work of these specifications. The Contractor must perform the necessary stability calculations for undocking of the vessel. These calculations must be forwarded to the CG TA for review 48 hours prior to flooding the dry dock.
- 3.1.17** The Contractor must remove the aft shaft seal rope guard for sterntube seal inspection and weld it back on as per ABS classification rules after completion of all work in this specification.
- 3.1.18** The Contractor must remove the main port and stbd seachest grids and the forward seachest grid port side. The Contractor must re-install all grids and lock

	CCGS Leonard J Cowley	
Spec Item #: HD-02	Specification	F7049-210183
DRY DOCKING		

up the screws as per ABS classification rules. The Contractor must bid on replacing 24 stainless steel bolts for sea grid's and provide unit costing to adjusted up or down by PSPC 1379 action.

3.1.19 The Contractor must ensure the four permanent hull anodes are covered with soft soap after docking. There are two anodes either side of the hull just aft of midships below the waterline.

3.2 Location

3.2.1 N/A

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

	CCGS Leonard J Cowley	
Spec Item #: HD-02	Specification	F7049-210183
DRY DOCKING		

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-03	Specification	F7049-210183
BUTTS AND SEAMS		

HD-03 Butts and Seams..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to ensure that all butts and seams are inspected and repairs made as determined by the CG TA and ABS Class Surveyor.
- 1.2** This work must be carried out in Conjunction with the following:
 - 1.2.1** HD-09 Underwater Hull Coating
 - 1.2.2** HD-10 Above Waterline Hull and Inside Bulwarks Painting
 - 1.2.3** HD-11 Underwater Hull Survey

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** 590-70 General Arrangement
- 2.1.2** 590-04 Profile and Deck
- 2.1.3** 590-01 Shell Expansion
- 2.1.4** 590-18 Stringer Plan

2.2 Standards

- 2.2.1** See General Notes

2.3 Regulations

- 2.3.1** See General Notes

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.
- 2.4.2** The Contractor must provide to the CG TA copies of all Material Specification Sheets and Material Safety Data Sheets for all Contractor Furnished Materials. This includes welding consumables.

	CCGS Leonard J Cowley	
Spec Item #: HD-03	Specification	F7049-210183
BUTTS AND SEAMS		

Part 3 – Technical Description

3.1 General

- 3.1.1** Subsequent to an examination of the external hull by the CG TA and ABS Class Surveyor (The Contractor must obtain the services of the ABS Class Surveyor), The Contractor must identify and designate areas of wasted butts and seams on shell plating. These to be ground and air arc gouged to good metal and built up to original level by ABS approved welding techniques and materials. The Contractor must use welding rods suitable for use with Grade “A” steel. All welding and work to be to the guidelines of CCG and TC/ ABS, and approval of the CG TA and ABS Class Surveyor. The Contractor must gas-free, certify and maintain safe for hot work any tanks that will be affected by welding on the hull and provide fire watch inside any other spaces affected by welding on the hull.
- 3.1.2** The Contractor must bid on seven hundred (800) linear feet of arcing and thirty two hundred (3200) bead feet of weld. The Contractor must bid a unit cost for arcing per foot and bead weld per foot using 3/16” low hydrogen rods (for adjustment purposes via PSPC 1379 action). The Contractor to assume welding will be at water line and include cost of staging or person lift in total bid.
- 3.1.3** The Contractor must bid for 6 non-destructive tests (x-Rays) to be carried out on welds. The Contractor must provide a unit cost per non-destructive test (x-Rays) to be used for adjustment purposes via PSPC 1379 action.
- 3.1.4** Any failed welds as a result of the x-Ray must be gouged out and re welded at the expense of The Contractor. The Contractor must also have the welds retested (x-ray) at The Contractors expense.
- 3.1.5** The Contractor must bid the services of a person lift and operator for 8 hours for survey. The Contractor must provide a unit cost per hour for person lift and operator for adjustment purposes via PSPC 1379 action.
- 3.1.6** Any butts and seams falling in way of fuel tanks that require gas freeing and certification will be covered by PSPC 1379 action or existing known work. Butts and seams failing in way of ballast/void tanks that are painted will require paint work to be touched up in way of damage and will be covered by PSPC 1379 action or existing known work.

	CCGS Leonard J Cowley	
Spec Item #: HD-03	Specification	F7049-210183
BUTTS AND SEAMS		

3.2 Location

3.2.1 External Hull

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor. The Contractor must present the prepared weld points to the CG TA and Inspection Authority before welding commences and present the completed welding to CG TA and ABS Class Surveyor for acceptance. The Contractor must notify the CG TA and ABS Class Surveyor 24 hours of advance of all visual examinations. The Contractor must notify CG TA of any weld deficiencies within 24 hours of completing the weld inspections.

4.1.2 100% visual must be carried out by CG TA and/or ABS Class Surveyor.

4.2 Testing

4.2.1 The welding must be tested by way of x-ray inspection in areas identified by the CG TA and ABS Class Surveyor and to be approved by them.

4.3 Certification

4.3.1 The Contractor must obtain an ABS My Eagle credit for the Hull Inspection

4.3.2 Welders and welding supervisors must be qualified by CWB to CSA Standard 47.1 for the Mode and Class of weld being used

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must

	CCGS Leonard J Cowley	
Spec Item #: HD-03	Specification	F7049-210183
BUTTS AND SEAMS		

deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 The Contractor must submit a final report to the ABS Class Surveyor including the Welding Procedure Specification stamped and approved by a qualified welding engineer, CWB approved welding procedure data sheets, and the final visual reports, for acceptance

5.1.3 The Contractor must provide the CG TA with a copy of the report submitted to ABS, including a letter from the ABS Class Surveyor stating that the repair work has been accepted by ABS as satisfactory

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-04	Specification	F7049-210183
CATHODIC PROTECTION, HULL IMPRESSED CURRENT SYSTEM		

HD-04 Cathodic Protection, Hull Impressed Current System..

Part 1 – Scope:

- 1.1** The intent of this specification is to provide the necessary parts/components and work to update, repair, test and reactivate the impressed current hull corrosion protection (ICCP) system.
- 1.2** The Contractor must remove spent sacrificial anodes and supply/fit new ones in their place.
- 1.3** All work must be to the satisfaction of the CG TA and ABS Class Surveyor.

Part 2 - References:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Drawing and manuals:

2.1.1.1 590-96 Docking Plan

2.1.1.2 Anode MPE Cathodic C 12300 as modified

2.1.1.3 Reference electrode MPE Cathodic C 12350

2.1.1.4 Cowley ICCP 2014

2.1.1.5 The installation drawings for ICCP anodes and reference electrodes, ship's electrical drawings and the instruction manual for Cathelco power/control unit will be available on board.

2.1.2 Equipment data:

2.1.2.1 The ICCP system consists of a "Cathelco" thyristor controlled power/control panel, 460/3/60 input, 150 A output at 24VDC , dwg. No. C1614, four anodes, and two reference electrodes. The panel is located in the main machinery space. Shaft grounding brush gear is fitted at fr.27 on the intermediate propeller shaft, the gear consists of grounding brushes and a potential brush connected to a millivolt meter at the control panel. The anodes and reference electrodes are to be renewed, see sec. 3.1.2

	CCGS Leonard J Cowley	
Spec Item #: HD-04	Specification	F7049-210183
CATHODIC PROTECTION, HULL IMPRESSED CURRENT SYSTEM		

2.2 Standards

2.2.1 See General Notes

2.2.2 Transport Canada TP127

2.3 Regulations

2.3.1 See General Notes

2.3.2 Lloyd's Rules

2.3.3 Local Provincial regulations

2.3.4 Transport Canada TP127

2.4 Contractor Furnished Equipment

2.4.1 To supply all material and labour as detailed the technical specification.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must engage the services of a Cathelco FSR to oversee the work listed.

3.1.1.1 The Contractor must contact the CG CE prior to commencement of work to carry out the lockout procedure to isolate all power supplies to the system.

3.1.1.2 The Contractor must include in their bid an allowance of \$35,000.00 to be adjusted on proof of invoice by PSPC 1379 action for the travel and labor costs of FSR.

3.1.2 Prior to entry into any tank or confined space, tank or space is to be certified "Safe for Workers" or "Safe for Hot Work" as required by Transport Canada Marine Safety TP3177E. Certificates to be given to CG TA and copies posted by the tank manhole and gangway.

3.1.3 The Contractor must supply and install four new anodes and two new reference electrodes from MPE Cathodic AS, Moss, Norway, www.mpecathodic.no, in

	CCGS Leonard J Cowley	
Spec Item #: HD-04	Specification	F7049-210183
CATHODIC PROTECTION, HULL IMPRESSED CURRENT SYSTEM		

accordance with the supplied drawings. Cofferdams for anodes and reference electrodes must be supplied with material certificates. The new reference electrodes require smaller shell openings, and The Contractor must make and fit compensating rings per the drawing supplied with this specification.

- 3.1.4** After installation of new anodes and reference electrodes with cofferdams, all cables must be connected in the cofferdams. The cofferdams must then be packed with Vaseline and secured watertight. Prior to reconnecting at the panel, the FSR must complete resistance and potential tests before and after refloating the vessel.
- 3.1.5** The Contractor must supply and install new shaft grounding brush gear, except for the slipring, which is in good condition. It must consist of a double brush holder for grounding and a single holder for potential pick-up, complete with three silver graphite 20 X 10 mm brushes. The brush holders must be insulated from the mounting posts. Approved suppliers include MPE Cathodic and Jastram Technologies. The cable from the brush gear to the millivolt meter and the grounding cable must be renewed.
- 3.1.6** The rudder stock grounding cable must be supplied by Contractor and replaced.
- 3.1.7** For remediation of paint and dielectric shields after installation of new anodes and ref. electrodes, please refer to HD-09 Underwater Hull Coatings.
- 3.1.8** During undocking of the vessel The Contractor with CG TA in attendance must check for leaks and The Contractor must make repairs prior to vessel floating off the keel blocks.
- 3.1.9** After refloating the vessel, power must be restored to the ICCP panel, and the FSR must reconnect the anode and ref. electrode cables and do a full system test assisted by the contractor.
- 3.1.10** New zinc sacrificial anodes (8 in number EFL Z-26 or equal, see docking plan) must be supplied and fitted in the seachests and thruster tunnel, and on the rudder after removing the spent ones. One anode EFL Z-12 or equal must be fitted in each structural cell of the SW cross bay (double bottom frs. 42-44, 14 in number). Anodes shall meet MILSPEC A18001

3.2 Location

	CCGS Leonard J Cowley	
Spec Item #: HD-04	Specification	F7049-210183
CATHODIC PROTECTION, HULL IMPRESSED CURRENT SYSTEM		

3.2.1 ICCP Anode locations:

3.2.1.1 Frame 31 ½ Port

3.2.1.2 Frame 31 ½ Stbd

3.2.1.3 Frame 39 ½ Port

3.2.1.4 Frame 39 ½ stbd

3.2.2 ICCP reference electrode Locations;

3.2.2.1 Frame 19 ½ Port

3.2.2.2 Frame 76 ½ stbd

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

3.3.2 The Contractor must ensure safe access including gas free certification where necessary.

Part 4 – Proof of Performance:

4.1 Inspection

4.1.1 The Contractor must assist CCG and its representatives to inspect the work after completion In particular the hull anodes (ICCP and sacrificial) and reference electrodes must be clean and free of overspray before the vessel is refloated. See section HD-09 Underwater Hull Painting for hull paint and dielectric shields.

4.1.2 All work must be completed to the satisfaction of the CG TA, ABS Class Surveyor and FSR.

4.2 Testing

4.2.2 The FSR must carry out a full system check on the ICCP system after the vessel has been refloated. One shipyard electrician should be available to assist. It is preferable that the vessel be on own power for this test.

4.3 Certification

	CCGS Leonard J Cowley	
Spec Item #: HD-04	Specification	F7049-210183
CATHODIC PROTECTION, HULL IMPRESSED CURRENT SYSTEM		

- 4.3.1** The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

- 5.2.1** N/A

5.3 Training

- 5.3.1** N/A

5.4 Manuals

- 5.4.1** N/A

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

HD-05 SW Cooling Anti-Fouling System..

Part 1 – Scope:

- 1.1** The intent of this specification is for The Contractor to remove the existing wasted 16 anodes in all 3 sea chests and the main sea bay and install new Contractor supplied anodes.
- 1.2** New anodes must be installed and resistance readings taken and recorded on all the new anodes prior to connection and again after all anodes are connected to the system electrically.
- 1.3** Sea bays and sea chests must be cleaned and then examined by the attending ABS Class Surveyor. All sea water piping suction tail pieces in the sea chests and main sea bay must be cleaned internally to remove deposits restricting flow. There are also four sacrificial anodes that must be removed and replaced with new in the main sea bay which are welded to the tank floors.

Part 2 – References:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Drawing, instruction book, tech. Order:

2.1.1.1 Drawing 590-96 Docking Plan

2.1.1.2 Cathelco System / Sea boxes and Sea Bay Electrolytic Protection” Drawing # ECMS-05-04-01 and 02

2.1.1.3 The drawing, installation and parts manual are on board the vessel and will be made available to the Contractor.

2.1.1.4 Drawing Cowley A/F 2014

2.1.1.5 Anode Installation

2.1.1.6 The system controller is fed from panel L10 Breaker 21/23, 115 V.A.C. 1 Phase

2.1.2 Equipment data: The Anti Fouling system consists of a modular power/control panel by Cathelco Ltd located in the main machinery space, 120/1/60 input, 8 dual control modules. Each of 16 controls is adjustable from 0 to 2 amps DC. The panel

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

was fitted in 2003. There are 16 expendable anodes, 6 copper, 6 aluminum, and 4 iron, located in the seachests and the cross bay.

2.1 Standards

2.2.1 See General Notes

2.2 Regulations

2.2.1 Transport Canada TP127,

2.2.2 Lloyds Rules,

2.2.3 Local safety regulations applicable to the shipyard

2.3 Owner Furnished Equipment

2.3.1 The Contractor must provide 16 anodes for this specification item and all other materials required to complete this spec. The Contractor must also supply the 4 x Z-26 sacrificial anodes.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must engage the services of a Cathelco FSR to oversee the work listed.

3.1.1.1 The Contractor must include in their bid an allowance of \$25,000.00 to be adjusted on proof of invoice by PSPC 1379 action for the FSR travel and labor.

3.1.2 The Contractor must contact the CG CE prior to commencement of work to carry out the lockout procedure to isolate all power supplies to the system.

3.1.3 Hull External Sea Chest grids (Port & Stbd) – each sea chest grid has 10 x M20 x 90mm long counter sunk stainless steel screws, nuts are welded to the back of 100 x 65 x 12.50mm flat bar lugs. Length of screws is not denoted on the drawing. The screws are locked by spot weld. The Contractor must bid on replacing 5 with new and provide a unit cost for adjustment purposes via PSPC 1379 action.

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

- 3.1.4** The Contractor must remove all manhole covers and sea chest grids to gain access to the anodes. The Contractor must remove all of the 16 antifouling system anodes regardless of their degree of consumption, and clean the safety caps and the plating in way of their installation. (all originally fitted anodes must be given to the CG CE upon removal). Badly corroded or damaged safety caps must be replaced with new ones. The distribution box under the control panel, the existing cables to the anodes and ground return junction boxes must be removed and deposited of as scrap. All disposals carried out by The Contractor must be per provincial environmental regulations.
- 3.1.5** Prior to entry, tank is to be certified "Safe for Workers" or "Safe for Hot Work" as required by Transport Canada Marine Safety TP3177E. Certificates to be given to Chief Engineer and copies posted by the tank manhole and gangway.
- 3.1.6** The Contractor must supply and install 16 new anodes complete with mounting hardware in accordance with the drawings. The Contractor must also supply six (6) spare old type safety caps, from EMCS Industries Ltd., 2066 Henry Ave. West, Sidney BC V8L 5Y1, email emcsLtd@ramsaygroup.com. The mounting hardware must suit the old type safety caps.
- 3.1.7** Before fitting the anodes, The Contractor must make suitable fittings and pressure test the eight (8) safety caps with conduit extensions through the Port and Stbd Double Bottoms at the main sea chests.
- 3.1.8** New cabling must be supplied and installed by The Contractor. All new cables must be marine approved armoured single conductor No.14 AWG. Alternatives will be considered if single conductor is not readily available. There are 16 anode cables and 4 ground cables. The Contractor must bid on supplying and installing 300 meters of cable. The Contractor must provide a unit cost per meter to supply and install new cable. Actual amount required to be adjusted via PSPC 1379 action. All cables must be fitted with straight crimp-on ends to fit the terminal block in the panel, and stake-ons to suit the tail cables on the anodes. Any defective glands on the safety caps must be replaced. The cables for the fire pump sea chest must use the same bulkhead transits as the replaced cables. Any damaged blocking must be replaced via PSPC 1379 action.
- 3.1.9** The anodes must be installed with 90-100 lbs. ft torque and the cables reconnected. The safety caps in the main sea chests P & S must be filled with

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

Vaseline and the covers fitted with new 'O' rings. The remaining safety cap covers or conduit glands must be left off until the trial float-off of the vessel and inspected for leaks. When proven tight, the caps must be filled with Vaseline and the covers replaced with new "O" rings as necessary.

3.1.10 Before connecting the cables at the panel, the FSR must check the resistance and potential.

3.1.11 After refloating the vessel, the power must be restored to the panel and the FSR must reconnect the anode and ref. electrode cables and do a full system test assisted by The Contractor.

3.1.12 The Contractor must remove any loose scale deposits in the sea bay and sea chests and dispose of as per provincial regulations. The Contractor must not scrape any scale from the sea bay internals, the scale acts as a protective coating

3.1.13 After all internal cleaning is completed The Contractor must arrange to have the main sea bay and all three sea chests inspected internally by ABS Class Surveyor.

3.1.14 The Contractor must install the new marine growth (M.G.), trap corrosion (T.C.) and cast iron anodes as per the FSR's instructions and location drawing. The four cast iron anodes are referenced on the drawing EMCS-05-04-01 as follows: 13-TC8 / 14-TC9 / 15-TC10 / 16-TC14. The Contractor must use all new gaskets and fittings. Resistance values must be taken and recorded on all of the new anodes prior to and after installation. The anode safety caps must be fitted with new seals.

3.1.15 The Contractor must clean internal piping of all sea suction tail pieces within the main sea bay. There are a total of 12 suction tail pieces as per the table below:

Number	Description	Diameter (mm)
CW-11	Port S/S Generator	65
CW-13	Air Compressors	38
CW-14	Port Main Engine	150
CW-15	Refrigeration	38
CW-16	Stbd. Main Engine	150

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

CW-17	Stbd generator	65
CW-18	Harbour Generator	65
B-16	Main Fire pump	100
B-17	General Service pump	100
B-36	Bilge Pump	100
No #	Reverse Osmosis Pump	38
No #	Emergency Fire pump fwd sea chest	100

3.1.16 The Contractor must replace and secure all manhole covers with new gaskets and the manhole cover studs must be wire brushed cleaned and coated with an anti-seize compound.

3.1.17 The Contractor must install and secure the 3 sea chest grids, the screws on the sea chest grids must be torqued up and spot welded. The welds must be ground flush to hull's profile. After installation the grids must be primed and coated as per the detail outlined in the Underwater Hull Painting spec.

3.1.18 During undocking of the vessel The Contractor with CG CE in attendance must check for leaks and The Contractor must make repairs prior to vessel floating off the keel blocks.

3.2 Location

Anode Location(s):

Forward emergency fire pump sea chest	Fr.80-82	(4 anodes)
Main Sea Bay	Fr.42-44	(4 anodes)
Port & Stbd sea chests	Fr.42-44	(4 anodes per chest)
Total of 16 Anodes		

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

3.3.2 The Contractor must ensure safe access including gas free certification where necessary.

Part 4 – Proof of Performance:

4.1 Inspection

4.1.1 The Contractor must assist CCG and its representatives to inspect the work after completion. In particular the hull anodes (ICCP and sacrificial) and reference electrodes must be clean and free of overspray before the vessel is refloated. See section HD-09 Underwater Hull Painting for hull paint and dielectric shields.

4.1.2 All work must be completed to the satisfaction of the CG TA, ABS Class Surveyor and FSR.

4.2 Testing

4.2.2 The FSR must carry out a full system check on the ICCP system after the vessel has been refloated. One shipyard electrician should be available to assist. It is preferable that the vessel be on own power for this test.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

	CCGS Leonard J Cowley	
Spec Item #: HD05	Specification	F7049-210183
SW COOLING ANTI-FOULING SYSTEM		

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-06	Specification	F7049-210183
SACRIFICIAL ANODES		

HD-06 Sacrificial Anodes..

Part 1 – Scope:

- 1.1** The intent of this specification is to renew the two anodes; one each on attached port and stbd midships just under the bilge keels and the four outside Bowthruster tunnel; two on each side. Anodes are welded to the hull.

Part 2 – References:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Refer to docking plan 590-96 for anodes placement /location details.

2.2 Standard

- 2.2.1** N/A

2.3 Regulations

- 2.3.1** N/A

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must remove wasted hull anodes located outside the Bow Thruster Tunnel and midships under bilge keels port and stbd side of vessel. The Contractor must grind off existing brackets flush to hull and install new anodes outside tunnel and touch up hull coating.
- 3.1.2** All materials must be Contractor supplied. The Contractor must dispose of wasted anodes as per Provincial environmental regulations.
- 3.1.3** The Contractor must schedule this work prior to the hull painting to ensure the bare metal is primed and coated along with the rest of the hull.

	CCGS Leonard J Cowley	
Spec Item #: HD-06	Specification	F7049-210183
SACRIFICIAL ANODES		

3.1.4 All work must be completed to the satisfaction of the CG TA.

3.2 Location

3.2.1 Four anodes outside bowthruster tunnel two anodes on each side and two attached port and stbd midships just under the bilge keels one on each side.

3.3 Interferences

3.3.1 N/A

Part 4 – Proof of Performance:

4.1 Inspection

4.1.1 100% visual by Chief Engineer

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 N/A

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-07	Specification	F7049-210183
BILGE KEEL INSPECTION		

HD-07 Bilge Keel Inspection..

Part 1 – Scope:

- 1.1** The intent of this specification is for The Contractor to carry out a hydrostatic test on the Port and Stbd bilge keels.
- 1.2** The Contractor must note that if welding repairs are required on the bilge keels that fuel oil tanks in adjacent areas must be gas freed prior to commencement of any hot work.

Part 2 – References:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Drawing #87536-Rev 1

2.2 Standards

- 2.2.1** N/A

2.3 Regulations

- 2.3.1** N/A

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all labour, materials, equipment and parts required to perform the specified work unless stated otherwise.

Part 3 – Technical Description:

3.1 General

- 3.1.1** The Contractor must remove the drain plugs from both bilge keels. The Contractor must perform a hydrostatic test on each to a head pressure of 2.45 meters for 30 minutes. All pressure testing must be witnessed by CG TA and ABS Class Surveyor.
- 3.1.2** The Contractor must replace plugs with thread sealant and secure them as per approved method to ABS Classification rules after completion of the work in this specification.

	CCGS Leonard J Cowley	
Spec Item #: HD-07	Specification	F7049-210183
BILGE KEEL INSPECTION		

3.1.3 The Contractor must bid on 20 meters of preparing, gouging and welding, and painting, and provide a unit cost per meter for adjustment purpose via PSPC 1379 action.

3.2 Location

3.2.1 Port and Stbd external bilge keels (Frame No's 26-68)

3.3 Interferences

3.3.1 N/A

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 100% visual inspection by CG TA and ABS Class Surveyor

4.2 Testing

4.2.1 100% Magnetic Particle Inspection (MPI)

4.3 Certification

4.3.1 Welding in accordance with CSA W47.1 and W59

4.3.2 ABS and any other certificates as required

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 N/A

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

	CCGS Leonard J Cowley	
Spec Item #: HD-07	Specification	F7049-210183
BILGE KEEL INSPECTION		

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-08	Specification	F7049-210183
STEERING GEAR BILGE CLEANING AND COATING		

HD-08 Steering Gear Bilge Cleaning and Coating..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to provide the necessary services and equipment to clean, prepare and paint the steering gear bilge area.

Part 2 - Reference

2.1 Guidance Drawings/Nameplate Data

2.1.1	Structural Sections, AFT – FR 20	590-02
2.1.2	Transverse Bulkheads, FR 5 – 52	590-05
2.1.3	Skeg Structure and Sternframe	590-08
2.1.4	Shell Expansion	590-01
2.1.5	Capacity Plan	590-79
2.1.6	Docking Plan	590-96

2.2 Standards

- 2.2.1** See General Notes

2.3 Regulations

- 2.3.1** Canada Shipping Act 2001

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, tools and equipment required to perform the specified work unless otherwise stated.

Part 3 - Technical Description

3.1 General

- 3.1.1** The Contractor must be responsible for cleaning, preparing and coating all areas of the steering compartment bilge. Total area approx. 200 m². The Contractor

	CCGS Leonard J Cowley	
Spec Item #: HD-08	Specification	F7049-210183
STEERING GEAR BILGE CLEANING AND COATING		

must verify the area and provide a unit cost per m2 for the work listed above. Any adjustments to the 200 m2 will be addressed via PSPC 1379 action.

- 3.1.2** All areas of the bilge, framing, piping, machinery seats and all other structure beneath the deck plates must be thoroughly degreased with solvent cleaner and high pressure washed to SSPC-SP-1. The Contractor must provide a unit cost per m² for cleaning and degreasing purposes. Any adjustments to be addressed via PSPC 1379 action.
- 3.1.3** Upon completion of initial cleaning, the space must be inspected by the Chief Engineer for cleanliness and original coating conditions.
- 3.1.4** On completion of general cleaning and degreasing as defined above, all areas of failing coating, scale and bare steel must be power tooled or grit blasted to SSPC-SP-10. All loose paint, scale and rust must be removed. The approx. area requiring grit blasting to bare steel is approx. 200 m². The Contractor must provide a unit cost per m2 to perform work listed above. Any adjustments to the 200m2 will be addressed via PSPC 1379 action.
- 3.1.5** Prior to grit blasting The Contractor is responsible for securing and sealing all manhole covers located in the steering gear compartment. This must be done to prevent dust from migrating inside the compartment.
- 3.1.6** Any debris that finds its way into the internal steering compartment space or equipment must be cleaned at The Contractor's expense.
- 3.1.7** Access to the bilge for power tooling or grit blasting must be through Contractor cut holes in the vessels shell plating. The Contractor must bid on cutting four access holes a minimum of 41cm by 61cm in the steering gear bilge area. Upon completion of work, these inserts must be re installed as per ABS Standards. The Contractor must provide a unit cost per opening to be adjusted via PSPC 1379 action.
- 3.1.8** All work areas must be adequately ventilated to exterior of ship to prevent dust from surface prep from migrating to other areas within machinery space and/or contaminating machinery in the space.
- 3.1.9** All fluids and debris from cleaning effort must be removed and disposed of in accordance with provincial environmental regulations.

	CCGS Leonard J Cowley	
Spec Item #: HD-08	Specification	F7049-210183
STEERING GEAR BILGE CLEANING AND COATING		

3.1.10 All valve bonnets must be wrapped and taped with suitable protective material.

3.1.11 All electrical cabling identification tagging must be taped.

3.1.12 High level bilge alarms must be removed before sandblasting. The Contractor is responsible for their re-installation and testing on the completion of the work described in this spec.

3.1.13 All bare steel areas must be coated as follows:

3.1.13.1 Two coats of International Interbond 808, each coat of contrasting colour as per manufactures data sheets.

3.1.13.2 One top coat of International Interthane 990 as per manufactures data sheets. Top coat must be applied to Interbond within specific time period as specified by manufacturer for proper adhesion. Top coat must be light grey in colour.

3.1.14 The Contractor must provide a unit cost per m2 for coating as described above for adjustment purposes. Any adjustments will be addressed via PSPC 1379 action.

3.1.15 The Contractor must remove all taping and other protective materials upon completion of the coating cure time.

3.1.16 Means of paint application must be via airless spray and over spray must be limited and contained. Any over spray on structure or machinery above deck plate level must be top coated to original color scheme.

3.2 Location

3.2.1 Steering Gear Compartment Frames D - 5

3.3 Interferences

3.3.1 The Contractor is responsible for all interference items that may require attention during the overhaul process.

Part 4: Proof of Performance

4.1 Inspection

	CCGS Leonard J Cowley	
Spec Item #: HD-08	Specification	F7049-210183
STEERING GEAR BILGE CLEANING AND COATING		

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5: Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-09	Specification	F7049-210183
UNDERWATER HULL COATING		

HD-09 Underwater Hull Coating – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to prepare the exterior hull of the vessel below the water line for painting and to apply the specified coating.
- 1.2** An independent (CG Supplied) NACE Coating Inspector will be used to oversee the coating process and will report directly to the CG TA.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** The total underwater hull area is approx. 1188 m².
- 2.1.2** Shell Expansion Drawing

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet Safety and Security Manual
- 2.2.3** IACS No. 47 – Shipbuilding and Repair Quality Standard
- 2.2.4** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Canada Shipping Act 2001
- 2.3.3** Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all labour, materials, paints, equipment, hardware and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

	CCGS Leonard J Cowley	
Spec Item #: HD-09	Specification	F7049-210183
UNDERWATER HULL COATING		

3.1 General

- 3.1.1** Underwater Hull from the waterline to the keel must be cleaned for inspection by the CG TA and ABS Class Surveyor. Painting must be carried out only after any tank repairs and hull inspection and any repair required in the area is completed. The Contractor must arrange for the ABS Class Surveyor to inspect of the external hull prior to painting.
- 3.1.2** Total area of the underwater hull is approximately 1188 m2.
- 3.1.3** All hull mounted equipment such as anodes, reference electrodes, echo sounders, speed log, etc. are to be suitably protected against damage during the cleaning of the hull and application of the new coatings. The Contractor will be responsible for repair/replacement of any damaged items to the satisfaction of the CG TA. On completion of cleaning and coating, The Contractor is responsible for the removal of any such protective coverings.
- 3.1.4** The Contractor must take measures to ensure that no damage, unnecessary cleaning or repairs, accrue from the dry abrasive blasting and/or the application of the coating. Dry abrasive material used for the blast cleaning must not be permitted into any part of the vessel. These areas include but are not limited to all exhaust outlets on top of the stack, all tank vents, all air intake and exhaust plenums, all scupper pipes, all overboard discharges, all seabays and chest, stern tube, rudder stock, zinc anodes and transducers. The Contractor must ensure that every opening into the vessel where dry abrasive blasting material may gain ingress and cause damage to be suitably protected. All deck equipment including davit wires and blocks are to be completely wrapped to prevent any entry of grit. The Contractor must supply and install all coverings.
- 3.1.5** The Contractor must ensure all navigation equipment (radar, etc.) are suitably protected from any ingress or contamination from the dry abrasive material utilized in the blasting process.
- 3.1.6** Measures must also be taken to ensure that application of coatings does not take place on surfaces or equipment other than those areas specified, and that the coating must not block any inlets or discharges in the shell.

	CCGS Leonard J Cowley	
Spec Item #: HD-09	Specification	F7049-210183
UNDERWATER HULL COATING		

3.1.7 The Contractor must plug deck scuppers and discharges, or take any necessary measures to prevent water or other liquids from contaminating the areas of plating being coated or prepared for coating.

3.1.8 The Contractor must remove from the vessel all traces of dry abrasive material used for blast cleaning. The Contractor to be responsible and liable for ensuring that the hull is clear and clean, prior to, during and immediately after the application of the coating.

3.1.9 All staging, craneage, screens, heaters, and other environmental control equipment, lighting and any other support services, equipment and material necessary to perform the tasks set out in this specification shall be supplied by the Contractor.

3.1.10 Surface Preparation Underwater Hull:

3.1.10.1 All underwater hull area to be dry abrasive blasted to bare metal to ISO 8501-1 Sa3 standards. Area to be blasted to bare metal estimated to be 1188 m². The Contractor must bid an all inclusive unit cost per 1m² to grit blast to ISO 8501-1 Sa3, near white blast. Actual area blasted to be adjusted up or down via PSPC 1379 action.

3.1.11 Painting Underwater Hull:

3.1.11.1 The underwater hull must be painted to the following schedule (product information sheets are attached). Before coatings begin the CG TA and CG contracted NACE Inspector must inspect hull to confirm correct coating removal and proper profile of steel is applied. The Contractor must bid an all inclusive unit cost per 1m² for each type of coating applied. Actual area coated to be adjusted up or down via PSPC 1379 action.

First Coat: Intershiel ENA 300 Bronze at 6 mls DFT, to be applied, according to manufacturer's directions, to the bare steel areas (1188 m2).

Second Coat: Intershiel ENA 300 Aluminum at 6 mls DFT, to be applied, according to manufacturer's directions, to the entire underwater hull.

Third Coat: Interzone 954 Black at 20 mls DFT, to be applied, according to manufacturer's directions, to the entire underwater hull area. If DFT cannot be

	CCGS Leonard J Cowley	
Spec Item #: HD-09	Specification	F7049-210183
UNDERWATER HULL COATING		

achieved in one coat, additional coats must be applied as per manufacturers instructions to achieve required DFT.

Drying time between each coat to be as per paint manufacturer's instructions.

3.1.12 The Contractor must be responsible for coating of all DFO/CCG identification markings on the vessel exterior hull. The color scheme and location for the draught marks, loadline marks, etc. will be dictated by the CG TA.

3.1.12.1 Draft Marks and Load Line: Interthane 990 White at 2 mils DFT as per vessel's original scheme. Approx area for underwater hull markings is 9 m². The Contractor must bid a unit cost per 1m² of coating applied. Actual area coated to be adjusted up or down via PSPC 1379 action.

3.1.13 The coatings must be applied with atmospheric and steel conditions acceptable to paint manufacturer/ NACE Coating Inspector and CG TA. The Contractor must monitor and record steel temp, air temp and relative humidity readings every 2 hours for the duration of coating and curing process and include this in the report submitted to TA.

3.1.14 The Contractor to be responsible for any additional prep work and coatings as a result of exceeding recoating times as per Manufacturers recommendations.

3.1.14.1 The Contractor must provide a unit cost to supply materials and erect a temporary structure around the entire hull of vessel in the event weather conditions are not favorable for coating. Unit cost must include all materials, labour to erect, maintain, disassemble and dispose of and any heating requirements to maintain recommended atmospheric conditions. If structure is not required, amount to be adjusted via PSPC 1379 action.

3.1.15 An independent (CG Supplied) NACE Coating Inspector will be used to oversee the entire coating process and shall report directly to the CG TA.

3.1.16 The Contractor must adhere to all Manufacturers recommendations when applying coatings and if required to maintain schedule, temporary hoarding must be installed at The Contractor's expense.

3.2 Location

3.2.1 Underwater Hull Area

	CCGS Leonard J Cowley	
Spec Item #: HD-09	Specification	F7049-210183
UNDERWATER HULL COATING		

3.3 Interferences

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA.
- 4.1.2** The Contractor is advised that an Independent NACE Inspector must be present during the prep and coating application and will report directly to the CG TA. The Contractor must allow NACE Inspector to inspect all components for surface preparation and for each of the applications of the coating system including environmental conditions, equipment, mixing and application processes. It is The Contractors responsibility to request and arrange for the NACE inspector to be present at the required times to inspect the preparation and applications. Coating at each stage must also be to the satisfaction of the CG TA.

4.2 Testing

- 4.2.1** WFT and DFT measurement of each coating must be taken with calibrated gauges at locations agreed upon between The Contractor and CG TA. Such measurements must be witnessed by the NACE Inspector/ CG TA and recorded with locations referenced to the vessel shell expansion drawing. Unwitnessed measurements will not be accepted.

4.3 Certification

- 4.3.1** Copy of the manufactures MSDS for the coating being applied must be supplied to the CG TA.

Part 5 - Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must deliver two (2) hard copies of all checklists and reports to the CG TA outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA and one (1) electronic copy

	CCGS Leonard J Cowley	
Spec Item #: HD-09	Specification	F7049-210183
UNDERWATER HULL COATING		

to Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

HD-10 Above Waterline Hull and Inside Bulwarks Painting..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to prepare the exterior hull of the vessel above the water line and inside bulwarks for painting and to apply the specified coating.
- 1.2** This work must be carried out in conjunction with the following:
 - 1.2.1** HD-09 Underwater Hull Coating
 - 1.2.2** HD-12 Weather Deck, Superstructure and Flight Deck
- 1.3** An independent (CG Supplied) NACE Coating Inspector will be used to oversee the coating process and will report directly to the CG TA.

Part 2 – References

- 2.1** Guidance Drawings/Nameplate Data
 - 2.1.1** The total above waterline hull area is approx. 850 m².
 - 2.1.2** The total inside bulwarks area is approx. 200 m².
 - 2.1.3** Shell Expansion Drawing
- 2.2** Standards
 - 2.2.1** See general Notes
 - 2.2.2** Fleet Safety and Security Manual
 - 2.2.3** IACS No. 47 – Shipbuilding and Repair Quality Standard
 - 2.2.4** Society for Protective Coatings (SSPC) Standards
- 2.3** Regulations
 - 2.3.1** See General Notes
 - 2.3.2** Canada Shipping Act 2001
 - 2.3.3** Maritime Occupational Health and Safety Regulations

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, paints, equipment, hardware and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** Above waterline hull must be cleaned for inspection by the CG TA and ABS Class Surveyor. Coating is to be carried out only after any tank repairs and hull inspection and any repair required in the area is completed. The Contractor must arrange for the ABS Class Surveyor to inspect of the external hull prior to painting.
- 3.1.2** Total area of the above waterline hull and inside bulwarks is approximately 1050 m².
- 3.1.3** The Contractor must ensure all portholes and openings are covered during preparation and painting. The Contractor will be responsible for repair/replacement of any damaged items to the satisfaction of the CG TA. On completion of cleaning and coating, The Contractor is responsible for the removal of any such protective coverings.
- 3.1.4** The Contractor must take measures to ensure that no damage, unnecessary cleaning or repairs, accrue from the dry abrasive blasting and/or the application of the coating. Dry abrasive material used for the blast cleaning must not be permitted into any part of the vessel. These areas include but are not limited to all exhaust outlets on top of the stack, all tank vents, all air intake and exhaust plenums, all scupper pipes, all overboard discharges, all seabays and chest, stern tube, rudder stock, zinc anodes and transducers. The Contractor must ensure that every opening into the vessel where dry abrasive blasting material may gain ingress and cause damage to be suitably protected. All deck equipment including davit wires and blocks are to be completely wrapped to prevent any entry of grit.
- The Contractor must supply and install all coverings.
- 3.1.5** The Contractor must ensure all navigation equipment (radar, etc.) are suitably protected from any ingress or contamination from the dry abrasive material utilized in the blasting process.

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

3.1.6 Measures must also be taken to ensure that application of coatings does not take place on surfaces or equipment other than those areas specified, and that the coating must not block any inlets or discharges in the shell.

3.1.7 The Contractor must plug deck scuppers and discharges, or take any necessary measures to prevent water or other liquids from contaminating the areas of plating being coated or prepared for coating.

3.1.8 The Contractor must remove from the vessel all traces of dry abrasive material used for blast cleaning. The Contractor to be responsible and liable for ensuring that the hull is clear and clean, prior to, during and immediately after the application of the coating.

3.1.9 All staging, craneage, screens, heaters, and other environmental control equipment, lighting and any other support services, equipment and material necessary to perform the tasks set out in this specification shall be supplied by the Contractor.

3.1.10 Surface preparation above waterline hull and inside bulwarks:

3.1.10.1 All above waterline hull and inside bulwarks area must be full blasted to ISO 8501-1 Sa2 or SSPC-SP6. The Contractor must bid a unit cost per 1m2 to blast to above standards. Actual area blasted to be adjusted up or down via PSPC 1379 action.

3.1.11 Painting above waterline hull:

3.1.11.1 The above waterline hull must be painted to the following schedule (product information sheets are attached). Before coatings begin the CG TA and CG contracted NACE Inspector must inspect hull to confirm correct coating removal and proper profile of steel is applied. The Contractor must bid for 850 m2 area and a unit cost per 1m2 for for the application of 3 coats as described below. Actual area coated to be adjusted up or down via PSPC 1379 action.

First Coat: Intershield 300 ENA300/ENA303 Bronze at 6mil DFT

Second Coat: Intershield 300 ENA300/ENA303 Aluminum at 6 mil DFT.

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

Third Coat: Interthane 990 PHA162/PHA046 RAL3000 CG Red at 3 mil DFT.

Drying time between each coat to be as per paint manufacturer's instructions.

3.1.12 Painting inside bulwarks:

First Coat: Intershield 300 ENA300/ENA303 Bronze at 6mil DFT

Second Coat: Intershield 300 ENA300/ENA303 Aluminum at 6 mil DFT.

Third Coat: Interthane 990 PH80570/PHA046 Dark Gray at 3mil DFT.

Area to be bid 200 m² and unit cost for 1 m² of above coating to be given for adjustment up and down via PSPC 1379 action

3.1.13 The Contractor must be responsible for coating of all DFO/CCG identification markings on the vessel exterior hull. The color scheme and location for the Coast Guard stripe, lettering, draught marks, loadline marks, etc. will be dictated by the CG TA. Stencils will be supplied by Vessel.

3.1.13.1 Black Stripe:

First Coat: Intershield 300 ENA300/ENA303 Bronze at 6mil DFT

Second Coat: Intershield 300 ENA300/ENA303 Aluminum at 6 mil DFT.

Third Coat: Interthane 990 PHA164/PHA046 RAL9004 Black SG at 3 mil DFT.

Area to be quoted 100 m² and unit cost for 1 m² of above coating to be given for adjustment up and down via PSPC 1379 action

3.1.13.2 White Stripe:

First Coat: Intershield 300 ENA300/ENA303 Bronze at 6mil DFT

Second Coat: Intershield 300 ENA300/ENA303 Aluminum at 6 mil DFT.

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

Third Coat: Interthane 990 PHA163/PHA046 RAL9003 White at 3 mil DFT.

Area to be quoted 100 m² and unit cost for 1 m² of above coating to be given for adjustment up and down via PSPC 1379 action

3.1.13.3 Above Waterline Markings (White and Black)

First Coat: Intershiel 300 ENA300/ENA303 Bronze at 6mil DFT

Second Coat: Intershiel 300 ENA300/ENA303 Aluminum at 6 mil DFT.

Third Coat: Interthane 990 PHA163/PHA046 RAL9003 White or PHA164/PHA046 RAL9004 Black SG at 3 mil DFT.

Area to be quoted 100 m² and unit cost for 1 m² of above coating to be given for adjustment up and down via PSPC 1379 action

3.1.14 The coatings must be applied with atmospheric and steel conditions acceptable to paint manufacturer/ NACE Coating Inspector and CG TA. The Contractor must monitor and record steel temp, air temp and relative humidity readings every 2 hours for the duration of coating and curing process and include this in the report submitted to TA.

3.1.15 An independent (CG Supplied) NACE Coating Inspector will be used to oversee the entire coating process and shall report directly to the CG TA.

3.1.16 The Contractor must adhere to all Manufacturers recommendations when applying coatings and if required to maintain schedule, temporary hoarding must be installed at The Contractor's expense.

3.2 Location

3.2.1 Above waterline hull area

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

4.1.1 All work must be completed to the satisfaction of the CG TA.

4.1.2 The Contractor is advised that an Independent NACE Inspector must be present during the prep and coating application and will report directly to the CG TA. The Contractor must allow NACE Inspector to inspect all components for surface preparation and for each of the applications of the coating system including environmental conditions, equipment, mixing and application processes. It is The Contractors responsibility to request and arrange for the NACE inspector to be present at the required times to inspect the preparation and applications. Coating at each stage must also be to the satisfaction of the CG TA.

4.2 Testing

4.2.1 WFT and DFT measurement of each coating must be taken with calibrated gauges at locations agreed upon between The Contractor and CG TA. Such measurements must be witnessed by the NACE Inspector/ CG TA and recorded with locations referenced to the vessel shell expansion drawing. Unwitnessed measurements will not be accepted.

4.3 Certification

4.3.1 Copy of the manufactures MSDS for the coating being applied must be supplied to the CG TA.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG TA outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and one (1) electronic copy to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-10	Specification	F7049-210183
ABOVE WATERLINE HULL AND INSIDE BULWARKS PAINTING		

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-11	Specification	F7049-210183
HULL INSPECTION AND SURVEY		

HD-11 Hull Inspection and Survey..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to carry out a hull inspection along with CG TA and ABS Class Surveyor, and perform non-destructive testing on the hull and structure of the vessel as per ABS requirement and technical description below.
- 1.2** The Contractor must include in bid for provision of 2500 UT Shots as indicated in 3.1.2.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Shell Expansion and Body Plan
- 2.1.2** Stern Frame and Bossing

2.2 Standards

- 2.2.1** The Ship's ISM Hot Work, Confined Space, Fall Protection and Lockout Procedures must be adhered to at all times.
- 2.2.2** Fleet Safety Manual (DFO/5737)

2.3 Regulations

- 2.3.1** The Contractor performing the repairs must be certified at minimum Level 2 in UT Thickness Testing.
- 2.3.2** Maritime Occupational Health and Safety Regulations
- 2.3.3** ABS-Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

	CCGS Leonard J Cowley	
Spec Item #: HD-11	Specification	F7049-210183
HULL INSPECTION AND SURVEY		

- 3.1.1** After docking and hull cleaning The Contractor along with the CG TA and ABS Class Surveyor must carry out a visual inspection of the underwater hull of the vessel. This item is to be carried out prior to the hull painting. The Contractor is responsible for arranging all ABS visits for inspections and informing TA about such arrangements
- 3.1.2** The Contractor must obtain the services of an ABS Certified company to carry out a minimum 2500 UT Shots for the hull and structure of the vessel. Individual taking the readings must be minimum Level 2 Certified. The Contractor must also include the unit cost per shot including prepping, priming and person lift and operator. Actual cost to be adjusted up or down via PSPC 1379 action.
- 3.1.3** The Contractor must be responsible for providing all equipment including staging or lift equipment to carry out the hull inspection and the ultrasonic inspection.
- 3.1.4** The UT shots must be taken in the following areas:
- 3.1.4.1** The wind and water strakes, full length of the vessel, port and stbd.
 - 3.1.4.2** Three transverse bands around the hull of the vessel from the Foc'sle deck, under the vessel to the foc'sle deck on the other side. One band at mid-ships and one each within 0.5L of amidships fore and aft.
 - 3.1.4.3** The shell plating in the fore peak and after peak area
 - 3.1.4.4** Framing and stiffeners inside the fore peak and after peak
 - 3.1.4.5** Ballast Tanks as directed
 - 3.1.4.6** Engine room bilges
 - 3.1.4.7** Shaft tunnel bilges
 - 3.1.4.8** Steering gear compartment bilges
 - 3.1.4.9** Sea chests
 - 3.1.4.10** Bilge keel areas
 - 3.1.4.11** Area around all overboard discharges
 - 3.1.4.12** Other areas as directed by the CG TA and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-11	Specification	F7049-210183
HULL INSPECTION AND SURVEY		

3.1.5 In areas where poor readings are found, additional shots are to be taken in the area to confirm the extent of the wastage.

3.1.6 The Contractor must inform the CG TA and ABS Class Surveyor at least two days prior to the shots being taken so that their attendance can be planned. Areas of concern are to be marked and documented at the time of survey. The locations are to be documented with frame number and approximate height above keel and a copy presented to CCG TA.

3.1.7 All original plate thicknesses can be obtained from the ships drawings. The CG TA will provide drawings upon request.

3.1.8 The Contractor must not apply any hull coatings (above or below waterline) until ABS Class Surveyor has completed the required inspection, and CG TA has provided permission to proceed. The Contractor must notify the CG TA and ABS Class Surveyor prior to the application of any coatings

3.2 Location

3.2.1 Ships hull and decks

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.1.2 100% visual by the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Ultrasonic Testing, minimum 2500 shots.

4.3 Certification

	CCGS Leonard J Cowley	
Spec Item #: HD-11	Specification	F7049-210183
HULL INSPECTION AND SURVEY		

4.3.1 NDT Technician performing the shots must be minimum Level 2 Certified and certified to do so by ABS.

4.3.2 The Contractor must contact ABS and arrange for all required inspections in order to gain ABS required certification

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. The Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 Contractor must ensure NDT Technician supplies detailed reports showing exact locations of each measurement, thickness measured as well as the corresponding original thickness and percentage of wastage found.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANING AND PAINTING		

HD-12 Weather Deck, Superstructure and Flight Deck Cleaning and Painting – UPDATED

Part 1 – Scope

1.1 The intent of this specification item is for the Contractor to clean, prepare and paint all of the weather deck, and the complete superstructure of the Vessel. This is to include, the Wheelhouse deck top, the Foc'sle deck, the flight deck, the exterior upper deck areas and all bollards, fairleads, mooring pipes, as well as all other superstructure surfaces including the telescoping hanger sections.

1.2 The Contractor must bid on each of the below separately for possible adjustment purposes. In the event one/all of the below areas does not require prep and painting the amounts to be adjusted via PSPC 1379 action.

1.2.1 Wheelhouse Deck Top

1.2.2 Foc'sle Deck

1.2.3 Flight Deck

1.2.4 Exterior Upper Deck Areas

1.2.5 Remaining Exterior Decks and Bollards, Fairleads, Mooring Pipes

1.2.6 Superstructure

Part 2 – References

2.1 All design, material and Work must meet the designated Classification Society (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify, coordinate, and meet the specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines (ARSR&G) referenced in this Statement of Work (SOW), under Part A, of the General Requirement Section. Approval, of design, material, and Work, is to be in accordance with the applicable Regulations and standards referenced therein over and above Class approval, must be met as and when required.

2.2 Drawings and Documents

2.2.1 Table: List of applicable drawings and documents

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

Dwg./Doc. N°	Description
590-70	General Arrangement - Profile Navigating Bridge, Bridge Deck and Foc'sle Deck - Sht 1 of 2
590-70	General Arrangement -Upper, Main Deck and Hold - Sht. 2 of 2
590-04	Profile and Decks
590-91	Painting Schedule (Original Build)
18-080-000-SG-003	Canadian Coast Guard Paint and Coatings Standard
CCG/6016	CCG Fleet – Federal Identity Program Guide
SOR/96-433	Canadian Aviation Regulations

2.3 Name Plate Data

2.3.1 N/A

2.4 OEM/SUPPLIER/FSR

2.4.1 N/A

2.5 Contractor Supplied Material

2.5.1 The Contractor must supply all labour, equipment, parts, materials, and tools required to perform the Work as specified herein.

2.6 Government Furnished Equipment

2.6.1 N/A

2.7 Owner's Supplied Equipment.

2.7.1 As part of Canada's On-site team, the Canadian Coast Guard will be providing a NACE level II Coatings Inspector who will be responsible for overseeing all surface preparation and the painting required by this specification on behalf of Canada. The Contractor will be responsible to ensure that all surface preparation, paint applications, dry and wet film thickness, etc. are to the satisfaction of the CG NACE Inspector.

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLENAING AND PAINTING		

2.7.2 It is the Contractor's responsibility to arrange for the Coast Guard NACE inspector to be present at the required times to inspect the surface preparation, level of cleanliness and all paint applications. Coatings applications applied at each stage must be to the satisfaction of the CG NACE Inspector and be approved prior to the applying the next coat.

2.8 Encapsulation

2.8.1 Should the environmental and steel temperature conditions, required by the paint manufacturer, not be met, then the Contractor must be responsible for encapsulating the defined work areas and provide sufficient heat (forced air) to meet the temperature and humidity requirements of the paint being applied.

2.8.2 The cost of this encapsulation must be included in the Contractors Bid. This cost must include the installation(s) and removals and all equipment (heaters) and fuel needed to maintain the required temperatures during the whole course of the paint applications.

3.0 TECHNICAL REQUIREMENTS

3.1 General

3.1.1 Prior to commencing the cleaning and surface preparation, all deck mounted equipment and openings must be fully protected from physical damage.

3.1.2 The CG TA, the CG NACE Inspector, the attending ABS Surveyor, and a Contractor's QC representative will inspect the entire weather deck area and superstructure to determine the extent of any areas that may require repair. Such areas must be agreed upon by the both the Contractor and the CG TA and will be repaired via 1379 action.

3.1.3 The Contractor must take the necessary precautions to ensure that there is no damage, or unnecessary cleaning, resulting from any abrasive blasting, hydro blasting and/or the application of coatings.

3.1.4 It is the responsibility of the Contractor to determine and confirm the entire surface areas of the weather decks, superstructure, hanger, and flight deck surface areas, based on the drawings provided and site visit.

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

- 3.1.5** The Contractor is to note that the presence of lead has been detected in the vessel's hull coatings in the past. Prior to staring any grit blasting the Contractor must take samples of the surface to be cleaned and blasted and have these samples tested for lead.
- 3.1.6** The Contractor must strictly follow all federal and provincial regulations when carrying out the removal and disposal of any lead coatings.
- 3.1.7** Grit used for blasting must not be allowed to enter any part of the Vessel or its exposed equipment, and where such ingress may occur, the equipment must be suitably protected.
- 3.1.8** The Contractor must ensure that all deck scuppers and overboard discharges are plugged or are diverted to prevent any liquids from contaminating areas being prepared or coated on the Vessel's hull.
- 3.1.9** Measures must be taken to ensure that the following surfaces, areas, and equipment are protected from grit blasting and or overspray:
- 3.1.9.1** Tank and Void space vents.
 - 3.1.9.2** Machinery spaces
 - 3.1.9.3** Funnel outlets
 - 3.1.9.4** All exterior lights
 - 3.1.9.5** PA speakers
 - 3.1.9.6** Helicopter fueling system
 - 3.1.9.7** Hanger Tracks
 - 3.1.9.8** Helicopter deck and hanger lighting system
 - 3.1.9.9** Searchlights
 - 3.1.9.10** Navigation equipment
 - 3.1.9.11** Air intake plenums and air intake and exhaust trunking;
 - 3.1.9.12** Accommodations air intake and exhaust plenums and trunking

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLENAING AND PAINTING		

3.1.9.13 Barge, lifeboat, FRC

3.1.9.14 Deck machinery including crane, winches, and davits

3.1.9.15 Exposed steel wires for davits, winches, etc.

3.1.10 The Contractor must be responsible for removing any over spray as a result of this Work.

3.1.11 The Contractor is responsible for ensuring that all deck and superstructure surfaces are clear and clean prior to, during, and immediately after each coating application.

3.1.12 New coatings must be applied with the atmospheric and steel temperature conditions required by the paint manufacturer and to the satisfaction of the CG NACE Inspector. Environmental and temperature conditions must be measured and recorded daily, by the Contractor, and prior to starting any painting, in any area. Typed copies of these environmental reports are to be submitted to the CG TA. Should the environmental conditions be outside the paint manufacture's recommendations, painting must not take place until the correct conditions have been reached and can be maintained.

3.1.13 The Contractor must follow the requirements as found in the document 18-080-000-SG-003 entitled Canadian Coast Guard Paint and Coatings Standard. Though the paint coatings specified within this Statement of Work are using International Paints products, equivalent paints and coatings from other manufacturers may be proposed providing that the manufacturers specifications and product data sheets are adhered to. Any changes to the type of paints being specified must be compatible to the existing coverings and must be approved by the CG TA prior to any applications taking place.

3.2 Surface Preparation

3.2.1 All surface preparation must include at least two (2) to three (3) inches (50-75mm) up on all bulkheads, coamings, pipes, and other vertical surfaces.

3.2.2 The Contractor is to paint only clean, and dry surfaces and is to be responsible for the removal of all salts, grease, oil, soluble contaminants, and other detrimental foreign matter by "solvent cleaning" (SSPC-SP1).

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLENAING AND PAINTING		

3.2.3 Once blasting of an area has been completed and prior to inspection, the bulk of spent grit (and old paint debris) must be removed from the deck area to be coated. Any substandard areas identified must be brought up to the manufacturer's specified standard. All marking paint, chalk, etc., used to identify substandard areas must be removed after these areas are rectified. Final approval of a substrate for coating application must be confirmed by the CG NACE Inspector after final cleaning.

3.2.4 Once clean, all steel deck surfaces, bollards, fairleads etc. are to be sandblasted to remove the existing coating to achieve a "Near White Blast Cleaning" (SSPC-SP10) profile.

3.2.5 Aluminum surfaces are to be solvent cleaned according to SSPC-SP1 then physically etched by abrasive blasting using a non-metallic abrasive. A minimum surface profile of three (3) mils (75 microns) is to be achieved.

3.2.6 Compressed air used for blasting must be clean, oil free and dry with a pressure suitable for the type of application being applied. A compressed air blotter test is to be performed on a daily basis and this test is to be witnessed and to the satisfaction to the CG NACE Inspector. The results of each blotter test is to be recorded as part of daily environmental conditions recordings noted in section 3.1.13.

3.2.7 All abrasives used for blasting must be dry and free from dirt, oil, grease and suitable for producing the standard of cleanliness and profile specified.

3.3 Coating Applications – Weather Decks

3.3.1 Upon completion of the surface preparation in each area, the Contractor's Quality Control representative and the CG NACE Inspector will inspect the whole area and identify and mark any substandard areas.

3.3.2 The Contractor must remove all dust and abrasive from the surface prior to each coating and apply the applicable coating before any corrosion or contamination occurs. Care must be taken not to contaminate the properly prepared surfaces, failure to do so will result in having the Contractor having to repeat the cleaning process.

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

- 3.3.3** The Contractor is to thoroughly mask and protect any areas to which the Exterior Deck System coating system is not to be applied, e.g., hatches deck drains, etc. A stripe coat of Intergard 5000 or Intershield 300 or equivalent, is to be applied to weld seams at the specified film thickness.
- 3.3.4** A full coat of the exterior deck coating is to be applied to the manufacturer's specified film thickness and is to be applied up two (2) to three (3) inches on all vertical surfaces. When applying over a stripe coat, a full coat must be applied while the stripe coat is still tacky.
- 3.3.5** Each coating is to be allowed to dry before inspecting the applied coating and checking the dry film thickness (DFT).
- 3.3.6** A full coat of Intershield 851 (Green) or equivalent is to be applied at the specified coverage rate. All exposed weather deck surfaces are to have a non-skid surface applied. To achieve this the Contractor is to apply medium grit glass or aluminum oxide granules to the final coat of paint whilst it is still wet. The minimum application rate is to be three (3) kg of grit granules per twenty (20) litres of paint being applied.
- 3.3.7** The Contractor is to ensure that each completed deck area(s) is kept free of all traffic until the coated areas have fully cured.
- 3.3.8** Mooring bits, bollards and fairleads are to receive a minimum of two (2) coats of Interlac 665 Black RAL 9004 or equivalent.

3.4 Coating Applications - Superstructure

- 3.4.1** The intent of this section is to provide the requirements to clean and paint the entire ship's superstructure including the telescoping helicopter hanger.
- 3.4.2** The Contractor is to note that superstructure and the telescoping hanger are constructed from aluminum and all surface preparations performed are to take this into account.
- 3.4.3** Once the structural transition joints between the aluminum and steel plates are exposed, the entire joint area is to be visually examined to ensure that there is not any excessive wastage and or corrosion found in these areas. The Contractor is to bid on performing NDT testing of ten (10) percent of the total linear feet of the

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLENAING AND PAINTING		

exposed transition joint(s) Location of the areas of test will be determined by the CG TA. The Contractor is to provide a unit price for an additional ten (10) percent of testing, should it be found to be necessary. Any repairs required will be done via 1379 action.

- 3.4.4** All superstructure mounted windows, fixtures, and equipment such as the exterior light fixtures, speakers, receptacles, ventilation inlets must be effectively covered and sealed. All windows must be covered and sealed using thin Masonite or an equivalent to protect the glass items from damage during all phases of preparation and coating. Greases and similar types of compounds must not be used. All protective coverings must be removed upon completion of all work.
- 3.4.5** Contractor must take the necessary precautions to ensure that no damage, unnecessary cleaning, or repairs are required as a result of the abrasive blasting and/or the application of coatings.
- 3.4.6** Contractor is responsible for any removals of ladders, fenders, etc. to allow access to perform the work. All removals must be put back in good order upon completion.
- 3.4.7** Grit used for blasting must not be allowed to enter any part of the vessel, it's ventilation systems or its exposed equipment, and where such ingress may occur, the equipment and components must be suitably protected.
- 3.4.8** Measures must be taken to ensure that surfaces and equipment other than those specified are not coated and that any inlets or discharges will not be blocked by the coating or grit. Contractor is responsible for removing any and all over spray on the Vessel.
- 3.4.9** The Contractor must use a freshwater wash to all areas in order to remove all dirt and contamination. Surfaces are to be degrease according to SSPC-SP1 solvent cleaning to the satisfaction of the CG NACE Inspector.
- 3.4.10** In areas where grit blasting cannot be use, Contractor must use power tool cleaning to bare metal in accordance with the SSPC.SP11 standard.
- 3.4.11** The Contractor must ensure that each area is clean and dry prior to the application of coatings. Contractor must bid on abrasive blasting to the above noted standard thirty (30) percent the Superstructure surface and plus 100 % of the Hanger

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

structure. All remaining coating edges must be feathered back. The superstructure and hanger areas must be swept clean of all traces of grit with compressed air. The surface profile must have a minimum roughness of two (2) mils. Blasting material used on the aluminum must be non-metallic.

3.4.12 Contractor must stripe coat all welds, edges, and inaccessible areas. A stripe must be completed with each coat. All areas must receive a touch up coat of Intershield 300, or equivalent, abrasion resistant epoxy. A full coat of Intergard 263 or equivalent is to be applied as a tie coat followed by two (2) separate coats of Interthane 990 polyurethane, or equivalent topcoat finish.

3.4.13 Prior to commencing each paint applications the Contractor must be perform and record the following:

3.4.13.1 Provide a list of batch numbers with correspondent dates of manufacture.

3.4.13.2 Record the quantity and type of any solvent added.

3.4.13.3 Measure and record the ambient conditions.

3.4.13.4 Record details of spray tips and pressures.

3.4.13.5 WFT gauge readings must be taken on a regular basis during application.

3.4.14 After each section of painting application has dried, using a calibrated DFT gauge, and in the presence of the CG NACE Inspector, the Contractor must arrange to take a minimum of fifteen (15) measurements per 9.29 m2 and these measurements are to be recorded. Any readings out of spec. will require the Contractor to apply a corrective coating application.

3.4.15 All recorded information must be typewritten, and three (3) copies given to the CG TA.

3.4.16 All paint being applied is to be as per Doc. No18-080-000-SG-003 entitled Canadian Coast Guard Paint and Coatings Standard and the paint manufacturer's requirements

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

3.4.17 All traces of grit used for blast cleaning must be removed by Contractor. The Contractor must be responsible for ensuring that the superstructure is clear and clean prior to, during, and immediately after each coating application.

3.4.18 Contractor must remove all protective materials from the machinery, equipment windows, vents etc. on completion of the coating work. All grit, dirt, debris, rust, scale, etc. must be removed from all decks and areas of accumulation and disposed of ashore by Contractor.

3.4.19 All vents and dampers are to be opened up and exposed for cleaning, removing any possible debris from the grit blasting. Vents and dampers are to be assembled with new gaskets fitted.

3.4.20 Canada word marks, emblems and CG Crest etc. are to be painted as per the requirements of CCG/6016 entitled CCG Fleet – Federal Identity Program.

3.5 Coating Applications – Flight Deck

3.5.1 Note: The Flight deck to be cleaned, prepared, and painted only after all work associated with specification Hanger Refurbishment and Steel Replacements has been completed and found to be satisfactory to the CG TA.

3.5.2 All flight deck hold down points (a total of fourteen (14) in total) are to be thoroughly cleaned and inspected. Each hold down point is to be load tested and witnessed to the satisfaction of the attending ABS surveyor. The Contractor must bid on supplying and installing 5 hold downs as per original and provide a unit cost per hold down (supply and install). Any adjustments will be made via PSPC 1379 action.

3.5.3 Four (4) new hold downs are to be installed between frames 19 to 23 on the flight deck. Final location will be determined by the CG TA and new installations will be done via 1379 action.

3.5.4 Once Hanger Refurbishment and Steel Replacements has been completed and the hold down points installed, the Vessel's flight deck is to then receive the appropriate surface preparation and paint applications as per the Canadian Coast Guard Paints and Coating Standard. Type of paint being used is to be non-skid, abrasion resistant pure epoxy optional polyurethane or an acrylic modified epoxy

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

and is to be the same colour schedule as per the weather deck coating. Surface profile of the non-skid application is to be suitable for flight decks.

3.5.5 Required Flight Deck Markings musty comply with the applicable sections of Part VI and Part VII of the Canadian Aviation Regulations (SOR/96-433).

4.0 INSPECTIONS, TESTS AND TRIALS

4.1 Inspections

4.1.1 The Contractor must allow the CG NACE Inspector to inspect all areas for surface preparation, cleanliness and prior to each paint application. This is also to include but not be limited to the environmental conditions, steel surface temperatures, equipment, mixing and the application processes.

4.2 Tests

4.2.1 As a minimum the Contractor is to arrange to take sixty (60) wet film thickness measurements; thirty (30) per side, in areas where the weather deck has been cleaned to bare steel and sixty (60) WFT measures of the paints being applied to the superstructure and hanger. These measurements must be witnessed by the CG NACE inspector and recorded with locations referenced to the attached Profile and Deck drawing. Unwitnessed measurements will not be accepted.

4.2.2 Using a calibrated DFT gauge, the Contractor is to take a minimum fifteen (15) measurements per 9.29 m² (100 ft²) in each area. These readings must be taken and recorded and be to the satisfaction of the CG TA and the GG NACE Inspector.

5.0 DELIVERABLES

5.1 Drawings/Reports

5.1.1 The Contractor must provide the CG TA with a final report, consisting of three (3) typewritten copies and one (1) electronic copy, in PDF format – containing the following information as the minimum:

5.1.1.1 Any areas on the weather deck or superstructure that were repaired.

5.1.1.2 The areas that were blasted, the blast media type and air pressure.

	CCGS Leonard J Cowley	
Spec Item #: HD-12	Specification	F7049-210183
WEATHER DECK, SUPERSTRUCTURE AND FLIGHT DECK CLEANAING AND PAINTING		

5.1.1.3 The areas that were coated, with what product, and the volume of coating used.

5.1.1.4 A list of batch numbers with corresponding dates of manufacture.

5.1.1.5 The record of the quantity and type of any solvent added.

5.1.1.6 Measured and recorded of all of the daily ambient conditions (air and steel temperature, humidity, barometric pressure)

5.1.1.7 Recoded details of all spray tips and pressures used as well as the results of the blotter tests performed.

5.1.1.8 All WFT and DFT readings taken, as prescribed in this specification.

	CCGS Leonard J Cowley	
Spec Item #: HD-13	Specification	F7049-210183
FUEL OIL TANKS INSPECTION		

HD-13 Fuel Oil Tanks Inspection – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to open up, clean and inspect all fuel oil tanks onboard. There are 16 fuel tanks in total required to be opened up, inspected and certified.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Tank Plan

2.1.2 Docking Plan

2.1.3 Vent Plan

2.1.4 Tank Descriptions

2.1.4.1 Tank Name	Frames
#1 Port F/O Double Bottom Tank	58-66
#1 Stbd F/O Double Bottom Tank	58-66
#2 Port F/O Deep Tank	52-58
#2 Stbd F/O Deep Tank	52-58
#3 Port F/O Double Bottom Tank	44-52
#3 Stbd F/O Double Bottom Tank	44-52
#4 Centre F/O Double Bottom Tank (ME Spill)	28-29
#4 Port F/O Double Bottom Tank	20-42 28 - 42
#4 Stbd F/O Double Bottom Tank	20-42 28 - 42
#5 Port F/O Deep Tank (Sett Tank)	12-18
#5 Stbd F/O Deep Tank (Sett Tank)	12-18

	CCGS Leonard J Cowley	
Spec Item #: HD-13	Specification	F7049-210183
FUEL OIL TANKS INSPECTION		

#6 Port F/O Deep Tank	5-12
#6 Stbd F/O Deep Tank	5-12
Athwartship Flume Stabiliser Tank	58-66
Stbd F/O Day Tank	18-21
Emergency Gen F/O Tank	40 – 42
Incinerator Tank	40 - 42

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** CCG Fleet Safety Manual
- 2.2.3** Coast Guard ISM Confined Space Entry
- 2.2.4** Coast Guard ISM Fall Protection Procedures

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Maritime Occupational Health and Safety Regulations
- 2.3.3** ABS Rules and Regulations
- 2.3.4** Canadian Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must open all fuel oil tanks listed in section 2.1.4.1 for cleaning, inspection and 5 year survey by ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-13	Specification	F7049-210183
FUEL OIL TANKS INSPECTION		

- 3.1.2** The Contractor with the assistance of ships crew will pump/transfer the tanks contents down to the suction levels, resulting in approx. 1m³ of fuel oil remaining in each tank. The Contractor must dispose of the remaining fuel in accordance with Provincial Regulations.
- 3.1.3** The Contractor must bid on removing and disposing of 100 m³ of fuel oil and provide a unit cost per m³. This amount to be adjusted up or down via PSPC 1379 action based on invoice.
- 3.1.4** The Contractor must remove all necessary manhole covers to gain access to the tanks.
- 3.1.5** The Contractor must ventilate each tank to the exterior of the ship and provide mechanical ventilation to all areas of the tank. Each tank must be gas freed and certified Safe For Entry by a certified Marine Chemist. Certificates must be forwarded to the CG TA prior to any personnel commencing work in each tank and a copy of these certificates must be posted in a conspicuous area near the entrance to each tank. This is the responsibility of The Contractor.
- 3.1.6** Once the tank is safe for entry, The Contractor must thoroughly rag out the internals of the tanks with lint free rags.
- 3.1.6.1** Once tanks are thoroughly cleaned and ventilated, the Contractor must arrange for Marine Chemist to certify tanks Safe For Hotwork.
- 3.1.6.2** The Contractor must bid on power washing, removal of water, wiping down with lint free rags and coating with linseed oil the below tanks:
- ~~**3.1.6.2.1** Emergency Gen Fuel Oil Tank~~
- ~~**3.1.6.2.2** Athwartship Flume Stabiliser Tank~~
- ~~**3.1.6.2.3** #5 Port and Stbd Deep Tanks (Settling Tank)~~
- 3.1.6.2.1** All tanks listed in 2.1.4.1
- 3.1.7** The Contractor must perform a visual inspection of all striker plates below the sounding pipes to ensure no visual damage. CG TA and ABS Class Surveyor must be notified of any damage.
- 3.1.7.1** The Contractor must bid on performing 16 – 12” x 12” crop and inserts below the sounding pipes due to damaged plate. The Contractor must use 5/16” plate for the insert and replacement striker plate. The Contractor may be required to remove and replace approx. 12” of sounding pipe in

	CCGS Leonard J Cowley	
Spec Item #: HD-13	Specification	F7049-210183
FUEL OIL TANKS INSPECTION		

order to gain access to the plate below to complete repairs. The Contractor must provide a unit cost per insert to be adjusted up or down via PSPC 1379 action as required.

3.1.7.2 The Contractor must provide a Certified Level 2 Technician and perform Magnetic Particle and visual inspection on all new welds required for the inserts. The Contractor must provide a unit cost for Magnetic Particle Testing per insert to be adjusted up or down via PSPC 1379 action as required.

3.1.8 Following the cleaning of the tanks and any repairs, the tanks must be inspected by the CG TA and ABS Class Surveyor and certified as required.

3.1.9 The Contractor must clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick white nitrile gaskets. The Contractor must bid on renewal of 40 manhole studs. The Contractor must provide a unit cost per stud replacement to be adjusted up or down via PSPC 1379 action as required.

3.1.10 The Contractor must conduct a pneumatic (air) test on each tank at 2 psi for a minimum of 30 minutes to be witnessed by CG TA and ABS Class Surveyor. The bid must include, if required, the installation and removal of blanks, balloons, etc for suction, sounding pipes, overflow pipes and vent head removals.

3.1.10.1 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test.

3.1.11 Upon completion of all work and testing of tanks, The Contractor must clean tanks of all fluids, debris and wipe dry.

3.1.12 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor and signed, certified as required.

3.1.13 The Contractor must prove all sounding pipes, vent pipes and suction pipes free and clear prior to tanks being closed up. The Contractor must check pipe connections on remote sounding bell housings to ensure they are tight.

3.1.13.1 The Contractor must remove, dismantle, clean and re-assemble vent heads to prove clear. Any/all moving parts(flaps, dogs) must be freed and functioning prior to completion. All check valves to be tested and all screens on the vent heads to be replaced.

	CCGS Leonard J Cowley	
Spec Item #: HD-13	Specification	F7049-210183
FUEL OIL TANKS INSPECTION		

3.1.13.2 The Contractor must dry abrasive blast any removed sounding pipes, vent pipes and fill lines to bare metal (SSPC-SP10-631, near white blast) and recoat to existing color using coatings outlined in HD-12 Superstructure Steel Replacement and Painting Spec. The Contractor must bid on 16 vent heads/pipes and 16 fill/sounding lines to be completed. The Contractor must provide a unit cost to remove, dismantle, clean, blast, paint and re-assemble each vent head and fill/sounding line. The actual number completed to be adjusted via PSPC 1379 action.

3.2 Location

3.2.1 Tanks located throughout the vessel at frame locations indicated in section 2.1.4.1

3.2.2 See included Vent Drawing for locations.

3.2.3 See included Capacity Plan for Tank locations.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction, be signed off and certified by the Contractor, CG TA and ABS Class Surveyor.

4.1.2 100% visual by the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Pneumatic (air) testing of tanks at 2 psi for minimum 30 mins or as indicated by attending ABS Class Surveyor.

4.2.2 Magnetic particle NDT testing as required on inserts by Level 2 Certified Technician.

4.3 Certification

	CCGS Leonard J Cowley	
Spec Item #: HD-13	Specification	F7049-210183
FUEL OIL TANKS INSPECTION		

4.3.1 NDT Technician performing the inspection must be minimum Level 2 Certified and certified to do so by ABS.

4.3.2 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test.

4.3.3 The Contractor must ensure NDT Technician provides a detailed report for all NDT Testing performed.

4.3.4 The Contractor must supply the MSDS and product data sheets on all products used in the course of this work

4.3.5 Safety Forms and checklists, including safe enclosed space entry certificate must be shown to the TA and ABS surveyor

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-14	Specification	F7049-210183
LUBE OIL TANKS INSPECTION		

HD-14 Lube Oil Tanks Inspection – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to open up, clean, pressure test and inspect all the tanks as listed below in the section 2.1.3.1 for Survey by CG TA and ABS Class Surveyor.
- 1.2** The Gearbox Lube Oil Storage Tank must not be emptied and cleaned until after the completion of the gearbox oil change as per spec HD-27.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Docking Plan Drawing – 590-96 Rev 2
- 2.1.2** General Arrangement Drawing – 590-70
- 2.1.3** Vents and Sounding Pipes – 590-40-01 and 590-40-03
- 2.1.4** Lube Oil Diagram – 590-41
- 2.1.5** Lube Oil Piping – 590-41
- 2.1.6** Capacity Plan – 590-79
- 2.1.7** Manhole and Level Transmitter Locations – 590-54
- 2.1.8** Tank Descriptions

2.1.8.1 Tank Name	Frames	Capacity
Port Aft Hydraulic Oil Tank	18-21	2.3 m3
Port Aft Outer Auxiliary Lube Oil Tank	18-21	4.4 m3
Port Aft Gearbox Oil Tank	18-21	2.3 m3
Port Aft Inner M/E Lube Oil Storage Tank	18-21	6.6 m3
Port Aft Outer Aux Lube Oil Storage Tank	18-21	3.8 m3
Center Sludge DB Tank	21-28	9.9 m3

	CCGS Leonard J Cowley	
Spec Item #: HD-14	Specification	F7049-210183
LUBE OIL TANKS INSPECTION		

Hydraulic Oil Storage Tank	21-28	2.3m3
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2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** CCG Fleet Technical Safety Manual
- 2.2.3** Coast Guard ISM Confined Space Entry
- 2.2.4** Coast Guard ISM Fall Protection Procedures

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Maritime Occupational Health and Safety Regulations
- 2.3.3** ABS Rules and Regulations
- 2.3.4** Canadian Shipping Act

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must open all lube oil tanks listed in section 2.1.3 for cleaning, inspection and 5 year survey by ABS Class Surveyor.
- 3.1.2** The ship's crew will pump/transfer the tanks contents down to the suction levels, resulting in approx. 1m³ of oil remaining in each tank. The Contractor must dispose of the remaining fluids in accordance with Provincial Regulations. Contractor must bid a unit cost per 1m³ for adjustment purposes up or down via PSPC 1379 action based on invoice.
- 3.1.3** The Contractor must remove all necessary manhole covers to gain access to the tanks.

	CCGS Leonard J Cowley	
Spec Item #: HD-14	Specification	F7049-210183
LUBE OIL TANKS INSPECTION		

- 3.1.4** The Contractor must clean and then ventilate each tank to the exterior of the ship and provide mechanical ventilation to all areas of the tank. Each tank must be gas freed and certified Safe For Entry by a certified Marine Chemist. Certificates must be forwarded to the CG TA prior to any personnel commencing work in each tank and a copy of these certificates must be posted in a conspicuous area near the entrance to each tank. This is the responsibility of the contractor.
- 3.1.5** Once the tank is safe for entry, The Contractor must thoroughly rag out the internals of the tanks using lint free rags.
- 3.1.5.1** Once tanks are thoroughly cleaned and ventilated, The Contractor must arrange for Marine Chemist to certify tanks Safe For Hotwork.
- 3.1.6** The Contractor must perform a visual inspection of all striker plates below the sounding pipes to ensure no visual damage. CG TA and ABS Class Surveyor must be notified of any damage.
- 3.1.6.1** The Contractor must bid on performing 6 – 12” x 12” crop and inserts below the sounding pipes due to damaged plate. Contractor must use 5/16” plate for the insert and replacement striker plate. The Contractor may be required to remove and replace approx. 12” of sounding pipe in order to gain access to the plate below to complete repairs. Contractor must provide a unit cost per insert to be adjusted up or down via PSPC 1379 action as required.
- 3.1.6.2** The Contractor must provide a Certified Level 2 Technician to perform Magnetic Particle and visual inspection on all new welds required for the inserts. The Contractor must provide a unit cost per insert to be adjusted up or down via PSPC 1379 action as required.
- 3.1.7** Following the cleaning of the tanks and any repairs, the tanks must be inspected by the CG TA and ABS Class Surveyor.
- 3.1.8** The Contractor must clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick white nitrile gaskets. Contractor must ensure anti-seize is applied to all threads. The Contractor must bid on renewal of 20 manhole studs. The Contractor must provide a unit cost per stud replacement to be adjusted up or down via PSPC 1379 action as required. Tightening of manhole covers, installation of vent caps and docking plugs must be witnessed by The CG CE. Bolt threads on Victaulic Couplings must be cleaned and coated with anti-seize prior to installation by The Contractor.

	CCGS Leonard J Cowley	
Spec Item #: HD-14	Specification	F7049-210183
LUBE OIL TANKS INSPECTION		

3.1.9 The Contractor must conduct a pneumatic (air) test on each tank at 2 psi for a minimum of 30 minutes to be witnessed by CG TA and ABS Class Surveyor. The bid must include, if required, the installation and removal of blanks, balloons, etc for suctions, sounding pipes, overflow pipes and vent head removals.

3.1.9.1 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test.

3.1.10 Upon completion of all work and testing of tanks, The Contractor must clean tanks of all fluids and debris and wiped dry.

3.1.11 All work must be to the satisfaction of the CG TA and ABS Class Surveyor and signed/ certified as required.

3.1.12 The Contractor must prove all sounding pipes, vent pipes and suction pipes free and clear prior to tanks being closed up. The Contractor must check pipe connections on remote sounding bell housings to ensure they are tight.

3.1.12.1 The Contractor must remove, dismantle, overhaul, clean and re-assemble 6 vent heads for inspection by CG TA and ABS Class Surveyor. The Contractor must provide a unit cost per vent head to be adjusted via PSPC 1379 action.

3.2 Location

3.2.1 Tanks located throughout the vessel at frame locations indicated in section 2.1.3

3.2.2 All storage tank vents are located port side upper deck at Frame 18-21 and sludge tank vent is on aft deck

3.2.2 See included Vent Drawing for locations.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

	CCGS Leonard J Cowley	
Spec Item #: HD-14	Specification	F7049-210183
LUBE OIL TANKS INSPECTION		

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.1.2 100% visual by the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Pneumatic (air) testing of tanks at 2 psi for minimum 30 mins or as indicated by attending ABS Class Surveyor.

4.2.2 Magnetic particle NDT testing as required on inserts by Level 2 Certified Technician.

4.3 Certification

4.3.1 NDT Technician performing the inspection must be minimum Level 2 Certified and certified to do so by ABS.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CG CE. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

4.3.3 The Contractor is responsible to ensure that the ABS surveyor signs off all surveyed tanks in the relevant record book and issues any required certificates.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test.

5.1.2 The Contractor must ensure NDT Technician provides a detailed report for all NDT Testing performed.

5.1.3 The Contractor must deliver two (2) hard copies of all checklists and reports to the CG CE outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA and CG CE. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

	CCGS Leonard J Cowley	
Spec Item #: HD-14	Specification	F7049-210183
LUBE OIL TANKS INSPECTION		

5.1.4 The contractor must supply the MSDS and data sheet on all products used in the course of this work

5.1.5 Safety forms and checklists, including safe enclosed space entry certificate must be shown to the CG TA and ABS surveyor

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

HD-15 Ballast Tank Inspection – UPDATED

Part 1 – Scope:

- 1.1** The intent of this specification item is for The Contractor to open up, clean, 100% blast, clean, inspect, recoat and test all ballast tanks onboard the vessel. There are nine listed water ballast tanks for cleaning, blasting, coating, inspection and hydrostatic testing. All inspections and testing must be witnessed by the CG TA and the attending ABS Class inspector. All of these tanks are to be treated as confined spaces.

Part 2 – References:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Drawing Capacity Plan 590-79
- 2.1.2** Docking Plan # 590-96 Rev. 2
- 2.1.3** #590-40-01, 590-40-03, Vents and sounding pipes
- 2.1.4** #590-54 Manhole and level transmitter locations.

2.2 Tank Descriptions

Tank No. & Name	Location	Capacity Cubic meters	Area (Sq. Meters)	Add 20% For Floors / Framing
No. 1 Water Ballast port	Fr. 71-81 80	35.8	130 119	156 143
No. 1 Water Ballast stbd	Fr. 71-81 82	39.1	130	156
No. 2 Water Ballast port	Fr. 66-71	58.7	142	170
No. 2 Water Ballast stbd	Fr. 66-71	58.7	142	170
No. 3 Water Ballast Center	Fr. 29-42	52.1	158	190
No. 4 Water Ballast port	Fr. 18-28	37.2	86 68	103 81.5
No. 4 Water Ballast stbd	Fr. 18-28	47	86	103
No. 5 Water Ballast port	Fr. B-Aft	48.8	102	122
Forepeak	Fr. 91-100		96	115.2

2.3 Standards

- 2.2.1** See General Notes

2.3 Regulations

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

2.3.1 See General Notes

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. All pumps, hoses, hardware, equipment and personnel required to carry out these operations must be supplied by The Contractor.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must open all ballast tanks listed in section 2.2 for cleaning, 100% blast, clean, inspect, test and recoat all ballast tanks onboard. The Contractors bid must include crop and re-install of access holes in bottom of each tank for removal of blast grit if deemed necessary.

3.1.2 Any inserts cut in the vessel for steel preparation or coating requirements must be approved by CG TA and ABS prior to cutting. Inserts must be re-installed as per ABS, CCG and CWB guidelines with full pen welds. All welds must receive 100% visual inspection by a level 2 CWB welding inspector (or higher) and be tested with 100% UT at a minimum in addition to ABS testing requirements.

3.1.3 The tanks listed above must be opened for cleaning and survey by an ABS Inspector and the CG TA. CG will provide the service of a NACE inspector to witness all aspects of the required painting.

3.1.4 The ship's crew will pump down the tanks contents to the suction levels, resulting in approx. 1m3 of water remaining in each tank. Ship's crew will pump down tanks prior to docking. The Contractor must dispose of the remaining water in accordance with Provincial Regulations.

3.1.5 The Contractors must bid on removing and disposing of 9 m3 of ballast water and provide a unit cost per m3. This amount to be adjusted up or down via PSPC 1379 action based on invoice. The Contractor must remove all manhole covers, as detailed on Drawing #590-54 for Manhole and Level Transmitter locations.

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

- 3.1.6** Prior to entry, tanks to be certified “ Safe for Workers” and “Safe for Hotwork” as required by Transport Canada Marine Safety TP3177E. The certificates must be given to the CG TA and copies posted by the tank manholes and gangway.
- 3.1.7** Once the tank is safe for entry and cleaned, The Contractor must 100% blast tanks to SSPC-SP10. The Contractor is responsible for removal and disposal of debris from the tanks. Tanks internals must be inspected by ABS Surveyor and CG TA.
- 3.1.8** The Contractor must ventilate each tank to the exterior of the ship and provide mechanical ventilation to all areas of the tank. Each tank must be gas freed and certified Safe for Entry by a Marine Chemist. Certificates must be forwarded to the CG TA prior to any personnel commencing work in each tank and a copy of these certificates must be posted in a conspicuous area near the entrance to each tank. Vapours as well as airborne dust and debris must not be allowed to enter the other parts of the vessel. This is the responsibility of the contractor.
- 3.1.9** The Contractor must perform a visual inspection of all striker plates below the sounding pipes to ensure no visual damage. CG TA and ABS Class Surveyor must be notified of any damage. The Contractor must bid on cropping and installing a 12”x 12” insert below the sounding tubes in each tank for a total of 9 inserts. The Contractor must provide a unit cost per insert to be adjusted up or down via PSPC 1379 action.
- 3.1.10** Following the blasting of the tanks, all tanks must be inspected by the CG TA and ABS Class Surveyor.
- 3.1.11** The Contractor must perform NDT in each tank as indicated by the attending ABS Surveyor. The Contractor must bid 900 shots in total and include unit price per shot. The total cost adjusted up or down via PSPC 1379.
- 3.1.12** All ventilation / heating requirements to assist in drying out of tanks prior to painting and to assist paint curing shall be Contractor supply.
- 3.1.13 Coating Specification for Application :**
- 3.1.13.1 Surface Preparation:**
- 3.1.13.1.1** Following the blasting of all tanks and any repairs the tanks must be inspected by the CG TA and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

3.1.14 Prior to Power tooling or Abrasive Blast cleaning the damaged areas of tank coatings has to be identified in agreement with CG TA.

3.1.15 Coating System:

3.1.15.1 The Contractor must apply 2 (two) coats: One primer coat Intershield ENA 300 – Aluminium and one Top coat Intershield ENA 300 – Bronze or approved equal product. The Contractor must apply each coat (8-10 mils) dry film thickness (dft) directly on to the prepared steel surface as per manufacturers recommendations.

Note: Any sharp edges, corners, etc, must be stripe coated prior to each full coat being applied.

3.1.16 The following tests and checks must be carried out before, during, and after the painting process. A Coating Application Log of these tests must be maintained by The Contractor and submitted to the CG TA upon completion of the Project. Contents of this log must incorporate as a minimum the following:

3.1.16.1 Surface preparation including anchor profile and abrasive used.

3.1.16.2 Wet and Dry film thicknesses.

3.1.16.3 Surface temperature, ambient temperature, room temperature, relative humidity, dew point and coating temperature.

3.1.16.4 Continuity of Paint to be checked using low voltage detector (Sponge Test) as specified by the CG NACE Inspector

3.1.16.5 Adhesion tests as specified by the CG NACE Inspector.

3.1.16.6 Coating Batch Numbers.

3.1.17 The Contractor must clean the sealing surfaces around the manhole and cover and supply and install the cover using new ¼ inch thick white nitrile gaskets. The Contractor must ensure anti-seize is applied to all threads. The Contractor must bid on renewal of 5 manhole studs per tank.. CG TA to be present when manhole covers are being reinstalled. The Contractor must provide a unit cost per stud replacement to be adjusted up or down via PSPC 1379 action as required.

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

3.1.18 The Contractor must reinstall docking plugs. The Contractor must prove sounding pipes, vent pipes and suction pipes are free and clear prior to tanks being closed up. The Contractor must check pipe connections on remote sounding to ensure they are tight.

3.1.19 The Contractor must remove, dismantle, acid dip clean, re-assemble and paint each tank vent head to prove clear. Any screens fitted on the tank vent heads to be renewed.

3.1.20 Prior to closing, all tanks must be inspected by CG TA, ABS Class Surveyor and CG NACE Inspector.

3.1.21 The Contractor must conduct a pneumatic test @ 2 psi on each tank for a minimum of 30 minutes to be witnessed by CG TA and ABS Class Surveyor. The bid must include, if required, the installation and removal of blanks for suctions, sounding pipes, overflow pipes and vent head removals. The Contractor must provide a unit cost per pneumatic pressure test to be adjusted via PSPC 1379 action as required.

3.1.22 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test.

3.1.23 Upon completion of all work and testing of tanks, The Contractor must clean tanks of all fluids and debris and wiped dry.

3.1.24 All work is to be to the satisfaction of the CG TA and ABS Class Surveyor.

3.2 Location

3.2.1 Tanks located throughout the vessel at frame locations indicated in section 2.2.

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel. The Contractor is responsible for protecting the surrounding area and any equipment while carrying out this work

Part 4 – Proof of Performance

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.
- 4.1.2** 100% visual by the CG TA and ABS Class Surveyor.
- 4.1.3** The Contractor is responsible for all inspections and must consult with ABS, prior to commencement of work, to determine an inspection schedule. At each inspection point, The Contractor must advise the Owner's representative, in advance, to allow their attendance.

4.2 Testing

- 4.2.1** Hydrostatic or Pneumatic (air) testing of tanks at 2 psi for minimum 30 mins or as indicated by attending ABS Class Surveyor.
- 4.2.2** Magnetic particle NDT testing as required on inserts by Level 2 Certified Technician.

4.3 Certification

- 4.3.1** NDT Technician performing the inspection must be minimum Level 2 Certified and certified to do so by ABS.
- 4.3.2** The Contractor is responsible to ensure that the ABS surveyor certifies/attests and gives credit for the tanks by signing off in the survey record book and/or as required. This must be available with the CG TA before re-floating the vessel.

Part 5 - Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test. A copy of any other certificates, including but not limited to safe confined space entry and hotwork permit with SMS forms and checklists. MSDS and data sheets to be provided for all products used in the course of the work (cleaning, coating etc.)

	CCGS Leonard J Cowley	
Spec Item #: HD-15	Specification	F7049-210183
BALLAST TANK INSPECTION		

5.1.2 The Contractor must ensure NDT Technician provides a detailed report for all NDT Testing performed.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

HD-16 Propulsion Control Upgrade..

Part 1 - Scope

1.1 Intent

- 1.1.1** The intent of this specification is to establish the technical requirements of a project to modernize the electrical and electronic controls comprising the propulsion system of the CCGS Leonard J Cowley.
- 1.1.2** The aim of this specification is to provide enough information to give potential Contractors a clear picture of the project details so that they may propose replacement solutions that will meet the high reliability and performance objectives that have been established.
- 1.1.3** It is the Contractor's responsibility to ensure that it has a good knowledge of all technical details of this project and to ensure that the requested work, as set out in this document, is completed to the full satisfaction of the CG TA, which includes providing all items and work deemed necessary to enable the safe and satisfactory operation of this type of vessel.

1.2 Scope of Work (Summary)

- 1.2.1** Within the framework of the upgrading project, The Contractor must meet all technical requirements described in this document and carry out all of the following work:
 - 1.2.1.1** Verify current system's drawings and technical information provided to allow The Contractor to produce a Preliminary Design Package (PDP) which will be assessed in detail by the CCG.
 - 1.2.1.2** Design the new system in compliance with the applicable regulations and receive all required approvals and certifications.
 - 1.2.1.3** The new system being proposed must fully integrate with the current machinery controls found on the main engines (governing systems), the Pneumaflex clutches, the LIPSTRONICS® remote control systems and the controllable pitch propeller system. The new system must also provide new control panel stations both in the engine room and on the bridge.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

1.2.1.4 Produce all required electrical diagrams and any other drawings required to obtain the proper approvals.

1.2.1.5 Plan and conduct a Factory Acceptance Test(s) (FAT) to demonstrate the effectiveness and performance of the new propulsion system controls.

1.2.1.6 Provide all the necessary equipment and components to carry out the project, as well as all the required labour and technical support to deliver a final functional product.

1.2.1.7 Remove all redundant equipment and wiring that is no longer required on the vessel.

1.2.1.8 Verify the existing wiring and conductors that will be reused in the new system.

1.2.1.9 Install and connect all of the equipment of the new controls system, according to a detailed work plan pre-approved by the CG TA.

1.2.1.10 Put entire new system into service using a safe method, which includes both dock and sea trials to assess the vessel's performance in all operating modes.

1.2.1.11 Provide advanced training to Canadian Coast Guard personnel in charge of operating and the troubleshooting the new control systems.

1.3 Background

1.3.1 The CCGS Leonard J Cowley is a steel hulled vessel built at the West Coast Manly Shipyards Ltd. in Vancouver BC. The vessel was launched and placed in service in 1985. The vessel is currently delegated to the American Bureau of Shipping (ABS) in accordance with the Transport Canada Marine Safety and Security (TCMSS) Delegated Statutory Inspection Program, (DSIP). The vessel is certified for 'Unlimited' voyages in accordance with the Canada Shipping Act 2001 and the Safety Convention as per the Regulations, Standards and Codes referenced therein. Inspection of the vessel in accordance with the Canada Shipping Act 2001 must be carried out by ABS as required for the purposes of this Vessel Life Extension (VLE) Contract.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

1.3.2 For the intention of this statement of work the term “Class” refers the American Bureau of Shipping and all of its requirements.

1.3.3 Although some technical improvements have been made to the CCGS Leonard J Cowley in recent years, many of the propulsion system's core components are original and are approaching the end of their serviceable life. This situation poses several problems in terms of spares provisioning and cause a general deterioration of all systems over the years. The mandate of the modernization/upgrading program is to guarantee the reliability of these systems for an additional minimum of fifteen (15) years.

1.4 Scope of Supply

1.4.1 The Contractor’s proposed design must as a minimum include the following components:

1.4.1.1 Should the design require a remote control cabinet be supplied, it is to be fitted in the engine control room (ECR) in the location previously occupied by the LIPSTRONIC® control cabinet.

1.4.1.2 One (1) E.C.R. Control Panel.

1.4.1.3 One (1) Wheelhouse Control Panel.

1.4.1.4 One (1) Port Wing Station Panel.

1.4.1.5 One (1) Stbd wing Station Panel.

1.4.1.6 One (1) Telegraph system.

1.4.1.7 One (1) Notebook computer c/w SSD drive storage and with measurement software. (As applicable)

1.5 Objectives of the New System

1.5.1 The new system must allow for the replacement or elimination of the outdated equipment found both in the engine room and in the wheelhouse.

1.5.2 Within the nominal values and specific limits of each power equipment, the system must be able to interface, control effectively and safely the following:

1.5.2.1 The power equipment to be controlled:

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

1.5.2.1.1 Propulsion diesels (two (2) in number)

1.5.2.1.2 PNEUMAFLEX Friction Clutch (two (2) in number)

1.5.2.1.3 LIPS Controllable Pitch System (one (1) in number)

1.5.2.2 Maintain or improve all control, regulation, protection and display functions found in the current system.

1.5.2.3 Take advantage of technological advances to incorporate the many electronic/analog circuits of the current system into a digital environment.

1.5.2.4 Offer high operational reliability through the judicious selection of equipment and a design that incorporates several redundancy functions.

1.5.2.5 Reduce the number of electrical/electronics connection points to decrease maintenance time and reduce potential malfunction sources.

1.5.2.6 Use equipment and components easily available on the Canadian or American industrial market.

1.5.2.7 Have its own alarm monitoring system to supervise all new propulsion control equipment and offer accurate malfunction diagnostics.

1.6 General Particulars of Vessel

Name:	CCGS LEONARD J. COWLEY
Type:	Offshore Patrol Vessel
Year built:	1985
Identification:	CGSB/IMO: 8320494 /MMSI: 316034000
Official CCG number:	805574
Builder:	West Coast Manly Shipyards
Port of registration:	Ottawa, Ontario
Home port:	St. John's NFLD

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

Length:	72 m (236.4 ft.)
Breadth:	14.2 m (46.6 ft.)
Draft:	4.5 m (14.76 ft.)
Gross register tonnage:	2188 T
Net register tonnage:	655 T
Load displacement:	2110 Tm
Maximum propeller power:	3160 KW
Maximum speed:	14 knots (25.9 Km/h)

Table 1 – Basic characteristics of the CCGS Leonard J Cowley

1.7 Overview of the Current Propulsion System

1.7.1 The CCGS LEONARD J. COWLEY's existing power plant consists of two (2) NOHAB ~~POLAR~~, twelve (12) cylinder diesel engines in a "Vee" configuration. Each engine outputs to a LOHMANN & STOLTERFOH Gearbox rated at 3120 Kw (1560 Kw per input) through a Lohmann+Stolterfoht Pneumaflex friction clutch with a maximum output RPM of 230 r/min, which in turn is connected to a single shaft fitted to a single LIPS Controllable Pitch Propeller (Model 4C09SW-ST).

1.8 Machinery Particulars (Existing)

1.8.1 Main Engines

- Make: Nohab ~~Polar~~
- Model: F312A (x 2)
- Bore: 250 mm
- Stroke: 300 mm
- Number of Cylinders: 12 (Vee Configuration)
- Power (MCR) : 1560 Kw
- RPM (MCR): 750 r/min
- Engine Rotation: CW (seen from the flywheel towards the engine)
- Governor Type: Electronic c/w mechanical override/backup
- Weight: 17.2 tonnes

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- Serial Numbers: 3355 (Port), 3356 (Stbd.)

1.8.2 Reduction Gearing

- Make: Lohmann & Stolterfoht
- Type: GVA 1250 B/ No.1358
- Gear Reduction: 3.2632 : 1
- Input: 2 x 1560 Kw
- Input RPM: 750
- Output RPM: 230
- Input Rotation: CW (direction of rotation facing flywheel)
- Output Rotation: CCW (ahead facing gearbox output flange)
- Bearing Type: Babbitt Metal

1.8.3 Input Clutch (x2)

- Make: Lohmann & Stolterfoht
- Type: Pneumaflex
- Model: KAP 240

1.8.4 Shafting

- Mass - Propeller Shaft 5860 kg
- Mass - Intermediate Shaft 2885 kg
- Mass - Sleeve Coupling 480 kg
- Mass - Split Ring 148 kg

1.8.5 Propeller Particulars:

- Make LIPS Controllable Pitch
- Type 4C09SW-ST
- Power 3120 KW (nominal)
- RPM 230
- Diameter 2800 mm

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- Design Pitch (ahead) 28.07degrees
- Bollard Pitch (ahead) 25.76 degrees
- Bollard Pitch (astern) 18.50 degrees
- Rotation CCW (ahead facing gearbox output flange)
- No. of Blades 4
- Weight 4170 kg
- Mass - One Blade 430 kg
- Moment of Inertia 1280 J (KgM²)

1.9 Related Specification Items

1.9.1 This work must be carried out in conjunction with the following specification items:

1.9.1.1 Overhaul of the Port and Stbd Main Engines

1.9.1.2 CPP System Inboard Hydraulic Upgrade

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 See General Notes

2.1.1.1 All design, material and work must meet the Classification Society's (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify and coordinate any specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines referenced in this specification, (reference Section 4.0 of the General Requirements Section).

2.1.1.2 Any TCMSS approvals, required of the design, material, and work, over and above the Class approvals, must be met as and when required.

2.1.1.3 The Contractor must plan and coordinate all statutory inspections and classification surveys in collaboration with the authority concerned. All signed and dated official documents must be delivered to the Coast Guard Technical Authority (CG TA).

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

2.1.1.4 At least twenty-four (24) hours' notice must be given before statutory inspections or scheduled classification surveys are to be performed so that the CG TA may arrange attendance by the CG.

2.1.1.5 Any TCMSS approval, of the design, material, and work, over and above the required Class approvals, must be met as and when required.

2.1.1.6 The following documents and/or drawings are being referenced for guidance purposes only and a complete listing of available documents and drawings for the CCGS Leonard J Cowley's VLE Project is included in Appendix A of this VLE's Technical Data Package.

Drawing N^o.	Description
N ^o . 12555	Wartsila Nohab Instruction Manual
N ^o . 5761-1940	Wartsila Diesel Engine F312A - Manual
4/1182/4021/0	Lohmann+Stolterfoht Highly Elastic Friction Clutch PNEUMAFLEX
FAMP-S	ASEA Operation of Main Engine & Clutch Controls Manual
UAI 4220.2000	ASEA Console Drawing Manual
UAI 4220.2000	ASEA Torductor, DEGO-S Manual
H02185/CP 142	LIPS B.V. Controllable Pitch Propellor System

2.2 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 Canada Shipping Act

2.3.2 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.3 ABS Rules and Regulations

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

2.4 Contractor Supplied Materials

2.4.1 The Contractor must supply all labour, technical expertise, equipment, parts, materials and tools required to perform the work as specified.

2.5 Field Service Representation

2.5.1 The Contractor must also include in their proposal the price to provide the services of a qualified Field Service Representative(FSR) for the new propulsion controls installation. The FSR must be fully familiar with the control types and model being installed and must oversee the installation of all components as well as their related commissioning, testing and training.

2.6 Government Supplied Equipment

2.6.1 N/A

2.7 Government Furnished Equipment

2.7.1 N/A

Part 3 – Technical Description

3.1 General Requirements – Design and Installation

3.1.1 The design method selected by The Contractor to meet the requirements presented in this technical statement of requirements must ensure that the proposed design meets the objectives of this TSOR and, unless indicated otherwise, maintain, or improve all control, regulation, protection, and display functions found on the current system.

3.1.2 Although the vessel's propulsion comprises two (2) identical and independent control systems (Port/Starboard), some sections of this document are presented in the singular to simplify the text. It is understood that the entire upgrading / modernization project must apply to both systems.

3.2 Preliminary Design Package (PDP)

3.2.1 The Contractor must submit a preliminary design package (PDP) to allow the Canadian Coast Guard the ability to provide feedback at an early stage of design.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.2.2 The Contractor's PDP must contain, at the minimum, the following documentation and design details:

- 3.2.2.1** Project schedule including design, installation, testing and commissioning of the new propulsion systems;
- 3.2.2.2** Documents and Drawings Management Plan;
- 3.2.2.3** Integration Management Plan for new and retained systems/components;
- 3.2.2.4** Systems bills of Materials and specs;
- 3.2.2.5** Regulation & Control systems philosophy descriptions;
- 3.2.2.6** Speed and Load curves for all propulsion modes and configurations of the new system;
- 3.2.2.7** General arrangements;
- 3.2.2.8** Systems block diagrams;
- 3.2.2.9** User interface & alarm system documentation;
- 3.2.2.10** Power supply arrangement;
- 3.2.2.11** Description of safety functions;
- 3.2.2.12** Preliminary information about Factory Acceptance Tests (FAT) of the new system;
- 3.2.2.13** Preliminary information about the propulsion controls commissioning program;

3.3 Technical Drawings

3.3.1 The Contractor must produce all drawings & diagrams necessary for the design and execution of work on the new control system. These drawings must provide a view of all equipment and circuits in the propulsion system, including those that will be kept from the old system and incorporated into the new installation. The drawings must also include all necessary information so that a qualified technician

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

can conduct a quick, complete, and specific search in case of malfunction or for any other reason.

3.3.2 Generally, the drawings must include or describe all of the following elements:

- 3.3.2.1** Detailed cover page and index;
- 3.3.2.2** Abbreviations and symbols used;
- 3.3.2.3** Identification and specification of equipment;
- 3.3.2.4** Location and physical representation of equipment;
- 3.3.2.5** Block diagrams giving an overview of the main systems;
- 3.3.2.6** Power supply circuits;
- 3.3.2.7** Control and display circuits, including PLC and Input/Output (I/O) modules (if fitted);
- 3.3.2.8** Power circuits;
- 3.3.2.9** Communication circuits;
- 3.3.2.10** Cables and connections between the different equipment components;
- 3.3.2.11** All other references or details required to understand the system

3.3.3 It is the responsibility of The Contractor to update or redraw all original vessel drawings affected by this upgrading / modernization project. Changes made to the old drawings must be denoted in a different colour or style. If more than 20% of an original diagram pertaining to the propulsion system is changed, the diagram must be redrawn in full, in DWG (AutoCAD) format. Although some original diagrams are kept in a series, this should not prevent all drawings from being homogenous in presentation, numbering and method of interpretation.

3.3.4 All drawings designed or modified must be presented individually in digital format in the most recent version of the DWG (AutoCAD) standard and allow for optimized standard 11x17 in. (ANSI B) printing. An exception may be made to the size of certain drawings in order to give an adequate view of the entire system, provided these are presented in a separate series. A grouped Adobe PDF version

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

must also be provided for each series of drawings to facilitate electronic consultation (one PDF file per series of drawings).

- 3.3.5** The first full version of drawings and other design documents must be submitted to both the designated Class (ABS) the CG TA for review and approval.
- 3.3.6** The approved drawings used during the Work must be kept up to date as installation work progresses, and additional approval of any subsequent changes made to the original version is required. A list of changes must be created and kept up to date to track the history of changes throughout the installation process.
- 3.3.7** Three (3) hard copies of the final version(s) of the “as fitted” drawings must be provided at the end of the project. The different series of drawings printed in 11x17 (ANSI B) format must be properly bound. The digital version of drawings must also be provided (DWG & PDF). DWG (AutoCAD) files must not be electronically protected, and the CCG must be able to modify all elements as needed in any future changes.

3.4 Equipment Selection

- 3.4.1** Main equipment and components used to achieve this upgrade project must be of recent design while having proved their reliability on the industrial marine market over the last two (2) years. To the extent possible, they must also be technically supported by the manufacturer for the next fifteen (15) years.
- 3.4.2** The Contractor must choose equipment/components, easily available from the OEM manufacturers or other qualified distributors already established on the Canadian or North American industrial market. Custom-made or experimental products are not acceptable for this project. All equipment, components and other materials must be new.
- 3.4.3** To the extent possible, the new system's design and the proposed equipment selection must be made to minimize the inventory of spare parts required on board the vessel.
- 3.4.4** If a piece of equipment or a device requires connecting a high number of electrical conductors, priority must be given to devices with pluggable terminal blocks ("plug-in") to facilitate replacement in the event of failure.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.4.5 Selected equipment must be able to withstand a variation of +/- 10% of the voltage and frequency when powered by alternating current (AC). If the equipment is powered directly by a DC circuit from a charger/battery set or an UPS, the equipment tolerance must be from -25% to +30% VDC to withstand voltage variations.

3.4.6 Selected equipment must not be affected by the use of portable communication devices found on the vessel. These devices are UHF and transmit with 5 Watts of power on a frequency band varying from 136 to 870 MHz They are frequently used in the control room close to various cabinets and elsewhere throughout the engine room.

3.4.7 Any fixed or portable computers provided under this modernization / upgrading project must all have SSD (Solid State Drive) hard disks to provide the best performance and greater shock and vibration resistance.

3.5 Ambient Operating Conditions

3.5.1 General Information

3.5.1.1 All new equipment must be able to minimally and continuously withstand the ambient conditions described in Section 1.5 of IEEE-45 (2002 Edition)

3.5.2 Temperature and Humidity

3.5.2.1 The ambient temperature must never exceed the operating threshold established by the manufacturers of the various equipment/components. It is the Contractor's responsibility to ensure safe operating temperature(s) inside the cabinets at all times. If necessary, a cooling system must be added.

3.5.2.2 Where fans are added to allow for additional air supply in the cabinets, a filtration method must be provided to prevent the accumulation of dust inside. The fans must then be accessible to allow for easy filter replacement.

3.5.2.3 New equipment must be able to withstand ambient humidity of up to 95%, without condensation. (See IEEE-45, section 1.5 for details).

3.5.3 Shock and Vibration Resistance

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.5.3.1 All equipment and components of the new propulsion control system must have shock and vibration resistance that takes into account the specific operational characteristics of the vessel.

3.5.4 Use of Cabinets and Consoles

3.5.4.1 Unless indicated otherwise in this document, wherever possible all equipment and main components of the new propulsion control system is to be installed in the existing cabinets. These cabinets are as follows:

3.5.4.1.1 The engine room main control console (PCC)

3.5.4.1.2 The diesel engine control panels

3.5.4.1.3 The navigation consoles located in the wheelhouse

3.5.4.2 It will be the Contractor's responsibility to mechanically and electrically adapt the inside of the various cabinets and consoles to accommodate the new system's equipment and components.

3.5.4.3 Any metal supports, brackets, and chassis added inside the cabinets to facilitate the installation of the new components must provide solid strength and adequate conductivity with the vessel's electrical grounding.

3.5.4.4 All cabinets must be thoroughly cleaned after the old equipment is removed, and two (2) separate coats of non-flammable paint must be applied on the inside walls of the cabinets in order to conceal areas of discolouration and other permanent marks. The type of paint must be approved by the CG TA.

3.5.5 Equipment Installation

3.5.5.1 New equipment and components must be positioned in such a way as to be accessible for troubleshooting and to allow for easy replacement if necessary. The method for securing equipment must not involve free nuts, which can fall and be lost when replacing equipment (anchor points must be fixed).

3.6 Wiring and Connection of Equipment

3.6.1 List of Wiring Tasks

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.6.1.1 Before beginning the work, The Contractor must produce a detailed list of required cables and connections in preparation for the new system's installation. This list must allow for assessment of all the following points:

3.6.1.1.1 Old cables/conductors to be removed from the system before beginning the work

3.6.1.1.2 Old cables/conductors to be retained for reuse

3.6.1.1.3 New cables/conductors to be installed

3.6.1.2 For all conductors/cables added or retained, the Contractor must also provide the following information:

3.6.1.2.1 The conductor's identification number

3.6.1.2.2 The cable identification number to which it belongs (if applicable)

3.6.1.2.3 The number of reserve conductors in each cable

3.6.1.2.4 The conductor's gauge (AWG)

3.6.1.2.5 The conductor's current limit

3.6.1.2.6 The conductor's connection points (source and destination terminals)

3.6.1.2.7 The type of cable/conductor: Armour (Shield), voltage and temperature

3.6.1.3 This list must cover all cable/connection work and is to be presented before the beginning of the work for verification and approval by the CG TA.

3.6.2 Use of Old Cables/Conductors

3.6.2.1 With the exception of communication cables, which must all be removed or replaced, existing cables or conductors may be reused in the new control system if needed. The Contractor must nonetheless ensure that the old cables or conductors comply with the current applicable regulations and that they meet all of the following general requirements:

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- 3.6.2.1.1** The cable must successfully pass a series of tests to measure the insulation resistance between different conductors, as well as the insulation resistance between each conductor and the vessel's grounding. This test must be conducted at a voltage of 500 volts and the insulation level must be greater than 100 Megohms. The results of these tests must be documented and submitted to the CG TA.
- 3.6.2.1.2** The cable must be suitable for the function for which it will be used and comply with all requirements established by the manufacturers of the new equipment. Special attention must be paid to low intensity analog signals, which can be affected by the many electromagnetic fields present on the vessel. Cables carrying this type of signal must all be shielded, and the shield must be connected to the vessel's ground at one end only (source side).
- 3.6.2.1.3** The ends of the cable must be inspected to ensure that the conductors' insulation or terminals are not damaged.
- 3.6.2.1.4** The cable must be re-identified along its length if its identification number is changed during the design of the new system.
- 3.6.2.1.5** The conductor must be re-identified at the connection points if the identification number is changed during the design phase or if the identification currently in place is no longer legible.
- 3.6.2.1.6** The conductor may not, in any way, be extended with crimp sleeves if it is too short to properly connect to the new equipment. If required, junction boxes may be added where cables need to be extended.

3.7.1 Old Cables To Be Removed

- 3.7.1.1** All old cables and conductors that are no longer useful must be removed by The Contractor. If any of these cables crosses a watertight bulkhead or a firewall, the hole left by its removal must be properly sealed (crossover

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

plug or gland). The addition of silicone caulking is not acceptable for plugging holes.

3.7.2 New Conductors and Cables

3.7.2.1 New conductors and cables must be suited to the function for which they are intended. They must comply with all maritime standards described in the TP127 document.

3.7.2.2 Cables used for communication or carrying analog signals must be industrial type and have shielding against interference. The cable's exterior jacket must also adequately withstand mechanical stress.

3.7.2.3 A 10% minimum of reserve conductors must be provided within each new control cable to allow for future modifications.

3.7.3 Passage and Securing of Cables/Conductors

3.7.3.1 All cables/conductors must be secured and/or passed inside the cabinets or between the various cabinets using existing supports and cable trays. If necessary, the Contractor must add additional supports or cable trays to adequately secure or contain the cabling.

3.7.3.2 The passage of cables and conductors inside the cabinets must not restrict access to the equipment. It must be easy to maintain or replace the different pieces of equipment as needed, without having to move a cable set.

3.7.4 Connection and Identification of Conductors

3.7.4.1 The various rail-mounted terminals that date from the vessel's construction (1978) must all be replaced with new ones or removed if no longer required. Newly installed terminals must be single-level industrial type and offer high vibration resistance. They must allow for access by measuring equipment probes for diagnostic purposes.

3.7.4.2 Conductors must all terminate their run on a terminal block, even if they are not used electrically by the system (spare conductors).

3.7.4.3 Each terminal strip must have an identification code to establish a relationship with the corresponding electrical diagram(s). Each individual

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

terminal must also be identified by a number.

3.7.4.4 All electrical conductors must be individually identified at both ends using labels made of a plastic material. The printed numbering must be indelible to water and resistant to dust particles and oily deposits. The label must be easily visible without having to move the wires or cables.

3.7.4.5 The new cables must be identified in compliance with the same conditions as for the conductors. If the cable crosses a bulkhead, an additional label must be added on each side of it. If environmental conditions are harsh, potentially causing the label's legibility to deteriorate over the long term, the label must be made of metal and the inscription must be embossed.

3.7.4.6 As on the current system, the numbering of conductors must follow a logic that makes them easy to search for and find. This implies that each conductor connected at a single point of electrical contact must have the same identification number.

3.7.4.7 The number displayed on a conductor must make it quick and easy to find on the electrical diagram and make it easy to determine to which system it belongs (Port, Starboard, common circuits).

3.7.4.8 For new conductors, The Contractor must either use an identification method that integrates perfectly with the method used for retained circuits or plan to re-identify all old conductors in order to adapt them to the new tracking system.

3.8 Removal and Disposal of Old Equipment

3.8.1 All redundant equipment, cables and other materials must be removed from the system, transported off the vessel and disposed of by The Contractor. If a piece of equipment to be disposed of is too large to be removed without modifying the vessel's internal structure, The Contractor must dismantle the equipment into several pieces in order to transport it.

3.9 Existing Propulsion Controls – Operational Philosophy

3.9.1 This section is not intended to describe all technical aspects of the current system in detail. In order to properly assess the scope of the work, The Contractor must

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

conduct its own analysis based on the numerous documents and diagrams available.

3.10 Speed Control of Diesel Engines

3.10.1 The existing speed control of each engine is controlled by an electronic governor system. The input signal to the system is provided by an electro-magnetic pickup which senses the speed rotation of the flywheel.

3.10.2 The signal is processed by the electronic control box (ASEA DEGO-S) and the control signal from the control box is passed to a Barber Coleman electronic actuator. The movement of the actuator is transmitted mechanically via the fuel linkages to the injection pumps.

3.10.3 Each system consists of the following components:

3.10.3.1 Electronic Control Box

3.10.3.2 Speed Sensor

3.10.3.3 Junction Box

3.10.4 The components of the governor system are mounted on each engine. The speed sensor is placed on the fly-wheel position pointer. The junction box is located on the side of the control cabinet and the electronic control box is mounted on top of the actuator.

3.10.5 As the installation is a multi-engine design driving a common variable pitch propeller, the governor systems are linked together, electrically, to ensure that the load is equally divided between each engine when they are in operation at the same time.

3.10.6 Overall load control throughout the complete speed range, is carried out by the electronic load control system supplied by the LIPSTRONIC® Control System. The input signals to the load control system comes from a separate fuel pump rack position transmitter linked to the racks on the engine and from a speed transmitter on the propeller shaft.

3.11 PNEUMAFLEX Clutch

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.11.1 Each clutch is a combination of a double cone friction clutch and a highly torsionally elastic shaft coupling. Each clutch operates on compressed air which upon actuation is fed to the clutch cylinder via a rotating air supply system.

3.11.2 The control of each clutch is done electro-pneumatically from a signal provided by the LIPSTRONIC® control stations with control station transfer. Controlling is only possible from the control station which is in command.

3.12 LIPSTRONIC® Remote Control

3.12.1 Purpose of the LIPSTRONIC® remote control system is to control the controllable pitch propeller and the speed setting of two (2) main engines, as well the capability of starting and stopping of the main engines and the clutch control system.

3.12.2 Remote control is possible from either the Engine Control Room (ECR) or from one of the three (3) control stations located in the wheelhouse (WH).

3.12.3 On the ECR/WH panel a selection of Follow Up (FU) pitch control or Non Follow UP (NFU) pitch control is possible.

3.12.4 The remote control system offers two (2) possible modes of operation:

3.12.4.1 Follow-up (FU) control or lever control. The propeller can be operated in two (2) pitch modes:

3.12.4.1.1 Combined pitch and RPM for two (2) engines or

3.12.4.1.2 Combined pitch and RPM for one (1) engine.

Lever demands are rate-limited. A load control system avoids main engine overloading.

3.12.4.2 Non follow-up (NFU) control or push-button (back-up) control. The propeller pitch is controlled by means of AHEAD and ASTERN push-buttons. The push-buttons are directly controlling the hydraulic valve of the pitch control. During NFU control the load control system is not active. There is an extra emergency mode of pitch operation possible independent of the remote control system:

3.12.4.2.1 Manual valve control or mechanical control. The propeller pitch is controlled by manual control of

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

the hydraulic valve of the pitch control on the OD box (Oil distribution). Engine control must then also be manual. Telegraph communication is now necessarily.

3.12.5 Follow-up (FU) control is possible from all control panels. During FU control the pitch demand is compared with the actual pitch (feedback potentiometer in the OD-box). The valve controller drives the hydraulic valve with the necessary voltage. This voltage is a function of the difference between pitch demand and actual pitch. The lever unit of the station, which is in control, sets the pitch and RPM demand.

3.12.6 The lever units on the Wheelhouse and ECR are equipped with an electric shaft system which means that the lever units not in control are following the position of the lever unit which is in control. Outside the lever pitch setpoint the pitch can be reduced via following interrupted actions as load control, pitch to zero, or freeze. A "Pitch to zero" order is given when there is a shutdown or Emergency stop active. A Freeze order is given when a sensor or power supply failure occurs.

3.12.7 The demand set by the lever unit of the station, which is in control, is rate-limited. A running-up/down module is active which incorporates three (3) rates for pitch increases and three (3) rates for pitch decreases. A special time program for warming-up and cooling down the engines is available. This program can be selected by push button "Slow Rate Limit Operated", change over to another running-up/down schedule will be selected. Also, an emergency rate limited time is foreseen. The running-up/down module will be overruled when Emergency push-button (NFU) control is selected. The running-up/down module is set to the emergency rate time.

The control parameters of the rate-limiter are adjustable.

This has been modified in the past and only one speed of pitch activation

3.12.8 For pitch scheduling there are two (2) modes of operation:

3.12.8.1 Combined control for one engine:

3.12.8.2 Combined control for two engines

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

Modes will be automatically selected by the number of clutches which are engaged.

3.12.9 For the RPM control there are two (2) possible modes of operation:

3.12.9.1 Combined pitch with RPM (Automatic).

3.12.9.2 Manual RPM control with push buttons.

Automatic/ Manual RPM control is manually selectable via a switch.

3.12.10 When Automatic RPM control is selected the setpoint RPM is coming from the lever unit which is in control and going to the engine governor(s). By selecting Manual RPM control, with the push buttons "Increase", "Decrease" RPM the setpoint to the governor(s) can be adjusted. A bump less take over from Automatic to Manual RPM control is provided.

3.12.11 The Load Control System will reduce the pitch demand (coming from the pitch schedule) whenever a main engine overload is sensed. The pitch demand will be reduced such, that for the main engine the actual fuel rack position stay below the maximum allowed fuel rack position.

The maximum allowed fuel rack position (proportional to fuel demand) is the lowest value of:

3.12.11.1 Maximum allowed fuel rack position for continuous operation. There is one schedule for maximum allowed fuel-rack position.

3.12.11.2 The limit set with the "load limit" potentiometer at the ECR panel. This limit can be set between 50% and 100%.

3.12.12 The load controller acts such that the pitch is quickly reduced and is slowly increased. In case of a wire-break of the fuel rack sensor signal or a disengaged clutch the signal is set to zero, thus setting the load control system inactive (for the corresponding main engine). The load limit, level can be overruled with the push-button "BY PASS LOAD LIMIT" on the bridge. When an overload occurs, this will be indicated by the "OVERLOAD" lamp on the Bridge.

The engine governor(s) supplies the fuel rack and engine speed input signals. The load control has also a heavy sea detection what means that

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

by extreme load fluctuations the permitted load will brought down so that load peaks just will cause small overloads.

3.12.13 For pitch indication a separate feedback potentiometer for actual pitch is mounted on the OD-box. Pitch indication is available on all panels.

3.12.14 The system for shaft RPM is executed by a separate independent system (Torductor).

3.12.15 The engagement of a main engine to the reduction gear is ordered by pressing the “Execute” and “Clutch engage” for the appropriate engine.

However, when one of the following interactions appear the engage signal will be reset:

- Declutch internal
- Push button “Disengage clutch” has been pressed.
- Emergency control of clutches is on
- Shaft turning gear engaged
- Emergency declutch from WH is active.

3.12.16 When “Clutch Engage” is asked then lamp will flash to show that clutch will engage, as soon the clutch is clutched-in the lamp’s illumination will become steady.

3.12.17 In order for clutching engaged/disengaged to occur the below conditions must be met.

Clutching-in:

3.12.17.1 In order to clutch an engine in a command has to be given to “clutch-in” and the clutching-in will only take place if the following conditions are being met:

- Engine speed at “Idle”.
- When on Bridge control this goes by the remote control and in ECR by manual or remote.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- Pitch has to be in zero before clutching.

3.12.17.2 If there is an engine running and clutched in and the second engine has to clutched-in, then the follow condition must be met:

- Speed of the in-coming engine must be equal to the other operating engine within +/- 4%.

Clutch Disengage:

3.12.17.3 Disengaging a clutch is accomplished by pressing both “Execute” and “Disengage Clutch” push buttons at the same time. If there is a mistake and the clutch order is overridden by pressing “Clutch Engaged” push button, the disengage order will be cancelled.

3.12.17.4 If there are two (2) engines connected to the gearbox and one engine has to be disengaged, then the following will happen:

- Pitch decreases until pitch for one engine operation is achieved (within 30 sec.).

- An unload signal will be supplied to the engine governor system of the engine being disengaged. Load of the disengaged engine has to be below 40%.

- Clutch will always disengage after a pre-set time delay.

3.12.17.5 Disengagement for one engine who is engaged following happen:

- Pitch decreased zero degrees (within 30 sec.).

3.12.17.6 When “Disengage clutch” is ordered the indicator lamp will start flashing and when the ordered position is reached the lamp’s illumination will become steady.

3.12.17.7 Two (2) additional safety systems will also provide a

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

“Disengage Clutch” command when the following conditions arise:

- Engine speed drops below 25% idle for more than five (5) seconds.
- Engine load is lower than 5% and for thirty (30) seconds.
- By a Shutdown or Emergency stop command or if the shaft turning gear is engaged (after one (1) sec.).
- Gearbox LO pressure low and Excessive slip after three (3) sec.

3.12.17.8 The aforementioned time delays are used to allow the propeller pitch to start decreasing and allow time for the engine(s) to unload. If for some reason the remote control is out of order, then this “Declutch” command will be given via the hardware side and the time delays of 1-3 seconds are no longer possible.

3.12.18 When in the ECR the “Emergency Clutch Control” is activated the direct control of the clutch is obtained.

3.12.19 Starting and stopping of the engines is commanded separately to the control cabinet by pressing the start or stop pushbuttons together with the “Execute” button.

3.12.20 Start of an engine is allowed if none of the following start blockings are active:

3.12.20.1 Turning gear engaged.

3.12.20.2 Shutdown.

3.12.20.3 Emergency Stop

3.12.20.4 Start blocking (pre. lube oil flow).

3.12.21 The starting air solenoid will stay energized as long the push buttons “Start” and “Execute” are being pressed unless the engine speed goes higher than the ignition speed level or the maximum starting time is passed.

3.12.22 Automatic starting is not possible if:

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- 3.12.22.1** The corresponding clutch is engaged.
- 3.12.22.2** Emergency start control is active
- 3.12.22.3** “Stop Engine” is pressed same time as “Start Engine”.
- 3.12.23** An engine will stop automatically if there is Emergency Stop command or a Shutdown command.
- 3.12.24** A Stop command is blocked if:
 - 3.12.24.1** The clutch engaged or
 - 3.12.24.2** The Emergency Start/Stop control is active.
- 3.12.25** When stop solenoid is energized it will stay on for thirty (30) seconds after the engine speed has dropped below 50% of the ignition setting. The thirty (30) seconds stopping time is not seen as a blocking signal so an immediate engine re-start can be given.

3.13 New System Requirements

In case of a remote control failure a separate Telegraph system between Bridge and Engine room will be activated. This arrangement is not currently fitted in the existing system.

3.13.1 Safety Protections

- 3.13.1.1** The new system must be designed such that it is impossible for an operator to cause a breakage of equipment following improper use of various manual controls.
- 3.13.1.2** The entire system must be designed to provide constant protection of persons and power equipment in the event of breakdown or loss of power on any control equipment. In other words, the new system must be completely fail safe.
- 3.13.1.3** When there is an unexpected loss of a power source due to a defect, the various regulation functions must be able to quickly adjust to avoid overloading the other power sources connected in parallel. In other words, when there

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

is more than one source in operation, a defect in one must never lead to a complete loss of control of the propulsion system.

3.13.1.4 It must not be possible to start the propulsion system if the manual propeller shaft brake is engaged or if the mechanism allowing manual rotation of the propeller shaft is engaged ("Turning Gear"). As is currently the case, the status of these protections must be displayed on the main control console and on the alarm system to enable the operator to be aware. The Contractor must provide for the replacement of existing limit switches with more recent models and ensure that the activation mechanism for these is reliable and properly adjusted.

3.13.1.5 Power circuits must be continuously monitored by a ground leak detection system. Any detected failure must be relayed to the monitoring and alarm system, as well as being indicated on the main control room display panel (Mimic) if fitted.

3.13.2 Pitch Direction Wrong Way Alarm System

3.13.2.1 The current propulsion system has an independent electronic module that generates an alarm if the propeller does not rotate in the same direction as the order received from the telegraph. This module is part of the obsolete equipment to be replaced, and the Contractor must propose a way to digitally incorporate this function into the new system, while complying with maritime regulations.

3.13.2.2 Distinctive audible and visual alarms must be present in the wheelhouse and the engine control room to warn personnel of a problem with the propeller direction. A delay must be added to the triggering of the alarm to prevent it from being activated during a normal transitional period in the speed control's direction.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- 3.13.2.3** The Contractor must provide a simple and effective simulation method to test the operation of this alarm when the vessel is in port and non-operational.

3.13.3 Alarm & Monitoring System

- 3.13.3.1** The Contractor must design and supply an alarm & monitoring system dedicated solely to the new propulsion control system (PCS). This alarm system must collect all faults and individual values available within the new PCS and make them accessible to the operator of the main control console.

- 3.13.3.2** An alarm & monitoring system is already installed in the main control room to display faults and values retrieved from the current PCS. Because it monitors the operation of several other devices on the ship, this system must be maintained functional.

- 3.13.3.3** To facilitate the integration of the new PCS, the Contractor may choose to use the same software and adapt existing screens.

- 3.13.3.4** If the Contractor provides a new PCS which already includes an alarm system from another manufacturer, it must ensure that the two (2) alarm systems could be properly integrated to avoid any confusion of the operator in charge of the surveillance.

- 3.13.3.5** Other requirements for the monitoring of propulsion alarms:

- 3.13.3.5.1** Displayed faults must be clear and detailed enough to enable accurate diagnosis. They must appear in chronological order and disappear only if the operator has read them, and the source of the problem has been corrected. If an error code is available, it must be displayed along with the alarm message to help locate the source of the failure. The Contractor must provide a list of

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

new propulsion alarms and all programming details to the TA for evaluation and approval. The description of the alarms must be displayed in English and with an option of displaying them in French as required.

3.13.3.5.2 Critical failures that have a direct effect on the speed or power available at the propeller must be visually and audibly distinctive from others to enable the control room operator to respond quickly. A distinctive audible and visual alarm must also warn wheelhouse personnel of this variance in system performance.

3.13.3.6 It must be possible to deactivate (or block) a specific alarm by a simple operation on the system operator interface. All deactivated alarms must be easy to identify and put back in operation as needed.

3.13.3.7 The system must allow for retaining and displaying an alarm history of at least four (4) weeks and offer a backup feature for a longer term as needed.

3.13.3.8 Alarms and other information must be displayed on a touch screen with a dimension of at least seventeen (17) inches. An alternative solution must be provided to allow the information to be viewed if this screen is broken.

3.13.3.9 The alarm system's design must provide for redundancy of the main hardware components, communication networks and programming to ensure operation even if there is a malfunction with any of the equipment.

3.13.3.10 Alarm system supply must be UPS type (24 VDC and/or 120 VAC).

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- 3.13.3.11** It must be possible to view all alarm system information from a portable computer linked to the network.

3.14 User Interface (Controls & Displays)

3.14.1 General Information

- 3.14.1.1** The current propulsion system essentially has manual controls and display devices on four (4) consoles:
- Main engine room console
 - Wheelhouse centre console
 - Wheelhouse port side console
 - Wheelhouse starboard side console

3.14.2 If new selector switches, pushbuttons or any other control methods are added, they must be designed and located so as to prevent accidental activation, while offering satisfactory accessibility and ergonomics for operations personnel.

3.14.3 All pushbuttons, selector switches and display devices that are not reused in the new system must be removed. The hole left by the removal of a manual control or display device must be properly plugged without leaving any trace. Once the work is done, the four (4) consoles must have a professional and uniform appearance.

3.14.4 The new drawings of the propulsion system must incorporate all existing display and control devices that are retained. The different wires and connection terminals must be identified to allow direct association with the new drawings.

Main Control Console (Engine Room)

In regards to the main control console located in the engine room, all manual controls related to the current propulsion system must be replaced or removed if they are no longer required. Any new switches or push buttons installed must be of equal or superior quality to existing components.

Wheelhouse Consoles

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

The three (3) wheelhouse consoles incorporate several display and control devices linked to the propulsion system. These devices, as a minimum, are as follows:

- Speed and pitch controls (telegraph) on each of the three (3) consoles
- Push Buttons and switches to transfer speed control between the wheelhouse and the engine room control console (on the centre console)
- Indicators showing availability of propulsion (centre console)
- Diesel engine motor status indicators (centre console)
- Wrong way alarm indicators (3 consoles)
- Propeller speed and pitch analog dials (3 consoles)
- Knobs to adjust indicator/dial light brightness (3 consoles)

Note: brightness adjustment must be possible over a range of 5% to 100%

The new system must incorporate the various control and display devices that currently exist on the three (3) wheelhouse consoles.

3.14.5 All analog dials used to display the speed of the propeller (RPM) must be replaced with new ones of same diameter. The new dials must be the same size and integrate analog and digital display in the same housing. These new dials must all have a backlight function, and it must be possible to decrease the brightness as required.

Supply to Control Equipment

3.14.6 The electrical distribution for the new propulsion control system(s) must be designed to allow the various main circuits to be powered by a secondary source should it be needed. It is the Contractor's responsibility to reconfigure or modify all existing power circuits, so they are adapted to the new system and adequately protected against short-circuits and overloads.

3.14.7 The Contractor must provide all power supplies required for the system's proper functioning. Each port/starboard system must have its own source, and an additional emergency power source (UPS) on each side must be provided in case of an outage in one of the main power sources.

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.14.8 All internal circuit breakers that feed control power inside the current propulsion system must be replaced by new ones or removed if no longer required.

3.14.9 The different fuses and fuse mounts dating from the vessel's commissioning (1985) must all be replaced or removed if they are no longer required. Where possible, the new fuses or fuse mounts must include a visual indication enabling quick identification of a defective fuse (open circuit).

3.14.10 The system must allow supervision of all primary and secondary supply sources of the control section (460VAC, 120VAC, 24VDC or others). A loss of power must be quickly detected, and a failure must be relayed to the alarm system to warn the operator. If this loss of power causes an outage on a circuit essential for control and regulation, action must automatically be taken to prevent any damage to power equipment.

3.14.11 The various standard power outlets (120 Volts AC) found in the different cabinets or close to them must all remain functional after the work has been completed. This requirement also applies to the lighting fixtures integrated into the main control console(s).

3.15 FACTORY TESTS, COMMISSIONING & SUPPORT

Factory Acceptance Tests (FAT)

3.15.1 The Contractor must perform a FAT to demonstrate that the new regulation and control method proposed will respond as quickly and efficiently as the current analog system. These tests must clearly attest that the propulsion system will always remain within the safe operating limits, regardless of the load applied to the propeller and the rate change of this load.

3.15.2 In summary, the FATs must prove that the new propulsion control system will offer an equivalent or superior performance than the current system installed.

3.15.3 These factory tests must be carried out in the presence of both the classification society representative and the CG TA.

Vessel Commissioning

3.15.4 It is the Contractor's responsibility to develop a detailed commissioning program that will allow testing of the new propulsion control system. This includes

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

verification of all protections and alarms, as well as verification and calibration of all feedback signals.

3.15.5 Sea trials must be planned to analyze system performance under different conditions. The results obtained from these tests must be compared to the performance observed on the former control system to measure the effectiveness of the new system. It is the Contractor's responsibility to make all necessary modifications and/or adjustments to obtain equivalent or better performance.

3.15.6 All details and procedures surrounding the commissioning program must be presented to the CG TA at least thirty (30) calendar days before the planned testing start date. All test results and other data collected during the commissioning program must be documented and submitted to both the attending ABS Surveyor and the CG TA for assessment.

Guarantee & Technical Support

3.15.7 A guarantee, including full technical support and manpower, must be provided for a period of one (1) year after the date of the vessel's commissioning and final approval of the new control system. During this period, the Contractor must provide the services of qualified technician(s) in case of any failure or operational problem with the new system at their own cost. If needed, a technician must be able to reach the Coast Guard base located in St Johns Nfld. within forty-eight (48) hours to give on-site support. This guarantee must include expertise, labor, replacement of defective parts and all travel expenses. If the ship is located elsewhere other than St. Johns, the Coast Guard will assume the additional travel costs required to reach the ship.

3.15.8 For a period of five (5) years, following the commissioning date, the Contractor must provide an update of any and all software, firmware, and licenses of the various computers both fixed and portable (if fitted) . This update must be done at least once per year, if applicable, and include the costs for services of a technician to perform these updates. These updates also applies to firmware of the different pieces of equipment within the system, if required.

Maintenance and Verification Tools

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

3.15.9 The Contractor must provide any special tools that may be required to perform maintenance and complete verification of the various pieces of equipment of the control system. These tools must be new.

Spare Parts

3.15.10 A detailed list of spare parts required on board the vessel must be proposed by the Contractor, at least three (3) months before the vessel's expected return to service. This list must meet the maintenance needs of the system for a period of at least five (5) years. The list must include a breakdown of the part, their part number and their associated cost in Canadian dollars. The cost for one set of consumables, and any other required parts for any annual maintenance to the system must be included in the bid.

4.0 DOCUMENTATION & TRAINING

4.1 General Information

4.1.1 The Contractor must provide all operating and maintenance manuals, as well as all materials and documents necessary for the training of personnel.

4.1.2 Manuals must be designed in accordance with the general principles described in section 9.2 of document IEEE 45 (2002 Edition). They must include clearly identified sections designed to provide accurate information on the entire propulsion system, both in French and in English.

4.1.3 All manuals must be presented in 8.5x11 inch format inside standard, D-ring quality binders. In addition to the printed manuals, a digital PDF (Adobe) version of all documents must be provided. If certain schematics or block diagrams are initially drawn in DWG (AutoCAD) or another format, this format must also be included digitally.

4.1.4 An initial digital version of the different manuals must be presented to the TA at least one (1) month before producing the final version and providing training to personnel.

4.2 Operating Manual

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- 4.2.1** The operating manual must include all the information necessary for a complete analysis of the various functions and procedures related to the system's use, both in English and in French.
- 4.2.2** To facilitate comprehension, the descriptive text must be accompanied by schematics, diagrams and/or photos providing a visual representation of the various elements presented.
- 4.2.3** One section of this manual must clearly explain the different functions offered by the monitoring and alarm system as well as provide a description of potential failures and possible solutions.
- 4.2.4** The final version of the operating manual must be delivered in three (3) paper copies both in English and in French version for a total of six (6) manuals. Each series of manuals must include a 3 USB stick/harddrives with all documents digitalized. The digitized manuals must be directly from the OEM and not a scanned copy of the hard copy.

4.3 Maintenance and Troubleshooting Manuals

- 4.3.1** This manual must provide, in detail, all the information that would be needed to understand, repair, and maintain the propulsion control system. In addition to the documents created by the Contractor, this manual must also include all documents produced by the manufacturers of the different components and pieces of equipment. Depending on how it is organized and the number of pages, this manual may be presented in multiple volumes if necessary.
- 4.3.2** As a minimum the aforesaid manual(s) must cover:
 - Overall description of the system (design, specifications, and operation)
 - Block diagrams and operation logic of the systems
 - Overview, specifications, and functionalities of the supply circuits
 - Specifications and technical details of the monitoring and alarm system
 - Operation and details of the protection and emergency systems
 - Centralized list of recommended periodic maintenance
 - Methods of verifying the proper functioning of equipment and protections

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

- Troubleshooting, adjustment, and calibration procedures
- Methods of replacing main components
- Complete list of potential defects/alarms and possible solutions

4.3.3 To facilitate the purchase and stocking of spare parts, a document must also be created to identify all components of the new control system. This manual must include the following information, at a minimum:

- Manufacturer's reference number for the part
- Manufacturer's name
- Detailed description, including model and main specifications
- Quantity of identical parts found on the system
- Physical location of the part
- Reference to an electrical schematic (if applicable)
- Price for each part in Canadian dollars.

4.3.4 As with the operating manual, the final version of the maintenance manual must be delivered in three (3) paper copies (including an English and French version) for a total of six (6) manuals. Each series of manuals must also include 3 USB/harddrives with all documents digitized. The digitized manuals must be directly from the OEM and not a scanned copy of the hard copy.

4.4 Reports of Inspection Tests and Certificates

- 4.4.1** An additional binder must group together all official documents related to the certification, the installation, and the commissioning of the new system, including the various factory tests and other tests conducted on board the vessel. It is the Contractor's responsibility to keep the original manual up to date and ensure the accuracy of the collected data.
- 4.4.2** The Contractor must ensure that the CG TA has, at all times, an up-to-date copy of all documents and certificates produced.

5.0 TRAINING

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

5.1 General information

- 5.1.1** The Contractor must deliver a Training Plan and program schedule for all training, to the CG TA for review and comment, not later than four (4) weeks prior to the delivery of the vessel.
- 5.1.2** The training must be provided by one or more technical representatives directly involved with the supply of the new control system or by a Subject Matter Expert familiar with the control system installation and its operation.
- 5.1.3** The various reference documents used must be submitted to the CG TA at least four (4) weeks before the start of the training program.

5.1.4 All costs related to the training mentioned in this section 5.0 must be included in the bid

5.2 Training of Operators (Engineers & Deck Officers)

- 5.2.1** The Contractor must be responsible for developing and providing two (2) separate pre-delivery familiarization training programs on the new propulsion control system and its associated systems and equipment(s) installations. All training shall be provided in English at the Contractor's facility, and on-board the vessel.
- 5.2.2** The training must be provided for a maximum of **12** CCG personnel per course with one (1) course given for each crew shift. The CG TA will be responsible for arranging and coordinating the availability of the required personnel from each crew shift.
- 5.2.3** As a minimum the pre-delivery training must familiarize each participant with the following :
 - 5.2.3.1** Overview of the system and its operation;
 - 5.2.3.2** Manual controls and operating modes/sequences in real situations;
 - 5.2.3.3** Interpretation of main control console indicators and dials in order to correctly assess the general state of the system;

	CCGS Leonard J Cowley	
Spec Item #: HD-16	Specification	F7049-210183
PROPULSION CONTROL UPGRADE		

5.2.3.4 Operation of the alarm system and interpretation of failures

5.2.3.5 Operation and adjustment of diesel engine governors & speed controls;

5.2.3.6 Scenarios of potential technical problems and actions required to maximize the speed and effectiveness of responses.

5.2.4 The Contractor must also be responsible for developing and providing a Training Manual intended for the instruction of the vessel's operating personnel. As a minimum this manual must cover the following topics:

5.2.4.1 Review of general safety

5.2.4.2 Familiarization with the operation of the main engines, their governing systems, and the control systems (both at the local and remote locations) for both the engines, clutches, and CPP Systems

5.2.4.3 Safety matters and safety systems, particular to the propulsion control system installation.

5.2.4.4 Practical operation instruction and,

5.2.4.5 Maintenance and troubleshooting procedures

Note: The Training Manual may rely on the other manuals defined herein for detailed instructional purposes pertaining to the equipment.

5.2.5 Each course participant is to receive a hard copy version of the training manual and there are to be made available to them when they are taking the training, for reference purposes. Each training manual must come with a USB Stick and/or hard drive containing the digitalized contents of the Training Manual.

	CCGS Leonard J Cowley	
Spec Item #: HD-17	Specification	F7049-210183
WINDOW AND PORTHOLE REPAIRS		

HD-17 Window and Porthole Repairs..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to disassemble and reassemble 40 portholes and make repairs to sealing surfaces.
- 1.2** The Contractor must disassemble and reassemble 50 accommodation sliding windows and replace all seals with new Contractor supplied seals.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Ships Window Plan

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet Safety and Security Manual

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Marine Machinery Regulations (SOR/90-264)
- 2.3.3** Maritime Occupational Health and Safety Regulations (SOR/87-183)
- 2.3.4** ABS Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

Portholes

- 3.1.1** The Contractor must remove deadlight and window frame/box.
 - 3.1.1.1** The Contractor must fabricate and install new stainless steel window boxes for each porthole. The Contractor must bid a unit cost per window

	CCGS Leonard J Cowley	
Spec Item #: HD-17	Specification	F7049-210183
WINDOW AND PORTHOLE REPAIRS		

box to be adjusted up/down via PSPC 1379 action as required based on inspections by CG CE.

3.1.1.2 The Contractor must reinstall the deadlights.

3.1.2 The Contractor must install temporary fire blankets and protective coverings around port hole and on cabin furniture to protect the cabin and contents.

3.1.3 The Contractor must prepare the sealing surface for welding buildup.

3.1.4 The Contractor must build up sealing surface using welding, then finish the sealing surface with power tools to create an even sealing surface.

3.1.5 The Contractor must replace the rubber seal on all portholes upon completion of repairs.

3.1.6 The Contractor must chalk test each porthole upon completion of repairs and prior to hose testing. The Contractor must ensure ABS Class Surveyor and CG CE are present for chalk and hose testing.

Windows

3.1.7 The Contractor must remove window boxes and bulkhead panels surrounding window.

3.1.8 The Contractor must disassemble each window and layout for inspection by CG CE.

3.1.9 The Contractor must supply and install all window sealing material for 50 accommodation windows.

3.1.10 The Contractor must bid on fabricating or supplying 20 new drip trays. The location of these replacements to be determined by CG CE upon inspections. The Contractor must provide a unit cost per drip tray to be adjusted up/down via PSPC 1379 action as required.

3.1.11 The Contractor must reassemble window upon completion of inspection by CG CE. Any other components requiring replacement will be addressed via PSPC 1379 action.

3.1.12 The Contractor must bid on fabricating and installing new stainless steel window boxes for each window overhauled. The Contractor must provide a unit cost per window box to be adjusted up/down via PSPC 1379 action as required.

3.2 Location

	CCGS Leonard J Cowley	
Spec Item #: HD-17	Specification	F7049-210183
WINDOW AND PORTHOLE REPAIRS		

3.2.1 Various

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG CE and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 Each portholes must be chalk tested and hose tested with waterhose operating at shipboard water pressure for 10 minutes in the presence of CG CE and ABS Class Surveyor.

4.2.2 Windows must be hose tested with waterhose operating at shipboard water pressure for 10 minutes in the presence of CG CE and ABS Class Surveyor

4.3 Certification

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must provide a checklist indicating each window/porthole was chalk tested, hose tested, date performed and who witnessed. ABS survey credit for this item, as required, to be provided.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-18	Specification	F7049-210183
SEABAYS AND SEACHEST CLEANING AND INSPECTIONS		

HD-18 Seabays and Seachests Cleaning and Inspections..

Part 1 - Scope

- 1.1** The intent of this specification is to open up the seabays and seachests for cleaning and inspection. This will include descaling, power washing, inspections, new coating application and anode replacement.
- 1.2** An independent (CG Supplied) NACE Coating Inspector will be used to oversee the coating process and will report directly to the Chief Engineer.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Port Seachest Frame 42 – 44 Approx 24 m²
- 2.1.2** Stbd Seachest Frame 42 – 44 Approx 24 m²
- 2.1.3** Centerline Inboard Seabay Frame 42 – 44 Approx 85.5 m²
- 2.1.4** Forward Port Seachest Frame 80 – 82 Approx 32 m²
- 2.1.5** Anode Plan 1512-005-01

2.2 Standards

- 2.2.1** Fleet Safety Manual
- 2.2.2** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

- 2.3.1** CSA2001 – Hull Inspection Regulations
- 2.3.2** Maritime Occupational Health and Safety Regulations
- 2.3.3** ABS Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts and transportation required to perform the specified work unless otherwise stated.

	CCGS Leonard J Cowley	
Spec Item #: HD-18	Specification	F7049-210183
SEABAYS AND SEACHEST CLEANING AND INSPECTIONS		

Part 3 – Technical Description

3.1 General

- 3.1.1** The Seabay must be mechanically ventilated to the outside of the ship and must be safe for manned entry and a certificate to this effect to be obtained from certified Marine Chemist. Spaces must be tested each day that personnel are scheduled to be working here.
- 3.1.2** All of the areas listed in Section 2.1 must be inspected by ABS Class Surveyor, CE and NACE Inspector prior to cleaning.
- 3.1.3** The Contractor must remove and later reinstall grid plates to gain access to the area of work. Any disturbed steel work in the area, including all hull perforations and removable grids must be grit blasted and coated as per the paint scheme in the area. The Contractor must supply and fit new stainless steel bolts (3/4" x 1 3/4") for grids. There are estimated to be 60 bolts in total to be replaced. Bolts are to be secured by means of locking arrangement as per original design. The Contractor must supply unit cost per bolt to be adjusted up or down as required via PSPC 1379 action. All grids are to be reamed out and all holes cleaned of blockages before re-installation.
- 3.1.4** The Contractor must high pressure water clean all areas listed at 242 bar and provide a unit cost per m² to be adjusted up or down via PSPC 1379 action as required. The Contractor must collect the high pressure wash residue and dispose of as per Provincial Regulations. The Contractor must remove and supply/install new anodes in areas listed in Section 2.1
- 3.1.4.1** The Contractor must carry out chloride ion testing of prepared surfaces to ensure the chloride ions are not imbedded into the substrate when cleaning seabay to near white metal (SSPC-SP10) as specified. The acceptable chloride ion level shall be less than 2µg/cm². If chloride ion level, as specified is not attained, a rewash of the affected area shall be carried out using a soluble salt remover, such as Chlor-Rid Liquid Salt Remover at a dilution ratio of 1:100, sprayed on the affected area at a minimum of 20 mps (3000 psi).
- 3.1.5** The Contractor prior to grit blasting must plug all outlets (pump suction/discharge, level transducer) sounding, vents.

	CCGS Leonard J Cowley	
Spec Item #: HD-18	Specification	F7049-210183
SEABAYS AND SEACHEST CLEANING AND INSPECTIONS		

- 3.1.6** The Contractor must bid on grit blasting all areas listed in Section 2.1 to bare metal as per SSPC SP-10/NACE 2 Near White Abrasive Blast clean with an angular Surface Profile of 50-75 microns (2-3 mils). The Contractor must provide a unit cost per m² for blasting to be adjusted up or down by PSPC 1379 action. The Contractor must provide bid on powertooling areas listed in Section 2.1 to bare metal as per SSPC SP-11 in the event that grit blasting is determined to not be possible by CG TA and The Contractor.
- 3.1.7** The Contractor must clean all debris from grit blasting in preparing for coatings.
- 3.1.8** The Contractor must remove all debris from grit blasting put ashore and properly disposed of it in accordance with its provincial environmental regulations.
- 3.1.9** All ventilation requirements to assist in drying out of tanks prior to painting and to assist paint curing must be The Contractor supply.
- 3.1.10** The Contractor must arrange for 100 UT Shots to be taken at locations indicated by the CG TA. The CG TA and ABS Class Surveyor must carry out inspection when seabays are clean and internals are to be examined for wastage.
- 3.1.11** The Contractor must bid a unit cost for the replacement of 2m² of 3/8" plate to be adjusted up or down via PSPC 1379 action as required.
- 3.1.12** The Contractor must clean all associated suction cooling lines of all sea growth and mussels. The Contractor must have these lines isolated from their respective pieces of machinery to facilitate The Contractor in the breaking of flanges and the removal of these suction piping lines for cleaning. These lines are to be cleaned to the satisfaction of the CG TA. Once cleaned, these suction piping lines must be reinstalled using new Contractor supplied gaskets compatible with seawater.
- 3.1.13** The areas must be painted to the following schedule (product information sheets are attached). Before coatings begin the CG TA and CG contracted NACE Inspector must inspect hull to confirm correct coating removal and proper profile of steel is applied. The Contractor must bid an all inclusive unit cost per 1m² for the coating applied. Actual area coated to be adjusted up or down via PSPC 1379 action.

First Coat: Intershield ENA 300 Bronze at 6 mls DFT, to be applied, according to manufacturer's directions, to the bare steel areas.

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Spec Item #: HD-18	Specification	F7049-210183
SEABAYS AND SEACHEST CLEANING AND INSPECTIONS		

Second Coat: Intershield ENA 300 Aluminum at 6 mils DFT, to be applied, according to manufacturer's directions.

Third Coat: Intergard 263 Light Grey 4 mils DFT, to be applied, according to manufacturer's directions.

Final Coat: Interspeed 640 Black at 4 mils DFT, to be applied, according to manufacturer's directions.

Drying time between each coat to be as per paint manufacturer's instructions.

3.1.14 An independent (CG Supplied) NACE Coating Inspector will be used to oversee the coating process for each coat and their thickness and will report directly to the CG TA.

3.1.15 All coatings must be inspected, measured and passed by attending NACE Inspector and CG TA prior to areas being closed up.

3.1.16 The cleaned sea chests and sea bays must be submitted for inspection by the attending ABS surveyor and the CG TA for a survey credit, as required

3.1.17 The Contractor must provide protection for the anodes located in the area to be coated and must remove the protection before floating the vessel

3.2 Location

3.2.1 See Section 2.1

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.1.2 The Contactor must allow the CG TA and/or Inspection Authority the opportunity to visually inspect the grids, sea bays, sea chests and sea inlet strainers after the

	CCGS Leonard J Cowley	
Spec Item #: HD-18	Specification	F7049-210183
SEABAYS AND SEACHEST CLEANING AND INSPECTIONS		

areas have been cleaned and before the application of any surface coatings, and also an opportunity for a final visual inspection before closing up.

4.2 Testing

4.2.1 WFT and DFT measurement of each coating must be taken with calibrated gauges at locations agreed upon between The Contractor and CG TA. Such measurements must be witnessed by the NACE Inspector/ CG TA and recorded with locations referenced to the vessel shell expansion drawing. Unwitnessed measurements will not be accepted.

4.3 Certification

4.3.1 The Contractor must obtain an ABS survey credit for the applicable sea chests and sea bay areas

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-19	Specification	F7049-210183
UT SHOT SURVEY		

HD-19 UT Shot Survey..

This spec has been included in HD-11 Hull Inspection and Survey

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

HD-20 Steel Repairs and Renewals – FR 52 To 56..



CCGS Leonard J Cowley

Steel Repairs and Renewals – Frames 52 To 56 Specification

Completed By:

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Completed For:

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Document Number: 3287-R-002
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Revision: 1

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed on girders and floors between Frame 52 and Frame 56. The renewals are based on the inspection of the applicable areas by the vessel representative and ABS Class Surveyor.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-01-RO Steel Repairs and Renewals Frames 52 To 56.

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 9mm Plate (original), 9.5mm (3/8") Plate (new)

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

3.3.1 All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at locations between Frame 52 and Frame 56 as per the supplied MSI drawing No. 3287-D-01-R0. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing web plating of the centerline girder from frames 52 to 53, leaving a minimum of 75mm from the upper flange bottom and a minimum of 40mm from the transverse floor at frame 53, and replace with new 9.5mm insert plate.

3.7.1.3 The Contractor must crop and remove the existing web plating of the portside transverse floors at frames 55 and 56. The cropped plating must

	CCGS Leonard J Cowley	
Spec Item #: HD-20	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS FR 52 TO 56		

leave a minimum of 75mm from the bottom of upper flange and a minimum of 40mm from the existing 100mm x 100mm flat bar stiffener located 900mm off the centerline. The Contractor must replace with new 9.5 insert plates.

3.7.1.4 All insert plates must have round corners with 100mm radius, as per the supplied MSI drawing No. 3287-D-01-R0.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals indicated in Section 3.7 are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

HD-21 Suction and Discharge Valve Re-Certification – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to open up, dismantle, clean, inspect, machine and overhaul the listed valves for inspection by CG TA and ABS Class Surveyor, then close and install them .

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** N/A

2.2 Standards

- 2.2.1** See General Notes

- 2.2.2** Fleet Safety and Security Manual

2.3 Regulations

- 2.3.1** See General Notes

- 2.3.2** Canada Shipping Act 2001

- 2.3.3** Maritime Occupational Health and Safety Regulations

- 2.3.4** Lloyds Rules and Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** Attached is a list of sea connections, storm valves and de-icing valves that are to be opened and overhauled for CG TA and ABS Class Survey.

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

ENGINE ROOM SEABAY VALVES				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
B18	SEA STRAINER SUCTION FROM SEA CHEST	PORT E/R	250 mm	B-FLY
B21	SEA STRAINER SUCTION FROM SEA CHEST	STBD. E/R	250 mm	B-FLY
B19	SEA STRAINER DISCHARGE INTO SEABAY	PORT E/R	250 mm	B-FLY
B20	SEA STRAINER DISCHARGE INTO SEABAY	STBD. E/R	250 mm	B-FLY
V49	SEA CHEST VENT STBD.	DRY STORES	50 mm	N-R GLOBE
V50	SEA CHEST VENT PORT	CREWS LOUNGE	50 mm	N-R GLOBE
CW14	PORT M/E SUCTION	PORT E/R	150 mm	B-FLY
CW16	STBD. M/E SUCTION	STBD. E/R	150 mm	B-FLY
CW15	REFRIGERATION COOLING	STBD. E/R	38 mm	GATE
B16	GEN. SERVICE PUMP	PORT E/R	100 mm	GATE SDNR
B17	FIRE PUMP	PORT E/R	100 mm	GATE SDNR
B36	BILGE PUMP	STBD. E/R	50 mm	B-FLY
CW13	AIR COMPRESSOR SUCTION	PORT E/R	38 mm	GATE
CW18	S/S #1 SUCTION	STBD. E/R	65 mm	B-FLY
CW17	S/S #2 SUCTION	PORT E/R	65 mm	B-FLY

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

CW11	#3 S/S SEABAY SUCTION	STBD. E/R	65 mm	B-FLY
DW40	R.O. SEABAY SUCTION	PORT E/R	38mm	GLOBE

FWD MACHINERY SPACE SEACHEST VALVES				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
DW31	R.O. R/W SUCTION	FWD. M/S	50 mm	S-L GLOBE
B450	EMERG FIRE P/P SUCTION	FWD. M/S	100 mm	S-L GLOBE
36V	SEA CHEST VENT	FWD M/S	50 mm	GLOBE

DE-ICING VALVES				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
CA 33	COMPRESSED AIR TO O/BOARD (M/E, #2 SS Gen., Air Comps.)	PORT E/R (FWD)	19 mm	N-R GLOBE
CA 34	COMPRESSED AIR TO O/BOARD (OWS, Refrig., Eductor, Bilge Pump)	STBD E/R (AFT)	19 mm	N-R GLOBE
CA 35	COMPRESSED AIR TO O/BOARD (M/E, #1 & #3 SS Gens.)	STBD E/R (FWD)	19 mm	N-R GLOBE
CA 36	COMPRESSED AIR TO O/BOARD (Fire & G.S. Pumps)	PORT E/R (AFT)	19 mm	N-R GLOBE
CA 37	COMPRESSED AIR TO FWD SEA CHEST	FWD. MACH SPACE	19 mm	N-R GLOBE
CA 38	COMPRESSED AIR TO SEA CHEST	FWD STBD. E/R	19 mm	N-R GLOBE
CA 39	COMPRESSED AIR TO SEA CHEST	FWD PORT E/R	19 mm	N-R GLOBE

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

CA 52	SEWAGE O/BOARD	HARBOUR GEN RM	19 mm	N-R GLOBE

OVERBOARD DISCHARGES; EACH IS FITTED WITH A ¾" DE-ICING VALVE				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
DW39	R.O. OVERBOARD	FWD. M/S		
CW7/8 O/B	M/E, S/S OVERBOARD DOUBLE FLAPPER	PORT E/R	150mm	DOUBLEFLAPPER
CW1/2	M/E, S/S OVERBOARD DOUBLE FLAPPER	STBD. E/R	150mm	DOUBLEFLAPPER
B66	FIRE/GEN SERVICE P/P'S	PORT E/R	125mm	DOUBLEFLAPPER
B40	BILGE PUMP	STBD. E/R	125mm	DOUBLEFLAPPER
SS4	SEWAGE O/B	HAR/GEN RM	50mm	FLAPPER
SS8	GREY WATER O/B	PURFIER RM	25mm	N-R GLOBE

RECIRC VALVES				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
CW 10	PORT M/E RECIRC TO SEA CHEST	PORT E/R	125 mm	GATE
CW 5	STBD M/E RECIRC TO SEA CHEST	STBD. E/R	125 mm	S-L GATE
CW 9	S/S #2 RECIRC TO SEA CHEST	PORT E/R	65 mm	GATE
CW 4	S/S #1 & #3 RECIRC TO SEA CHEST	STBD. E/R	100 mm	S-L GLOBE

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

PORT & STBD SEA CHEST VENT LINE VALVES				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
34V	PORT SEA CHEST VENT VALVE	CREWS LOUNGE	50 MM	GATE
35V	STBD SEA CHEST VENT VALVE	DRYSTORES	50 MM	GATE

MISC. HULL VALVES				
I.D No	DESCRIPTION	LOCATION	SIZE	TYPE
	FWD DRAFT INDICATION	FWD END OF PIPE TUNNEL FRAME 80-81	100 MM	GATE
	FWD MANUAL DRAFT VALVE	FWD END OF PIPE TUNNEL FRAME 80-81	50 MM	SCREW LIFT
	AFT DRAFT INDICATION	UNDER STERNTUBE FRAME 12-13	100 MM	GATE
	AFT MANUAL DRAFT VALVE	UNDER STERNTUBE FRAME 12-13	50 MM	SCREW LIFT
	SPEED LOG VALVE	PIPE TUNNEL FRAME 68	100 MM	GATE

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

- 3.1.2** The Contractor must ensure prior to any work commencing that both the Contractor Basic Safety Familiarization and Pre Job Safety Assessment are completed and signed off.
- 3.1.3** The Contractor must open up, completely open, dismantle, clean and layout all valves mentioned above for inspection by CG TA and ABS Class Surveyor. All valves that open the ship to the exterior must be blanked to prevent ingress of grit blasting materials and coating overspray. All costs for staging, crange and transportation to be included.
- 3.1.4** All valves and parts are to be tagged and marked as to where they belong. Valve bonnets are to be removed, valves disassembled, and disks cleaned and machined. Disks and valve seats are to be lapped in with lapping compound to ensure a good seat. All associated piping and flanges are to be inspected for wastage. Contractor must supply and install new rubber sealing surfaces on all butter fly valves.
- ~~**3.1.5** Valve internals must be wire brushed and cleaned. Valve internals (seats excluded) must be given two coats of Apexior #3 paint. Second coat is not to be applied until the first one has fully cured. Valves are to be inspected by Chief Engineer between the first and second coats.~~
- 3.1.6** All valve stems must be cleaned and checked for wastage
- 3.1.7** All studs must be checked for wastage. Any deficiencies are to be noted and corrected by PSPC 1379.
- 3.1.8** The Contractor must exercise caution when re-installing butterfly valves such that the rubber insert pieces are not bent or crimped between flanges and that flanges are tightened down evenly.
- 3.1.9** All valves must be reassembled with Contractor supplied new gaskets, valve stem packing, and nuts of original material, and blanks and plugs, if any used by the Contractor must be removed. Valves must be bench tested in the shop prior to installation. If the Contractor is not able to source repair kits for existing butterfly valves or where any new valves may be required due to their condition or wastage, a PSPC 1379 will be raised to cover the cost of new valves.

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

3.1.10 The Contractor must be responsible for any leaks detected during testing of overhauled valve and repaired on their own cost. All de-icing valves after installation are to be left in close position, unless testing

3.1.11 All debris resulting from the valve overhaul must be removed and properly disposed of by The Contractor.

3.1.12 The Contractor must bid on performing 4 UT shots on each thru hull penetration listed in 3.1.1. Any thru hull penetration requiring replacement to be addressed via PSPC 1379 action as per section 3.1.13.

3.1.13 The Contractor must bid a unit cost to remove, fabricate and install one (1) thru hull penetration in the event penetrations require replacement based upon inspections and UT shots. Unit cost must include any interference item removal and reinstall. Adjustment to number of penetrations to be replaced to be adjusted via PSPC 1379.

3.2 Location

3.2.1 See chart in section 3.1.1

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Inlet side of each valve is to be pressure tested to 2 bar (~30 psi) for a period of one hour. Results must be recorded and presented to the CG TA.

4.2.2 The Contractor must function test each valve after re-installation and un-docking of vessel to ensure proper operation and watertightness. Testing must be witnessed by CG TA and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-21	Specification	F7049-210183
SUCTION AND DISCHARGE VALVE RE-CERTIFICATION		

4.3 Certification

4.3.1 ABS credits and certificates as required

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 Three (3) copies of the type written report shall be presented to the Chief Engineer after completion.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-22	Specification	F7049-210183
RUDDER, STOCK AND CARRIER BEARING INSPECTION		

HD-22 Rudder, Stock and Carrier Bearing Inspection..

Part 1 - Scope

1.1 The intent of this specification is for The Contractor to remove the rudder, rudder stock, carrier bearing and pintle for ABS Class Survey

1.1.1 The Contractor must bid an allowance of \$50,000 for the services of a Tenfjord Steering FSR for removal and re-installation of the steering gear actuator to the rudder stock lock rings. The FSR must also inspect the rudder stock sea water seal. This allowance to be adjusted up or down via PSPC 1379 action based on invoice. This allowance to cover travel, labor, accommodation and meals.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Tenforjd Steering Gear Type SR 722, SER# 15123-92

2.1.1.1 Manual #9 – Includes assembly drawing for actuator to rudder lock rings/tolerances and torque values/instructions and parts list.

2.1.1.2 Schilling Rudder 2800mm x 2965mm

For details see Industramar Ltd drawing # 8321 (3 sheets)

Upper Thordon bearing to rudder stock diametrical clearance
1.5mm

Lower pintle to Thordon bearing diametrical clearance 1.5mm

2.2 Standards

2.2.1 See General Notes

2.2.2 CCG Fleet Safety and Security Manual

2.3 Regulations

2.3.1 See General Notes

2.3.2 Marine Machinery Regulations (SOR/90-264)

	CCGS Leonard J Cowley	
Spec Item #: HD-22	Specification	F7049-210183
RUDDER, STOCK AND CARRIER BEARING INSPECTION		

2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 Prior to any hot work taking place, The Contractor must ensure that the area of work and adjacent space is certified as gas free and suitable for hot work as per the General Notes.

3.1.2 Prior to erecting staging in way of the rudder, The Contractor must ensure that the steering gear has been locked out and tagged out as per the General Notes and Fleet Safety Manual.

3.1.3 The Contractor must supply all equipment, staging, chain falls, crange, slings and shackles necessary to perform the work. All lifting equipment must be appropriate for the expected duties, and be accompanied by current certification indicating or permanently marked as to being, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification must be welded into place by CWB-certified welders certified to welding standard W47.1, Div 1 and 2.

3.1.4 The Contractor must be responsible for arranging ABS Class Surveyors when completing this specification item.

3.1.5 Prior to commencing any work The Contractor must perform the following:

3.1.5.1 Take and record the clearance between rudder stock and Thordon bush, also the lower pintle and bushing clearance and jumping collar clearance. The ABS Class surveyor to witness.

3.1.5.2 Proof mark rudder stock to actuator assembly and any other as required.

	CCGS Leonard J Cowley	
Spec Item #: HD-22	Specification	F7049-210183
RUDDER, STOCK AND CARRIER BEARING INSPECTION		

3.1.5.3 The Contractor must remove the drain plugs from the rudder, kort nozzle and skeg and replace the plugs and secure them after completion of the work in this specification.

3.1.5.4 The Contractor must measure and record the time required to move rudder from hard port to hard stbd using each pump individually and then with both pump.

3.1.6 Any Contractor attached lifting points which have been welded to the ship must be removed prior to the undocking of the ship and any disturbed coatings must be repaired with appropriate hull coating.

3.1.7 Prior to lifting, The Contractor must determine if there has been any water ingress into the internals of the rudder. This must include the removals of the vent and drain plugs and a subsequent pneumatic pressure test of the rudder with air at a pressure not to exceed 2.5psi for 30 mins. Pressure testing of the rudder must be witnessed by CG CE and ABS Class Surveyor.

3.1.7.1 Should the rudder fail the pressure test, The Contractor must locate the problem area on the rudder and provide a repair option. Once all repairs have been completed, The Contractor must coat the internals of the rudder with an anti-corrosion coating by means of float coating. Actual cost of repair and coating to be negotiated by PSPC 1379 action prior to work starting.

3.1.8 The Contractor must unship the rudder to gain access for removal and re-installation of the tailshaft. The Contractor with the CG CE must verify the rudder position when set amidships from the Wheelhouse steering control stand. This must be verified again after the rudder is fitted. The Contractor must proof mark the rudder stock to steering hydraulic actuator relationship for subsequent re-installation. The steering gear actuator is secured to the rudder stock with two sets of lock rings, refer to Tenfjord steering gear manual for removal/installation of the lock rings.

3.1.9 The Contractor must include an allowance of \$10,000.00 to permit for the buildup and machining of the rudderstock in way of the rudder gland and rudder stock guide. Adjustment of this allowance to be via PSPC 1379 action.

	CCGS Leonard J Cowley	
Spec Item #: HD-22	Specification	F7049-210183
RUDDER, STOCK AND CARRIER BEARING INSPECTION		

3.1.10 After completion of all the work in this spec The Contractor must ship the rudder and secure the lock rings as per the manufacturers procedures and torque values. The rudder palm bolts must be hardened up and secured with locking bards welded in place and final inspection by ABS Class Surveyor must be carried out. The Contractor must once again take all clearances as previously mentioned in section 3.1.5.

3.1.11 Once completely installed, the rudder must be test swung easily and then rapidly from side to side to ensure freedom of movement and complete range of travel for multiple cycles. The Contractor must measure and test the time required for the rudder to travel from hard port to hard stbd using each pump individually and with both pumps and compare to initial test at docking. Alignment of the rudderstock and rudder must be verified at zero helm once installation and testing has been completed as per initial findings. This testing must be witnessed by CG CE and ABS Class Surveyor.

3.1.12 Dockside trials must be conducted to test the operation of the rudder and steering from all locations and witnessed by CG CE and ABS Class Surveyor.

3.1.13 Sea trials must be conducted to prove the all systems operational to the satisfaction of the Chief Engineer and the requirements of ABS The testing should cover the requirements of ABS and the relevant chapter of MMR (SOR/90-264).

3.1.14 The Contractor must supply the Chief Engineer with four typed copies of their work report including all wear measurements and readings, parts used with corresponding part numbers.

3.1.15 All work in this specification shall be carried out to the satisfaction of the CG CE and ABS Class Surveyor.

3.1.16 All work and testing must be carried out to the satisfaction of the attending ABS Class Surveyor and CG CE.

3.2 Location

3.2.1 Aft Engine Room

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: HD-22	Specification	F7049-210183
RUDDER, STOCK AND CARRIER BEARING INSPECTION		

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** All work must be 100% visual by CE and ABS Class Surveyor. All work must be completed to the satisfaction of the CE and ABS Class Surveyor.

- 4.1.2** All work must be completed to the satisfaction of the Tenjford Steering FSR.

4.2 Testing

- 4.2.1** The Contractor must carry out a function test to the satisfaction of the CG CE, Steering Gear FSR and ABS Class Surveyor.

4.3 Certification

- 4.3.1** A survey credit from ABS is required.

- 4.3.2** The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required, to CE.

Part 5 - Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required, to CE, including all clearances recorded. The contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

- 5.2.1** N/A

5.3 Training

- 5.3.1** N/A

5.4 Manuals

	CCGS Leonard J Cowley	
Spec Item #: HD-22	Specification	F7049-210183
RUDDER, STOCK AND CARRIER BEARING INSPECTION		

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-23	Specification	F7049-210183
ANCHORS, CHAINS AND CHAIN LOCKERS		

HD-23 Anchors, Chains and Chain Lockers – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is to remove both anchors and chain, and to prepare both port and starboard chain lockers, for inspection, certification and coating.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Drawing 590-81 Anchor Arrangement As Fitted
- 2.1.2** Drawing 590-94 Anchor Chain Emergency Release As Fitted
- 2.1.3** Drawing 590-36 Bilge Ballast and Fire System As Fitted
- 2.1.4** Chains are 220m in length each x 36mm Grade U3
- 2.1.5** Anchors are 2100KG each
- 2.1.6** Chain Locker Drain Piping is 2 inch diameter schedule 40.

2.2 Standards

- 2.2.1** General Notes
- 2.2.2** Fleet Safety and Security Manual (DFO/5737)

2.3 Regulations

- 2.3.1** General Notes
- 2.3.2** Canada Shipping Act 2001 – Hull Inspection Regulations

2.4 Owner Furnished Equipment

- 2.4.1** N/A

Part 3 - Technical Description

3.1 General

- 3.1.1** The Contractor must remove the Port and Starboard anchors and anchor chains from the vessel and lower from the ship to the wharf by means of The Contractor supplied crane, one at a time, with the assistance of the ship's crew for the use of ship's machinery.

	CCGS Leonard J Cowley	
Spec Item #: HD-23	Specification	F7049-210183
ANCHORS, CHAINS AND CHAIN LOCKERS		

3.1.2 The Contractor must disconnect the “bitter end” of each anchor chain. The bitter ends are located in the Bosun’s Store and the engineer’s room store port and stbd respectively.

3.1.3 Both anchor chains must be ranged in a suitable area in the dry dock for cleaning, inspection and subsequent painting of shot markings. The Contractor must remove all scale and rust from both anchors and chains by media blasting. Upon completion of blasting, the anchors and chain are to be laid out on a clean surface to be inspected by CG TA and ABS Class Surveyor.

3.1.3.1 The Contractor must media blast both anchors and coat as per 3.1.5.

3.1.4 All links and studs on each cable must be hammer tested and visually inspected for defects. Any defects found in the anchors or chain must be immediately brought to the attention of the CG TA. Defects will be dealt with via PSPC 1379 action. There must be 20 sets of measurements taken on each chain for a total of 40 measurements. The measurements must be typed and provided to the CG TA. Prior to the start of measurements, the CG CE must be informed and will determine where the measurements must be taken.

The Contractor must grind smooth any distorted areas on anchors and dye check for the presence of any cracks.

A typewritten copy of the measurements must be given to the CG TA and an electronic copy must be forwarded to the CG TA. Report to indicate what links were measured, measurements and any observations noted.

3.1.5 The Contractor must paint the anchors and chains with a minimum of two (2) coats of “Interprime Red”. Each coat is to be 3.5 mils to achieve a DFT of 3.0 mil. Each anchor and chain is to thereafter have two (2) coats of “Interlac Black CL”. Each coat is to be 3.5 mils to achieve a DFT of 3.0 mil. The anchors and chains are to be raised from the ground to apply the coatings.

3.1.6 The Contractor must arrange for the anchor chain to be flipped end-for-end. The Contractor must finally paint the Joining Shackles red after the painting mentioned above. Every shot(27.5m) must be marked with stainless steel wire (bowtie type wrap of a heavier gauge wire approved by CCG TA/ CE to be utilised) and white paint. Items to be painted must receive two (2) coats of appropriate color at 3.5 mils to achieve 3.0 mils DFT. Numbering of shots must begin at the anchor. CG TA must oversee marking of shots and shall be completed to his/her satisfaction.

	CCGS Leonard J Cowley	
Spec Item #: HD-23	Specification	F7049-210183
ANCHORS, CHAINS AND CHAIN LOCKERS		

- 3.1.7** The chain lockers are considered to be confined space. Prior to entry, The Contractor must ensure that the space has been thoroughly ventilated and has been certified safe for entry by a certified Marine Chemist. Lockout/ tagouts, as required, must be in place. Copy of the certificate must be posted at the manhole and a copy to be given to the CG TA prior to any entry.
- 3.1.8** The Contractor must remove the false bottoms in both the Port and Stbd chain lockers and remove all debris, mud, and rust. All mud, scales and debris must be disposed of ashore by The Contractor. The chain lockers will be inspected by the CG TA and ABS Class Surveyor after cleaning.
- 3.1.9** The Contractor must prepare the surface of each chain locker, including the false bottoms as per NACE Inspector for recoating. The Contractor must bid on preparing and coating 100m2 of tank coating and must provide a unit cost per m2 for preparation, primer and topcoat for areas above/below the 100m2. . Any bare areas must receive two coats of Interprime Red 3.5 mil DFT. All chain locker surfaces must receive two coats of Interlac Black CL 3.5 mil DFT.
- 3.1.10** The Contractor must provide a means for the CG TA and ABS Class Surveyor to inspect both the spurling and hawse pipes, i.e. scaffolding/ladder in the chain locker and man lift on the dock. Any defects will be dealt with via PSPC 1379 action. The Contractor must bid on performing 16 UT shots on each spurling pipe and each hawse pipe for a total of 64 shots. The Contractor must provide a unit cost per UT shot to be adjusted up or down via PSPC 1379 action.
- 3.1.11** The Contractor must demonstrate that all bilge wells and suction lines are clear and that the bilge pumping system is operational. Mud boxes and strainers must be cleaned and proven clear. Any sounding pipes, vents and drains to be proven clear. Both chain lockers must be inspected by the CG TA and ABS Class Surveyor prior to stowing the anchor cables. Upon completion of inspection, the false bottoms must be secured in place
- ~~**3.1.12** The Contractor must remove both 1" drain connection from the exterior of the chain lockers (found in bow thruster compartment), weld on 2 new 1" connections, install 2 new nipples and 2 new stainless steel locking ball valves.~~
- 3.1.13** The Contractor must reinstall the false bottoms in each chain locker and connect the bitter end of each chain to the ship's structure with new Owner supplied end shackles. The Contractor must ensure pin on anchor shackles are secured with lead.

	CCGS Leonard J Cowley	
Spec Item #: HD-23	Specification	F7049-210183
ANCHORS, CHAINS AND CHAIN LOCKERS		

Use of ship's equipment to stow the anchors and chains will be performed by ship's crew only. Prior to lifting the anchors and chains aboard, the Contractor must notify the CG TA.

3.1.14 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

3.2 Location

3.2.1 Chain Locker Fr. 88– 91

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel.

Part 4 - Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Testing and measurements must be to the satisfaction of the CG TA and ABS Class Surveyor.

4.3 Certification

4.3.1 The contractor must obtain ABS certificate/ credit for the anchor, anchor chain and chain locker inspection

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to CG TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 Any components which have been Owner supplied and not used must be returned to the CG TA or delegate upon completion of this specification item.

	CCGS Leonard J Cowley	
Spec Item #: HD-23	Specification	F7049-210183
ANCHORS, CHAINS AND CHAIN LOCKERS		

5.2.2 Any components which may have been damaged when carrying out this specification item must be returned to the CG TA and a replacement supplied by the Contractor.

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

HD-24 Tailshaft, Bearings, Propeller and Mechanisms – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to arrange for a Wartsila FSR to open up the following equipment and perform all necessary removals to carry out the 5 year ABS surveys for the tailshaft, intermediate shafting, intermediate shaft bearing, fore and aft stern tube bushings, propeller/hub and mechanism, stern tube fore and aft mechanical seals and oil distribution box.
- 1.1.1** The Contractor must bid an allowance of \$125,000.00 for the services of the Wartsila FSR to be adjusted up or down via PSPC 1379 action based on invoice.
- 1.1.2** The Contractor must arrange for an alignment company to oversee the alignment of the shaft line. The Contractor must include an allowance of \$35,000.00 for the services of the alignment company for this specification item. Any necessary adjustments will be through PSPC 1379 action upon presentation of invoices. This cost must include per day, accommodations, meals and transportation.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Lips CPP Order No. H02185/CP 142

2.1.1.1 Manual No. 4

2.1.1.2 Drawing No W000400759-A1, Assembly of Oil Distribution Unit

2.1.1.3 Drawing No W000100627-AO, Arrangement of Shafting

2.1.1.4 Drawing No 590-31, Shafting Layout

2.1.2 Stern tube Seals

2.1.2.1 Inboard Stern Tube Seal

2.1.2.1.1 John Crane Lips Simplex Type 330 MK2 C1 HSG Viton Seal

2.1.2.1.2 Tails Shaft SS Liner OD 330mm

2.1.2.2 Outboard Stern Tube Seal

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

2.1.2.2.1 John Crane MN 337 Modified 335 Membrane

2.1.2.2.2 Manual No. 50

2.1.2.2.3 Tail Shat SS Liner OD 335 mm

2.1.3 Tailshaft

2.1.3.1 328mm Dia x 9486 mm Long

2.1.3.2 Frame No. 2 – 17/18.

2.1.3.3 Intermediate shaft bearing Wausheka – Lips B.V Order No. W03163

2.1.3.3.1 Weight 150Kg, LO Capacity 1.5L , Cooling Water Capacity 1.1L.

2.1.3.4 SKF Sleeve Coupling Type OK 270 HB 480 KG. 440mm Dia x 705mm L

2.1.4 Lubrication Types and Quantities

2.1.4.1 Stern tube Hydrex AW68 – Quantity 1600L

2.1.4.2 CPP Hydrex MV 32 – Quantity 1200L

2.2 Standards

2.2.1 See General Notes

2.2.2 Fleet Safety and Security Manual

2.3 Regulations

2.3.1 See General Notes

2.3.2 Marine Machinery Regulations (SOR/90-264)

2.3.3 Maritime Occupational Health and Safety Regulations (SOr/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

- 2.4.1** The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** Prior to commencing any work The Contractor must perform the following:

3.1.1.1 Check and record the tail shaft run out axially and radially with a dial gauge, before and after docking vessel and prior to dismantling and subsequent re installation of all components in this specification.

3.1.1.2 Check the tail shaft wear down with the ABS Class Surveyor and CG CE present.

3.1.1.3 Check centering mark on propeller blade to centering mark on propeller hub.

3.1.1.4 Proof mark all shafting flanges.

3.1.1.5 Check and record thrust clearance at Mitchell thrust block.

3.1.1.6 Prior to and after all work is completed The Contractor must verify / test with the Chief Engineer that the following temperature and alarm transducers are working correctly:

3.1.1.6.1 Fore and aft stern tube bearing temperature transducers on the VTS Alarm and monitoring system in the Motor Control room.

3.1.1.6.2 Alarm and temperature unit for the intermediate shaft bearing and inboard stern tube seal.

3.1.1.6.3 The Contractor must take precautions to prevent damage to these transducers and associated wiring for (1) & (2) above during the work in this spec.

3.1.1.6.4 Chief Engineer to witness all of the above

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

- 3.1.2** Prior to removal of blades, the hydraulic oil must be drained from CPP system, The Contractor must dispose of oil approx. 1200 liters as per the provincial environmental regulations. The complete oil system must be flushed with new oil until all signs of dirt and water are removed. The CPP header tank located in the tank room stbd side upper deck must be opened up and cleaned using lint free rags. After cleaning the header tank must be inspected by the Chief Engineer prior to closing up with new gaskets fitted to the manholes / inspection covers. All system filters shall be renewed from vessel's inventory. The System must be filled by The Contractor with new Contractor supplied oil using a filter cart with a micron rating of 3 microns absolute. The Contractor must supply oil and filter cart. The system must be purged of all air and system run up to check for leaks and to prove satisfactory pitch operation to the Chief Engineer.
- 3.1.3** Prior to the removal of the tail shaft the stern tube lubrication system must be drained and disposed of as per the provincial environmental regulations. The complete oil system must be flushed with new oil until all signs of dirt and water are removed. The stern tube header tank located in the port side foc'sle deck must be opened up and cleaned using lint free rags. After cleaning the header tank must be inspected by the Chief Engineer prior to closing up with new gaskets fitted to the manholes / inspection covers. All system filters must be renewed from vessel's inventory. System must be filled by Contractor with new oil using a filter cart with a micron rating of 3 microns absolute. The Contractor must supply oil and filter cart. System must be purged of all air and system run up to test operation and to check for leaks. The CG CE and ABS Class Surveyor must witness run up.
- 3.1.4** The Contractor must remove the aft shaft seal rope guard and fit it back on after completion of all work in this specification. The rope guard is secured by welding.
- 3.1.5** The Contractor must proof mark each set of coupling flanges at adjacent sections of all shafting including the SKF sleeve coupling for alignment prior to disassembly. The fitted bolts and nuts on each coupling are to be marked for identification purposes and the contractor is to ensure that each bolt is placed back in its original hole upon final coupling. Coupling bolts, nuts, and holes are to be cleaned and examined for wear/defects.
- 3.1.6** In conjunction with the propeller survey, The Contractor must remove the propeller tail shaft. The tail shaft is coupled to the intermediate shaft through a SKF sleeve coupling. The owner will supply the high injection pump necessary for

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

withdrawal and installation of the coupling. The Contractor must remove the SKF coupling, strictly following the manufactures procedures and withdraw the tail shaft. Note** the pitch must be adjusted to the full astern position before dismantling the SKF coupling. The tail shaft must be cleaned prior to inspection by ABS Class surveyors. The Contractor must ensure the tail shaft is protected at all times from damage, deflection and corrosion due to the elements while it is unshipped. The tail shaft must be supported at all times during removal, inspection and re-installation. The Contractor must also support the internal oil feed supply and return piping for pitch actuation at all times. This has to be accomplished as soon as the SKF sleeve coupling is released and the tail shaft is first moved back by fitting support pieces for the internal pipes and covering the opening to prevent ingress of foreign matter.

3.1.7 Once the tail shaft is withdrawn, The Contractor must remove the SKF coupling from the intermediate shaft. The coupling must be thoroughly cleaned and prepared as per the manufactures procedures prior to replacement. The coupling must be protected against the ingress of dirt and moisture while removed from the shaft.

3.1.8 The Contractor must remove the four propeller blades. The Contractor must install owner supplied spare set of crated blades. The Contractor will use same crating and secure old ones in. The FSR in conjunction with The Contractor must dismantle the propeller hub and mechanism for survey by the classification surveyors. All components must be inspected for wear. The Contractor must re-build the unit with new Contractor supplied seals. New blade foot o-ring seals are to be installed. Propeller blade bolts must be torqued and bolts must be locked up as per original method. Refer to Lips drawing No. W00001150-AO "Propeller hub" for welding instructions for propeller blade bolt locking bars. The Contractor to quote on 200 hours for machining for this specification.

3.1.8.1 The Contractor must bid an allowance of \$10,000.00 for the cleaning, polishing, measuring and minor repairs to the removed blades prior to re-crating.

3.1.8.2 As per last overhaul report by OEM, The Contractor must replace blade carriers and sliding blocks with new Owner supplied.

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

- 3.1.9** The Contractor must conduct non-destructive testing (magnetic particle inspection) to detect the presence of cracks on the tail shaft hub flange radius.
- 3.1.10** The Contractor in conjunction with the FSR must open up the oil distribution box (O.D. Box) as part of the CPP system for cleaning and inspection of all components. The O.D. Box must be re-built using all new seal and o-rings supplied with The Contractor supplied overhaul kit. The Contractor / FSR to open up the O.D. box feed back transmitter and check for worn components and to check condition of potentiometers, bushings and linkages.
- 3.1.11** The stern tube must be cleaned prior to inspection by ABS Class Surveyors and CG CE. Measurements must be taken on the bore of each stern tube bearing in the vertical and horizontal direction at four equal points along the length of each bearing to check for ovality and uneven wear patterns.
- 3.1.12** The Contractor must open up the intermediate shaft bearing for cleaning and inspection by ABS Class Surveyors. The Contractor must gauge the bearing wear to shaft clearance for ABS Class Surveyors. The Contractor must remove cooling water passage inspection cover bolted to the bottom of the lower bearing housing and clean the passage of all scale. To access the cooling water passage inspection cover the bearing housing complete has to be unbolted and moved ahead to turn the unit to remove the cover. The Contractor must mark alignment shims for correct re-installation. The intermediate shaft and SKF coupling is to be supported at all times during removal and re-installation of the bearing housing to prevent any deflection in the same. After cleaning, the bearing housing assembly has to be fitted in place and bolts torqued to manufactures specs. Refer to Waukesha – Lips B.V. drawing No. W006205045 manual No. 4 for details of bearing. Upon completion of inspection the shaft bearing is to be closed up with new gaskets and the oil in the base renewed, oil must be Contractor supply.
- 3.1.13** The Contractor in conjunction with the FSR must dismantle the inboard and outboard stern tube seals for inspection by the attending ABS Class Surveyor and the CG CE. The seal assemblies must be re-built renewing any worn components, all new seals and o-rings shall be fitted. Parts are Contractor supply.
- 3.1.14** Upon completion of all inspections, O.D. box, intermediate shaft bearing, SKF sleeve coupling, tail shaft, stern tube seals, propeller and hub assemble including propeller blades, must be installed in good order with all fasteners being torqued

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

as required and all locking put in place. The Contractor must prove to the CG CE and ABS Class Surveyors that all system components in this specification including all shafting, couplings, flanges, bearings and seals are within the manufacturer's alignment tolerances.

- 3.1.15** The Contractor must open up the CPP and stern tube heat exchangers for cleaning, inspection and pressures testing. The Contractor must chemically clean and de-scale the tube nests internally and externally including the internal shell and end bells on each exchanger. Heat exchangers must be pressure tested to the name plate data test pressure for a minimum of 30 minutes to check for leaks. The heat exchangers must be re-built using all Contractor supplied new gaskets and seals. The Contractor must renew the sacrificial zinc anodes on the sea water side of the exchangers. The Contractor is responsible for removal, transportation and re-installation should exchangers have to be transported to The Contractors (or subcontractors) facilities for the work / testing in this specification. All disturbed piping, flanges and brackets must be re-installed in good order with contractor supplied new gaskets and pipe sealant applied as required. All fasteners shall be cleaned and anti seize compound applied. ABS Class Surveyors must witness inspection and pressure testing of exchangers.
- 3.1.16** After all work on CPP system is completed, The Contractor must check that all valves are in the correct position, start CPP pumps and check complete system for leaks, check movement of propeller blades in the full ahead and full astern positions and that the blades line up on centering marks on hub.
- 3.1.17** All piping, fixtures, wiring, removed or disturbed during the work in this specification must be replaced by the contractor in good order with new consumables like gaskets cable ties, etc.
- 3.1.18** After installation of the tail shaft and stern tube seal assemblies The Contractor must pressure test the stern tube seals to 15 p.s.i. to verify the static integrity. The test must be applied for 30 minutes. The lube system shall be filled prior to this test as per paragraph (3.1.3.). The CG CE and ABS Class Surveyor must witness this test.

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

3.1.19 Dockside trials must be conducted to test the operation of the CPP and stern tube to the satisfaction of the CG CE and ABS Class Surveyor. The Contractor must check for overheating at the intermediate shaft bearing and inboard seal.

3.1.20 Sea trials must be conducted to prove the all systems operational to the satisfaction of the Chief Engineer working from no load to full load in 15 minute intervals while recording temperatures and pressures. Propeller pitch to be 0 at no thrust.

3.1.21 The Contractor must supply the Chief Engineer with four typed copies of their work report including all wear measurements and readings, parts used with corresponding part numbers.

3.1.22 All work in this specification shall be carried out to the satisfaction of the CG CE and ABS Class Surveyor.

3.1.23 All work and testing must be carried out to the satisfaction of the attending ABS Class Surveyor and CG CE.

3.2 Location

3.2.1 Aft Engine Room

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be 100% visual by CE and ABS Class Surveyor. All work must be completed to the satisfaction of the CE and ABS Class Surveyor.

4.1.2 All work must be completed to the satisfaction of the Wartsila Propulsion FSR.

4.2 Testing

4.2.1 The Contractor must carry out a function test to the satisfaction of the CG CE, Propulsion FSR and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-24	Specification	F7049-210183
TAILSHAFT, BEARINGS, PROPELLER AND MECHANISMS		

4.3 Certification

4.3.1 A survey credit from ABS is required.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required, to CE.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required, to CE. The contractor must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

5.1.2 The Contractor must take stern tube wear-down readings prior to drawing the propeller and shafting. Upon completion of all work, a second set of wear-down readings must be taken and recorded.

5.1.3 The pressure required for release of the SKF coupling halves must be recorded.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-25	Specification	F7049-210183
PORT AND STBD CLUTCH SURVEY		

HD-25 Port and Stbd Clutch Survey..

Part 1 - Scope

1.1 The intent of this specification is for The Contractor to supply the services of a Lohmann and Stolterfoht FSR or other experienced authorized dealer familiar with the operation and overhaul procedures of Lohmann and Stolterfoht clutches to perform an overhaul and 5 year inspection of the Port and Stbd Clutches.

1.1.1 The Contractor familiarity with L&S Clutches must be proven by providing reports of 3 overhauled L&S Clutches in the past 5 years.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Leonard J Cowley:

2.1.1.1 Lohmann and Stolterfoht Pneumaflex Highly Elastic Double Cone Friction Clutch.

2.1.1.2 Type: KAP 240/Design 1000/1251 & 125

2.1.1.3 Order # 12/321 176

2.1.1.4 Hardness Degree of Rubber Elements: W

2.1.1.5 Input Speed: 750 RPM

2.1.1.6 Order Number: 12/321 176

2.1.1.7 Weight Per: Approx 690 kg.

2.1.1.8 Installation Drawing: 3/1182/5007/0

2.2 Standards

2.2.1 See General Notes

2.2.2 Fleet Safety and Security Manual

2.3 Regulations

2.3.1 See General Notes

	CCGS Leonard J Cowley	
Spec Item #: HD-25	Specification	F7049-210183
PORT AND STBD CLUTCH SURVEY		

2.3.2 Marine Machinery Regulations (SOR/90-264)

2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must perform an alignment of the Main Engines to Gearbox input shafts prior to starting work.

3.1.2 The Contractor must remove port and stbd main engine clutches and any other interference items.

3.1.2.1 Any removed items must be safely stored by The Contractor and any damage will be The Contractors responsibility. All removed items must be reinstalled upon completion of clutch inspections.

3.1.3 The Contractor must remove both clutch assemblies from the vessel and transport to Technicians shop for overhaul using Contractor Supplied Parts. Clutch assemblies to be reinstalled upon completion.

3.1.4 All removed piping/tubing must have the open ends covered to prevent the ingress of dirt and debris into the system. The Contractor must remove the guard housing and step that covers the clutch. The Contractor must remove any necessary piping, wiring, etc to facilitate the removal of the clutch assembly.

3.1.5 Prior to commencing and again after completion of all work in this specification, The Contractor must record the axial and radial run out with the clutch engaged and dis-engaged. The Contractor must record the readings starting from the same point and in the same direction of the rotation as per the work history data contained in the vessels maintenance program for comparison to check if the current readings are still within the manufacturers tolerances. The Contractor

	CCGS Leonard J Cowley	
Spec Item #: HD-25	Specification	F7049-210183
PORT AND STBD CLUTCH SURVEY		

must check the condition of all magnetic pins and pickups for the clutch slippage unit (there are four pins on the input and four pins on the output). The Contractor must check the clearance between pins and pick-ups. The CE and CG TA must witness these checks.

- 3.1.6** Prior to uncoupling the clutch from the engine, The Contractor must check and record the thickness of all friction pad linings on the input and output sides of the clutch by following the manufacturer's detailed instructions outlined in the service manual. All friction linings must be supplied and replaced by The Contractor.
- 3.1.7** The Contractor must supply and install new Spiroflex elements on both clutches. Existing elements must be inspected visually for cracks and wear. The Contractor must also check by measuring the tensional angle of twist limitation. These measurements and observations must be included in the final report.
- 3.1.8** Prior to uncoupling the clutch from the engine and gearbox, The Contractor must ensure that all faces of the associated flanges and spacer plates are properly "proof" marked for subsequent reassembly and correct orientation.
- 3.1.9** The Contractor must also "proof" mark all coupling bolts. The sizes of the bolts are different and this will save time when re-assembling. The Contractor must bid on reaming of 10 holes for new fitted bolts allowing a minimum of 4 thousandths of one inch per hole to be removed. The Contractor must bid on supplying, machining and installing 10 new fitted bolts. The Contractor must provide a unit cost per hole and bolt to be adjusted up or down via PSPC 1379 action.
- 3.1.10** The Contractor must remove the clutch from the engine and reduction gearbox to the engine room deck plates. The clutch must be dismantled and all components cleaned and inspected for wear or damage. All parts must be inspected by ABS Class Surveyor and CE. All measurements and clearances must be checked and recorded as per the manufacturers service manual. Any parts requiring replacement, not listed in Section 3.1.12 to be addressed via PSPC 1379 action based on invoice.
- 3.1.11** The magnetic pins (8 total) four on the input side and four on the output side for the clutch slippage unit must be checked and any damaged or missing pins must be replaced. The Contractor must check clearance between magnetic pick ups(2) and all magnetic pins and adjust to within service manual tolerances. Any parts requiring replacement to be addressed via PSPC 1379 action based on invoices.

	CCGS Leonard J Cowley	
Spec Item #: HD-25	Specification	F7049-210183
PORT AND STBD CLUTCH SURVEY		

3.1.12 The Contractor must re-build the clutch with all new Contractor supplied seals, o-rings, clutch linings and gaskets.

3.1.13 Upon completion of reassembly of the clutch pack, The Contractor must perform an air pressure test of 100 PSI on the clutch to demonstrate that all components are tight and that all seals are operating correctly. All of the testing must be carried out in the presence of the CE and CG TA.

3.1.14 The Contractor must re-install the clutch in good order using newly machined fitted bolts. Once installed, the radial and axial alignment of the clutch must be checked and recorded with the clutch engaged and disengaged. The Contractor must check the working air pressure and engagement time, making adjustments if required, as stated in the manufacturer's instruction manual.

3.1.15 After the clutch is installed The Contractor must check the friction cone travel at four points on the periphery to ensure equal travel of both friction cones to equalize the axial reaction forces of the pre-stressed elastic rubber ring elements "Spiroflex". Refer to page 5/6 of the service manual.

3.1.16 All guard, as well as any disturbed piping, wiring and metal work must be replaced in good order upon completion of the above work.

3.1.17 All work and testing must be carried out to the satisfaction of the attending ABS Class Surveyor and CG.

3.2 Location

3.2.1 Aft Engine Room

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be 100% visual by CE and ABS Class Surveyor. All work must be completed to the satisfaction of the CE and ABS Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-25	Specification	F7049-210183
PORT AND STBD CLUTCH SURVEY		

4.2 Testing

- 4.2.1** Dock Trials: Upon completion of all work, the clutch must be tested with the engine running and clutch engaged. The Contractor must adjust slippage time for engagement if required. The Contractor must record the clutch temperature for one hour while alongside the dock taking temperature readings throughout the hour. The Contractor must use a handheld digital infra-red temperature unit to monitor temperature as there is no permanent transducer in place. The Contractor must supply proof of accuracy of the instrument being used.
- 4.2.2** Sea Trials: After clutch operation and temperature proves acceptable during the dock trials the vessel must carry out a minimum 2 hour sea trial with The Contractor in attendance to witness the engine/clutch operation through various load conditions up to 100% load. The Contractor must continue to monitor and record the clutch temperature at 15 minute intervals throughout the sea trials.
- 4.2.3** The Contractor must carry out a function test to the satisfaction of the CE and attending ABS Class Surveyor.

4.3 Certification

- 4.3.1** A survey credit from ABS is required.
- 4.3.2** The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CE. The must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.
- 4.3.2.1** Final report must include all wear measurements, observations, clearances and operational tolerances for comparison, engine to gearbox alignment readings, clutch axial and radial run out readings and the clutch temperature readings log sheet with Engine RPM and pitch taken during trials. The Contractor must also include a list of all new parts fitted including their corresponding position/part numbers and quantities.

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: HD-25	Specification	F7049-210183
PORT AND STBD CLUTCH SURVEY		

5.1.1 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to CE. The must deliver 1 electronic copy of all reports/certs to CG TA. All certificates must be delivered at least 14 days prior to scheduled refit end date.

5.1.1.1 Final report must include all wear measurements, observations, clearances and operational tolerances for comparison, engine to gearbox alignment readings, clutch axial and radial run out readings and the clutch temperature readings log sheet with Engine RPM and pitch taken during trials.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

HD-26 Bow Thruster Replacement and Installation - UPDATED

Part 1 – Scope

1.1 The intent of this specification is to have The Contractor remove the existing Ulstein 90 TV bow thruster assembly and replace it with a refurbished and upgraded unit supplied by Kongsberg Maritime(formally Ulstein).

1.1.1 The Contractor must be responsible for the procurement of refurbished and upgraded bow thruster unit and the return of the original fitted bow thruster to Kongsberg Maritime, the present official owner of Ulstein brand of Bow Thrusters.

Part 2 - References

2.1 Rules, Regulations and Standards

2.1.1 All design, material and Work must meet the designated Classification Society (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify, coordinate, and meet the specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines (ARSRC&G) referenced under Section 4.2 of the General Requirements Section of the Leonard J Cowley’s VLE Project’s Statement of Work (SOW). Approval, of design, material, and Work, must be in accordance with the applicable Regulations and Standards referenced therein.

2.1.2 All references to the word “Class” within this specification are to be interpreted as being the American Bureau of Shipping (ABS).

2.2 Drawings and Documents

2.2.1 The following Drawings are to be considered as Guidance Drawings as defined under the Drawings section of the General Notes.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

Drawing Number	DRAWING TITLE
590-27	Bow Structure
590-29	Bow Thruster Structural Details
590-57	Bow Thruster Compartment Arrangement
P 21882	Bow Thruster Tunnel
D8101825	Tunnel Detail
KM Dwg. 216841	Location of Tunnel Thruster in Hull

2.3 Existing Equipment

2.3.1 Manufacturer:	Ulstein
Model:	90 TV
Type:	Tunnel Thruster
Propeller type:	Variable Pitch
No. of Blades:	4
Propeller RPM	390
Electrical:	440 VAC/3Ph/60Hz, 310 amps
Full Load Eff.:	250 HP
E-Motor RPM:	1800
Min. Tunnel Dia. (Inner):	1300 mm
Oil type:	Ultima EP-150
Oil Quantity:	300 litres

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

2.4 Contractor Supplied Material

2.4.1 The Contractor must supply all labour, equipment, material, fluids, parts, and tools required to perform the specified work, unless specified otherwise within this specification. The Contractor must also be responsible for providing the necessary engineering support as well as the required Class approvals for this installation.

2.4.2 The Contractor must coordinate with Kongsberg Marine CM Canada to supply a refurbished and upgraded Ulstein (now Kongsberg) Type 90 TV variable pitch bow thruster assembly complete with its associated equipment, any additional controls, and all related equipment, material, parts, and specialized tools that will be needed to perform the specified work.

2.4.2.1 The Contractor must ensure that the new motor being supplied by Kongsberg Marine CM Canada is a 290 KW motor. The existing motor being returned is 220KW.

2.4.3 The existing Ulstein 90 TV thruster assembly will be required to be returned to Kongsberg as an exchange towards the refurbished unit being supplied under this specification.

2.4.4 Any new steel plates and shapes used in support of this specification must be minimum Lloyds Grade A or a Class (ABS) acceptable equivalent. The steel necessary to plate over any openings in bulkheads, decks and or any shell plating must have the same steel grade as the surrounding plating.

2.4.5 All electrical equipment being provided by Contractor must be marine rated, Class approved, and comply with the requirements of TP 127E, IEEE 45, and be of current production, make, and models.

2.5 OEM/SUPPLIER/FSR

2.5.1 The Contractor must source the equipment and any associated systems, required by this specification, from Kongsberg Maritime CM Canada Ltd.

2.5.2 The Contractor must bid on and make the necessary arrangements to obtain the services of a qualified Kongsberg Field Service Representative (FSR) to be on-site to oversee the installation, commissioning, testing, and be present for both the HATs and SAT trials that are to be performed as part of this specification.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

2.5.3 For bidding purposes, the Contractor must bid the sum of \$40,000 for the services of this FSR and this bid must include the expected time on site, all related travel (i.e., airfare, vehicle rental etc.), meals, and accommodation. Final billing for these services will be adjusted upwards or downwards via 1379 action and will be based on final invoicing.

2.5.4 The contact information for Kongsberg Maritime in Canada is:

KONGSBERG Maritime CM Canada Ltd

Point of Contact: Mr. Ted Gurr
Title: Head of Aftermarket Sales
Tel: (902) 488-4153
Email: ted.gurr@km.longsberg.com

2.5.5 The Contractor must also arrange to sub-contract to “Madsen Controls and Engineering” or equivalent to perform the required engineering and interfacing that will be needed to incorporate the alarm and monitoring points of the upgraded bow thruster into the existing Alarm and Monitoring System currently aboard the vessel.

2.5.6 For bidding purposes, the Contractor must bid the sum of \$15,000 for the services of Madsen Controls or equivalent. This bid is to include the required engineering needed, the expected time on site, which is to include all related travel (i.e., airfare, vehicle rental etc.), meals, and accommodation. Final billing for these services will be adjusted upwards or downwards via 1379 action and will be based on final invoicing.

The contact information for Madsen Controls and Engineering is:

In Dartmouth, NS

Tel: 902-468-4736
Email: sales@madsencontrols.ca

In Mount Pearl, Nfld.

Tel: 709-747-7841
Email: sales@madsencontrols.ca

2.6 Government Supplied Equipment

2.6.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

2.7 Government Furnished Equipment

2.7.1 N/A

Part 3 – Technical Requirements

3.0 General

3.0.1 The Contractor must be responsible for ensuring and confirming that the equipment being supplied by Kongsberg Maritime CM Canada Ltd. is provided in accordance with the Classification's machinery requirements for both ABS and Transport Canada Marine Safety and Security (TCMSS).

3.0.2 The Contractor must be responsible for ensuring that the upgraded bow thruster system package, its required support, and the control systems required, are seamlessly integrated with each other and with the existing shipboard systems and hull structure.

3.0.3 The broad scope of services, to be initially executed by the Contractor are as follows:

3.0.3.1 Active interaction with the OEM (Kongsberg) to ensure the delivery of a reliable and safe upgraded bow thruster system, complete with any associated controls and monitoring systems required.

3.0.3.2 Ensuring that any required preliminary and detailed design drawings and the documents for finalization of the bow thruster system layout/arrangement, are provided to Class for review and approval as required. Copies must also be provided to the CG TA as they are being submitted to Class.

3.0.3.3 Ensuring that the bow thruster package being supplied is type approved by both TCMSS and Class.

3.0.4 Any hardware that is required for a complete and functional bow thruster system and that is not specifically included in the Kongsberg's scope of supply, must be provided by the Contractor. Any such material must be compatible with the OEM's specifications.

3.1 Contractor & OEM Documentation Requirements

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

3.1.1 The Contractor must be responsible and must ensure that any dimensional drawings, hydraulic diagram(s), electrical diagram(s) and technical data needed for the bow thruster installation are being provided and once received they are to be submitted to Class as required and to the CG TA.

3.1.2 As part of this Statement of Work, the Contractor must also provide the CG TA with the following documentation:

3.1.2.1 Any Classification Society approved drawing(s) showing structural and dimensional details needed to fit the bow thruster.

3.1.2.2 Updated single line diagram(s) of new electrical connections to the existing electrical systems.

3.1.2.3 Updated single line diagram(s) of showing the modification performed on the bow thruster's hydraulic system.

3.1.2.4 List of Alarm Monitoring Points, controls, and instrumentation system details as per Class requirements.

3.1.2.5 A costed list of OEM recommended and proposed standard spares.

3.1.3 The Contractor must also arrange to provide the following OEM manuals, upon delivery of the Bow Thruster package. Manuals are to be provided both in hard copy and electronically (PDF format).

- Three (3) Printed Mechanical User Manuals.
- Three (3) Printed Electrical User Manuals.
- Three (3) Printed Mechanical Installation Drawings/Manuals
- Three (3) Printed Electrical Installation Drawings/Manuals.
- Two (2) Thumb Drives containing the above documentation

NOTE: Copies of the aforementioned manuals/drawings must also be provided in both English and French, if French versions are available.

3.2 Procurement Requirements

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

- 3.2.1** The Contractor must be responsible for the procurement and the delivery to their facilities of a refurbished and upgraded version of the Type 90 TV variable pitch bow thruster package from Kongsberg Maritime CM Canada Ltd.
- 3.2.2** Prior to delivery, a Factory Acceptance Test (FAT) must be performed to prove that the upgraded Type 90 TV bow thruster can meet its stated performance criteria. At a minimum, this FAT test must be witnessed by an attending Class Surveyor. A full test report must be provided by the OEM and is to be signed off as witnessed by the attending surveyor and copies of same are to be provided to the CG TA.
- 3.2.3** Canada reserves the right to provide personnel to visit the OEM Facilities to attend the FATs, at the OEM's facilities. These visits will be at Canada's expense. For such cases, the Contractor is to provide a minimum of sixty (60) days' notice for trials attendance at OEM's premises.

3.3 Delivery Requirements

- 3.3.1** On delivery at the Contractor's facilities, the new bow thruster package must be inspected for any transportation damage. Arrangements are to be made with the CG TA to have a CG representative present when the bow thruster package arrives on site and this representative must be allowed complete access to perform a full inspection on behalf of Canada. This inspection will require the opening of crates and or shipping boxes but will not require the opening of any hermetically sealed units unless damage to the packaging can be readily seen.
- 3.3.2** The Contractor must provide a minimum of five (5) working days' notice to the CG TA to allow their designated representative time to prepare and attend this inspection. The Contractor must provide any assistance required to allow Canada's representative access to the various components.
- 3.3.3** After a satisfactory inspection, the new bow thruster package and its associated equipment is to be safely stored in a heated, environmentally controlled, location and is to be quarantined until it is ready for installation.

3.4 Documents To Be Submitted After Placement of Order

- 3.4.1** The following list of drawings/documents must be submitted to the CG TA after placement of order and upon their availability:

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

3.4.1.1 Detailed drawings of the equipment to be installed within the Contractor's scope.

3.4.1.2 All applicable Class approved drawings, engineering studies, and documents.

3.4.1.3 Installation drawings, indicating foundation details and procedures showing space constraints for withdrawal of various accessories of all the offered machinery and equipment.

3.4.1.4 A comprehensive and detailed listing (i.e., operating voltages and amperage requirements etc.) of the bow thruster's alarm(s), set and operating points to allow for any modifications to be made to the Vessel's existing Alarm and Monitoring System (AMS) to accept the new I/O inputs.

3.4.2 The above drawings are to be submitted in triplicate, both in hard copy (PDF) and in AutoCAD DWG format, to the CG TA.

3.4.3 All drawings requiring Class approval must be to the responsibility of the Contractor. Copies of the original Class approved drawings must be provided to the CG TA.

3.4.4 The Contractor must submit the following certificates and reports in triplicate (one (1) original plus two (2) copies):

3.4.4.1 Shop test data, duly signed by Class

3.4.4.2 Classification Type approval,

3.4.4.3 Manufacturer Test Certificates and Certificates of Compliance.

3.4.5 All Contractor developed drawings and documents relating to this specification and the equipment being installed must be delivered in the bilingual format.

3.5 Removal Of The Existing Bow Thruster System

3.5.1 Note to Contractor

The broad scope of services, needed to complete this installation will be solely the responsibility of the Contractor. The following items regarding the removals, installation and connection of systems, controls and services are being suggested by Canada only and they are being provided to assist the Contractor as what steps

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

that should be considered when the Contractor is developing their cost model and installation plans to complete this installation. The following sections, C.6.3 thru to C.6.14 inclusive are not to be seen as direction by Canada, but only as guidelines of what should be considered.

- 3.5.2** It is not the intention of this specification to detail all minor items requiring removal to carry out the required work. Any additional removals and replacement, or relocation of existing equipment, but necessary for either access or protection of items from damage, can be seen at the time of the Vessel's viewing and must be included by Contractor in the scope of Work. All interference items that have been removed in order to access the work must be replaced to an "as found" condition, unless otherwise determined by the CG TA.
- 3.5.3** The Contractor must be fully responsible for isolating, locking out and tagging out the electrical power supplies to the existing bow thruster gear. The Contractor is then to completely disconnect, both mechanically and electrically, the existing Ulstein 90 TV bow thruster and its associated control systems. Once disconnected the mechanical components are to be removed, in their entirety, from the vessel. Special care is to be taken when disconnecting the existing sensor points as these will be re-used on the refurbished bow thruster system installation.
- 3.5.4** All piping removed to carry out the Work must be suitably blanked using blind flanges or capped to prevent the ingress of contaminants.
- 3.5.5** Any openings in watertight or fire rated decks and bulkheads, including bolt holes, caused by removal of equipment, steel structure, cables and piping not being re-used must be sealed by the Contractor. Openings must be sealed with welded plate inserts, or an alternate Class approved and acceptable method.
- 3.5.6** The existing tunnel is to remain in place and will be re-used with the new installation.
- 3.5.7** The Contractor must label/tag all electrical cables as to their intent before disconnecting.
- 3.5.8** The intent is to re-use the main switchboard bow thruster power supply unit and power supply feeder cables to the thruster drive motor starter cabinet that will be located in the Bow Thruster Compartment. Once these cables are disconnected it

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

is the responsibility of the Contractor to protect them and have them secured so they cannot be damaged.

3.5.9 The Contractor must erect and remove the necessary staging to access the bow thruster tunnel guards. The guards must be cleanly cut away to allow access to the thruster propeller hub. These guards are to be re-installed upon completion of the installation.

3.5.10 The Contractor is expected to be fully responsible for determining the best removal/installation route needed to perform these removals, taking into account all interference removals required. (i.e., machinery, piping systems, electrical wiring etc.).

3.5.11 As each system, and electrical connection is disconnected it is to be properly tagged as to its source and as to its usage. These tags are to be legible and durable and are to remain in place until the associated system has been reconnected.

3.5.12 The Contractor must remove the existing bow thruster and its associated components. These will include, but are not limited to:

3.5.13 Bow Thruster Unit (propeller, thruster hub, and tunnel guards)

3.5.14 Bow Thruster Motor and associated foundation

3.5.15 Various Cabling not intended for re-use

3.5.13 The Contractor must remove the drain plugs on the hub assembly and remove approximately 300 liters of oil from the thruster hub unit. The oil must be drained and collected by Contractor for disposal as per local and Federal environmental requirements. Copies of invoices detailing disposal of the oil are to be given to the CG TA.

3.5.14 The Contractor must remove the existing bow thruster and hub/propeller assembly and have them removed ashore to their facilities. As this unit is to be returned to Kongsberg, as an exchange unit, the Contractor must prepare the removed bow thruster components for shipping. This preparation must include the covering and capping off all exposed openings and electrical connections to prevent ingress of contaminants and or weather. The entire bow thruster unit is to be covered in plastic shrink wrap and secured on a wooden pallet(s). The

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

Contractor will be responsible for arranging for the necessary transportation to a location as determined by Kongsberg Maritime CN Canada Ltd..

3.6 Installation Of The Refurbished Bow Thruster

- 3.6.1** After removal of the existing thruster unit, the upgraded and refurbished bow thruster's hub assembly must be installed within the existing tunnel and modifications will be required to the top portion of the tunnel to allow for the installation of an adapter flange.
- 3.6.2** A new seating adapter/foundation supplied as part of this installation must be installed on the upper portion of the tunnel to allow for the installation of the upgraded bow thruster drive motor. It is the responsibility of Contractor to complete modifications or repairs to machinery seats and foundations to provide correct fit, alignment, and oil/watertight integrity.
- 3.6.3** The Contractor is to note that the existing pod supporting brackets, found within the thruster tunnel, will required modifications to be made to accept the upgraded bow thruster's pod.

3.7 Electrical Requirements

- 3.7.1** The Contractor must install, arrange, test and commission all electrical installations necessary to provide a fully functioning bow tunnel thruster system. This must include all cabling, cableways, safety interlocks, protection and the necessary deck and bulkhead penetrations for the cables. The intent is to re-use the existing supply feeder cables to the existing thruster drive motor starter cabinet as well as all control and communication cables fitted between the wheelhouse and the Bow Thruster Compartment .
- 3.7.2** Prior to installation of the new bow thruster components the Contractor, with CG TA present, must Meggar test and record the existing supply and motor power cables insulation to ground. A second test of these cables must be performed just before the existing power feeds are connected to the motor itself. These readings are to be recorded as well.
- 3.7.3** Contractor must supply and install any cabling not identified as being supplied with the Kongsberg package. All new and used cables to be installed or modified requiring new terminals or lugs, as well Rextec cable glands, are to be supplied and installed by the Contractor.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

- 3.7.4** All new Power and Control cables, being supplied by Contractor, must be Class approved braided/armoured cable rated at 0.6/1kV, 110 °C with a low smoke zero halogen (LSZH) designation.
- 3.7.5** All glands utilized to secure motor supply cables must be of a metal construction, fiber or composite glands will not be acceptable.
- 3.7.6** Contractor must provide to the CG TA the lengths of all new conductors installed, to comply with the requirements for fault current calculations.
- 3.7.7** Routing of the new cables is to follow the existing cable lays wherever possible and cable installation(s) must be in compliance with all pertinent TP127, IEEE45 and Class requirements. Existing cable trays are to be utilized wherever possible. In locations 3where new trays are required, these must be supplied and installed by Contractor.
- 3.7.8** Prior to installation, the new bow thruster motor must be meggered tested, and this test must be performed based on the IEEE 43-2000 standard and TP 127 requirements (i.e., 500 VDC for a sixty (60) second duration). The Contractor must provide a copy, to the CG TA, of the current calibration certificate(s) of all of the test equipment being used.
- 3.7.9** The temperature of the equipment being tested must be measured and recorded and the megger readings must be corrected to 40 °C as per IEEE 43-2000. Contractor must inform the CG TA of any Megger readings below the limits as set down by TP127.
- 3.7.10** A Polarization Index (PI) test must be completed on the bow thruster motor and is to be based on the IEEE 43-2000 requirements. The temperature of the equipment being tested must be recorded and the readings must be corrected to 40 °C as per IEEE 43- 2000. The PI test must consist of a ten (10) minute test duration with the first reading being recorded fifteen (15) seconds into the test and then recorded at one (1) minute increments up to ten (10) minutes max. Contractor must inform the CG TA of any readings outside the limits of this test as set down by IEEE 43-2000.
- 3.7.11** Any repairs required that have been identified as a result of the tests being performed under paras C.8.9 and C.8.10 will be completed via 1379 action.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

3.7.12 Any new cabling required for communication, monitoring and signal cables must be mounted at a safe distance from power cables in order to prevent interference signal. Special attention in this respect must be given to the cable installation in the Engine Room, the Wheelhouse, and Bow Thruster compartment.

3.7.13 Cables in the accommodation areas must be concealed in the ceiling and behind bulkhead panels in wire ways.

3.7.14 Contractor must supply a new three (3) pole circuit breaker sized to meet the electric demands of the upgraded bow thruster electrical motor and its associated equipment as well as meeting the requirements of Class. The new circuit breaker is to be installed in location formally occupied by the existing bow thruster breaker.

3.7.15 The new breaker must come with the required over-current and short circuit protection as set out by Class. The protection must be automatic and are to meet the short circuit level and the selectivity requirements for the application.

3.8 Alarm and Status Monitoring

3.8.1 The Contractor must reconnect the existing communication cabling from the AMS to the alarm and monitoring points on the upgraded bow thruster. Any new communication cabling required, over and above the original cabling fitted, must be supplied, and installed by the Contractor and this is to include any additional wire tray, junction boxes, and cable transits etc. necessary. New cabling installations will be done via 1379 action.

3.8.2 The Contractor is to liaise with *Madsen Controls and Engineering or equivalent* to assist with the required engineering. Software updates and the interfacing requirements of the bow thruster to the existing AMS.

3.8.3 As a minimum the following alarm and monitoring points of the upgraded bow thruster must be captured and displayed on the AMS:

- Main Motor Incomplete Sequence
- Ground Fault
- Gravity (Header) Tank Level
- Winding Temperature A

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

- Servo Oil Pressure (or equivalent alarm)
- Bow thruster Overload
- Winding Temperature B
- Winding Temperature C

3.8.4 The Contractor must make connections to system's electrical power but is not to install specialized equipment within the cabinets or make connections of control or signal wiring, unless directed and under the guidance of the Kongsberg FSR.

3.9 Hydraulic Power Unit

- 3.9.1** The existing hydraulic power unit (HPU), previously used with the Ulstein Bow thruster bow thruster, is to be re-used and the Contractor is responsible for connecting the existing hydraulics to the upgraded bow thruster.
- 3.9.2** The Contractor is to drain any remaining oil from the HPU header tank and reservoir, and this is to be collected and then disposed of ashore in an environmentally acceptable manner. Proof of this disposal must be given to the CG TA by way of invoice or other pertinent documentation.
- 3.9.3** The access/hand hole cover(s) on the HPU reservoir and associated header tank are to be removed to allow access to each of the tank internals for cleaning. The internal surfaces must be cleaned and wiped down using lint free rags and once cleaned they are to be visually inspected and must be to the satisfaction of the CG TA prior to being closed up. The access cover(s) are to be re-installed using new oil resistant gasket(s) and secured into place.
- 3.9.4** Whilst the HPU oil reservoir is open, the low oil level alarm switch is to be tested for correct operation with the CG TA in attendance.
- 3.9.5** The pump suction strainer(s) must be opened out and cleaned/renewed as required. Strainer filter renewal, if required, will be via 1379 action. All cleaning rags used must be lint free.
- 3.9.6** The oil reservoir level gauge is to be removed, dismantled, cleaned, inspected by the CG TA and the old gaskets removed. Upon completion of identified work, the level gauge is to be reassembled and re-installed using new Contractor supplied gaskets/seals.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

- 3.9.7** Contractor must re-install all hydraulic piping and interconnections required between the hydraulic pump(s), motor(s), reservoir, and controller in accordance with the thruster manufacturer's requirements.
- 3.9.8** All new hydraulic pressure piping/tubing used must be high-pressure seamless stainless steel pipe/tubing rated at a minimum 10,000 PSI bursting pressure. Hydraulic piping/tubing being fitted must, as far as possible, be run in single lengths. Stainless steel Swagelok (or equivalent) fittings rated for the application and pressures intended can be used for the tubing connections.
- 3.9.9** Flexible hoses fitted must be in accordance with SAE standards for the working pressure of the system with a minimum 690 bar (10,000 PSI) bursting pressure for high-pressure hose.
- 3.9.10** All pipes passing through non-watertight openings must be protected against chafing.
- 3.9.11** All hydraulic pipes/tubes must be properly supported against vibration and securely clipped and supported. Where necessary, expansion pieces or flexible connections must be fitted.
- 3.9.12** Jointing materials used must be suitable for the application and service intended. Whenever possible the stainless steel tubing must be bent using dies of the appropriate radius required. Where installed, hoses bends must meet or exceed the minimum allowed radius for the hose type and diameter. NPT type pipe threads must not be used.
- 3.9.13** All piping and associated arrangements must be flushed to meet the cleanliness standard specified below.

3.10 Flushing and Testing of Hydraulics

- 3.10.1** Prior to their installation all new hydraulic hoses must be hydrostatically tested by a certified facility to 1.5 times the working pressure of the system prior to system operation. Hoses must be supplied with the associated test certificate and copies of these certificates are to be supplied to the CG TA.
- 3.10.2** The hydraulic system must be flushed with service fluid before being put into operation to ensure the system is clean and free of any debris. Filters must be changed after the flushing of the system. Flushing of the hydraulic system is not

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

to include the bow thruster hub and must be performed before the final connections have been made to this hub.

3.10.3 The hydraulic system must be flushed using a ten (10) micron filter(s) and the level of cleanliness of the fluid must meet or exceeds grade 16/13 of the ISO 4406 standard. The flushing process is to be witnessed by the CG TA and the Contractor must provided a flushing and test in report on completion

3.10.4 Once flushing is completed, the Contractor must drain and collect the service fluid used from the HPU, and its associated piping. Once complete the entire system is to be re-filled with new OEM approved Contractor's supplied hydraulic oil.

3.11 Wheelhouse Controls

3.11.1 The existing bow thruster controls fitted in the Wheelhouse must be reused.

3.12 Coatings and Paint Applications

3.12.1 The surface preparation and coatings of the internal surfaces of the tunnel, the hull inserts, and tunnel protective grid plates must be completed in accordance with the requirement of the Underwater Hull Coating spec item.

3.12.2 Contractor will be responsible to prepare and coat any new and the heat affected steel in way of access openings, bulkhead(s), and deck plating(s). The Contractor is to supply all coatings in accordance with CG technical Publication 18-80-00-SG-003 entitled *Paints and Coating Standard*.

3.12.3 The Contractor must ensure that the surface preparation(s) follow, as a minimum, the coating manufacturer's recommendations for application.

3.12.4 Areas that have been affected by this work must be mechanically cleaned to the SSPC-SP-11 Standard and then given two (2) coats of primer paint, Grey. Coatings must be applied to yield 2-3 mils (ASTM D1640) DFT per coat and once cured this is to be followed by two separate (2) topcoats of a Fire Retardant paint. Color to be dependant on location of the coating application.

3.13 Spares

3.13.1 The Contractor must supply all OEM recommended spare parts for a period of five annual maintenance inspections and for the first five year survey.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

- 3.13.1.1** The Contractor must provide list from OEM to confirm all recommended parts have been supplied.

Part 4 – Proof of Performance

4.0 Inspection

- 4.0.1** All work must be completed to the satisfaction of the attending Class Surveyor, the CG TA, and the Kongsberg FSR, as applicable.

4.1 Testing

- 4.1.1** Following the completion of all related hot work required by this specification, the Contractor must arrange to have the following NDT tests performed:

4.1.1.1 Full penetration welds in way of any hull welds must be subject to 100% UT.

4.1.1.2 Fillet welds must be subject to MPI or LPI examination or as otherwise required by Class.

- 4.1.2** Contractor must arrange and be responsible for the operational and load testing of the bow thruster after final installation. The operational and load tests must be performed in accordance with Class's requirements.

- 4.1.3** The attending Class Surveyor and the CG TA must witness all tests and trials and the Contractor must prove that the bow thruster functions as per the performance requirements set out by the OEM.

4.2 Harbour (Dock) Acceptance Trials (HAT's)

- 4.2.1** The Contractor must develop, prepare, and provide a test and trials booklet c/w the associated trials sheets that will be used during the commissioning and testing of the upgraded bow thruster installation. Copy of this booklet must be submitted to the CG TA a minimum of three (3) weeks prior to trials commencing so they can be reviewed and allow for any additional test procedures that the CG TA may require to be added.

- 4.2.2** Once the bow thruster installation has been completed, and is ready for operation, the Contractor must be responsible for the necessary commissioning

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

and the start-up tests required. The commissioning and testing must only be performed under the full guidance of the OEM's authorized FSR.

4.2.3 The Contractor is to arrange to have the attending ABS Surveyor and the CG TA to inspect the newly installed equipment, to establish cleanliness, tightness, and that the supporting systems are correctly connected, i.e., electrical power, hydraulics, fluid levels, control systems, etc. All work is to be to the satisfaction of ABS and the CG TA. Any deficiencies found must be rectified immediately by the Contractor.

4.2.4 All controls, gauges, alarms, and shutdowns must be proven functional, their operations witnessed, and must be to the satisfaction of all both the attending ABS Surveyor and the CG TA. The operation of these systems must be proven by using the upgraded bow thruster sensor and alarm points and using simulated alarm conditions as required.

4.2.5 The Contractor must arrange to perform the necessary commissioning and testing required to certify the new bow thruster for operation. This certification testing must be accomplished in accordance with ABS requirements and as a minimum the following tests must be carried out:

4.2.5.1 Full testing of the bow thruster and its associated control system(s)

4.2.5.2 The remote-control systems of the bow thruster

4.2.5.3 The bow thruster status position indicator(s) in the Wheelhouse

4.2.5.4 Power failure alarms for the bow thruster control system (if fitted)

4.2.6 The following listed procedures must be included along with the check and tests described above:

4.2.6.1 The full movement of the controllable pitch propeller of the thruster.

4.2.6.2 A visual inspection of all the associated linkages and connections in the bow thruster compartment.

4.3 Sea Acceptance Trials (SAT's)

4.3.1 Upon completion of successful HATs and when all work has been completed to the satisfaction of the attending ABS surveyor, the CG TA and the Kongsberg FSR,

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

the Contractor must then be responsible for arranging to have a formal SAT performed to prove the operability and performance acceptance of the upgraded bow thruster installation whilst at sea. This sea trial can be included as part of the overall sea trial required to be performed on the vessel upon completion of all Work. This does not preclude the requirements of para: D.3.1.

4.3.2 Five (5) working days prior to commencing sea trials, the Contractor must provide a complete trials agenda and booklet to the CG TA complete with the sign off section for evaluation by the witnessing parties.

4.3.3 As minimum the SATs are to include the operation of the following:

4.3.3.1 The bow thruster controls, including transfer of control and local control.

4.3.3.2 The thruster's variable pitch propeller is to be operated through all pitch degrees to provide minimum thrust to maximum thrust to either port or starboard. The Contractor is to monitor and record the amperage draw on all legs of the bow thruster motor's during the course of these tests (i.e., amperage draw at minimal thrust, ¼ thrust, ½ thrust, ¾ thrust and full thrust). These readings are to be recorded for both the port and starboard thrust conditions.

Note: The tests for the alarms and indicators may be proven at dockside.

4.3.3.3 The Contractor must be responsible for producing, recording, and maintaining all trial sheets.

4.3.3.4 Three (3) typed copies of these trial sheets must be given to the CG TA after completion of all trials.

4.4 Completion and Acceptance

4.4.1 On completion of a satisfactory SAT the Contractor must remove all hydraulic filters used during trials and replace them with new Contractor supplied filters units.

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

- 4.4.2** Filters are to be broken open and the filter elements removed for inspection. This is to be witnessed by the OEM's FSR, the attending ABS surveyor and the CG TA.
- 4.4.3** Oil samples are to be taken from the bow thruster's hydraulic system, whilst the system is under pressure, and sent to a certified laboratory for analysis. Analysis report is to be provided to the OEM's FSR and the CG TA upon receipt.
- 4.4.4** Final acceptance will not be performed until all of the above tests and trials have been satisfactorily completed with data available for review. The upgraded bow thruster installation must be ready for service in all respects and any identified discrepancy(s) must have been corrected.
- 4.4.5** The CG TA will conduct the final inspection and will advise the PSPS Contracting Authority when the new bow thruster is ready for Acceptance as per the Contract.
- 4.4.6** The Contractor must ensure all remaining warranty from OEM is transferred to CG upon completion of VLE and vessel returning to service.

4.5 Drawings/Reports

- 4.5.1** Upon completion of all work, the contractor must be responsible for providing updated "as fitted" drawings of the new bow thruster installation including all machinery installs, piping systems, electrical systems (one line diagrams), any structure modifications made, etc.
- 4.5.2** The Contractor must provide to the CG TA all of the documents listed below:
 - 4.5.2.1** All Technical information, including design drawings calculations and reports,
 - 4.5.2.2** Preliminary design and in-process production documents, including tests and trials field copies,
 - 4.5.2.3** All Tests and Trials Records
 - 4.5.2.4** Copies of all Material Test Certificates (Mill Certs) of the steel used.
 - 4.5.2.5** All original Classification certificates and TCMSS Notices of Compliance

	CCGS Leonard J Cowley	
Spec Item #: HD-26	Specification	F7049-210183
BOW THRUSTER REPLACEMENT AND INSTALLATION		

4.5.2.6 Weld test(s) and NDT report(s)

4.5.2.7 Hydraulic flushing report

4.5.3 The Contractor must provide the CG TA with the typewritten report of the Contractor's work in both electronic and hardcopy formats outlining the details of the installation and any alterations / repairs made prior to the acceptance of this item.

	CCGS Leonard J Cowley	
Spec Item #: HD-27	Specification	F7049-210183
GEARBOX SURVEY		

HD-27 Gearbox Survey – UPDATED

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to supply the services of a Lohmann and Stolterfoht FSR or other experienced authorized dealer familiar with the operation and overhaul procedures of Lohmann and Stolterfoht gearboxes to perform an overhaul and 5 year inspection of the Main Gear Box.
- 1.1.1** The Contractor familiarity with L&S Gearboxes must be proven by providing reports of 3 overhauled L&S Gearboxes in the past 5 years.
- 1.1.2** The Contractor must bid an allowance of \$50,000.00 for FSR to supervise the overhaul by Contractor. This allowance to include FSR labour, travel and accommodations and will be adjusted up/down via PSPC 1379 action based on invoice.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Lohmann and Stolterfoht
 S/N – GVA 1250 B/1358
 Order Number – 12/240 489
 Year of Manufacture – 1984
 Input Power – 2 x 1560 KW
 Input Speed – 750 I/min
 Ratio – 3.2632:1
 Lubricating Group – HP 100

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet Safety and Security Manual

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Marine Machinery Regulations (SOR/90-264)

	CCGS Leonard J Cowley	
Spec Item #: HD-27	Specification	F7049-210183
GEARBOX SURVEY		

2.3.3 Maritime Occupational Health and Safety Regulations (SOr/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 The Contractor must supply all materials, equipment, lifting and transporting arrangements, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must perform an alignment of the Main Engines to Gearbox input shafts prior to starting work. This alignment must be taken prior to the vessel being removed from the water and while in sea going conditions(fuel, ballast, potable water, stores).

3.1.2 The Contractor must ensure that the FSR is present and supervising all work carried out by The Contractor in this specification.

3.1.3 The Contractor must remove port and stbd main engine clutches, cooler, filter assembly and all other interference items prior to starting work on the Gearbox.

3.1.3.1 Any removed items must be safely stored by The Contractor and any damage will be The Contractors responsibility. All removed items must be reinstalled upon completion of gearbox inspections.

3.1.3.2 All removed piping must have the open ends covered to prevent the ingress of dirt and debris into the system. The brackets holding the engine controls and alarms systems must be removed and reinstalled later. The wiring to the controls must be marked and disconnected. Both main engine coupling guards must be removed to provide access to the equipment and later replaced.

3.1.4 The Contractor must remove all inspection covers to gain access to the gearbox internal gearing. Backlash, thrust and bearing clearances must be taken and recorded. ABS Class Surveyor and CG CE must be present to inspect all gearing and witness backlash measurements.

3.1.4.1 The Contractor must take a set of measurements of each journal and polish if required. Unit cost for polishing one journal must be bid on and the actual amount to be adjusted via PSPC 1379 action

	CCGS Leonard J Cowley	
Spec Item #: HD-27	Specification	F7049-210183
GEARBOX SURVEY		

3.1.4.2 The Contractor must rotate gear train to inspect and check pinion, secondary and bull gears for tooth contact.

3.1.4.3 The Contractor must confirm correct torque of gearbox holddown bolts to what is recommended by OEM. The torques must be recorded and provided to CG TA.

3.1.4.4 The Contractor must perform a wear down measurement on journals.
Procedure for wear down measurements can be found in manual.

3.1.5 The Contractor must remove the used oil from the gearbox and dispose of in accordance with the provincial environmental regulations. The Contractor must bid on removing 1m3 of gear oil. The Contractor must flush gearing and gearbox with varisol to remove any residue. The Contractor must flush gearbox with new oil and pump it out again. Upon completion of inspection, The Contractor must supply and fill gearbox to correct operating level with Ultima EP 150 oil. Approx volume is 1000L.

3.1.6 The Contractor must install all inspection covers with Contractor supplied new gasket material, and torque fasteners to manufactures specifications.

3.1.7 The Contractor must replace the oil filters with new Contractor supplied, clean strainers and the gearbox sump must be washed and cleaned. After cleaning the gearbox must be flushed and filled with new Contractor supplied oil as per L&S requirements.

3.1.8 The Gearbox must be reassembled using new Contractor supplied gaskets and seals.

3.1.9 The Contractor must contact ABS Class Surveyor and confirm their requirements for inspection prior to starting.

3.2 Location

3.2.1 Aft Engine Room

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 – Proof of Performance

4.1 Inspection

	CCGS Leonard J Cowley	
Spec Item #: HD-27	Specification	F7049-210183
GEARBOX SURVEY		

4.1.1 All work must be completed to the satisfaction of the CG TA and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 The gearbox lube oil pump must be used to flush the oil through the gear box at least 3 hours prior to startup; then the turning gear must be operated for at least 1 hour prior to startup in order to detect any gear binding.

4.2.2 Trials of 1 hour ahead and 1 hour astern on the gearbox must be carried out. Any unusual action or heating is to be immediately investigated and rectified.

4.2.3 The Magnetic Filter must be opened up and examined for foreign material, cleaned and replaced after completion of ahead trial and again after astern trial.

4.2.4 Cone Strainers must be placed in the oil suction line and discharge line close to the gear box before pumps are started. Strainers must be removed and examined upon completion of trials.

4.3 Certification

4.3.1 A survey credit from ABS is required.

4.3.2 The Contractor must deliver 2 hard copies of service certificates and the original service certificates with ABS endorsement, as required to Chief Engineer. Contractor must deliver 1 electronic copy of all reports/certs to SVMM. All certificates must be delivered at least 14 days prior to scheduled refit end date.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must deliver two (2) hard copies of all checklists and reports to the Chief Engineer outlining any work and/or modifications required. Contractor must deliver one (1) electronic copy of all reports to SVMM and Chief Engineer. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-27	Specification	F7049-210183
GEARBOX SURVEY		

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

HD-28 Steering Gear Actuator Replacement

Part 1 – Scope

- 1.1** The purpose of this requirement is to have a qualified Contractor provide a full- service turnkey package to replace the existing Tenfjord Rotary Vane Steering Gear Actuator, currently found aboard the CCGS LENOARD J. COWLEY, with a new Contractor’s supplied upgraded Kongsberg SR722B FCP rotary vane steering actuator system, which is to be compatible to the existing steering gear control systems.
- 1.2** General scope will include:
 - 1.2.1** Development of all of the necessary Classification Society (Class) approved drawings (e.g., foundation modifications, piping, electrical etc.) and the engineering studies that will be needed to obtain the required regulatory approvals and certifications for this installation.
 - 1.2.2** Removal of the existing steering gear actuator.
 - 1.2.3** The supply and installation of the new upgraded Kongsberg steering gear actuator.
 - 1.2.4** Commissioning and testing of the new steering gear actuator.
- 1.3** This work must be carried out in conjunction with the following specification items:
 - 1.3.1** HD22 – Rudder, Stock and Carrier Bearing
 - 1.3.2** HD08 – Steering Compartment Bilge Cleaning

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** The following Kongsberg drawings are available as part of the new actuator package and it will be the responsibility of the Contractor to obtain the most up to date copies of these drawings from Kongsberg for their installation purposes.

List of applicable drawings and documents.

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

DESCRIPTION*	DRAWING NUMBER
Steering Gear SR722B FCP Top Rudder Stock	A-9909
Piping Diagram SR722 FCP	A-8798
Motor Circuit Diagrams	0003-5799 (Sht. 1-7)
Motor Controller Cabinet Layout	L-1799-00-16
Frequency Converters Cabinet Layout	0000-0321
Control System Unit	W-1223-02-01 (Sht. 1-5)
Proposed Foundation Design	A-9161
Foundation Bolts Drawing Number	A-9889
Rudder Stock Sleeve & Mounting Piston	A-7956

2.2 Rules, Regulations and Standards

2.2.1 All design, material and work must meet the Classification Society's (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify and coordinate any specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines (ARSRC&G) referenced in this specification, (refer to General Requirement Section 4.0).

2.2.2 TCMSS approval, of design, material, and work, over and above Class approval, must be met as and when required.

2.3 Existing Equipment

2.3.1 Manufacturer: Rolls Royce

TENFJORD Rotary Vane Steering Gear (Ref. Figure 1)

Type SR 722 FCP

Max. Stock Dia. 340 mm

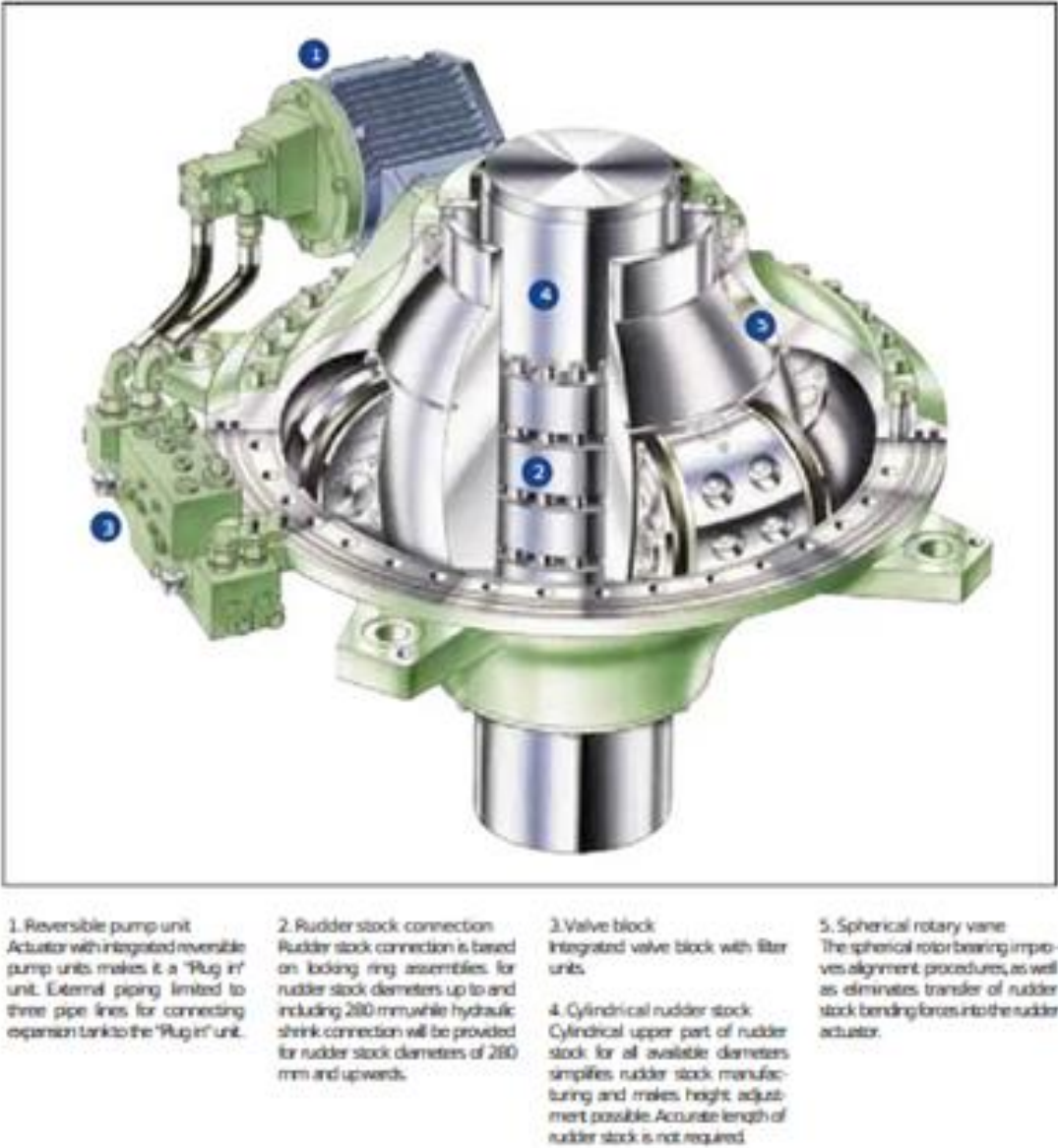
Max. Working Torque 275 kNm

Max. Rudder Angle 2 x 72.0

Weight (approx.) 2750 kg

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

Max. Radial Load	855 kN
Max axial Load	370 kN
Max. Working Press	100 Bar



2.4 Contractor Supplied Material

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

2.4.1 The Contractor must supply a new, Kongsberg Type SR722B FCP steering gear actuator complete with its ancillary and auxiliary equipment and all related equipment as described later in this specification, material, parts, and tools required to perform the specified work as defined in this SOR .

2.4.2 The Contractor must be responsible for ensuring that all the components, necessary for the satisfactory installation and operation of the vessel's steering gear, are supplied and installed.

2.5 OEM/Supplier/FSR

2.5.1 The Contractor must retain the services of the steering gear manufacturer (OEM) authorized field service representative (FSR) to supervise and oversee the entire installation of the new steering gear, including alignment, fitting out, commissioning and training. The FSR must also be present for all dock, sea trials and the training required to prove that the new upgraded steering gear system installation meets all its performance requirements.

2.5.2 The Contractor must coordinate the total labor and material requirements for this requirement with the FSR and the bid price must include all FSR costs as well as all Contractor costs for all labour, material and FSR support needs.

2.6 Government Supplied Equipment

2.6.1 N/A

Part 3 – Technical Requirements

3.1 General

3.1.1 The Contractor must be responsible for ensuring and confirming that the equipment being supplied is dimensioned in accordance with classification machinery requirements for both the designated Classification Society and Transport Canada Marine Safety (TCMS). For the purpose of this Statement of Requirements (SOR) the designated Classification Society shall be the American Bureau of Shipping (ABS).

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

3.1.2 The Contractor must be required to develop and engineer completely the new steering gear installation package, ensuring that the new steering gear actuator package, its required support and control systems are seamlessly integrated with each other and with the existing shipboard systems and hull structure.

3.1.3 The broad scope of services, to be initially executed by the Contractor are as follows:

3.1.3.1 Relevant studies / analysis, during design and integration process

3.1.3.2 Active interaction with the OEM to ensure a reliable and safe steering system, complete with its associated controls and monitoring.

3.1.3.3 Preliminary and detailed design drawings (co-ordination level drawings) documents for finalization of the steering gear system layout/arrangement, associated supporting system(s) and equipment foundations.

3.1.3.4 The Contractor is to liaise and work closely with Kongsberg Maritime CM Canada Ltd. in regard to this Statement of Requirements (SOR) to ensure a fully satisfactory installation. The point of contact at Kongsberg Maritime CM Canada will be:

Mr. Ted Gurr

Head of Aftermarket Sales

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3.2 Operational Parameters

3.2.1 The new steering gear actuator package is required to be capable to operate over an indefinite period at any speed from one knot to full designed speed, and still give good control both in the vessel's maneuvering capability and its steering.

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

3.2.2 The new steering gear actuator is to be designed to operate satisfactorily with a momentary roll of forty-five (45) degrees, a permanent list of twenty (20) degrees, a permanent trim of ten (10) degrees and a pitch of nine (9) degrees.

3.2.3 The units shall be suitable for continuous operation in an enclosed compartment with an ambient air temperature ranging from 0o to 45o C and relative humidity up to 100%.

3.2.4 The Contractor must be responsible for ensuring that the steering gear package being supplied is a type approved by both Transport Canada Marine Safety Branch (TCMS) and the designated Classification Society

3.3 New Actuator Particulars

3.3.1 The following technical information is being presented to the Contractor to provide them with the necessary data to assist them in developing the required installation plans and guides to install the new actuator unit.

Manufacturer KONGSBERG Steering Gear Actuator

Type: SR722B FCP

Rudder actuator

Effective torque: 275 kNm

Max working pressure: 125 bar

Allowable axial load : 370 kN

Allowable radial load: 855 kN

Rudder stock diameter: 300 mm

Max. mechanical rudder angle: 2x72°

Max. electrical rudder angle: 2x65°

Steering time at 30° - 0° - 35°: 28 s with one pump unit in line

Steering time at 30° - 0° - 35°: 14 s with two pump units in line

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

Theoretical Loss: 35 kNm

Electric Motor

Power : 12.8 kW (S1)

Current: IN = 21 A

Rotational speed: 1750 rpm

Voltage: 3 Phase 440-460 VAC

Frequency: 60 Hz

Frame Number (IEC 60072-1): 160 M

Protection: IP 55

Design: B35

Insulation class: F

Heating: Element, (Through Windings)

Start/Stop and Control System

Control panels for console mounting in the bridge

Control system unit for bulkhead mounting with interface to analogue autopilot.

Panel for run/stop indication

Motor controllers for bulkhead mounting in the steering gear room

The system is powered internally from motor controllers

Limit switches and potentiometers for the follow-up system are mounted in feed-back units

Alarm System

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

Panels for console mounting including all alarms, instrumentation and indicators required to meet Class requirements must be supplied, installed and commissioned by The Contractor.

Interface to Voyage Data Recorder (VDR) and ship's main alarm system

Interface to alarm sensor

24VDC external power supply (00W)

Steering Gear Performance Monitoring System

Enables recording, processing, and sharing of Steering Gear operational data Enables early notification of performance degradation

Steering Gear Pressure (torque) and Temperature monitoring

3.4 Contractor & OEM Documentation Requirements

3.4.1 All dimension drawings, hydraulic diagram(s), electrical diagram(s) and technical data for the steering gear system are to be provided and once received they are to be provided to Canada.

3.4.2 As part of this Statement of Requirements, the Contractor must also provide Canada the following documentation:

3.4.2.1 Classification Society approved drawing(s) showing foundation and dimensional details needed to fit the new actuator.

3.4.2.2 Single line diagram of new electrical connections to the existing electrical systems.

3.4.2.3 List of Alarm Monitoring Points, controls, and instrumentation system details as per Class requirements.

3.4.2.4 A costed list of proposed standard spares.

3.4.2.5 A costed list of special tools needed to support the aforementioned

3.4.3 The Contractor must also arrange to provide the following OEM manuals, in English, upon delivery of the steering Gear package Manuals are to be provided both in hard copy and electronically.

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

Three (3) Printed Mechanical User manuals.

Three (3) Printed Electrical User Manuals.

Three (3) Printed Mechanical Installation Drawings/Manuals

Three (3) Printed Electrical Installation Drawings/Manuals.

Three (3) USB Drives with English user/installation manuals.

NOTE: Copies of the aforementioned manuals must also be provided in French, if available.

3.4.4 All drawings, documents and sign plates on the equipment will also be delivered in English language.

3.5 Procurement Requirements

3.5.1 Introduction

3.5.1.1 The Contractor must be responsible for the procurement and delivery of the new upgraded Kongsberg steering gear actuator package, complete with its associated ancillary and auxiliary equipment, and the agreed upon spares and specialized tool(s), to their facilities in Canada.

3.5.1.2 The broad scope of services, to be executed by the Contractor during this Phase re as follows:

3.5.1.2.1 Relevant studies / analysis, during design and integration process

3.5.1.2.2 Steering gear equipment FAT(s) analysis; for ensuring compliance to required performance requirements.

3.5.1.2.3 Development of detailed Class approved design drawings, co-ordination level drawings, engineering studies and documents for finalization of the installation of the new steering gear system layout/arrangement, associated support system(s) and equipment foundations.

3.5.1.3 A Factory Acceptance Test (FAT) must be performed to prove operability and the capability that the SR722B FCP steering gear actuator can meet

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

its performance criteria. At a minimum, this FAT test must be witnessed by the attending surveyor from the designated Classification Society. A full test report shall be provided by the OEM and is to be signed off by the attending surveyor and copies provided to Canada.

3.5.1.4 Canada reserves the right to provide personnel to visit the OEM Facilities during the fabrication phase of the steering gear components as well as attending the FATs, at the OEM's facilities. These visits will be at Canada's expense. For such cases, the Contractor is to provide at least fifteen (15) days' notice for trials at OEM's premises abroad and for any trials at OEM's premises in North America.

3.6 Delivery Requirements

3.6.1 On delivery to the Contractor's facilities, the new steering gear package must be inspected for any transportation damage. Arrangements are to be made with Canada to have a representative present when the steering gear engine package arrives on site and this representative is to be allowed complete access to perform a full inspection on behalf of Canada. This inspection will require the opening of crates and or shipping boxes but will not require the opening of any hermetically sealed units unless damage to the packaging can be readily seen.

3.6.2 The Contractor must provide a minimum of five (5) days' notice to Canada to allow their designated representative time to prepare and attend this inspection. The Contractor must provide any assistance required to allow Canada's representative access to the various components.

3.6.3 After a satisfactory inspection, the new steering gear package and its associated equipment are to be safely stored in a heated, environmentally controlled, location and are to be quarantined until they are ready for installation

3.7 Documents To Be Submitted Within Two Months After Placement Of Order

3.7.1 The following list of drawings / documents must be submitted to Canada after placement of order:

3.7.1.1 Detailed drawings of the machinery to be installed within the Contractor's scope

3.7.1.2 Approved foundation/mountings details

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

3.7.1.3 All relevant class approved drawings, engineering studies, and documents.

3.7.1.4 Installation drawings indicating foundation details and procedures showing space constraints for withdrawal of various accessories of all the offered machinery and equipment.

3.7.1.5 Three (3) sets of the Contractor's proposed project guides for installation & Work execution of the equipment.

3.7.1.6 A comprehensive and detailed listing (i.e., operating voltages and amperage requirements etc.) of the steering gears alarm(s), set and operating points to allow for any modifications to be made to the existing VTS Trihedral AMS system to accept the new I/O inputs.

3.7.2 The above drawings are to be submitted in triplicate, both in hard copy and in AutoCAD DWG format to Canada.

3.7.3 All drawings requiring Class approval must be the responsibility of the Contractor. Copies of the original stamped drawing must be provided to Canada.

3.7.4 The Contractor must submit the following certificates and reports in triplicate (1 original + 2 copies):

3.7.4.1 Shop test data, duly signed by Class

3.7.4.2 Classification Type approval,

3.7.4.3 Manufacturer Test Certificates and Certificates of Compliance.

3.7.5 All drawings, documents and sign plates on the equipment are to be delivered in English language. All drawings must be delivered in PDF-format unless stated otherwise.

3.8 Removals

Note to Contractor

The broad scope of services, needed to complete this installation will be solely the responsibility of the Contractor. The following items regarding the removals, installation and connection of

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

systems, controls and services are being suggested by Canada only and they are being provided to assist the Contractor as what steps that should be considered when the Contractor is developing their cost model and installation plans to complete this installation. The following sections, 3.8.1 thru to 3.13.1 inclusive are not to be seen as direction by Canada, but only as guidelines of what should be considered.

- 3.8.1** The Contractor shall ensure that all insulation, piping, structural fittings, or electrical cables removed, disturbed, or damaged while performing any of the installations, are re-installed in good order and functionally tested, where necessary, for correct operation. All functional testing shall be witnessed by the CG TA and IA and the attending ABS surveyor, where applicable. All insulating materials used shall be asbestos free and be ABS approved for the type of application required.
- 3.8.2** All piping removed to carry out the Work shall be suitably blanked or capped to prevent the ingress of contaminants.
- 3.8.3** The Contractor will be fully responsible for isolating, locking-out and tagging out the electrical power supplies to the existing steering gear. The Contractor is then to completely disconnect, both mechanically and electrically, the existing Tenfjord rotary vane steering actuator and have it removed, in its entirety, from the vessel. Special care is to be taken when disconnecting the existing sensor points as these are to be reused on the new steering gear actuator installation.
- 3.8.4** The Contractor is expected to be fully responsible for determining the best removal/installation route needed to perform these removals, taking into account all interference removals required. (i.e., machinery, piping systems, electrical wiring etc.).
- 3.8.5** As each system, and electrical connection is disconnected it is to be properly tagged as to its source and as to its usage. These tags are to be legible and durable and are to remain in place until the associated system has been reconnected.
- 3.8.6** The Contractor must treat the existing actuator and all associated parts as "Class A" material.
- 3.8.7** The Contractor will be offered first right to refusal to procure the actuator and its associated parts. The Contractor must include in their bid submission, a value the

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

Contractor is willing to pay to take possession of the removed actuator in an “as removed” condition.

- 3.8.8** Should the Contractor not wish to procure the old steering gear actuator, its open pipework and loose electrical connections, are to be capped and secured and the unit is then to be wrapped with heavy gauge plastic and prepared for transportation to a defined Coast Guard facility for disposal. As the defined CG facility is yet to be determined, all transportation costs related to this delivery will be negotiated via 1379 action.

3.9 Installation

3.9.1 Foundation/Structural Modifications

- 3.9.1.1** Once the existing steering gear actuator has been removed, the structure, framing and deck immediately below the steering gear is to be cleaned of all dirt, oil residue and other contaminants to allow for seat/foundation modifications to be performed.

- 3.9.1.2** The existing foundation is to be modified to accept the new mounting arrangement(s) of the Kongsberg steering actuator.

- 3.9.1.3** Once the required modifications have been completed, the area under the steering gear, the new foundations and or structure, etc. are to receive a minimum two (2) separate coats of "Interplate NLA 069" epoxy zinc grey (1 GP 183). Once cured this is then to be followed by two (2) separate coats of paint that matches the surrounding paint schedule of the compartment.

- 3.9.1.4** The design of the new foundation shall be of strong construction, approved by the OEM and ABS, fabricated from Class approved steel, and well braced to form a rigid supporting base that shall minimize vertical and horizontal vibrations to the greatest extent possible.

- 3.9.1.5** On completion of the welding performed when installing the new foundation, all full penetration welds and all fillet welds are to be subjected to NDT Testing. Method of and types of acceptable testing will be determined and to be to the satisfaction of the attending ABS surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

3.9.1.6 All Work performed must be inspected and is to be to the complete approval of the attending ABS surveyor. Any structural changes proffered by the Contractor will have to have prior approval of both ABS and the CG TA before the actual Work can take place.

3.10 New Actuator Installation

3.10.1 Foundation/Structural Modifications

- 3.10.1.1** All connections between components supplied by KONGSBERG are the Contractor's responsibility. However, type of pipes and cables are given in the OEM's diagrams and mounting instructions.
- 3.10.1.2** The new steering actuator package must come complete with the following equipment and the Contractor shall be responsible for developing and implementing the necessary procedures to install the identified components to make the installation fully operable, functional, and to the satisfaction of the designated Classification Society and Canada.

3.11 Steering Gear Components

3.11.1 The following components must be supplied by Kongsberg as part of the actuator package:

- 3.11.1.1** One (1) pc. Rudder actuator (rotary vane) type SR722B FCP
- Complete with spherical self-aligning rudder carrier
 - pressure pumps
 - non-return valves
 - load control valves
 - valve block with sensors for hydraulic lock alarm
 - filter units with sensor for clogged filter alarm
 - mechanical rudder angle indicator

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

- feedback units with limit switches
- transmitters for the steering control system
- Pressure and temperature sensors, for continuous logging of oil pressure and system temperature.

3.11.1.2 One (1) pc. sleeve for hydraulic coupling complete with mounting piston. Suitable for a rudder stock diameter of 280 mm.

NOTE: The existing rudder stock is to be measured thoroughly to establish exact diameter. If the required dia. 280 mm g7 tolerance is not attainable, the supplied sleeve will have to be machined to the actual diameter of rudder stock. Costs for these adjustments will be done via 1379 action.

3.11.1.3 Two (2) Motor controllers (FCP) (IP44) for bulkhead mounting in the steering gear compartment.

3.11.1.4 Two (2) Frequency converters (IP44) for bulkhead mounting in the steering gear room with ammeter, hour counter indication and power supply for heating of electrical motor through the windings. Vibration dampers included.

3.11.1.5 One (1) Control system unit (IP44) this unit will replace the existing Control system unit located on the bridge and is meant for bulkhead mounting with its interface to analogue autopilot.

3.11.1.6 Four (4) Rough machined foundation bolts. Final machining of these bolts to the fitted size requirements must be the responsibility of the Contractor.

3.11.2 The Contractor must take into account that the new seating/foundation arrangements are to be machine drilled to accept the bolt patterns of the new actuator's mounts.

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

3.11.3 Existing deck plates and supports are to be modified to fit around the new foundations, secured and properly braced to prevent movement in a seaway.

3.11.4 Once the foundation modifications have been completed it is to be painted in accordance with section 3.9.1.3 of this specification. Once cured the new steering gear actuator is to be installed on the new foundation, realigned and re-chocked using an OEM approved Orange Chockfast or equivalent process.

3.12 Connection of Systems

3.12.1 The Contractor must be responsible for the connection and the modifying of the associated systems i.e., hydraulics, electrical, communication cabling, etc. to make the new steering gear actuator operable and meet the OEM's requirements and the requirements of this Statement of Requirements.

3.12.2 The Contractor is also responsible for fabricating and fitting all the necessary piping, piping connections, valves, and flexible hoses, needed to connect the steering gear actuator to any existing systems.

3.12.3 Lengths and diameters of any piping required, will be the responsibility of the Contractor and are defined in OEM's Piping Diagram Dwg. #: A-8798. New hydraulic pipe sections are to be fabricated from stainless-steel seamless heavy walled hydraulic tubing and stainless-steel heavy duty fittings (Swagelok or equivalent).

3.12.4 The Contractor is to note that prior to connecting to the new actuator to any existing hydraulic systems, the system shall be completely cleaned and flushed by a qualified company. This cleaning and flushing shall be done in accordance with the requirements of ISO 28521:2009 Ships and Marine Technology — Hydraulic Oil Systems — Guidance for Grades of Cleanliness and Flushing.

3.12.5 Flushing process shall be witnessed and is to be to the complete satisfaction of both the CG TA and the attending ABS Surveyor. A flushing report will be required and shall include, the flushing media used, the flushing pressures, how long the flushing occurred, the final particle count found, etc.

3.13 Instrumentation and Controls

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

3.13.1 It will be the responsibility of the Contractor to connect or modify and make functional the existing Steering Control System to accept and control the new and upgraded Kongsberg F722B FCP Steering gear. As this will require modifications to the existing Tenfjord (Rolls Royce) systems, the Contractor is advised to bring in a representative(s) from Kongsberg who is familiar with the existing Control Systems, to design and be capable of making any necessary modifications required to enable the new steering gear actuator to be operated from the existing controls both locally and remotely from the Bridge. Should this individual not be the FSR who was present during the installation, then the controls representative will be required to be aboard during the sea trials of the vessel.

4.0 PROOF OF PERFORMANCE

4.1 Inspection

4.1.1 Testing

4.1.1.1 The Contractor must ensure that a Factory Acceptance Trials (FAT) Plan from the OEM is provided for submission and review by Canada and then arrange to perform the required FAT, based on the submitted plan.

4.1.1.2 The FAT Plan must identify the tests and trials which are to be performed upon initial assembly of the SR722B FCP rotary vane steering actuator in order to satisfy this SOR, and to support certification requirements by the designated Classification Society. The FAT plan is to identify all conditions, precautions, adjustments, the expected test results, tolerances, and the test equipment required to verify the correct operation of the new actuator.

4.1.1.3 The FAT test report must be provided by the OEM and is to be signed off by the attending Class surveyor and copies provided to Canada. The results of the FAT tests and the accompanied test report are to be to the satisfaction of both attending Class surveyor and Canada, before the new actuator is prepared for shipment to the Contractor's facilities.

4.1.1.4 Canada reserves the right to provide personnel to visit the OEM Facilities during the construction phase of the new steering gear actuator as well as attending the FATs, at the OEM's facilities. These visits will be at Canada's

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

expense. For such cases, the Contractor must provide a minimum fifteen (15) days' notice for trials both at OEMs premises abroad and for any trials at OEMs premises in North America.

4.2 Trials

- 4.2.1** The Contractor must conduct their own inspections, tests and trials to verify successful completion of the work in accordance with this statement of requirements. all discrepancies identified through the inspection, test and trials processes must be corrected prior to delivery and acceptance.
- 4.3.2** The Contractor must develop, prepare and provide a test and trials booklet c/w the associated trials sheets that will be used during the commissioning and testing of the new steering gear installations. Copy of this booklet is to be submitted to the CG TA three (3) weeks prior trials commencing so they can be reviewed and allow for any additional test procedures that the CG TA may require to be added.
- 4.3.3** Once the new steering gear installation has been completed, and is ready for operation, the Contractor must be responsible for the necessary commissioning and startup tests required. The commissioning and testing shall only be done under the full guidance of the OEM's FSR.
- 4.3.4** The Contractor is to arrange to have the CG TA and the attending ABS Surveyor to inspect the newly installed equipment, to establish cleanliness, tightness, and that the supporting systems are correctly connected, i.e., electrical power, hydraulics, fluid levels, etc. All work is to be to the satisfaction of the CG TA and ABS and any deficiencies found shall be rectified immediately by the Contractor.
- 4.3.5** All controls, gauges, alarms and shutdowns shall be proven functional, their operations witnessed, and is to be to the satisfaction of all both the CG TA and the attending ABS Surveyor. The operation of these systems shall be demonstrated by using the sensors, and by activating with simulated alarm conditions as required.
- 4.3.6** The Contractor shall arrange to perform the necessary commissioning and testing required to certify the new steering gear for operation. This certification testing shall be accomplished in accordance with ABS and as a minimum the following tests are to be carried out:

4.3.6.1 Full testing of the Main steering gear and system

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

4.3.6.2 Auxiliary steering gear and system

4.3.6.3 The remote-control systems of steering gear

4.3.6.4 The steering position indicator on the navigation bridge

4.3.6.5 The emergency power supply to one of the steering unit

4.3.6.6 The rudder angle indicators showing actual position of the rudder

4.3.6.7 Power failure alarms for the remote steering gear control system

4.3.6.8 Power unit failure alarms for the steering gear unit

4.3.6.9 Automatic isolating arrangements and other automatic equipment

4.3.7 The following listed procedures must be included along with the check and tests described above:

4.3.7.1 The full movement of the rudder as per the required capabilities of the steering gear system present onboard.

4.3.7.2 A visual inspection of all the linkages and connection in the steering gear.

4.3.7.3 The means of communication between the steering gear room and navigational bridge must proven operational

4.3.8 Should the existing block diagrams displaying the steering system, the changeover procedure from remote to local steering and steering gear power unit indicating the emergency supply unit, which are located both on the Bridge and in the Steering Gear Compartment, be no longer be valid, the Contractor shall then be responsible for providing a new block diagrams and emergency change over procedures.

4.3.9 New block diagrams are to be on etched metal plates and are to be clearly legible. and pasted in the Navigation Bridge and steering gear compartment

4.4 Sea Trials

4.4.1 Upon completion of successful dock trials and when all work has been completed to the satisfaction of the attending ABS surveyor and the CG TA, the Contractor will then be responsible for arranging to have a formal sea trial performed to prove

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

the operability and performance acceptance of the new steering gear whilst at sea,

4.4.2 Five (5) working days prior to commencing sea trials, the Contractor must provide a trials agenda and booklet to the CG TA complete with the sign off section for evaluation by the witnessing parties.

4.4.3 As minimum the sea trials are to include the operation of the following:

4.4.3.1 The CPP's propeller pitch is to be set at the maximum design pitch approved for the maximum continuous ahead R.P.M. at the main steering gear trial. If the vessel cannot be tested at the deepest draught, steering gear trials shall be conducted at a displacement as close as reasonably possible to full-load displacement and the vessel is in an acceptable trim condition, or the rudder load and torque at the specified trial loading condition have been predicted and extrapolated to the full load condition.

4.4.3.2 The steering gear power units, including transfer between steering gear power units.

4.4.3.3 The isolation of one power actuating system, checking the time for regaining steering capability.

4.4.3.4 The hydraulic fluid recharging system.

4.4.3.5 The emergency power supply is to be tested and proven operational.

4.4.3.6 The steering gear controls, including transfer of control and local control.

4.4.3.7 The means of communication between the wheelhouse, engine room, and the steering gear compartment.

4.4.3.8 The alarms and indicators, these tests may be proven at dockside.

4.4.4 The Contractor must be responsible for producing, recording, and maintaining all trial sheets.

4.4.5 Three (3) typed copies of these trial sheets shall be given to the on-site ABS Surveyor and the CG TA Owners after completion of all trials

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

4.5 Completion and Acceptance

- 4.5.1** On completion of a satisfactory sea trials the Contractor is to be responsible for the removal of all hydraulic filters used during trials and replacing them with new Contractor supplied filters units.
- 4.5.2** Filters are to be broken open and the filter elements removed for inspection. This is to be witnessed by the OEM's FSR, the CG TA and the attending ABS surveyor.
- 4.5.3** Oil samples are to be taken from steering gear's hydraulic system, whilst the system is under operation, and sent to a certified laboratory for analysis. Analysis report is to be provided to the CG TA upon receipt.
- 4.5.4** Final acceptance will not be performed until all of the above tests and trials have been satisfactorily completed with data available for review. The upgraded steering gear must be ready for service in all respects and any identified discrepancy(s) must have been corrected.
- 4.5.5** The CG TA, or a representative of the CG TA, will conduct the final inspection and will advise the Contracting Authority when the upgraded steering gear is ready for Acceptance as per the Contract.4

5.0 DELIVERABLES

5.1 Drawings/Reports

- 5.1.1** Upon completion of all work, the Contractor must be responsible for providing updated "As Fitted" drawings of the new steering gear actuator installation including all machinery installs, piping systems, electrical systems (one line diagrams), structure modifications, etc.
- 5.1.2** The Contractor must provide to the CG TA all documents listed below and found elsewhere with in this Statement of Requirements.
 - 5.1.2.1** All Technical information, including design drawings calculations and reports,
 - 5.1.2.2** Preliminary design and in-process production documents, including tests and trials field copies,

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

5.1.2.3 All Tests and Trials Records

5.1.2.4 Copies of all material test certificates (Mill Certs)

5.1.2.5 All original classification certificates and TCMSS Notices of Compliance

5.1.2.6 Weld test report(s)

5.1.2.7 Hydraulic flushing report (if performed)

5.1.2.8 All OEM Documentation including but not limited to:

- Operation and Safety Manual
- Maintenance Manual
- Parts Manual

5.2 Manuals

5.2.1 The Contractor must compile and provide a comprehensive STEERING GEAR ACTUATOR OPERATIONAL MANUAL which must include all of the general information in sufficient detail to support the operational and maintenance requirements of the upgraded steering gear system.

5.2.2 The STEERING GEAR ACTUATOR OPERATIONAL MANUAL, including any necessary Annexes and supporting documents, must fully describe all features of the new actuator and document its production, tests, trials, and certification.

NOTE: All original classification certificates and TCMSS Notices of Compliance must be separately delivered to the TA – copies only must be included in the STEERING GEAR ACTUATOR OPERATIONAL MANUAL.

5.2.3 The STEERING GEAR ACTUATOR OPERATIONAL MANUAL must be presented in the following format with its individual sections defined as follows:

- TABLE OF CONTENTS
- INDEX TO DOCUMENTS (separate manuals)
 - o Maintenance Manual
 - o Recommended Spares

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

- o Special Purpose Tools
- o Operator and Safety Manual
- o Training Manual

1 – DESCRIPTION

2 – CERTIFICATION

3 – LOAD RADIUS DIAGRAMS

4 – ARRANGEMENT DRAWINGS

5 – STRUCTURAL DRAWINGS

6 – ELECTRICAL SYSTEM SCHEMATICS

7 – ELECTRICAL LOAD ANALYSIS

8 – HYDRAULIC POWER PACKS

9 – HYDRAULIC SCHEMATICS

10 – HYDRAULIC CYLINDERS

11 – CONTROL AND SAFETY SYSTEM SCHEMATICS

12 – PRIMARY CONTROL STATION

13 – REMOTE CONTROL (BELLY PACK) STATION

14 – RIGGING DIAGRAM

15 – LOAD HOOKS AND LOOSE GEAR

16 – MISCELLANEOUS

ANNEX I – (separate document)

A. ILLUSTRATED PARTS BREAKDOWN DIAGRAMS

B. DETAILED PARTS LIST

ANNEX II – (separate document)

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

A. SUPPLIER MANUALS

ANNEX III : (separate document)

A. CLASS CERTIFICATES, TCMSS NOTICES OF COMPLIANCE (etc., copies only)

B. MATERIAL, EQUIPMENT & RIGGING TEST CERTIFICATES

C. TESTS AND TRIALS RECORDS

D. MATERIAL SAFETY DATA SHEETS (MSDS)

5.3 Spare Parts and Specialized Tool Requirements

5.3.1 The Contractor's must also arrange to supply, to Canada the following OEM recommended spare parts, needed to support the following requirements:

5.3.1.1 Sufficient spared for two (2) preventative maintenance routines and any other critical spares which are recommended to be carried on board.

5.3.1.2 Spare parts suitable for two (2) years of maintenance routines and any other critical spares which should be stocked.

5.3.1.3 Spare parts being provided shall be itemized and provided with the following information.

- Each of the Spare lists is to identify:
 - o Part name, part number
 - o Description and/or identifying features
 - o Recommended number of units required
 - o Shelf life
 - o Lead time for delivery
 - o Supplier (including address, contact and phone number); and,
 - o Current price.

5.3.3 The Contractor must also arrange to supply, to Canada any OEM recommended specialized or purposed tools, not generally commercially available, and which

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

will be required either for routine inspection and maintenance or for the quinquennial re-certification of the steering gear.

5.4 Certification

5.4.1 The upgraded steering system and its associated equipment/components must be designed, approved, constructed, tested, and trialed, inspected, and certified in accordance with the Rules of the designated Classification Society (ABS).

5.4.2 The Contractor must be responsible for providing all the necessary design drawings and calculations, if required, to ABS for their review and approval for compliance with all applicable Regulations, Codes and Standards on behalf of TCMSS.

6.0 TRAINING

6.1 Training Manual

6.1.1 The Contractor must be responsible for developing and providing two (2) separate pre-delivery familiarization training programs on the upgraded steering gear and its associated systems.

6.1.2 The Contractor must be required to deliver a Training Plan and program schedule for all training, to the CG TA for review and comment, not later than six (6) weeks prior to the delivery of the vessel.

6.2 Familiarization Training

6.2.1 The Contractor shall be responsible for developing and providing two (2) separate pre-delivery familiarization training programs on the new steering gear system and their associated systems and equipment(s) installations. All training shall be provided in English at the Contractor's facility, on-board the vessel, whilst the vessel is at the Contractor's facility. Training is to be performed by either the OEM's FSR or another OEM qualified representative.

6.2.2 The Contractor shall also be responsible for developing and providing a Training Manual intended for the instruction of the vessel's engineers. As a minimum the manual must cover the following topics:

- Review of general safety

	CCGS Leonard J Cowley	
Spec Item #: HD-28	Specification	F7049-210183
STEERING GEAR ACTUATOR REPLACEMENT		

- Familiarization with the operation of the installed steering gear, and its control systems (both at the local and remote locations). etc.
- changeover procedure from one to other system
- Safety matters and safety systems, particular to the steering gear installation,
- Practical operation instruction and .
- Maintenance and troubleshooting procedures

The Training Manual may rely on the other manuals defined herein for detailed instructional purposes pertaining to the equipment.

6.2.3 All training material developed shall be delivered in both in hard and in soft copy and in English.

6.2.4 Each course participant shall receive a hard copy version of the training manual and this is to be available to them when they are taking the training for reference purposes.

6.2.5 Pre-delivery familiarization training shall:

6.2.5.1 Be provided for a maximum of (12) CCG personnel per course with one (1) course given for each crew shift. CC TA will be responsible for arranging and coordinating the availability of the required personnel from each crew shift.

6.2.4.2 Provide training on the safety systems and safe operation of the steering gear system and its control systems including practical operational experience.

6.2.4.3 Provide training regarding the maintenance and troubleshooting of the steering gear and its systems.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

HD-29 CPP System Hydraulics Upgrades..

Part 1 - Scope

- 1.1** The intent of this specification is to modernize and upgrade the existing controllable pitch propeller(CPP) hydraulic system onboard the vessel. The current hydraulic set-up is no longer compatible with new parts and to ascertain spare parts availability in the upcoming years, an upgrade to a more modern set up is necessary
- 1.2** This work must be carried out in conjunction with the following specification items:
 - 1.2.1** H-27 Overhaul of Port and Stbd Main Engines
 - 1.2.2** HD-16 Propulsion Control System Upgrade
- 1.3 Scope of Work (Summary)**
 - 1.3.1** The Contractor must sub-contract this Work to Wärtsilä Canada Inc. who are the current LIPS representative.
 - 1.3.2** The Contractor must be responsible for ensuring and confirming that the equipment being supplied by Wärtsilä Canada is fabricated and dimensioned in accordance with classification machinery requirements for both the designated Classification Society and Transport Canada Marine Safety & Security (TCMSS).
 - 1.3.3** For the purpose of this Specification the designated Classification Society shall be the American Bureau of Shipping (ABS).
 - 1.3.4** The Contractor, in conjunction with Wärtsilä Canada must develop, engineer, and install the new hydraulic system installation package, ensuring that the new CPP hydraulic system package, its required support and control systems, are seamlessly integrated with each other and with the existing shipboard CPP System.
 - 1.3.5** The broad scope of services, to be initially executed by the Contractor are as follows:
 - 1.3.5.1** Relevant studies / analysis, during design and integration process
 - 1.3.5.2** Active interaction with Wärtsilä Canada to ensure a reliable and safe operating controllable pitch propeller system, complete with its associated controls and monitoring.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

1.3.5.3 Preliminary and detailed design drawings, documents for finalization of the controllable pitch hydraulics system layout/arrangement and associated supporting system(s) and foundations.

1.3.5.4 Design the new system in compliance with the applicable regulations and receive all required Class and TCMSS approvals and certifications.

1.3.5.5 The new system being proposed must fully integrate with the new propulsion controls being installed during this VLE Project.

1.3.5.6 Produce all required electrical diagrams and any other drawings required to obtain the proper approvals.

1.3.5.7 Remove all redundant equipment and wiring that is no longer required on the vessel.

1.3.5.8 Verify the existing wiring and conductors that will be reused in the new system.

1.3.5.9 Install and connect all of the equipment of the new hydraulic system, according to a detailed work plan pre-approved by the CG TA.

1.3.5.10 Put entire new system into service using a safe method, which includes both dock and sea trials to assess the vessel's performance in all operating modes.

1.3.6 The new CPP Hydraulic system must be designed, approved, constructed, tested, trialed, inspected, and certified in accordance with both the Rules of the designated Classification Society (ABS) and TCMSS. Detailed purchase order including scope of supply and drawings to be submitted to CCG TA for comments before final ordering.

1.3.7 All original Class and TCMSS (where applicable) approval certificates for all system components and drawings must be submitted to the CG TA prior to the acceptance of this item.

1.4 Objectives of the New System

1.4.1 The new system must allow for the replacement or elimination of the outdated equipment found on the existing hydraulic system for the controllable propeller pitch system.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

1.4.2 Within the nominal values and specific limits of the equipment, the system must be able to interface, control effectively and safely the following:

1.4.2.1 Maintain or improve all control, regulation, protection, and display functions found in the current system.

1.4.2.2 Offer high operational reliability through the judicious selection of equipment and a design that incorporates several redundancy functions.

1.4.2.3 Use equipment and components easily available on the Canadian or American industrial market.

Part 2 - Reference

2.1 Rules, Regulations and Standards

2.1.1 All design, material and work must meet the Classification Society's (ABS) and Transport Canada Marine Safety and Security (TCMSS) requirements for approval and purpose on the vessel. The Contractor must identify and coordinate any specific requirements in accordance with the Acts, Regulations, Standards, Rules, Codes and Guidelines referenced in this specification, (reference Section 4.0 of the General Requirements section).

2.1.2 Any TCMSS approvals, required of the design, material, and work, over and above the Class approvals, must be met as and when required.

2.1.3 The Contractor must plan and coordinate all statutory inspections and classification surveys in collaboration with the authority concerned. All signed and dated official documents must be delivered to the Coast Guard Technical Authority (CG TA).

2.1.4 At least twenty-four (24) hours' notice must be given before statutory inspections or scheduled classification surveys are to be performed so that the CG TA may arrange attendance by the CG.

2.2 Drawings and Documents

2.2.1 The following documents and or drawings are being referenced for guidance purposes only and a complete listing of available documents and drawings for the CCGS LEONARD J. COWLEY's VLE Project is included in Appendix A of this VLE's Technical Data Package.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

2.2.1.1 LIPS B.V. Controllable Pitch Propellor System Manual

2.2.1.2 2021 12 WCA CCGS Leonard J Cowley - Tech Spec Hydraulic Upgrade

2.3 Contractor Supplied Material

2.3.1 The Contractor must supply all labour, technical expertise, equipment, parts, materials, fluids, and tools required to perform the work as specified.

2.4 OEM Support and Field Service Representation

2.4.1 The Contractor is to liaise and work closely with Wärtsilä Canada Inc. in regard to this Specification to ensure a fully satisfactory installation. The contact address at Wärtsilä Canada in St. John's, Newfoundland is:

Wärtsilä Canada Incorporated

27 Sagona Avenue

Mount Pearl, NL

A1N 4P8

Tel. +1 709 747 4600

Fax: +1 709 747 4486

2.4.2 The Contractor must also include in their proposal the price to provide the services of qualified Wartsila approved Field Service Representative (FSR) for the CPP Hydraulic installation. The FSR must be fully familiar with the LIPS control, type and model of the equipment being installed and is to oversee the installation of all components as well as their related commissioning, testing, trials and any training as required.

2.5 Government Supplied Equipment

2.5.1 N/A

2.6 Government Furnished Equipment

2.6.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

Part 3 - Technical Description

3.1 Ambient Operating Conditions

- 3.1.1** New equipment must be able to meet the requirements of Section 1.5 of IEEE-45 and be able withstand ambient humidity of up to 95%, without condensation.
- 3.1.2** All equipment and components of the new hydraulic system must have shock and vibration resistance that takes into account the specific operational characteristics of the vessel.

3.2 Equipment Selection

- 3.2.1** Main equipment and components used to achieve this upgrade project must be of recent design while having proved their reliability on the industrial marine market over the last two (2) years. To the extent possible, they must also be technically supported by the manufacturer for the next fifteen (15) years.
- 3.2.2** The Contractor must choose equipment/components, easily available from the OEM manufacturers or other qualified distributors already established on the Canadian or North American industrial market. Custom-made or experimental products are not acceptable for this project. All equipment, components and other materials must be new.
- 3.2.3** To the extent possible, the new system's design and the proposed equipment selection must be made to minimize the inventory of spare parts required on board the vessel.

3.3 Scope of Supply

- 3.3.1** The equipment being supplied must as a minimum include the following components:
 - 3.3.1.1** One (1) complete modular Wärtsilä Hydraulic Power Pack for CPP (Type WCPP-HPP-5-440-160M-60) - The power pack tank must be provided with ISO flanges for external connections, filling connection, air-breather, drain plug, sight glass and dip stick. The local control, alarm and monitoring system should be ready to be connected to the central alarm and monitoring system.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

3.3.1.2 Cabinets for pump starters (1) and junction box (1) - Starter boxes and Junction box must be mounted on a frame onto the power pack. A digital display is to be mounted in the front on the JB which is to display the pitch and RPM indicator. The pump(s) starters to be able to be connected to any remote starting, if required.

3.3.1.3 One (1) foundation of the power pack tank is to be located in the vicinity of the oil distribution box, (Note: the foundation must be installed at least four (4) meters below the bottom of the header tank and not less than one (1) meter above the shaft line.)

3.3.1.4 One (1) HPP Header Tank. The header tank must be provided with the following:

3.3.1.4.1 connections, BSP threaded,

3.3.1.4.2 respiration device,

3.3.1.4.3 filling connection,

3.3.1.4.4 drain plug,

3.3.1.4.5 dip stick/ sight glass, and

3.3.1.4.6 level switch, low oil level alarm

3.3.2 The following equipment must be removed from vessel for overhaul/servicing by OEM and reinstalled upon completion

3.3.2.1 OD Box

3.3.2.2 Proportional Valve

3.3.2.3 Servo valve (s)

3.3.3 The Contrator must bid an allowance of \$75,000.00 for the overhaul/servicing by OEM. Actual amount to be adjusted up or down via PSPC 1379 action based on invoicing.

3.4 Removal and Disposal of Old Equipment

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

- 3.4.1** The existing system must be completely drained of all oil and must be disconnected both electrically and mechanically.
- 3.4.2** All redundant oil, equipment, cables, and other materials must be removed from the system, transported off the vessel and disposed of by The Contractor as per regulations. If a piece of equipment to be disposed of is too large to be removed without modifying the vessel's internal structure, The Contractor must dismantle the equipment into several pieces in order to transport it.
- 3.4.3** All exposed openings on the remaining CCP system, as a result of these removals, must be blanked off or plugged to prevent ingress of any foreign matter.

3.5 Equipment Installation

- 3.5.1** New equipment and components must be positioned in such a way as to be accessible for troubleshooting and to allow for easy replacement if necessary.
- 3.5.2** Use of Old Cables/Conductors
 - 3.5.2.1** The Contractor must ensure that the old cables or conductors comply with the current applicable regulations and that they meet all of the following general requirements:
 - 3.5.2.1.1** The cable(s) must successfully pass a series of tests to measure the insulation resistance between different conductors, as well as the insulation resistance between each conductor and the vessel's grounding. This test must be conducted at a voltage of 500 volts and the insulation level must be greater than 100 Megohms. The results of these tests must be documented and submitted to the CG TA.
 - 3.5.2.1.2** The cable must be suitable for the function for which it will be used and comply with all requirements established by the manufacturers of the new equipment.
 - 3.5.2.1.3** The ends of the cable must be inspected to ensure that the conductors' insulation or terminals are not damaged.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

3.5.2.1.4 The cable must be re-identified along its length if its identification number is changed during the design of the new system.

3.5.2.1.5 The conductor must be re-identified at the connection points if the identification number is changed during the design phase or if the identification currently in place is no longer legible.

3.5.2.1.6 The conductor may not, in any way, be extended with crimp sleeves if it is too short to properly connect to the new equipment.

3.5.3 Old Cables to be Removed

3.5.3.1 All old cables and conductors that are no longer useful must be removed by The Contractor. If any of these cables crosses a watertight bulkhead or a firewall, the hole left by its removal must be properly sealed (crossover plug or gland). The addition of silicone caulking is not acceptable for plugging holes.

3.5.4 New Conductors and Cables

3.5.4.1 New conductors and cables must be suited to the function for which they are intended. They must comply with all maritime standards described in the TP127 document.

3.5.4.1.1 Any cables not reused as per section 3.5.2 will be addressed via PSPC 1379 action. The descriptions and types of cables required will be listed in the supplied Wartsila drawings.

3.5.4.2 Any cables used for communication or carrying analog signals must be industrial type and have shielding against interference. The cable's exterior jacket must also adequately withstand mechanical stress.

3.5.5 Passage and Securing of Cables/Conductors

3.5.5.1 All cables/conductors must be secured and/or passed inside the cabinets or between the various cabinets using existing supports

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

and cable trays. If necessary, the Contractor must add additional supports or cable trays to adequately secure or contain the cabling.

- 3.5.5.2** The passage of cables and conductors inside the cabinets must not restrict access to the equipment. It must be easy to maintain or replace the different pieces of equipment as needed, without having to move a cable set.

3.6 New System Requirements

3.6.1 Safety Protections

- 3.6.1.1** The new hydraulic system must be designed such that it is impossible for an operator to cause a breakage of equipment following improper use of various manual controls.

- 3.6.1.2** Power circuits must be continuously monitored by a ground leak detection system. Any detected failure must be relayed to the monitoring and alarm system, as well as being indicated on the main control room display panel (Mimic) if fitted.

3.7 Installation and Connection of Systems

- 3.7.1** The Contractor must be responsible for the total installation of the new system including the connection of both mechanically and electrically systems needed to make the new CPP Hydraulics operable and meet the OEM's and Class requirements and the intent of this TSOR.
- 3.7.2** The new HPP Header Tank must be installed such that the bottom of the header tank is to be located $1.2D + \text{three (3) to five (5) meters}$ above the center of the propeller ($D = \text{distance from the loaded water line to the centre of the shaft line}$).
- 3.7.3** Once installed the header tank's oil level switch, low oil level alarm must be connected to the vessel's existing alarm and monitoring system and proven functional.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

- 3.7.4** The Contractor is also responsible for fabricating and fitting all the necessary piping, piping connections, valves, and flexible hoses, needed to connect the components to their respective hydraulic power units (HPU).
- 3.7.5** All flexible hydraulic hoses must be new and prior to fitting must first be pressure tested, witnessed and the appropriate certificates issued. Copies of these certificates are to be provided to the CG TA.
- 3.7.6** Most of the hydraulic components will be mounted on the hydraulic panel supplied with this installation.
- 3.7.7** The hydraulic lines must be mounted in such a manner so that there are not any stresses transmitted to the sub-assemblies or components which they link. Moreover, they must be adequately supported in order to prevent the transmission of vibration.
- 3.7.8** The pipework supplied and fitted by the Contractor must comply with the requirements of the classification society and as per Wartsila approval/ approved drawings.
- 3.7.9** Pipes which have been heated for any reason (welding or making of bends) must subsequently be immersed in an acid solution (acid pickled) and afterwards thoroughly rinsed and oiled. Before operating the hydraulic system, all feed lines should be flushed through.
- 3.7.10** During this installation every precaution must be taken to prevent foreign matter entering pumps or other components.
- 3.7.11** Lengths and diameters of any piping required, will be the responsibility of the Contractor and are defined in OEM's dimensional piping requirements. New hydraulic pipe sections are to be fabricated from stainless-steel seamless heavy walled hydraulic tubing and stainless-steel heavy duty fittings (Swagelok or equivalent). Any additional pipe lengths and/or fitting required outside fo the OEM's package to be addressed via PSPC 1379 action.
- 3.7.12** The Contractor is to note that prior to connecting the new hydraulic system to its HPU, the system must be completely cleaned and flushed by a qualified company. This cleaning and flushing shall be done in accordance with the requirements of ISO 28521:2009 Ships and Marine Technology — Hydraulic Oil Systems — Guidance for Grades of Cleanliness and Flushing.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

3.7.13 The flushing process must be witnessed and is to be to the complete satisfaction of both the attending ABS Surveyor, Wartsila FSR and the CG TA. A flushing report will be required and shall include, the flushing media used, the flushing pressures, how long the flushing occurred, the final particle count found, etc.

3.7.14 On completion of a successful flushing the entire system must be filled with the manufacturer's recommend oil supplied by the contractor and purged of all air.

3.2 Location

3.2.1 Main engine room

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4 - Proof of Performance

4.1 Inspection

4.1.1 All work performed must be inspected and must be to the satisfaction of both the attending ABS Class Surveyor and CG CE.

4.2 Testing

4.2.1 The Contactor under the guidance of the OEM's FSR, must be responsible for proof testing the new CPP hydraulic system to the satisfaction of both the attending ABS surveyor and the CG CE.

4.2.2 Harbour (Dock) Acceptance Trials (HATs)

4.2.2.1 Once the new hydraulic system installation has been completed, and is ready for operation, The Contractor must be responsible for the necessary commissioning and startup tests required by the OEM and Class. The commissioning and testing must only be done under the full guidance of the OEM's authorized FSR and is to be witnessed by the attending ABS Class Surveyor and the CG CE.

4.2.2.2 Prior to commencing trials the Contractor must arrange to have the attending ABS Surveyor and the CG CE to inspect the newly installed

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

equipment, to establish cleanliness, tightness, and that the supporting systems are correctly connected, i.e., electrical power, hydraulics, fluid levels, control systems, etc. All work is to be to the satisfaction of ABS and the CG CE. Any deficiencies found must be rectified immediately by the Contractor.

4.2.2.3 All controls, alarms, and shutdowns, local and remote, must be proven functional and their operations witnessed, by both the attending ABS Surveyor and the CG TA.

4.2.3 Sea Acceptance Trials (SATs)

4.2.3.1 Upon completion of successful HATs and when all work has been completed to the satisfaction of the attending ABS Class Surveyor and the CG CE, the Contractor must then be responsible for arranging to have a formal SAT performed to prove the operability and performance acceptance of the new CPP hydraulics whilst at sea.

4.2.3.2 A minimum of five (5) working days prior to commencing sea trials, The Contractor must provide a trials agenda and booklet to the CG TA complete with the sign off section for evaluation by the witnessing parties.

4.2.3.3 The Contractor must be responsible for producing, recording, and maintaining all trial sheets.

4.2.3.4 Three (3) typed copies of these trial sheets must be given to the CG TA after completion of all trials.

4.3 Completion and Acceptance

4.3.1 On completion of a satisfactory SAT the Contractor must remove all HPU hydraulic filters used during trials and replace them with new Contractor supplied filters units.

4.3.2 Filter elements removed are to be broken open and examined for any contaminants. This is to be witnessed by the OEM's FSR, the attending ABS surveyor and the CG TA.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

- 4.3.3** Final acceptance will not be performed until all of the above tests and trials have been satisfactorily completed with data available for review. The new CPP hydraulic system must be ready for service in all respects and any identified discrepancy(s) must have been corrected.
- 4.3.4** The CG TA conduct the final inspection and will advise the PSPC Contracting Authority when the new CPP hydraulic system is ready for acceptance as per the Contract

Part 5 - Deliverables

5.1 Technical Data

- 5.1.1** The following technical data must be supplied for the CPP hydraulic system documentation and must be supplied in three (3) typewritten and three (3) electronic copies in Adobe PDF documents.
- 5.1.1.1** Complete Bill of Materials (BoM)
- 5.1.1.2** Operation, Service, and parts manuals
- 5.1.1.3** Functional Descriptions
- 5.1.1.4** Site Acceptance Test Procedures
- 5.1.1.5** All relevant class approved drawings, engineering studies, and documents.
- 5.1.2** The Contractor must also be responsible for providing updated "As Fitted" of the new hydraulic installation including all machinery installs, dimensional drawings piping systems, electrical systems (one line diagrams), and any structure modifications made.
- 5.1.3** The above noted drawings are to be submitted in triplicate, both in hard copy and in AutoCAD DWG format to the CG TA.
- 5.1.4** All drawings requiring Classification approval shall be the responsibility of the Contractor. Copies of the original stamped drawings shall be provided to the CG TA.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

5.1.5 In addition to the above the Contractor must also provide to the CG TA with all of the documents listed below:

5.1.5.1 All original Classification certificates and TCMSS Notices of Compliance

5.1.5.2 Copies of all hydraulic hose pressure test certificates

5.1.5.3 Copies of the NDT report(s) (if applicable)

5.2 Manuals

5.2.1 The Contractor must provide all operating and maintenance manuals and the manuals must be presented in 8.5x11 inch format inside standard, D-ring quality binders. In addition to the printed manuals, a digital PDF (Adobe) version of all documents must be provided. If certain schematics or block diagrams are initially drawn in DWG (AutoCAD) or another format, this format must also be included digitally.

5.2.2 Operating Manual

5.2.2.1 The operating manual must include all the information necessary for a complete analysis of the various functions and procedures related to the system's use.

5.2.2.2 Facilitate comprehension, the descriptive text must be accompanied by schematics, diagrams and/or photos providing a visual representation of the various elements presented.

5.2.2.3 One section of this manual must clearly explain the different functions offered by the monitoring and alarm system as well as provide a description of potential failures and possible solutions.

5.2.2.4 Three (3) paper copies of the final version of the operating manual must be delivered. Each copy must come complete with a DVD containing the aforementioned documents digitalized.

5.2.3 Maintenance and Troubleshooting Manuals

5.2.3.1 This manual must provide, in detail, all the information that would be needed to understand, repair, and maintain the CPP Hydraulic system. In addition to the documents created by the Contractor,

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

this manual must also include all documents produced by the manufacturers of the different components and pieces of equipment.

- 5.2.3.2** As with the operating manual, the final version of the maintenance manual must be delivered as per para: 5.2.2.4 of this Specification.

5.3 Reports of Inspection Tests and Certificates

- 5.3.1** An additional binder must group together of all official documents related to the certification, the installation, and the commissioning of the new system, including the various factory tests and other tests conducted on board the vessel. It is the Contractor's responsibility to keep the original manual up to date and ensure the accuracy of the collected data.
- 5.3.2** The Contractor must ensure that the CG TA has, at all times, an up-to-date copy of all documents and certificates produced.

5.4 Technical Drawings

- 5.4.1** The Contractor must produce all drawings & diagrams necessary for the design and execution of work on the new hydraulic system. These drawings must provide a view of all equipment and circuits in the CPP hydraulic system, including those that will be kept from the old system and incorporated into the new installation.
- 5.4.2** All drawings designed or modified must be presented individually in digital format in the most recent version of the DWG (AutoCAD) standard and allow for optimized standard 11x17 in. (ANSI B) printing. An exception may be made to the size of certain drawings in order to give an adequate view of the entire system, provided these are presented in a separate series. A grouped Adobe PDF version must also be provided for each series of drawings to facilitate electronic consultation (one PDF file per series of drawings).
- 5.4.3** The first full version of drawings and other design documents must be submitted to both the designated Class (ABS) and the CG TA for review and approval.
- 5.4.4** The approved drawings used during the Work must be kept up to date as installation work progresses, and additional approval of any subsequent changes

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

made to the original version is required. A list of changes must be created and kept up to date to track the history of changes throughout the installation process.

- 5.4.5** Three (3) hard copies of the final version(s) of the “as fitted” drawings must be provided at the end of the project. The different series of drawings printed in 11x17 (ANSI B) format must be properly bound. The digital version of drawings must also be provided (DWG & PDF). DWG (AutoCAD) files must not be electronically protected, and the CCG must be able to modify all elements as needed in any future changes.

5.5 Spare Parts and Specialize Tool Requirements

- 5.5.1** To facilitate the purchase and stocking of spare parts, a document must also be created to identify all components of the new hydraulic system. This document must include the following information, at a minimum:

5.5.1.1 Manufacturer's reference number for the part

5.5.1.2 Manufacturer's name

5.5.1.3 Detailed description, including model and main specifications

5.5.1.4 Quantity of identical parts found on the system

5.5.1.5 Physical location of the part

5.5.1.6 Reference to an electrical schematic (if applicable)

5.5.1.7 Price for each part in Canadian dollars.

- 5.5.2** The Contractor must provide all mechanical and electrical spares required to perform two (2) years of the OEM’s recommended regularly scheduled maintenance. The required spares must be genuine OEM parts as published in the manufacturer’s maintenance manual.
- 5.5.3** The Contractor must provide a list of manufacturer recommended spares for a fifteen (15) year lifespan as published in the manufacturer’s maintenance manual. The list must include part numbers, lead-time to order, retail prices at time of bid submission, complete with a list of Canadian distributors and service centers.

	CCGS Leonard J Cowley	
Spec Item #: HD-29	Specification	F7049-210183
CPP SYSTEM HYDRAULICS UPGRADES		

6.0 TRAINING

6.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

HD-30 Steel Repairs – Sound & Fresh Water Fill Pipes Frames 75 – 77..



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Steel Repairs – Sound and Fresh Water Fill Pipes Frames 75 - 77

Completed By:

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Completed For:

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Document Number: 3287-R-020
Issued: January 2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs to be completed on the forecastle deck, upper deck and main deck port & stbd between frames 75 and 77. The repairs required after removal of the existing fresh water sounding and fill pipes. The repairs are based on the inspection of the applicable areas by the CG CE.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-19-R0 Steel Repairs – Sound & F.W. Fill Pipes – Frames 75 - 77

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

	CCGS Leonard J Cowley	
Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional

	CCGS Leonard J Cowley	
Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 8.0mm Plate(original), 8.0mm(5/16") Plate(new)

3.2.5.2 Plating – 11.25mm Plate(original), 12.7mm(1/2") Plate(new)

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install shall also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative.

3.3 Welding

3.3.1 All welding associated with plating renewals shall be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

	CCGS Leonard J Cowley	
Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

- 3.3.2** The Contractor shall ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor shall remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds shall be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must

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Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner’s personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at the noted locations between frame 75 and frame 77 on the forecastle deck, upper deck and main deck as per the supplied MSI drawing number 3287-D-19. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing fresh water sounding and fill pipes located between frames 75 – 77.

3.7.1.3 The Contractor must crop and remove sections of the forecastle deck, upper deck and main deck plating between frames 75 and 77 on port and

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Spec Item #: HD-30	Specification	F7049-210183
STEEL REPAIRS – SOUND AND FRESH WATER PIPES FRAMES 75 - 77		

stbd in way of the former fresh water sounding and fill piping locations. The new deck insert plates must be fitted in way of the center of the existing piping locations at each deck and extend outboard to the side shell plating. The approximated size of the new insert plates at the forecastle deck level are 200mm x 240mm with 8.0mm(5/16") thickness. The approximated size of the new insert plates at the upper deck level are 200mm x 200mm with 8.0mm (5/16") thickness. The approximated size of the new insert plates at the main deck level are 200mm x 200mm with a 12.7mm (1/2") thickness.

3.7.1.4 All insert plates must have round corners with a 100mm radius.

3.8 Removals

- 3.8.1** The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by The Contractor unless otherwise directed by the vessel's Owner.
- 3.8.2** The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.
- 3.8.3** The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.
- 3.8.4** The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

HD-31 Steel Repairs and New Wire Transit Tank Top – Frames 75 – 80..



CCGS Leonard J Cowley

Steel Repairs and New Wire Transit Tank Top – Frames 75 - 80

Completed By:

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Document Number: 3287-R-018
Issued: January 2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals on the tank top between frames 76 and 80 and the replacement of the existing wire transit between frames 75 and 76. The repairs and renewals are based on the inspection of the applicable areas by the CG CE.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-17-R0 Steel Repairs & New Wire Transit – Tank Top – Frames 75-80

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

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Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 9.5mm Plate(original), 9.5mm(3/8") Plate (new).

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

	CCGS Leonard J Cowley	
Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

- 3.3.1** All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor`s welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel`s coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner`s representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic

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Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at the noted locations between frames 76 & 80 as well as replace the existing wire transit sleeve between frames 75 & 76 as per the supplied MSI drawing No.3287-D-17. An overview is as follows.

	CCGS Leonard J Cowley	
Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

3.7.1.2 The Contractor must crop and remove the section of tank top plating between frames 76 & 77. A new deck insert plate will be fitted with the aft end approximately 100mm from frame 76 and the forward end approximately 100mm from frame 77 with the outboard side approximately 200mm from the intersection of the deck at side. The size of the new insert plate is approximately 415mm x 600mm with 9.5mm (3/8") thickness.

3.7.1.3 The Contractor must crop the existing capped pipe section between frames 79 & 80 just forward of the bolted access hatch to tunnel below. The Contractor must crop and remove the section of tank top plating in the way of the former pipe section location. A new deck insert plate must be fitted with the center of the insert 150mm inboard of the port side water tight bulkhead and 175mm forward of frame 79. The size of the new insert plate is 200mm in diameter with 9.5mm (3/8") thickness.

3.7.1.4 The Contractor must crop and remove the existing wire transit sleeve between frames 75 & 76. A new larger wire transit sleeve must be fitted in its place. The new transit must be fitted with the inboard side at the vessel centerline and the outboard end 450mm to the port side leaving a gap between the wire transit and the port side longitudinal watertight floor under of approximately 50mm. The aft end of the wire transit must be located similar to the existing transit sleeve. The overall dimensions of the new wire transit must be 150mm x 450mm with a depth of 100mm. The transit must be 9.5mm (3/8") steel plating.

3.7.1.5 The Contractor must secure the existing wiring within the new wire transit sleeve with an approved type of cable sealing system.

3.7.1.6 All insert plates must have round corners with a 100mm radius.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

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Spec Item #: HD-31	Specification	F7049-210183
STEEL REPAIRS AND NEW WIRE TRANSIT TANK TOP – FRAMES 75 - 80		

- 3.8.2** The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.
- 3.8.3** The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.
- 3.8.4** The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-32	Specification	F7049-210183
TRANSDUCER BUBBLE (FRAME 55-56) – VENT MODIFICATIONS		

HD-32 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

HD-33 Fwd Draft Indicator..



CCGS Leonard J Cowley

Steel Repairs and Renewals – Forward Draft Indicator Specification

Completed By:

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Document Number: 3287-R-014
Issued: December 2021

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed after removal of the forward draft indicator from the hull bottom between frames 81 and 82. The repairs and renewals are based on the inspection of the applicable areas by the vessel representative.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-13-R0 Steel Repairs and Renewals – Fwd Draft Indicator

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 9.5mm Plate(original), 9.5mm (3/8") Plate(new)

3.2.5.2 Plating – 14.0mm Plate(original), 16.0mm (5/8") Plate(new)

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install shall also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative.

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

3.3 Welding

- 3.3.1** All welding associated with plating renewals shall be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.
- 3.3.2** The Contractor shall ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor shall remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds shall be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at the noted locations between frame 81 and frame 82 as per the supplied MSI drawing No. 3287-D-13. An overview is as follows.

	CCGS Leonard J Cowley	
Spec Item #: HD-33	Specification	F7049-210183
FWD DRAFT INDICATOR		

3.7.1.2 The Contractor must crop and remove the existing draft indicator located at the keel bottom plate between frames 81 and 82. The sounding pipe is to be cropped up to a point of approximately 200mm below the tank top with the remainder of the pipe up to the upper deck staying in place. The vent point is to be cropped up to a point of approximately 150mm below the tank top with remainder of the pipe above the tank top staying in place.

3.7.1.3 The Contractor must crop and remove a section of keel bottom plating in way of the former draft indicator location on the centerline floor between frames 81 and 82. A new bottom insert plate will be fitted transversely in the center of the draft indicator location with a minimum clearance between the new insert plate and frame 81 of approximately 50mm. The approximated size of the new insert plate is 470x300mm with 16.0mm (5/8") thickness. A new insert is to be fitted in the centerline girder/floor in way of the cropped draft indicator. The approximate size of the new centerline girder/floor insert plating is 600x170mm with 100mm flange with 9.5mm (3/8") thickness.

3.7.1.4 All insert plates are to have round corners with a 100mm radius.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals described in Section 3.7 are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

HD-34 AFT Draft Indicator ..



CCGS Leonard J Cowley

Steel Repairs and Renewals – AFT Draft Indicator Specification

Completed By:

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Document Number: 3287-R-014
Issued: December 2021

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed after removal of the aft draft indicator along with the sounding and vent piping from the hull bottom to the upper deck between frames 12 and 13. The repairs and renewals are based on the inspection of the applicable areas by the vessel representative.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-11-R0 Steel Repairs and Renewals – Aft Draft Indicator

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks,

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

- 3.1.5** The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.
- 3.1.6** The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

- 3.2.1** The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.
- 3.2.2** All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.
- 3.2.3** All materials used must be approved by A.B.S. or equivalent Classification Society.
- 3.2.4** The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.
- 3.2.5** The following scantlings of steel renewals are as follows:
 - 3.2.5.1** Plating – 8.0mm Plate(original), 8.0mm(5/16") Plate(new)
 - 3.2.5.2** Plating – 7.0mm Plate(original), 8.0mm(5/16") Plate(new)
 - 3.2.5.3** Plating – 14.0mm Plate(original), 16.0mm(5/8") Plate(new)
- 3.2.6** Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install shall also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative.

3.3 Welding

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

3.3.1 All welding associated with plating renewals shall be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

3.3.2 The Contractor shall ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor shall remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds shall be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.8 Scope of Work

3.8.1 Renewals

3.8.1.1 The Contractor must crop and renew the identified plating at the noted locations between frame 12 and frame 13 as per the supplied MSI drawing No. 3287-D-11. An overview is as follows.

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

3.8.1.2 The Contractor must crop and remove the existing draft indicator located at the keel bottom plate between frames 12 and 13. The sounding and vent piping and all related fittings up to the Upper Deck between frames 12 and 13 are also to be cropped and removed from the vessel.

3.8.1.3 The Contractor must crop and remove a section of keel bottom plating in way of the former draft indicator location on the port side of the centerline floor between frames 12 and 13. A new bottom insert plate will be fitted longitudinally in the center of the draft indicator location with a minimum clearance between the new insert plate and the centerline floor of approximately 63mm (2½"). The approximated size of the new insert plate is 300x300mm with 16.0mm (5/8") thickness.

3.8.1.4 The Contractor must crop and remove a section of the main deck plating between frames 12 and 13 in way of the former sounding and vent piping locations. The new deck insert plate will be fitted 180mm inboard of the port side gas-tight bulkhead (G.T.B.) with the aft end of the new insert at 300mm from frame 13. The approximated size of the new insert plate is 300x400mm with 8.0mm (5/16") thickness.

3.8.1.5 The Contractor must crop and remove a section of the upper deck plating between frames 12 and 13 in way of the former sounding pipe location. The new deck insert plate will be fitted approximately 130mm aft of frame 13. The center of the insert plate will be inline with the sounding pipe in the transverse direction. The approximated size of the new insert plate is 200mm diameter with 8.0mm (5/16") thickness.

3.8.1.6 All insert plates must have round corners with a 100mm radius..

3.9 Removals

3.9.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by The Contractor unless otherwise directed by the vessel's Owner.

3.9.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.9.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-34	Specification	F7049-210183
AFT DRAFT INDICATOR		

- 3.9.4** The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

HD-35 Frame B Steel Renewals ..



CCGS Leonard J Cowley

Steel Repairs and Renewals – FRAME B Specification

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Completed By:

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Document Number: 3287-R-010

Revision: 0

Issued: December 2021

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed on the port side bulkhead at frame B in way of the No.5 water ballast tank. The renewals are based on the inspection of the applicable areas by the vessel representative

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-09-R0 Steel Repairs and Renewals – FRAME B

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 9.0 mm Plate(original), 9.5mm (3/8") Plate(new)

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

3.3.1 All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at the noted location on Frame B as per the supplied MSI Drawing No. 3287-D-09. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing bulkhead plating on the port side at Frame B, starting from the main deck up to a height of 300 mm

	CCGS Leonard J Cowley	
Spec Item #: HD-35	Specification	F7049-210183
FRAME B STEEL RENEWALS		

above the main deck, leaving a minimum clearance of 50 mm from the adjacent inboard longitudinal bulkhead at 1500mm off centerline. The approximated size of the new insert plate is 950 mm x 300 mm with a 9.5mm (3/8") thickness.

3.7.1.3 All insert plates must have round corners with a 100 mm radius, as per the supplied MSI drawing No. 3287-D-09

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

HD-36 Stringers 75 – 82 Renewals..



CCGS Leonard J Cowley

Steel Repairs and Renewals – Stringers – 75 to 82 Specification

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	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed on the port and starboard side stringers plating between frames 75 to 82. The renewals are based on the inspection of the applicable areas by the vessel representative

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-07-R0 Steel Repairs and Renewals – Stringers 75 - 82

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 11.0mm Plate (original), 12.7mm (1/2") Plate (new)

3.2.5.1 Plating – 12.5mm Plate (original), 12.7mm (1/2") Plate (new)

3.2.5.3 Pipe – Nom. Dia. 2-1/2" SCH 40 (original), Nom. Dia. 2-1/2" SCH40 (new)

3.2.5.4 Pipe – Nom. Dia. 3-1/2" SCH 40 (original), Nom. Dia. 3-1/2" SCH40 (new)

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials

	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

- 3.3.1** All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

	CCGS Leonard J Cowley	
Spec Item #: HD-36	Specification	F7049-210183
STRINGERS 75 – 82 RENEWALS		

3.7.1.1 The Contractor must crop and renew the identified plating at locations between Frame 75 and Frame 82 as per the supplied MSI drawing No. 3287-D-07. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing port stringer web plating from approximately frame 80.5 to frame 82 out to the hull side. The approximated size of the new web insert plate is 820 x 300mm with 12.7mm (1/2") thickness. The contractor must crop and replace the stringer to the side frame bracket at approximately frame 81.5. A new pipe sleeve is to be inserted in the web as per the existing pipe sleeve. Location to match existing.

3.7.1.3 The Contractor must crop and remove the existing starboard stringer web plating from approximately frame 75 to frame 75.5 out to the hull side. The approximated size of the new web insert plate is 600 x 300mm with 12.7mm (1/2") thickness. A new pipe sleeve is to be inserted in the web as per the existing pipe sleeve. Location to match existing.

3.7.1.4 For details of work see supplied MSI drawing no. 3287-D-07-R0

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

HD-37 Steel Repairs and Renewals – FR 0 To FR 5..



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Steel Repairs and Renewals – Frames 0 To 5 Specification

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Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed on bulkhead plating and stiffeners between Frame 0 and Frame 5. The renewals are based on the inspection of the applicable areas by the vessel representative and ABS Class Surveyor.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-05-RO Steel Repairs and Renewals Frames 0 To 5.

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 12.5mm Plate (original), 12.7mm (1/2") Plate(new).

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

	CCGS Leonard J Cowley	
Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

3.3.1 All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is

	CCGS Leonard J Cowley	
Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

3.7.1.1 The Contractor must crop and renew the identified plating at locations between Frame 0 and Frame 5 as per the supplied MSI drawing No. 3287-D-05. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing doubler plating on the stbd side gas tight bulkhead from approximately frame 0.5 to frame 2.5. The Contractor must then crop and remove the existing bulkhead plating

	CCGS Leonard J Cowley	
Spec Item #: HD-37	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 0 TO FR 5		

from approximately frame 0.5 to frame 2.5 from the hull bottom up to a height of 300mm. The approximated size of new insert plate is 1100mm x 300mm with 12.7mm(1/2") thickness.

3.7.1.3 The Contractor must remove the existing cement located on the hull bottom stbd side between frames 4 and 5. The Contractor must then crop and remove the existing bulkhead plating from approximately frame 4 to frame 5 from the hull bottom up to a height of 300mm. The approximated size of the new insert plate is 580mm x 300mm with 12.7 mm (1/2") thickness.

3.7.1.4 All insert plates must have round corners with 100mm radius, as per the supplied MSI drawing No. 3287-D-05.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals listed in Section 3.7 are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

HD-38 Steel Repairs and Renewals – FR 58 to 62..



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Steel Repairs and Renewals – Frames 58 to 62 Specification

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Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

Part 1 - Scope

- 1.1** This specification and associated drawing describe the extent of steel repairs and renewals to be completed on bulkhead plating and stiffeners between Frame 58 and Frame 63. The renewals are based on the inspection of the applicable areas by the vessel representative and ABS Class Surveyor.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3287-D-03-R0 Steel Repairs and Renewals Frames 58 to 62

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

	CCGS Leonard J Cowley	
Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.

	CCGS Leonard J Cowley	
Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

3.1.4 The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating – 9 mm Plate (original), 9.5mm (3/8") Plate (new)

3.2.5.1 Flat Bar – 150 mm x 10 mm F.B. (original), 150mm x 9.5mm (3/8") F.B (new).

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All

	CCGS Leonard J Cowley	
Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

3.3.1 All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.

3.3.2 The Contractor must ensure that only CWB certified welders are used to complete the welding.

3.3.3 The Contractor's welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.

3.3.4 Welds subjected to 100% MPI inspection by qualified NDT technician.

3.3.5 The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

3.4.1 The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.

3.4.2 The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.

3.4.3 The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel's coating system.

3.5 Testing & Inspections

3.5.1 The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.

	CCGS Leonard J Cowley	
Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

3.5.2 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.3 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.6.2 The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Renewals

	CCGS Leonard J Cowley	
Spec Item #: HD-38	Specification	F7049-210183
STEEL REPAIRS AND RENEWALS – FR 58 TO 62		

3.7.1.1 The Contractor must crop and renew the identified plating and stiffeners at locations between Frame 58 and Frame 63 as per the supplied MSI drawing No. 3287-D-03. An overview is as follows.

3.7.1.2 The Contractor must crop and remove the existing 150mm x 10mm flat bars on the bulkhead at frame 58 above manholes and tunnel and replace with new 150mm x 9.5mm (3/8") flat bars.

3.7.1.3 The Contractor must crop and remove the existing bulkhead plating on port and stbd sides between frame 61 and frame 62 starting at the hull bottom up to a height of 350mm, leaving a minimum clearance of 40mm from the adjacent transverse floors at frames 61 and 62. The approximated size of the new insert plate is 536mm x 350mm with 9.5mm (3/8") thickness.

3.7.1.4 All insert plates must have round corners with 100mm radius, as per the supplied MSI drawing No. 3287-D-03.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals listed in Section 3.7 are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

HD-39 AV Gas Pump Room and Cofferdam..

Part 1 – Scope:

- 1.1** The intent of this specification item is for The Contractor to open up, clean, 100% blast, clean, inspect, recoat and test the internal AV gas pump room and the AV gas cofferdam coatings. All inspections and testing must be witnessed by the CG TA and the attending ABS Class inspector. All of these tanks are to be treated as confined spaces.
- 1.2** The Contractor must bid a \$15,000.00 allowance for the removal and abatement of asbestos gaskets in the piping system. The final amount to be adjusted up or down via PSPC 1379 action.

Part 2 – References:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Approximate cofferdam and pump room dimensions (ft).

Cofferdam	Dimension	Approx Area
Top	14.5' x 14'	203ft ²
Fore End	14' x 13'	182ft ²
Aft End	13'x 13'	169ft ²
Inboard Side	14.5' x 13'	188.5ft ²
Ship Side/Bottom	14.5' x 20'	290ft ²
Pump Room		
Top	12' x 6'	72ft ²
Fore End	13' x 13'	169ft ²
Aft End	12' x 12'	144ft ²
Inboard Side	12' x 6'	72ft ²
Ship Side/Bottom	12' x 17'	204ft ²

2.3 Standards

2.2.1 See General Notes

2.3 Regulations

2.3.1 See General Notes

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. All pumps, hoses, hardware, equipment and personnel required to carry out these operations must be supplied by The Contractor.

Part 3 – Technical Description

3.1 General

- 3.1.1** The areas listed above must be opened for cleaning, grit blasting, coating and survey by the attending ABS Class Surveyor, CG CE and CG supplied NACE Inspector..
- 3.1.2** The CG will provide the services of an independent NACE inspector to witness all aspects of preparation and painting application.
- 3.1.3** Prior to entry, tanks to be certified “ Safe for Workers” and “Safe for Hotwork” as required by Transport Canada Marine Safety TP3177E. The certificates must be given to the CG TA and copies posted by the tank manholes and gangway.
- 3.1.4** The Contractor must remove all contents of the Pump Room to allow for blasting and coatings. The contents consist of:
- 3.1.4.1** two pumps
 - 3.1.4.2** stainless steel piping and associated valves and meters.
 - 3.1.4.3** AV gas drains tank
 - 3.1.4.4** AV gas fuel separator
 - 3.1.4.5** 3 ft of catwalk
 - 3.1.4.6** catch all tray
 - 3.1.4.7** heat radiator tubes and piping
- 3.1.5** The Contractor must remove all piping in the AV gas cofferdam to allow for blasting and coatings. The AV gas tank is located in this compartment and will not be removed.

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

- 3.1.6** All of the above mentioned items will be re-installed upon completion of work. The Contractor must fabricate new catch all tray as per original size, shape and materials.
- 3.1.7** The Contractor must replace all support brackets where needed as directed by the CG CE.
- 3.1.8** The Contractor must crop out pump room escape hatch, combing and decking area sufficient to allow removal of the AV gas drains tank.
- 3.1.9** Once all of the above items have been removed, areas must be inspected by the attending ABS Class Surveyor, CG CE and NACE inspector prior to cleaning.
- 3.1.10** The Contractor must high pressure water clean all areas listed at 242 bar and quote per additional ft² to be adjusted up or down as required via PSPC 1379 action. The Contractor must collect the high pressure wash residue, remove from site and dispose of as per Provincial Regulations.
- 3.1.11** Prior to grit blasting, the Contractor must plug all outlets(pump suction/discharge, level transducer) sounding, vents, etc.
- 3.1.12** The Contractor must bid on grit blasting all areas listed in section 2.1.1 to bare metal as per SSPC SP-10/NACE near white abrasive blast clean with an angular surface profile of 50-75 microns (2-3mils) and quote per m² to be adjusted up or down via PSPC 1379 action.
- 3.1.13** The Contractor must clean all debris from grit blasting in preparation for coatings.
- 3.1.14** The Contractor must remove all debris from grit blasting and properly dispose of as per Provincial Environmental Regulations.
- 3.1.15** The Contractor must bid on 20m² of steel replacement to be adjusted up or down via PSPC 1379 action.
- 3.1.16** The Contractor must ensure all ventilation requirements are in place to assist in drying out of tanks prior to painting and to assist paint curing.
- 3.1.17** The Contractor must coat all areas listed in this spec and provide a unit cost per ft² to be adjusted up or down via PSPC 1379 action.

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

3.1.18 The Contractor must perform NDT as indicated by the attending ABS Surveyor.
The Contractor must bid 200 UT shots in total and include unit price per shot.
The total cost adjusted up or down via PSPC 1379.

3.1.19 Coating Specification for Application :

3.1.19.1 Surface Preparation:

3.1.12.1.1 Following the blasting of all tanks and any repairs the tanks must be inspected by the CG TA and ABS Class Surveyor.

3.1.19.2 Coating System:

3.1.19.2.1 The Contractor must apply 2 (two) coats: One primer coat Intershiel ENA 300 – Bronze and one Top coat Intershiel ENA 300 – Aluminum as per manufacturers recommendations. The Contractor must apply each coat (8-10 mils) dry film thickness (dft) directly on to the prepared steel surface as per manufacturers recommendations.

3.1.19.2.2 The Contractor must apply two strip coats of Intershiel ENA 300 to all corners, crevices, rivets, bolts, welds and other edges. The first coat must be bronze in color and the second coat must be aluminum in color as per manufacturers recommendations. Each strip coat must extend a minimum of 2.2 cm from the edge. The strip coats must be applied prior to the full coats and must be set to touch prior to applying full coats.

3.1.20 The following tests and checks must be carried out before, during, and after the painting process. A Coating Application Log of these tests must be maintained by The Contractor and submitted to the CG TA upon completion of the Project. Contents of this log must incorporate as a minimum the following:

3.1.20.1 Surface preparation including anchor profile and abrasive used.

3.1.20.2 Wet and Dry film thicknesses.

3.1.20.3 Surface temperature, ambient temperature, room temperature, relative humidity, dew point and coating temperature.

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

3.1.20.4 Continuity of Paint to be checked using low voltage detector (Sponge Test) as specified by the CG NACE Inspector

3.1.20.5 Adhesion tests as specified by the CG NACE Inspector.

3.1.20.6 Coating Batch Numbers.

3.1.21 The Contractor must clean the sealing surfaces around the manhole and cover and supply and install the cover using new ¼ inch thick white nitrile gaskets. The Contractor must ensure anti-seize is applied to all threads. The Contractor must bid on renewal of 5 manhole studs per tank.. CG TA to be present when manhole covers are being reinstalled. The Contractor must provide a unit cost per stud replacement to be adjusted up or down via PSPC 1379 action as required.

3.1.22 The Contractor must remove, dismantle, acid dip clean, re-assemble and paint each goose neck and vent head to prove clear. Any screens fitted on the vent heads to be renewed.

3.1.23 Prior to closing, all spaces must be inspected by CG TA, ABS Class Surveyor and CG NACE Inspector.

3.1.24 The Contractor must conduct a pneumatic test @ 2 psi on each space for a minimum of 30 minutes to be witnessed by CG TA and ABS Class Surveyor. The bid must include, if required, the installation and removal of blanks for suctions, sounding pipes, overflow pipes and vent head removals. The Contractor must provide a unit cost per pneumatic pressure test to be adjusted via PSPC 1379 action as required.

3.1.25 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test.

3.1.26 Upon completion of all work and testing of tanks, The Contractor must clean tanks of all fluids and debris and wiped dry.

3.1.27 All work is to be to the satisfaction of the CG TA and ABS Class Surveyor.

3.2 Location

3.2.1 Aft Main Deck Stbd Side

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

3.3 Interferences

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel. The Contractor is responsible for protecting the surrounding area and any equipment while carrying out this work

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.
- 4.1.2** 100% visual by the CG TA and ABS Class Surveyor.
- 4.1.3** The Contractor is responsible for all inspections and must consult with ABS, prior to commencement of work, to determine an inspection schedule. At each inspection point, The Contractor must advise the Owner’s representative, in advance, to allow their attendance.

4.2 Testing

- 4.2.1** Hydrostatic or Pneumatic (air) testing of tanks at 2 psi for minimum 30 mins or as indicated by attending ABS Class Surveyor.
- 4.2.2** Magnetic particle NDT testing as required on inserts by Level 2 Certified Technician.

4.3 Certification

- 4.3.1** NDT Technician performing the inspection must be minimum Level 2 Certified and certified to do so by ABS.
- 4.3.2** The Contractor is responsible to ensure that the ABS surveyor certifies/attests and gives credit for the tanks by signing off in the survey record book and/or as required. This must be available with the CG TA before re-floating the vessel.

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: HD-39	Specification	F7049-210183
AV GAS PUMP ROOM AND COFFERDAM		

5.1.1 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test. A copy of any other certificates, including but not limited to safe confined space entry and hotwork permit with SMS forms and checklists must be provided upon completion of work. MSDS and data sheets to be provided for all products used in the course of the work (cleaning, coating etc.)

5.1.2 The Contractor must ensure NDT Technician provides a detailed report for all NDT Testing performed.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

HD-40 Conversion of Number 4 Center Double Bottom Fuel Oil Tank To Void Tank – Frames 29 To 42 ..



CCGS Leonard J Cowley Conversion of Number 4 Center Double Bottom Fuel Oil Tank To Void – Frames 29 - 42

Completed By:

Marine Services International Ltd.
P.O. Box 29132
St. John's, NL
Canada, A1A 5B5
Phone: 709 782 2700
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Completed For:

DFO Vessel Support
P.O. Box 5667
St. John's, NL
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Document Number: 3356-R-002
Issued: September
2022

Revision: 0

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

- 1.1** This specification and associated drawing describe the extent of work to be completed for the conversion of the existing number 4 center double bottom engine room fuel oil tank to a void compartment.

Part 2 - References

2.1 Supplied Drawings

Attached for use is the MSI drawing covering the scope of work. The MSI drawing is as follows:

- 2.1.1** 3356-D-01-R2 Installation of New Tank Top Manhole Frames 34 - 35

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards
- 2.2.6** Transport Canada Marine Safety (TCMS) Guide To Structural Fire Protection TP11469.

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.

3.1.5 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding prior to the acceptance of the items noted within this specification.

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs and CCG property and equipment is suitably sheltered and protected.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 The Contractor must ensure that all steel plates are clean and free of scale. All surfaces shall be coated with a weldable primer prior to fabrication. Material certificates for all steel shall be provided.

3.2.5 The following scantlings of steel renewals are as follows:

3.2.5.1 Plating (Manhole) – 9.5mm Plate

3.2.5.2 Solid Round (Manhole Cover Handle) – 5/8" Diameter

3.2.6 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be addressed via PSPC 1379 action. All such materials and their install must also be to the satisfaction of the vessel's Chief Engineer and/or CG TA.

3.3 Welding

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

- 3.3.1** All welding associated with plating renewals must be as per original specification. Full penetration welding for new plate inserts with continuous fillet welding of the same size for new plate inserts to structural members.
- 3.3.2** The Contractor must ensure that only CWB certified welders are used to complete the welding.
- 3.3.3** The Contractor`s welding inspector will complete a 100% visual inspection of all welds prior to arranging an inspection by the attending A.B.S. Class Surveyor.
- 3.3.4** Welds subjected to 100% MPI inspection by qualified NDT technician.
- 3.3.5** The Contractor must remove weld splatter, smooth weld seams, and sharp edges and remove grease, smoke, and soot marks as per SSPC-SP1. All welds must be power tool cleaned to SSPC-SP3 and primer applied by hand brush.

3.4 Coatings and Paint Work

- 3.4.1** The Contractor must prepare and recoat all heat-affected and new steel both externally and internally. The heat-affected paint is to be hand-tooled to a feathers edge and the current coating reapplied. The contractor is to supply all coatings.
- 3.4.2** The Contractor must complete the coating and all associated machine tooling to feather back the affected areas. All coatings, glues, and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. The Contractor is responsible to remove all containers of paint and solvents from the workplace daily.
- 3.4.3** The Contractor must repair all steel coating disturbed during the listed work in accordance with the vessel`s coating system.

3.5 Testing & Inspections

- 3.5.1** The Contractor must retain the services of a certified third-party welding inspection firm to perform welding inspections on the repair area.
- 3.5.2** The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner`s representative. The completed steelwork is to be visually inspected after welding is completed. Welding is subject to 100% magnetic

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

particle inspection and completed by approved testing personnel. This testing is to be carried out in the presence of the attending A.B.S. Class Surveyor, Chief Engineer, and/or Technical Authority. Costs for any other testing requirements, as required by ABS, to be included. All costs associated with the inspection are to be included in the Contractor's price for known steelwork. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

- 3.5.3** The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

- 3.6.1** The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

- 3.6.2** The Contractor must ensure that the following documents are included in the final report for this specification item:

3.6.2.1 Material Certificates for Plate & Sections

3.6.2.2 CWB Certificates for Welders

3.6.2.3 CWB Certificates for Weld Supervisors

3.6.2.4 CWB Weld Procedures

3.6.2.5 CWB Weld Data Sheets

3.6.2.6 NDT Testing Documentation

3.7 Scope of Work

3.7.1 Conversion Of Tank

- 3.7.1.1** The Contractor must temporarily remove all piping and fittings on the tank top of the Number 4 Center Double Bottom Tank (ex fuel tank) in the engine room on the starboard side of the center line between frames 34 – 35 in way of the new manhole to be fitted between frames 34 and 35. The Contractor must then fabricate and install a new manhole at this location.

	CCGS Leonard J Cowley	
Spec Item #: HD-40	Specification	F7049-210183
CONVERSION OF NUMBER 4 CENTER DOUBLE BOTTOM FUEL OIL TANK TO VOID TANK – FR 29 TO 42		

3.7.1.2 The Contractor must remove the existing coatings in the No.4 center double bottom tank (ex. Fuel oil) in the engine room using approved procedures. A complete inspection of the tank has not yet been completed, therefore the level of steel repair work that may be required is unknown at this time. To account for this the contractor is to bid on 20 square meters of steel renewals, to be adjusted up or down by 1379 action.

3.7.1.3 The Contractor is to then recoat the tank interior in accordance with the vessels coating system for void compartments.

3.7.1.4 For details of new manhole see supplied MSI drawing no. 3356-D-01-R1.

3.8 Removals

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

3.8.4 The Contractor must be responsible for the removal, storage, and reinstallation of all wiring and equipment deemed to interfere with the steel renewals as outlined.

	CCGS Leonard J Cowley	
Spec Item #: HD-41	Specification	F7049-210183
KORT NOZZLE INSPECTION AND REPAIR		

HD-41 Kort Nozzle Inspection and Repair..

Part 1 - Scope

- 1.1** The intent of this specification is for The Contractor to perform 100% visual and 100% dye penetrant NDT testing on the weld between the stainless steel ring and the carbon steel kort nozzle structure. All repairs must be completed as per Part 3 – Technical Description.
- 1.2** This procedure relates to the repairs to the kort nozzle on the CCGS Leonard J Cowley. The Kort nozzle design has a carbon steel structure, as per drawing supply by owner (CCG), with a stainless steel insert ring around the circumference of the interior nozzle surface. This is typical to other kort nozzles and the band of stainless steel is centered about the rotation path of the propeller. The carbon steel material has been identified as Lloyd's Grade E material in accordance with drawing, but we had to conduct PMI on the stainless steel. PMI results are in Appendix A, which indicates that the material in question is a 316 grade of stainless steel.

The problem area on the kort nozzles appears to be the welds joining the stainless steel insert into the nozzle itself. These welds appear to be either corroding or eroding away, or a combination of both. The repair involves removing the corroded / eroded welds and fixing the damaged areas with welding.

Part 2 - References

2.1 Supplied Drawings

2.1.1 N/A

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

	CCGS Leonard J Cowley	
Spec Item #: HD-41	Specification	F7049-210183
KORT NOZZLE INSPECTION AND REPAIR		

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

2.3.1 Canada Shipping Act 2001

2.3.2 Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120

2.3.3 A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 General

The repair must be performed in accordance with the stipulations of this procedure. Visual examinations should be performed after each weld pass and each layer to ensure no cracks have formed.

3.1.2 Method

Gouging and / or grinding shall remove the corroded and / or eroded areas. Ensure a smooth contour for good transitions to allow for quality of welding. Prior to welding, the ground area shall be subjected to 100% visual inspection to ensure that the corroded and pitted material has been completely removed.

Clean area to be welded, including 50 mm (2 in) surrounding the area. Ensure the area is free from all slag, paint, oil, grease, moisture, rust, scale and other foreign material likely to be detrimental to welding immediately prior to the commencement of the welding process. Inspect the prepared surfaces of the access opening for gouges, cracks or other defects, and repair if necessary.

We recommend an E309MoL electrode or equivalent electrode to be used for all welds to be completed on the stainless steel to carbon steel interface. Weld-up

	CCGS Leonard J Cowley	
Spec Item #: HD-41	Specification	F7049-210183
KORT NOZZLE INSPECTION AND REPAIR		

the damaged areas to an acceptable level, then grind or machine by mechanical means to provide the desired surface profile, if required.

3.1.3 Welding

All welding must be carried out by a CSA W47.1 certified company and personnel. The welding procedure (welding procedure data sheet) should be approved at a minimum by CWB (Canadian Welding Bureau) and acceptable to Lloyd's Register Representative.

All welding must be performed in accordance with Sketch SK-1 (Appendix B).

Prior to all welding, the welding area and 50 mm (2 in) around must be free of moisture, paint, oil, grease or any other deleterious material, which could have an adverse effect on the weld quality.

Electrodes must be stored and handled in accordance with the manufacturer's recommendations.

3.1.4 Preheating

The base metal shall be preheated to a temperature of 10°C (50°F).

3.1.5 Post-Weld Heat Treatment

No post-weld heat treatment shall be required for this repair procedure.

3.1.6 Non-Destructive Examination

New welding must be subjected to 100% visual inspection immediately upon completion of welding, followed by 100% liquid penetration inspection after 48hrs, and corrected as required.

The acceptance criteria shall be in accordance with clause 12.5.4.3 of CSA W59.

Defects that do not meet the acceptance criteria of Clause 12.5.4.3 of CSA W59-03 must be repaired in accordance with the requirements of the welding procedure data sheet that was used to complete the weld and this procedure.

If during this inspection, significant defects are detected a repair shall not be attempted until approved by the owner and welding engineer.

	CCGS Leonard J Cowley	
Spec Item #: HD-41	Specification	F7049-210183
KORT NOZZLE INSPECTION AND REPAIR		

Previously repaired areas must not be repaired a second time without prior approval of the owner.

3.1.7 Documentation

Records of the repair shall be assembled during the progress of the work.

The records required in connection with this repair shall include, but not necessarily be limited to, the following:

1. Welding Qualification Certificates;
2. Welding Procedure(s)
3. Visual Inspection Reports for all welding;
4. NDE Reports for all welding;

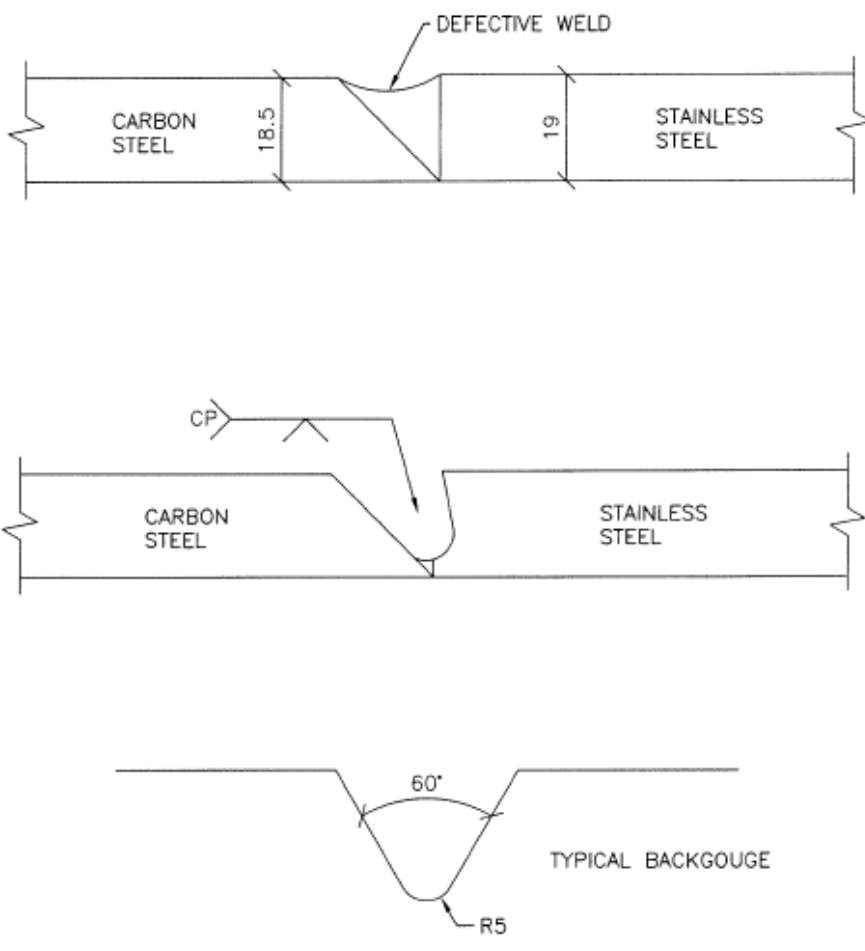

3.1.8 Enclosures

Appendix A PMI Report

Appendix B SK-1

	CCGS Leonard J Cowley	
Spec Item #: HD-41	Specification	F7049-210183
KORT NOZZLE INSPECTION AND REPAIR		

Appendix B

 <p>DEFECTIVE WELD</p> <p>CARBON STEEL 18.5</p> <p>19 STAINLESS STEEL</p> <p>CP</p> <p>CARBON STEEL</p> <p>STAINLESS STEEL</p> <p>60°</p> <p>TYPICAL BACKGOUGE</p> <p>R5</p> <ol style="list-style-type: none"> 1. REMOVE ANY PAINT, GREASE, OIL OR OTHER CONTAMINANT BACK AT LEAST 50mm EITHER SIDE OF WELD. 2. GOUGE AND GRIND OUT CORRODED/ERODED WELD SECTIONS. PROVIDE SMOOTH TRANSITIONS. 3. RE-WELD WITH APPROVED CWB/LLOYD'S WELDING PROCEDURE. 4. USE AN ER309NOL, E309MOL, OR E309MOLT1 CONSUMABLE. 				
 <p>ACUREN Acuren Group Inc.</p> <p>2 Hunt's Lane, St. John's, NL A1B 2L3 Tel: (709) 753-2100 / Fax: (709) 753-7011 email: reception@fgaacuren.com</p>		<p>TITLE</p> <p>TYPICAL REPAIR DETAIL</p>		
DATE	SCALE	REV. No.	DWG. No.	JOB No.
10.07.30 YY.MM.DD	1:1	A	S1	3500-47

	CCGS Leonard J Cowley	
Spec Item #: HD-42	Specification	F7049-210183
VOID TANK/SPACE INSPECTION		

HD-42 Void Tank/Space Inspection..

Part 1 - Scope

1.1 The intent of this specification is for The Contractor to open up, clean, 100% blast, clean, inspect, test and recoat all void spaces listed below.

1.1.1 #4 Port Void Space

1.1.2 #4 Stbd Void Space

1.1.3 AV Gas Cofferdam

1.1.4 Fore Peak Tank Void Space

1.1.5 Forward Pipe Tunnel

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

2.1.1 Drawing Capacity Plan 590-79

Profile and Decks 1 of 2 590-04

Profile and Decks 2 of 2 590-04

Transverse Bulkheads Frs 5-52 590-05

Shell Expansion 590-01

2.1.2 Tank Descriptions

2.1.2.1 Tank Name Frames

#4 Port Void Space 18 – 21

#4 Stbd Void Space 18 - 21

AV Gas Cofferdam A - 4

Fore Peak Tank Void Space 91 - 96

Forward Pipe Tunnel 75 - 80

	CCGS Leonard J Cowley	
Spec Item #: HD-42	Specification	F7049-210183
VOID TANK/SPACE INSPECTION		

2.2 Standards

- 2.2.1** See General Notes
- 2.2.2** Fleet safety and Security Manual (DFO/5737)
- 2.2.3** Coast Guard ISM – Confined Space Entry, Hotwork Procedures, Fall Protection Procedures
- 2.2.4** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

- 2.3.1** See General Notes
- 2.3.2** Canada Shipping Act
- 2.3.3** Maritime Occupational Health and Safety Regulations (SOR/87-183)
- 2.3.4** ABS Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. All pumps, hoses, hardware, equipment and personnel required to carry out these operations must be supplied by The Contractor.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must open voids and spaces listed in section 2.1.2.1 for cleaning, 100% blast, clean, inspect, test and recoating. Bid to include crop and reinstall in bottom of each tank for removal of blast grit if deemed necessary.
 - 3.1.1.1** The Contractor must bid on 40 UT Shots per void listed and provide a unit cost per UT Shot to be adjusted up or down via PSPC 1379 action.
- 3.1.2** Once the tank is safe for entry and cleaned, The Contractor must 100% blast tanks to SSPC-SP10. The Contractor is responsible for removal and disposal of debris from the tanks. Tanks internals must be inspected by ABS surveyor and

	CCGS Leonard J Cowley	
Spec Item #: HD-42	Specification	F7049-210183
VOID TANK/SPACE INSPECTION		

TA. The area for blasting must be calculated by the contractor from the drawings provided.

3.1.2.1 Once tanks are thoroughly cleaned and ventilated, The Contractor must arrange for Marine Chemist to certify tanks Safe For Hotwork.

3.1.3 The Contractor must ventilate each tank to the exterior of the ship and provide mechanical ventilation to all areas of the tank. Each tank must be gas freed and certified Safe For Entry by a Marine Chemist. Certificates must be forwarded to the CG TA prior to any personnel commencing work in each tank and a copy of these certificates must be posted in a conspicuous area near the entrance to each tank. Vapours as well as airborne dust and debris must not be allowed to enter the other parts of the vessel. This is the responsibility of the contractor.

3.1.4 The Contractor must bid on supplying, cropping and inserting 16 sqft of shell plating and 10 sqft of tank top plating and provide a unit cost per sqft of plate for adjustment purposes.

3.1.4.1 The Contractor must provide a Certified Level 2 Technician to perform Magnetic Particle and visual inspection on all new welds required for the inserts. The Contractor must provide a unit cost per insert to be adjusted up or down via PSPC 1379 action as required.

3.1.5 The Contractor must bid on removal and disposal of 2m³ tank residue and provide a unit cost per m³ for adjustment purposes. This amount to be adjusted up or down via PSPC 1379 action as required.

3.1.6 The Contractor must bid on completing the below coating scheme on each void space, the area for which must be calculated by the Contractor from the drawings provided:

3.1.6.1 First Coat – Primer Coat Intershield ENA 300 aluminum applied at 8-10mils DFT.

3.1.6.2 Second Coat – Top Coat Intershield ENA 300 bronze applied at 8-10 mils DFT.

3.1.7 The Contractor must clean the sealing surfaces around each manhole and cover and install the cover using new ¼ inch thick white nitrile gaskets. The Contractor

	CCGS Leonard J Cowley	
Spec Item #: HD-42	Specification	F7049-210183
VOID TANK/SPACE INSPECTION		

must ensure anti-seize is applied to all threads. The Contractor must bid on renewal of 5 manhole studs. CG TA to be present when manhole covers are being reinstalled. The Contractor must provide a unit cost per stud replacement to be adjusted up or down via PSPC 1379 action as required.

3.1.8 The Contractor must reinstall docking plugs. The Contractor must prove sounding pipes, vent pipes and suction pipes are free and clear prior to voids being closed up. The Contractor must check pipe connections on remote sounding bell housings to ensure they are tight.

3.1.9 The Contractor must remove, dismantle, clean and re-assemble each tank vent head to prove clear.

3.1.10 Prior to closing, all tanks must be inspected by CG TA, ABS Class Surveyor and CG NACE Inspector.

3.1.11 The Contractor must conduct a pneumatic (air) test on each void at 2 psi for a minimum of 30 minutes to be witnessed by CG TA and ABS Class Surveyor. The bid must include, if required, the installation and removal of blanks for suctions, sounding pipes, overflow pipes and vent head removals. Contractor must provide a unit cost per pneumatic pressure test to be adjusted via PSPC 1379 action as required.

3.1.11.1 The Contractor must provide a Test Report for each void indicating the test pressure, start/stop times, observations and name of employee performing the test.

3.1.12 Upon completion of all work and testing of tanks, The Contractor must clean tanks of all fluids and debris and wiped dry.

3.1.13 All work is to be to the satisfaction of the CG TA and ABS Class Surveyor.

3.2 Location

3.2.1 Voids located throughout the vessel at frame locations indicated in section 2.1.3.1

3.3 Interferences

	CCGS Leonard J Cowley	
Spec Item #: HD-42	Specification	F7049-210183
VOID TANK/SPACE INSPECTION		

- 3.3.1** The Contractor is responsible for the identification of interference items, their temporary removal, storage and refitting to vessel. The Contractor is responsible for protecting the surrounding area and any equipment while carrying out this work

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.
- 4.1.2** 100% visual by the CG TA and ABS Class Surveyor.
- 4.1.3** The Contractor is responsible for all inspections and must consult with ABS, prior to commencement of work, to determine an inspection schedule. At each inspection point, The Contractor must advise the Owner’s representative, in advance, to allow their attendance.

4.2 Testing

- 4.2.1** Pneumatic (air) testing of tanks at 2 psi for minimum 30 mins or as indicated by attending ABS Class Surveyor.
- 4.2.2** Magnetic particle NDT testing as required on inserts by Level 2 Certified Technician.

4.3 Certification

- 4.3.1** NDT Technician performing the inspection must be minimum Level 2 Certified and certified to do so by ABS.
- 4.3.2** The Contractor is responsible to ensure that the ABS surveyor certifies/attests and gives credit for the tanks by signing off in the survey record book and/or as required. This must be available with the CG TA before re-floating the vessel.

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: HD-42	Specification	F7049-210183
VOID TANK/SPACE INSPECTION		

5.1.1 The Contractor must provide a Test Report for each tank indicating the test pressure, start/stop times, observations and name of employee performing the test. Also a copy of any other certificates, including but not limited to safe confined space entry and hotwork permit with SMS forms and checklists. MSDS and data sheets to be provided for all products used in the course of the work (cleaning, coating etc.)

5.1.2 The Contractor must ensure NDT Technician provides a detailed report for all NDT Testing performed.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L-01	Specification	F7049-210183
INTERIOR LIGHTING UPGRADES		

L-01 Interior Lighting Upgrades..

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to supply and replace all interior vessel lights as indicated by attached Glamox lighting survey.
- 1.2** These fixtures include but not limited to vanity lights, bunk lights, recessed 2ft & 4ft fixtures and alley way lighting.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1 General Arrangement

2.1.2 General Notes

2.2 Standards

2.2.1 Fleet Safety and Security Manual (DFO 5737)

2.2.2 The Contractor shall adhere to the Ships ISM Hotwork, Confined Space Entry, Fall Protection and Lockout Procedures.

2.2.3 TP 127E, Transport Canada Marine Safety – Ship Electrical Standards

2.3.4 General Notes

2.3 Regulations

2.3.1 Canada Shipping Act 2001

2.3.2 This vessel is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector and ABS.

2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.4 ABS Rules and Regulations

2.3.5 General Notes

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: L-01	Specification	F7049-210183
INTERIOR LIGHTING UPGRADES		

2.4.1 The Contractor must supply all other materials and equipment required to perform the specified work, unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must supply Glamox or equivalent LED lighting fixtures as per included Glamox Lighting Survey. If an equivalent product is to be installed it must meet or exceed the Glamox product in the below parameters:

3.1.1.1 Dimensions – must be able to fit in the location of the existing fixture.

3.1.1.2 Must meet IEC 60533 and IEC 60945.

3.1.1.3 Lumens

3.1.1.4 Lifespan

3.1.1.5 Accessories (USB outlet, dual brightness, etc)

3.1.2 The Contractor must ensure all lockout/tag out procedures are complete prior to beginning existing lighting removals.

3.1.3 The Contractor must notify CG TA which lighting fixtures are being replaced prior to starting job.

3.1.4 The Contractor must remove existing lighting fixtures as indicated in lighting survey and install new Contractor supplied fixtures.

3.1.5 The Contractor must confirm with CG TA prior to disposing of fixtures to ensure fixtures/components are not required elsewhere.

3.1.6 The Contractor must dispose of approved removed fixtures as per Provincial Regulations.

3.1.7 The Contractor must be responsible for removal and reinstall of all interference items required to replace the fixtures.

3.1.7.1 These interference items include but not limited to deck head panels, bulkhead panels, insulation, vanities and furniture.

	CCGS Leonard J Cowley	
Spec Item #: L-01	Specification	F7049-210183
INTERIOR LIGHTING UPGRADES		

3.1.8 The Contractor must include in their bid an allowance of \$10,000.00 for any electrical repairs required during the install of the new fixtures and for the replacement of any fixtures not identified on the survey.

3.1.9 The Contractor must be responsible for any modifications required to bulkhead and deckhead panels during installation of new fixtures.

3.2 Location

3.2.1 N/A

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 The Contractor must test all fixtures in the presence of the CG TA to prove correct operation. All fixtures must be turned on and off a minimum of 4 times and left on for 12 hours continuous hours. All USB outlets must be tested by connecting to a USB device and charging for 15 mins per outlet.

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of all fixture certificates and manuals(if available) to CG TA. Contractor must deliver 1 electronic copy of all certificates and to the CG TA.

Part 5 – Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must provide the CG TA with a hard copy of the typewritten report outlining the details of the inspection and final megger survey report and any

	CCGS Leonard J Cowley	
Spec Item #: L-01	Specification	F7049-210183
INTERIOR LIGHTING UPGRADES		

alterations / repairs made prior to the acceptance of this item. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L-02	Specification	F7049-210183
INSULATION TESTING, ENCLOSURE CLEANING AND TERMINAL TIGHTENING		

L-02 Insulation Testing, Enclosure Cleaning and Terminal Tightening – UPDATED

Part 1 – Scope

- 1.1** The intent of this specification is for The Contractor to test the insulation resistance of all electrical distribution systems onboard to satisfy the annual survey requirements of ABS.
- 1.2** The Contractor must check all terminal connections for tightness.
- 1.3** While distribution panels, MCC enclosures and breaker boxes are open for meggering, The Contractor must mechanically clean all components contained within.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Meggar Test Template – Attachment 2
- 2.1.2** Vessel Electrical Panel Index

2.2 Standards

- 2.2.1** Fleet Safety and Security Manual (DFO 5737)
- 2.2.2** The Contractor shall adhere to the Ships ISM Hotwork, Confined Space Entry, Fall Protection and Lockout Procedures.
- 2.2.3** TP 127E, Transport Canada Marine Safety – Ship Electrical Standards

2.3 Regulations

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** This vessel is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector and ABS.
- 2.3.3** Maritime Occupational Health and Safety Regulations (SOR/87-183)
- 2.3.4** ABS Rules and Regulations

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: L-02	Specification	F7049-210183
INSULATION TESTING, ENCLOSURE CLEANING AND TERMINAL TIGHTENING		

2.4.1 The Contractor must supply all other materials and equipment required to perform the specified work, unless otherwise stated.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must arrange for a certified company to perform an annual Megger test of the Ship's Electrical System Insulation. Testing must include all essential and non-essential circuits, generators switch boards, electrical panels, breakers and transformers onboard.

3.1.1.1 1000VDC for alternators(current transformers must be shorted for protection and field disconnected from electronic regulators) and 500 VDC for all remaining circuits.

3.1.1.2 All lighting circuits must be meggered to 100 volt.

3.1.2 The Contractor must contact ABS before work begins and must arrange for an ABS Class Surveyor to be present for the inspection if required.

3.1.3 The Contractor must inform CG TA prior to starting meggering in order to reduce any disruptions to normal shipboard activities.

3.1.4 The Contractor must include in their bid an allowance of \$10,000 for the tracing and repair of any/all ground faults detected. The actual amount to be adjusted up or down via PSPC 1379 action.

3.1.5 The Contractor must be responsible for the isolation of any electronic equipment throughout the vessel during megger testing. Any readings below 1 MΩ or any other defects must be immediately brought to the attention of the CG TA and must be repaired.

3.1.6 The Contractor must restore connections to all circuits tested and shall ensure that each of the circuits is operating as prior to testing.

3.1.7 While all panels are open for meggering all enclosures and components must be cleaned of dust build-up with use of a soft bristle brush and dust vacuumed out, prior to panel being reclosed.

	CCGS Leonard J Cowley	
Spec Item #: L-02	Specification	F7049-210183
INSULATION TESTING, ENCLOSURE CLEANING AND TERMINAL TIGHTENING		

3.1.8 The Contractor must ensure all terminal connections are checked for tightness and tightened as required. Any abnormally loose terminals must be identified in the final report and brought to the immediate attention of the Chief Engineer.

3.1.9 The Contractor must present a report of the megger readings of all listed circuits to the CG TA and ABS Class Surveyor for credit. Report must be completed on the included Excel template.

3.2 Location

3.2.1 N/A

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and the attending ABS Class Surveyor.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 The Contractor must deliver 2 hard copies of service certificates and original service certificate to CG TA. Contractor must deliver 1 electronic copy of all reports/certs to the CG TA.

4.3.2 The Contractor must supply ABS Class Surveyor with a typewritten copy of the final results of the Megger Survey Final Report after all corrections have been made and verified. Once approved, The Contractor must ensure ABS Class Surveyor gives credit for this item in the relevant ship's record book.

Part 5 – Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: L-02	Specification	F7049-210183
INSULATION TESTING, ENCLOSURE CLEANING AND TERMINAL TIGHTENING		

5.1.1 The Contractor must provide the CG TA with a hard copy of the typewritten report outlining the details of the inspection and final megger survey report and any alterations / repairs made prior to the acceptance of this item. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L-03	Specification	F7049-210183
THERMOSCAN		

L-03 Thermoscan..

Part 1: Scope

- 1.1** The intent of this specification is for The Contractor to perform Infrared Thermography on the ship's electrical generators, switchboards, distribution panels and transformers(over 10kVA) as required by ABS.
- 1.2** The Contractor must include an allowance of \$10,000.00 to correct any defects discovered during the thermo scan. This amount to be adjusted up or down via PSPC 1379 action as required.
- 1.3** This work must be carried out in conjunction with the following spec item:
 - 1.3.1** L-02 Insulation Testing, Enclosure Cleaning and Terminal Tightening

Part 2: References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** See General Notes

2.2 Standards

- 2.2.1** All equipment must be scanned in accordance and compliance with ABS and TP 127E Ship's Electrical Standards.
- 2.2.2** The Contractor must use proper equipment for the job being completed and provide up to date calibration certificate. Technician performing scan must be at minimum Level 2 Certified though a recognized institution.
- 2.2.3** Fleet safety and Security Manual

2.3 Regulations

- 2.3.1** Readings must be recorded and acceptable according to the limits stated in TP 127E Electrical Standards, and ABS Rules and Regulations as applicable
- 2.3.2** Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

	CCGS Leonard J Cowley	
Spec Item #: L-03	Specification	F7049-210183
THERMOSCAN		

- 2.4.1** The Contractor must supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: Technical Description

3.1 General

- 3.1.1** The Contractor must provide the services of a min Level 2 Certified Infrared Thermographer to survey all the required connections as identified by the CG TA and ABS Class Surveyor.
- 3.1.2** The Contractor must carry out IR Thermography on ship's three electrical generators, emergency generator, switchboards, distribution panels and transformers (over 10kVA) while vessel is operating at peak operational levels.
- 3.1.3** The Contractor must include an allowance of \$10000.00 to correct any defects discovered during the thermo scan. This amount to be adjusted up or down via PSPC 1379 action as required.
- 3.1.4** The below equipment must be surveyed by The Contractor:

3.1.4.1 Main Engine Room

Cell Number	Description
1A	440 Volt Distribution Breakers
1B	440 Volt Distribution Breakers
2A	Shore Power Controls
2B	460 Volt Bus
3A	Generator #1 Metering
3B	Generator #1
4A	Breaker/Bus Synch Section
4B	Emergency Gen Tie
5A	Gen #2 Controls

	CCGS Leonard J Cowley	
Spec Item #: L-03	Specification	F7049-210183
THERMOSCAN		

5B	Gen #2 Breaker
6A	Gen #3 Controls
6B	Gen #3 Breaker
7A	440 Volt Distribution Breakers
7B	440 Volt Distribution Breakers
8A	120 Volt Distribution Breakers
8B	220 Volt Distribution Breakers

- Generator #1 Approximate Load – 150 amps
- Generator #2 Approximate Load – 150 amps
- Generator #3 Approximate Load – 180 amps
- Ship Services Transformers, 460V – 230V, 3 Single Phase @ 25kVA/Phase
- Ship Services Transformers, 460V – 120V, 3 Single Phase @ 25 kVA/Phase

3.4.1.2 Emergency Generator Room

Cell Number	Description
1A	Emergency Generator Controls
1B	Emergency Generator Breaker
2A	120 Volt Section
2B	460 Volt Section
3A	DC Section
3B	Emergency Tie

- Emergency Generator Approximate Load – 150 amps
- Emergency 3 X 15kVA Transformers
- Shorepower Transformer 300 kVA

	CCGS Leonard J Cowley	
Spec Item #: L-03	Specification	F7049-210183
THERMOSCAN		

3.1.5 The Contractor must prepare written report, detailing any defects or deficiencies discovered and the proposed corrective actions the CG TA and ABS Class Surveyor. All deficiencies must be reported to the CG TA upon discovery.

3.2 Location

3.2.1 Various locations throughout the vessel. CG TA or delegate will assist The Contractor with exact locations.

3.3 Interferences

3.3.1 The Contractor is responsible for all interference items that may be encountered.

Part 4: Proof of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA and ABS Class Surveyor.

4.2 Testing

4.2.1 Any repairs conducted must be tested by The Contractor and approved by CG TA and ABS Class Surveyor before acceptance.

4.3 Certification

4.3.1 The Contractor performing the IR Thermography scan must be at minimum Level 2 Certified and equipment being used must be calibrated and capable of performing the required work.

4.3.2 ABS Surveyor credit must be obtained for this item.

Part 5: Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must prepare three bound copies and one electronic copy of the reports of readings and digital images of deficiencies identified and these must be given to the Chief Engineer. The Contractor must include an IR image and normal photographic views of each deficiency identified.

	CCGS Leonard J Cowley	
Spec Item #: L-03	Specification	F7049-210183
THERMOSCAN		

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L-04	Specification	F7049-210183
ELECTRICAL TRANSIT REPAIRS		

L-04 Electrical Transit Repairs..

Part 1 - Scope

- 1.1** The Contractor must repair or replace wire transits according to the included Transit Surveys.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** CCGS Leonard J Cowley – Pennecon Transit Survey

2.2 Standards

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** Transport Canada Ships Electrical Standards – TP127E

2.3 Regulations

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** ABS Rules and Regulations
- 2.3.3** Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must overhaul the cable trunk multi-transits and/or single cable transits as indicated in the included report. These transits must meet ABS Class Standards once overhauled.
- 3.1.1.1** The Contractor must ensure that any replacement blocking used is from the same manufacturer as the fitted frame.

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Spec Item #: L-04	Specification	F7049-210183
ELECTRICAL TRANSIT REPAIRS		

3.1.2 Where blocks cannot be replaced the whole wire transit frame must be replaced with a class approved transit via PSPC 1379 process.

3.1.3 The Contractor must allow for disconnecting/reconnecting and pulling up to 10' of each cable. Anything more than 10' must be addressed by PSPC 1379 action by installing junction boxes or pulling additional cable. The Contractor must bid on supplying and installing 30 junction boxes to be adjusted up/down via PSPC 1379 action.

3.1.4 Upon completion, The Contractor must arrange for ABS Class Surveyor to complete inspection of repairs.

3.2 Location

3.2.1 See included report and pictures

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 Repaired transits must be inspected by an ABS Class Surveyor

4.2 Testing

4.2.1 As required by ABS Class Surveyor for the bulkhead being transited

4.3 Certification

4.3.1 All transit blocks must be Class Certified and certificates to be provided to the CG TA.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must supply CG TA with both a typed and electronic copy of the overhaul report.

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Spec Item #: L-04	Specification	F7049-210183
ELECTRICAL TRANSIT REPAIRS		

5.1.1.1 Report to include:

- before and after pictures.
- details of repairs, components used including required certificates for any new components and cables used.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

L-05 Distance Measuring Equipment (DME) – UPDATED

Part 1 - Scope

- 1.1** This specification serves as a guide for the removal of the existing Distance Measuring Equipment(DME) system and the installation of the new owner supplied DME system.
- 1.2** The Contractor must bid an allowance of \$25,000 for the travel and commissioning of the system by FSR. Amount to be paid based on invoice.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** DME Instruction Book
- 2.1.2** DME Operations and Maintenance Manual
- 2.1.3** Leonard J Cowley Preliminary DME Drawing PDF
- 2.1.4** DME Antenna Drawing 950962 Rev B PDF
- 2.1.5** DME Antenna Mount

2.2 Standards

- 2.2.1** TP127E – Ships Electrical Standards
- 2.2.2** IEEE 45- Recommended Practice for Electrical Installations on Ships
- 2.2.3** Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-Jan-001)
- 2.2.4** See General Notes

2.3 Regulations

- 2.3.1** General Information for the Rules and Regulations for the Classification of Ships.
- 2.3.2** See General Notes

2.4 Owner Furnished Equipment

- 2.4.1** DME Antenna
- 2.4.2** DME Cabinet
- 2.4.3** DME Operator Panel

	CCGS Leonard J Cowley	
Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must supply all equipment, enclosures, ventilation, staging, scaffolding, chain falls, crane, slings, and shackles necessary to perform the work. All lifting equipment must be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, of a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification must be welded into place by certified welders.
- 3.1.2** Prior to any hot work taking place, the contractor shall ensure that the area of work and all equipment has been sufficiently protected from any sparks or metal filings.
- 3.1.3** The Contractor must ensure all work areas are neat and tidy at the end of the work day to ensure a safe environment.
- 3.1.4** The Contractor must remove all sharp edges and grind all burrs smooth.
- 3.1.5** The Contractor must repaint damaged areas as per client specs. 1 coat of primer and 2 finish coats.
- 3.1.6** All welding must be completed to CWB's latest revision, or an equivalent standard accepted by the Canadian Coast Guard.
- 3.1.7** The Contractor must store all materials as instructed by the Chief Engineer.
- 3.1.8** The Contractor must ensure that the surrounding area is properly cleaned to ensure that the surrounding area is safe prior to any hot work.
- 3.1.9** The Contractor must ensure all new and existing electrical penetrations are properly prepared and cleaned prior to hot work.
- 3.1.10** The Contractor must ensure all new and existing electrical wires affected in this modification shall be properly supported in accordance with accepted / approved practices.
- 3.1.11** Electrical penetrations through frames or brackets shall be in accordance with accepted / approved practices.
- 3.1.12** All existing, unused electrical penetrations shall be closed in accordance with accepted / approved practices.

	CCGS Leonard J Cowley	
Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

- 3.1.13** The Contractor must follow existing cable trays throughout the vessel where fitted and the cables must be supported well and secured. Once installed all cabling must be installed as per TP127.
- 3.1.14** The contractor must use all stainless steel mounting hardware that is recommended by the manufacturer for the mounting of all equipment within this specification unless provided with the equipment.
- 3.1.15** The Contractor must clean up all debris (including all old wire that is taken out) and dispose of it as per Provincial regulations.
- 3.1.16** The Contractor must paint new steel as per client specifications before installation. 1 coat of primer and 2 finish coats.
- 3.1.17** The Contractor must coat all new and disturbed areas on the Bridge Top and in AC Hut.
- 3.1.18** The Contractor must ensure all electrical disconnections are labelled, stowed, and protected.
- 3.1.19** The Contractor must be responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering with the installation of cables or equipment within this specification.
- 3.1.20** The Contractor must ensure that provincial regulations are met with regard to all required training for workers including, but not necessarily limited to, fall arrest training/certification.
- 3.1.21** The Contractor must work in conjunction with a CCG Electronic Technologist to oversee the installation of the new DME System to ensure compliance with applicable CCG Standards. Wiring Terminations in all equipment must be completed by CCG Technologists with the exception of those for electrical supply. All AC electrical connections and grounding connections must be completed by Contractor.

3.2 Removals

- 3.2.1** Prior to the commencement of any electrical work, The Contractor must ensure all electrical supplies feeding the system have been isolated at the source following an established lockout/tagout procedure.

	CCGS Leonard J Cowley	
Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

3.2.2 Electrical isolations for AC power to the DEM Equipment Cabinet located on the aft bridge deck, electronics room is listed below. Breaker to be verified by The Contractor prior to commencement of work.

3.2.2.1 Location, panel and breaker number – TBD

3.2.3 All electronic equipment and components removed from the vessel resulting from the performance of this specification must be safely stored and returned to the owner.

3.2.4 It would be recommended to start the cable removal from the below deck equipment side to eliminate any discrepancies within the applicable drawings. The Contractor must confirm with CG TA prior to disposing of originally fitted cables.

3.2.5 The Contractor must disconnect and remove all existing equipment and cabling indicated in Table 1(DME Cable Removal List CCGS Leonard J Cowley) and Table 2 (DME Equipment Removal List CCGS Leonard J Cowley).

3.2.5.1 Table 1 – DME Cable Removal List

Cable Label	Cable Type	From	To	Signal
DME-ANT	Heliac	DME Cabinet Electronics Equipment Room aft bridge deck	Bridge Top DME Antenna	RF
DME-RMT	6 Conductor Grey Belden	DME Cabinet Electronics Equipment Room aft bridge deck	Wheelhouse behind chart table, aft electronics wall	Data
DME-PWR	Braided 14 AWG AC Cable	DME Cabinet Electronics Equipment Room aft bridge deck	Power Panel TBD	AC

3.2.5.2 Table 2 – DME Equipment Removal List

Equipment	Location
DME Equipment Cabinet	Electronics Equipment Room aft bridge deck

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Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

DME Remote Display	Wheelhouse, behind chart table, aft electronics wall
DME Antenna	Wheelhouse Top
DME Antenna Pedestal	Wheelhouse Top

3.3 Installations

- 3.3.1** The Contractor must work with a CG Technician to oversee the installation of the new system and ensure compliance with applicable CG Standards.
- 3.3.2** The Contractor must provide a unit cost for the supply and installation of 5M of each type of cable identified in Table 3.
- 3.3.3** For the purpose of adjustment, The Contractor must include a unit cost for the supply and installation of one (1) Roxtec, or equivalent class approved transit with glands.
- 3.3.4** The Contractor must install the DME Cabinet in the electronics room or wash closet pending further investigation of the size requirements of the new equipment and space availability. Both rooms are located in the Wheelhouse Aft, Bridge Deck. The exact location will be determined by the CG Technical Authority.
- 3.3.5** The Contractor must supply and install a new **aluminum** antenna Pedestal (subject to change pending further investigation).
 - 3.3.5.1** The Pedestal must be six (6) feet high.
 - 3.3.5.2** It must be welded to the Deck.
 - 3.3.5.3** It must have strengthening webs.
 - 3.3.5.4** It must have a hole at the bottom to allow water to drain.
 - 3.3.5.5** It must have a hole for cable penetration.
 - 3.3.5.6** The pedestal must have a mounting flange on top as per guidance drawing Ref 2.5 New DME Antenna Mount.PDF.
 - 3.3.5.7** It must be finished with White Powder Coat
 - 3.3.5.8** Antenna Pedestal will be installed in location of Previously removed DME Antenna pedestal

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Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

3.1.6 The Contractor must supply and install one cable penetration close to the new pedestal. Cable Penetration must be of one (1) inch NPT kick pipe type with suitable and approved cable gland.

3.1.7 The Contractor must install the new DME Antenna on the new Pedestal.

3.1.8 The Contractor must install the DME Operator Panel in the wheelhouse behind the chart table or alongside in the wash closet/electronics room pending final installation of equipment.

3.1.8.1 Location will be determined by Coast Guard Technical Authority at the time of work.

3.1.8.2 DME remote operator panel form and fit has not been confirmed at the time of writing this Statement of Work. It will be either a computer or a small display.

3.1.9 The Contractor must ground all equipment as per OEM Manuals.

3.1.10 The Contractor must supply and install a new AC Power Feed from spare breaker in Power Panel (Panel and Breaker TBD) to DME Cabinet aft wheelhouse. If Power Panel cannot be used, Contractor must find an alternative Power Panel to use. Contractor must supply and install class approved cable and 15 Amp Circuit Breaker. New cable to include marine protective braid with outer PVC Jacket. Contractor will terminate AC to DME Cabinet.

3.1.11 The Contractor must supply and install the cable indicated in Table 3 below:

3.1.11.1 Table 3

Cable Label	Cable Type	From	To	Length
DME-1	LMR 600	TBD	DME Antenna Bridge Top Port Side	
DME-2	CAT6A Marine Grade	TBD	DME Remote Operator Panel Wheel house	

3.2 Interferences

3.2.1 The Contractor must be responsible for the identification of interference items, their temporary removal, storage protection and refitting to the vessel.

3.3 Possible Amendments

3.3.1 All supporting documentation including all applicable drawings to be provided with the installation specification.

3.3.2 Breaker Panel and Breaker Numbers to be determined.

	CCGS Leonard J Cowley	
Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

3.3.3 Exact location for equipment installation TBD pending space availability. New equipment must be installed in either the wash closet or equipment room.

3.3.4 If any of the above possible amendments mentioned in Section 3.3 are required, these will be addressed via PSPC 1379 action.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be subject to witness by the Chief Engineer or delegate and the attending surveyor if applicable.

4.1.2 100% visual inspection of all welding.

4.1.3 10% MPI testing on all welds by approved testing personnel.

4.2 Testing

4.2.1 All cables must be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at The Contractors expense.

4.2.2 All cable testing must be witnessed by the CG Technical Authority.

4.2.3 The Contractor must be responsible to ensure AC connections to DME Equipment cabinet is proven operational.

4.2.4 The commissioning of the new DME system must be done under the direction of an approved FSR and in accordance with the manufacturer approved procedures. This must be arranged by The Contractor.

4.2.4.1 FSR Contact info:

Stephen Leadbetter

VP Marketing and Business Development

Approach Navigation Systems

(902)449-5533

sleadbetter@approachnavigation.com

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: L-05	Specification	F7049-210183
DISTANCE MEASURING EQUIPMENT (DME)		

5.1.1 The Contractor must provide the Chief Engineer a report of The Contractor's work in both electronic and hardcopy formats outlining the details of the inspections and any alterations/repairs prior to the acceptance of this item.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

L-06 VHF – DF System Upgrade..

Part 1 - Scope

- 1.1** This specification serves as a guide for the removal of the existing OAR 4400 VHF Direction Finder system and see the installation of a new owner supplied Rhoteta RT-500-M system.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Rhotheta RT500 – M User Manual
- 2.2.2** VHF Direction Finder System Drawing
- 2.2.3** Preliminary Drawing CCGS Leonard J. Cowley Rhotheta RT500-M Drawing.

2.2 Standards

- 2.2.1** TP127E – Ships Electrical Standards
- 2.2.2** IEEE 45- Recommended Practice for Electrical Installations on Ships
- 2.2.3** Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-Jan-001)
- 2.2.4** See General Notes

2.3 Regulations

- 2.3.1** General Information for the Rules and Regulations for the Classification of Ships.
- 2.3.2** See General Notes

2.4 Owner Furnished Equipment

- 2.4.1** Rhotheta 500 VHF-DF System
- 2.4.2** All Cabling
- 2.4.3** Pipe and/or adaptor for mounting antenna unit and pipe clamps pending inspection of existing clamps.
- 2.4.4** Rubber gasket for antenna mount.

Part 3 – Technical Description

3.1 General

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

- 3.1.1** The Contractor must supply all equipment, enclosures, ventilation, staging, scaffolding, chain falls, crane, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, of a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification must be welded into place by certified welders.
- 3.1.2** Prior to any hot work taking place, the contractor must ensure that the area of work and all equipment has been sufficiently protected from any sparks or metal filings.
- 3.1.3** The Contractor must ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.1.4** All cabling, once installed, must be marked with a stamped metal tag securely affixed to the cable at each end with the designation for each cable as provided in this specification.
- 3.1.5** The Contractor must follow existing cable trays throughout the vessel where fitted. All penetrations in fire rated bulkheads and decks must be installed using approved transit system meeting the requirements of this specification and in accordance with TP 127E.
- 3.1.6** All cabling which has been removed and deemed surplus as a result of this specification must be disposed of at the contractor's expense as per regulations.
- 3.1.7** The Contractor must be responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering with the installation of cables or equipment within this specification.
- 3.1.8** The Contractor must ensure all new and existing electrical wires affected in this modification shall be properly supported in accordance with accepted / approved practices. Electrical penetrations through frames or brackets shall be in accordance with accepted / approved practices.
- 3.1.9** The Contractor must paint all disturbed steel as per client specifications before installation of new Rhotheta Antenna. 1 coat of primer and 2 finish coats. DFT, colour and specifications as per surrounding areas and CCG acceptance

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

3.1.10 The Contractor must ensure that provincial regulations are met with regard to all required training for workers including, but not necessarily limited to, fall arrest training/certification.

3.1.11 The installation must not be considered complete, until relocated or installed equipment has been tested, and considered operating as per manufacturers specifications, to the satisfaction of the Chief Engineer and ABS Class Surveyor.

3.2 Removals

3.2.1 Prior to the commencement of any electrical work, The Contractor must ensure all electrical supplies feeding the system have been isolated at the source following an established lockout/tag-out procedure.

3.2.2 Electrical isolations for AC power are as follows. Breakers must be verified by The Contractor prior to commencement of work.

3.2.2.1 NAV Bridge Power Panel TBD

3.2.3 All electronic equipment and components removed from the vessel resulting from the performance of this specification must be safely stored and returned to the owner.

3.2.4 It would be recommended to start cable removal from the below deck equipment side to eliminate any discrepancies with the applicable drawings.

3.2.5 The Contractor must disconnect and remove all existing equipment and cabling indicated in Table 1 (OAR 4400 Cable Removal List CCGS Leonard J Cowley) and Table 2 (OAR 4400 Equipment Removal List CCGS Leonard J Cowley).

3.2.5.1 Table 1 – OAR 4400 Cable Removal List

Cable Label	Cable Type	From	To	Signal
TBD		Shelf above radar display next to the chart table	Main Mast Top VHF DF Antenna	RF
TBD		Shelf above the radar display next to the chart table	Main Mast Top VHF DF Antenna	Data

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

3.2.5.2 Table 2 – OAR 4400 Equipment Removal List

Equipment	Location
OAR VHF DF Antenna	Main Mast Top
OAR 4400 Display and Control Unit	Bridge Deck Center, shelf above radar display next to the chart table

3.2.6 CCGS Leonard J Cowley OAR 4400 VHF-DF Antenna

REMOVE



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Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

3.2.7 The Contractor must disconnect and remove the OAR 4400 Display and Control Unit from the Bridge Center Console, on the shelf above the radar display. If the power supply proves to be in good functioning condition, the power supply and all associated cabling (except for those listed in Table 1) will be reused for the new installation as shown in the photo below.



Retain



Remove

3.2.8 The Contractor must dispose of all cables that have been identified in the cable removal list at The Contractors expense.

3.3 Installations

3.3.1 The Contractor must work with a CG Technician to oversee the installation of the new system and ensure compliance with applicable CG Standards.

3.3.2 The Contractor must provide a unit cost for the installation of 5M of each type of cable identified in Table 3.

3.3.3 For the purpose of adjustment, The Contractor must include a unit cost for the supply and installation of one (1) Roxtec, or equivalent class approved transit with glands.

3.3.4 The Contractor must install owner supplied cable indicated in Table 3 below:

3.3.4.1 Table 3

Cable Label	Cable Type	From	To	Length
VHF-DF-1	Multicable L8260(19T) SFSB-CMG	Rhotheta RT-500-M Display and Control Unit Bridge Nav Console above radar display	Rhotheta RT-500M Antenna Unit at Top of Main Mast	

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

VHF-DF-2	Coax	Bridge Top (Upper Main Mast near VHF-DF Antenna	Aft Bridge Deck Radar Closet	
VHF-DF-3	Data/Audio 2Pr-18Awg	Rhotheta RT-500-M Display and Control Unit Bridge Nav Console above radar display		

3.3.5 Prior to commencement of line item 3.3.4 above, VHF-DF-1 cable must be terminated with connector on the antenna end by a CG Installation Technician. The Contractor must liaise with on-site CG Technician when they are ready to have the cable terminated. The Contractors must protect the cable connector and take special care to ensure the connector is not damaged while being installed.

3.3.6 The Contractor must install the Rhotheta RT500-M VHF-DF antenna at the top of the main mast through the CG provided antenna mounting pipe. The terminated end of the cable will be protruding from the end of the pipe with the adaptor ring attached. The provided mounting arrangement will be similar in style to the drawing below.



3.3.7 The Contractor must place the provided rubber gasket onto the base of the antenna unit and connect the cable with the finished X-1067 connector to the connector on the bottom of the antenna unit. The Contractor must install the antenna unit onto the CG provided pipe using the attached adapter plate. This will require stainless steel hardware including eight M6 bolts at minimum 1.5 inch long, lock washers, washers and nuts. The Contractor must ensure the rubber gasket is in place between the antenna unit and the pipe as shown in the photo below.

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		



- 3.3.8** Mount the antenna at the top of the mast in the same position as the removed OAR 4400 antenna, type of clamp to be determined. Ensure that the marking line on the antenna unit is facing as close to the bow line of the ship as possible as shown in the photo below.



- 3.3.9** The Contractor must mount the RT-500-M display control unit and the external speaker (TBD) in the Navigation Console where the OAR 4400 unit was removed, above the radar display next to the chart table.

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		



3.3.10 Grounding of Equipment

3.3.10.1 The Contractor must ground the system components as per the manufacturers recommendations.

3.4 Possible Amendments

3.4.1 Exact cables to be removed will be determined as part of the installation specification(cable removal list will be updated but will not include any more that 3 cables to be removed).

3.4.2 All drawings to be updated/created as part of the installation specification.

3.4.3 All cable lengths to be determined as part of the installation specification.

3.4.4 Exact location of speaker (if required) will be determined as part of the installation specification.

3.4.5 All applicable references to be included with installation specification.

3.4.6 Exact breaker panel and breaker number to be confirmed with installation specification.

	CCGS Leonard J Cowley	
Spec Item #: L-06	Specification	F7049-210183
VHF – DF SYSTEM UPGRADE		

3.4.7 Any amendments to this specification as indicated by section 3.3 or other to be addressed via PSPC 1379 action.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be subject to witness by the Chief Engineer or delegate and the attending surveyor if applicable.

4.2 Testing

4.2.1 All cables must be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at The Contractors expense.

4.2.2 All cable testing must be witnessed by the CG Technical Authority.

4.2.3 Electronic equipment which has been removed for the performance of this specification item must be returned to operational condition.

4.2.4 Testing must be completed in accordance with the Regulations, standards and codes found in the reference documents.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must provide the Chief Engineer a report of The Contractor's work in both electronic and hardcopy formats outlining the details of the inspections and any alterations/repairs prior to the acceptance of this item.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L07	Specification	F7049-210183
AIS ANTENNA AND CABLE INSTALLATION		

L-07 AIS Antenna and Cable Installation..

Part 1 - Scope

- 1.1** This specification serves as a guide for the removal of the existing R4 AIS System and upgrade to the new owner supplied R5 or R6 AIS system onboard the CCGS Leonard J. Cowley.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Leonard J. Cowley AIS drawing
2.1.2 L13_Leonard J. Cowley Antenna layout MM692-001-AL.pdf

2.2 Standards

- 2.2.1** TP127E – Ships Electrical Standards
2.2.2 IEEE 45- Recommended Practice for Electrical Installations on Ships
2.2.3 Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-Jan-001)
2.2.4 See General Notes

2.3 Regulations

- 2.3.1** General Information for the Rules and Regulations for the Classification of Ships.
2.3.2 See General Notes

2.4 Owner Furnished Equipment

- 2.4.1** AIS VHF Antenna
2.4.2 AIS GPS Antenna
2.4.3 AIS NAV Sensor Antenna
2.4.4 All cabling with the exception of AC power cable.

Part 3 – Technical Description

3.0 General

	CCGS Leonard J Cowley	
Spec Item #: L07	Specification	F7049-210183
AIS ANTENNA AND CABLE INSTALLATION		

- 3.0.1** The Contractor must supply all equipment, enclosures, ventilation, staging, scaffolding, chain falls, crane, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, of a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification must be welded into place by certified welders.
- 3.0.2** The Contractor must ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.0.3** The Contractor must be responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering with the installation of cables or equipment within this specification.
- 3.0.4** The Contractor must ensure all new and existing electrical wires affected in this modification shall be properly supported in accordance with accepted / approved practices.
- 3.0.5** Electrical penetrations through frames or brackets shall be in accordance with accepted / approved practices.
- 3.0.6** The Contractor must ensure that provincial regulations are met with regard to all required training for workers including, but not necessarily limited to, fall arrest training/certification.
- 3.0.7** The Contractor must ensure all new and existing electrical wires affected in this modification shall be properly supported in accordance with accepted / approved practices.

3.1 Removals

- 3.1.1** Prior to the commencement of any work, the contractor must ensure all electrical supplies feeding the systems have been isolated at the source following an established lockout/tag out procedure.
- 3.1.2** Electrical isolations for DC power are as follows.
 - 3.1.2.1** Disconnect 24 Volt input cable AIS-6 fed from AC Panel (**Panel and breaker TBD**).

	CCGS Leonard J Cowley	
Spec Item #: L07	Specification	F7049-210183
AIS ANTENNA AND CABLE INSTALLATION		

3.1.3 All electronic equipment and components removed from the vessel resulting from the performance of this specification must be safely stored and returned to the owner.

3.1.4 It would be recommended to start the cable removal from the equipment side to eliminate any discrepancies within the applicable drawings

3.1.5 The Contractor must disconnect and remove all existing equipment and cabling indicated in Table 1 and Table 2. Refer to drawings shown in Reference 2.1 and 2.2.

3.1.6 AIS Cable Removal List CCGS Leonard J. Cowley

3.1.6.1 Table 1

Cable Label	Cable Type	From	To	Signal
AIS - VHF	RG214	Wheelhouse, next to bridge PC	Main Mast Top Backrest	RF
AIS - GPS	RG214	Wheelhouse, next to bridge PC	Bridge Top Fan Room Port Hand Rail	RF
NAV SEN	RG214	Wheelhouse, next to bridge PC	Bridge Top Stbd Wing	RF

3.1.7 AIS Equipment Removal List CCGS Leonard J. Cowley

3.1.7.1 Table 2

Equipment	Location
AIS VHF Antenna	Bridge Top
AIS GPS Antenna	Bridge Top
AIS/GPS Nav Sensor Antenna	Bridge Top

	CCGS Leonard J Cowley	
Spec Item #: L07	Specification	F7049-210183
AIS ANTENNA AND CABLE INSTALLATION		

3.1.8 The Contractor must dispose of all cables that have been identified in the cable removal list at their own expense.

3.2 Installations

3.2.1 The Contractor must work with a Coast Guard Electronic Technician/Technologist to oversee the installation of the new systems and ensure compliance with applicable Coast Guard standards.

3.2.2 For the purpose of adjustment, The Contractor must include a unit cost for the supply and install for one (1) roxtec, or equal class approved transit with glands.

3.2.3 The Contractor must provide a unit price for the supply and installation of 5 meters of cable identified in table 3.

3.2.4 The Contractor must install the new owner supplied AIS VHF Antenna on Bridge Top Port Rail Aft in previous location of removed AIS VHF Antenna. The final installation location will be approved by Coast Guard Technical Authority.

3.2.5 The Contractor must install the new owner supplied AIS GPS Antenna (see antenna layout diagram) in previous location of removed AIS GPS Antenna. The final installation location will be approved and possibly moved by Coast Guard Technical Authority.

3.2.6 The Contractor must install the new owner supplied AIS-NAV SENS Antenna Bridge (see antenna layout diagram) in the same location as the previously installed antenna.

3.2.7 The Contractor must install the owner supplied cable as indicated in Table 3 below:

3.2.7.1 Table 3 Cable installations CCGS Leonard J Cowley

Cable Label	Cable Type	From	To	Signal
AIS-VHF	LMR 400	Wheelhouse next to bridge PC	Wheelhouse Top	RF
AIS-GPS	LMR 400	Wheelhouse next to bridge PC	Wheelhouse Top	RF

	CCGS Leonard J Cowley	
Spec Item #: L07	Specification	F7049-210183
AIS ANTENNA AND CABLE INSTALLATION		

AIS-NAV SENS	LMR 400	Wheelhouse next to bridge PC	Wheelhouse Top	RF
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- 3.2.8** All cable terminations shall be conducted by CCG Technicians.
- 3.2.9** The Contractor shall follow existing cable trays throughout the vessel where fitted for all cable installation. Once installed, all cabling must be secured as per TP127.
- 3.2.10** The Contractor must re-use existing cable penetrations and repack with classification society approved products. Any cable penetration that is determined to be not reusable by The Contractor must be approved for replacement by either the CG Technical Authority or Chief Engineer. The Contractor must supply and install all required materials.
- 3.2.11** All cabling installed by The Contractor must be identified with a marked stamped stainless steel metal tag. Labels are to be securely affixed to the cable at each end, through any deck, deck head, and gland penetration. The designation for each cable is provided in Table 3 (Cable Label).
- 3.2.12** The Contractor must work with a Coast Guard Electronic Technician/Technologist to oversee the installation of the new system and ensure compliance with applicable Coast Guard standards.

3.3 Possible Amendments

- 3.3.1** Pending further investigation, and availability, it will be determined at a later date which system will be procured (R5 or R6). The spec will be adjusted to reflect the desired system and any discrepancies will be addressed via PSPC 1379 action.
- 3.3.2** All supporting documentation, including drawings and references will be provided with installation specification(if required).
- 3.3.3** All breaker panels and numbers to be confirmed/identified
- 3.3.4** All antenna locations to be confirmed/identified

Part 4 – Proof of Performance

4.1 Inspection

- 4.1.1** All work must be subject to witness by the Chief Engineer or delegate and the attending surveyor if applicable.

	CCGS Leonard J Cowley	
Spec Item #: L07	Specification	F7049-210183
AIS ANTENNA AND CABLE INSTALLATION		

4.2 Testing

4.2.1 All cables are to be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at the contractor's expense.

4.2.2 All cable testing must be witnessed by the CG Technical Authority.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must provide the Chief Engineer a report of The Contractor's work in both electronic and hardcopy formats outlining the details of the inspections and any alterations/repairs prior to the acceptance of this item.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

L-08 Anemometer Install..

Part 1 – Scope

- 1.1** This specification serves as a guide for the installation of a new Owner Supplied GILL Wind Observer Ultrasonic Anemometer and Display.

Part 2 – References

2.1 Guidance Drawings/Nameplate Data

2.1.1 GILL Wind Speed Sensor User/Installation Manual

2.1.2 Antenna Arrangement Drawing

2.2 Standards

2.2.1 Fleet Safety and Security Manual (DFO 5737)

2.2.2 The Contractor shall adhere to the Ships ISM Hotwork, Confined Space Entry, Fall Protection and Lockout Procedures.

2.2.3 TP 127E, Transport Canada Marine Safety – Ship Electrical Standards

2.3 Regulations

2.3.1 Canada Shipping Act 2001

2.3.2 This vessel is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector and ABS.

2.3.3 Maritime Occupational Health and Safety Regulations (SOR/87-183)

2.3.4 ABS Rules and Regulations

2.4 Owner Furnished Equipment

2.4.1 GILL Wind Observer II Anemometer

2.4.2 Gill Anemometer Display

2.4.3 Pipe clamps for mounting to mast pipe

2.4.4 Rubber Gasket For Antenna Mount

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must supply all equipment, enclosures, ventilation, staging, scaffolding, chain falls, crane, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, of a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification must be welded into place by certified welders.
- 3.1.2** Prior to any hot work taking place, the contractor must ensure that the area of work and all equipment has been sufficiently protected from any sparks or metal filings.
- 3.1.3** The Contractor must ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.1.4** All cabling, once installed, must be marked with a stamped metal tag securely affixed to the cable at each end with the designation for each cable as provided in this specification.
- 3.1.5** The Contractor must follow existing cable trays throughout the vessel where fitted. All penetrations in fire rated bulkheads and decks must be installed using approved transit system meeting the requirements of this specification and in accordance with TP 127E.
- 3.1.6** All cabling which has been removed and deemed surplus as a result of this specification must be disposed of at the contractor's expense.
- 3.1.7** The Contractor must be responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering with the installation of cables or equipment within this specification.
- 3.1.8** The Contractor must ensure all new and existing electrical wires affected in this modification shall be properly supported in accordance with accepted / approved practices. Electrical penetrations through frames or brackets shall be in accordance with accepted / approved practices.

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

3.1.9 The Contractor must paint all disturbed steel as per client specifications before installation of new wind sensor. 1 coat of primer and 2 finish coats.

3.1.10 The Contractor must ensure that provincial regulations are met with regard to all required training for workers including, but not necessarily limited to, fall arrest training/certification.

3.1.11 The installation must not be considered complete, until relocated or installed equipment has been tested, and considered operating as per manufacturers specifications, to the satisfaction of the Chief Engineer, Class and/or Flag as applicable.

3.2 Installation

3.2.1 The Contractor must work with a Coast Guard Technician to oversee the installation of the new system and ensure compliance with applicable Coast Guard standards.

3.2.2 Electrical isolations for AC power TBD (see amendments in Section 3). Breaker to be verified by The Contractor prior to commencement of work.

3.2.2.1 NAV Bridge Power Panel(TBD)

3.2.3 The Contractor must provide a unit price for the supply and installation of 5M of each type of cable identified in Table 3.

3.2.4 For the purpose of adjustment, The Contractor must include a unit cost for the supply and installation of one (1) roxtec, or equal class approved transit with glands.

3.2.5 The Contractor must supply/install cables as indicated in table 3 below:

3.2.5.1 Table 3: Installations CCGS Leonard J Cowley

Cable Label	Cable Type	From	To	Length
Wind-1	Belden 8774 (or similar type approved marine cable)	GILL wind sensor display	Junction box, main mast near top	TBD
Wind-2	Factory Cable	Junction Box, main mast near top	Anemometer	TBD

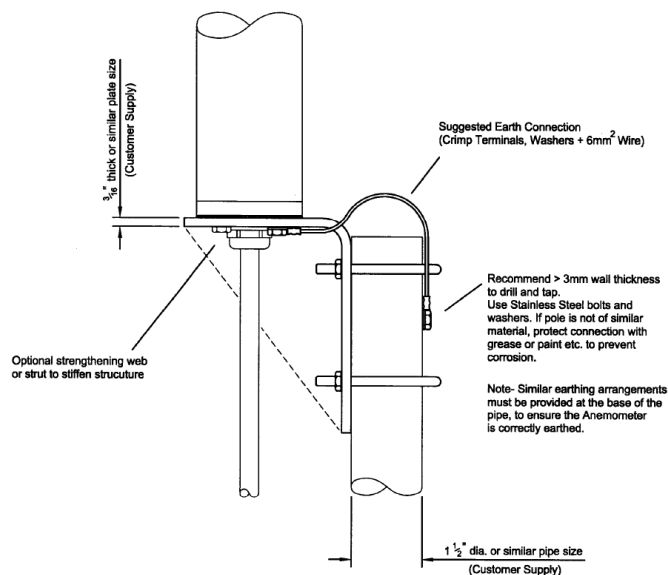
	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

- 3.2.6** The Contractor must install the GILL ultrasonic anemometer on the main mast in the general vicinity of the existing RM Young Anemometer (exact location to be determined by CG Technical Authority). See photo below for a reference idea of location.

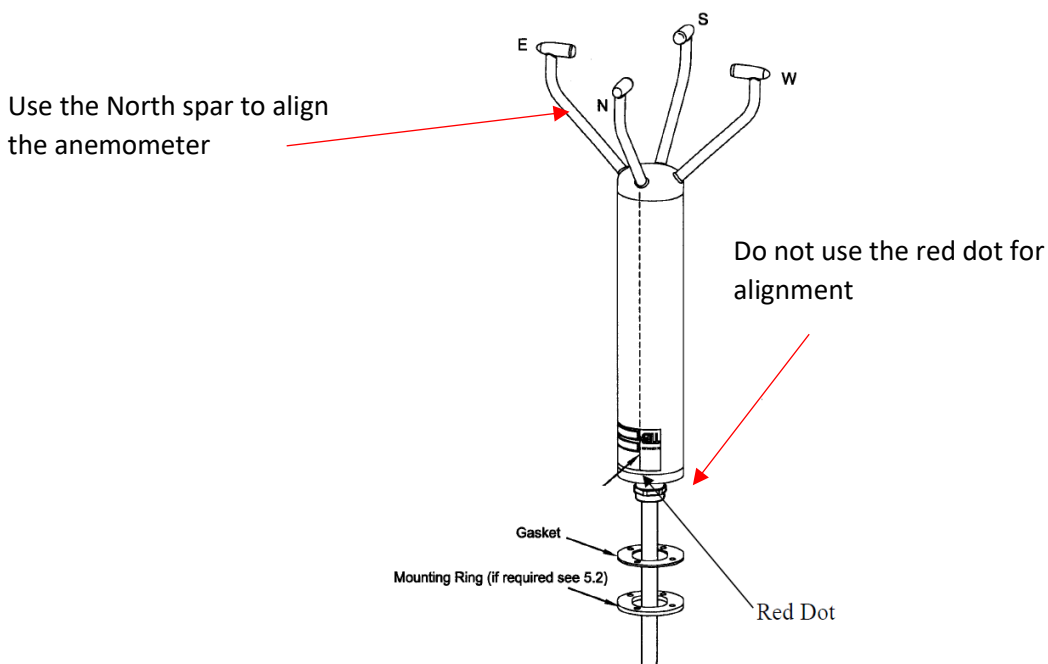


- 3.2.7** The Contractor must be responsible for installing a pipe on the mast top to mount the new anemometer. It will be of like material and at approx. 1.5 inch in diameter or slightly larger based on mast investigation. See diagrams below for reference. Coast Guard will have mounting bracket fabricated and will be provided prior to installation.
- 3.2.8** When installing the ground cable to the post as shown in the diagram below, The Contractor must use stainless steel bolts and washers.

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		



3.2.9 When mounting, The Contractor must ensure the anemometer points North using the North spar and not the red dot located at the base of the unit, as shown in the diagram below.



3.2.10 Wheelhouse Equipment Installation

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

3.2.10.1 The Contractor must mount the wind observer wind display on the forward bulkhead in the vicinity of, and on the opposite side of the RM Young display. Picture to follow.

3.2.11 Grounding Equipment

3.2.11.1 The Contractor must ground the system components as per the manufacturer's recommendations.

3.3 Amendments

3.3.1 All drawings to be updated/created as part of the installation specification.

3.3.2 All cable lengths to be determined as part of the installation specification.

3.3.3 Exact location of bridge display to be determined as part of installation specification.

3.3.4 All applicable references to be included with installation specification.

3.3.5 Exact breaker panel and breaker number to be confirmed with installation specification.

3.3.6 Exact pipe width for mast to be confirmed with installation specification.

3.3.7 This setup is for a secondary unit. Possible integration into bridge electronics to be decided at a later date.

3.3.8 Pending further investigation, extra slave displays may be integrated.

3.3.9 If any of the above listed amendments are deemed necessary by CG TA, it will be addressed via PSPC 1379 action.

3.2 Location

3.2.1 N/A

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

4.1 Inspection

- 4.1.1** All work must be completed to the satisfaction of the CG TA and the attending ABS Class Surveyor.

4.2 Testing

- 4.2.1** All cables must be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at The Contractors expense
- 4.2.2** All cable testing must be witnessed by the CG Technical Authority.
- 4.2.3** Electronic equipment which has been removed for the performance of this specification item must be returned to operational condition.
- 4.2.4** Testing must be completed in accordance with the Regulations, standards and codes found in General Notes.

4.3 Certification

- 4.3.1** The Contractor must deliver 2 hard copies of service certificates and original service certificate to CG TA. Contractor must deliver 1 electronic copy of all reports/certs to the CG TA.
- 4.3.2** The Contractor must supply ABS Class Surveyor with a typewritten copy of the final results of the Megger Survey Final Report after all corrections have been made and verified. Once approved, The Contractor must ensure ABS Class Surveyor gives credit for this item in the relevant ship's record book.

Part 5 – Deliverables

5.1 Drawings/Reports

- 5.1.1** The Contractor must provide the CG TA with a hard copy of the typewritten report outlining the details of the inspection and final megger survey report and any alterations / repairs made prior to the acceptance of this item. The Contractor must deliver 1 electronic copy of all reports/certs to CG TA.

5.2 Spares

- 5.2.1** N/A

	CCGS Leonard J Cowley	
Spec Item #: L08	Specification	F7049-210183
ANEMOMETER INSTALL		

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

	CCGS Leonard J Cowley	
Spec Item #: L09	Specification	F7049-210183
MCC PANEL OVERHAULS		

L-09 MCC Panel Overhauls..

Part 1 - Scope

- 1.1** The Contractor must remove existing MCC buckets as listed in included Pennecon MCC Survey Report and rebuild using new Contractor supplied components.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** CCGS Leonard J Cowley – Pennecon MCC Survey Report

2.2 Standards

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** Transport Canada Ships Electrical Standards – TP127E

2.3 Regulations

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** ABS Rules and Regulations
- 2.3.3** Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must confirm with the CG TA prior to beginning removal of MCC Buckets to ensure the equipment is not currently in use
- 3.1.2** The Contractor must remove MCC Buckets from panel and transport to Electrical shop for overhaul.
- 3.1.2.1** The Contractor must rebuild all buckets listed in included report with all new Contractor supplied components.

	CCGS Leonard J Cowley	
Spec Item #: L09	Specification	F7049-210183
MCC PANEL OVERHAULS		

3.1.2.2 The Contractor must provide documentation from suppliers that all components will be readily available and supported for the next 10 years.

3.1.2.3 All components used must be readily available off the shelf. If off the shelf components are not available, the CG TA must be notified to determine an alternate replacement.

3.1.3 The Contractor must supply 1 spare for every type of component used in the overhaul of the MCC bucket.

3.1.3.1 The Contractor must provide CG TA with supplier information for each component provided. Information must include model number, serial number, supplier, cost, estimated lead time, etc...

3.1.4 The Contractor must reinstall the overhauled MCC buckets as per original configuration.

3.1.5 The Contractor must perform a function test on MCC's upon completion to ensure correct operation. Function test must be witnessed by CG TA.

3.1.6 The Contractor must replace all equipment tags with new Lamacoid Tags affixed to door.

3.1.7 The Contractor must bid \$25,000.00 for additional/ changed new components/equipment required during the overhauls. This allowance to be adjusted up or down via PSPC 1379 action on presentation of supporting invoices.

3.1.8 Upon completion, The Contractor must arrange for ABS Class Surveyor to complete inspection of repairs.

3.2 Location

3.2.1 See included report and pictures

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel.

Part 4 – Proof Of Performance

4.1 Inspection

	CCGS Leonard J Cowley	
Spec Item #: L09	Specification	F7049-210183
MCC PANEL OVERHAULS		

4.1.1 Overhauled MCC's Panels must be inspected and approved by an ABS Class Surveyor

4.2 Testing

4.2.1 Function test must be performed and witness by CG TA and ABS Class Surveyor.

4.3 Certification

4.3.1 The Contractor must provide the CG TA with all documentation for equipment being used during overhaul.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must supply CG TA with both a typed and electronic copy of the overhaul report.

5.1.1.1 Report to include:

5.1.1.1.1 Before and after pictures of each bucket

5.1.1.1.2 Condition of each bucket prior to overhaul

5.1.1.1.3 Details of all new components(part numbers, make and model) used during the overhaul.

5.1.1.1.4 ABS inspection and approval documents

5.2 Spares

5.2.1 The Contractor must supply one (1) spare for all different components used during the overhaul.

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 The Contractor must provide any documentation and/or manuals for components used during the overhaul

	CCGS Leonard J Cowley	
Spec Item #: L10	Specification	F7049-210183
MISC MOTORS OVERHAUL		

L-10 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: L12	Specification	F7049-210183
STEERING MOTOR OVERHAULS		

L-11 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: L12	Specification	F7049-210183
CONTROL INTEGRATION UPGRADE		

L-12 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: L13	Specification	F7049-210183
MCR CONSOLE UPGRADE		

L-13 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: L14	Specification	F7049-210183
UPGRADE #3 GENERATOR ELECTRICAL		

L-14 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: L15	Specification	F7049-210183
SYNCHRONIZATION CONTROL UPGRADE		

L-15 Synchronization Control Upgrade..

Part 1 - Scope

- 1.1** The Contractor must arrange for the services of a Madsen Diesel and Turbine FSR to upgrade synchronization control of Shore Power and Emergency Generator.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** N/A

2.2 Standards

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** Transport Canada Ships Electrical Standards – TP127E

2.3 Regulations

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** ABS Rules and Regulations
- 2.3.3** Maritime Occupational Health and Safety Regulations

2.4 Owner Furnished Equipment

- 2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

- 3.1.1** The Contractor must arrange for the services of a Madsen Diesel and Turbine FSR to upgrade synchronization controls of Shore Power and Emergency Generator.
- 3.1.2** The Contractor must bid an allowance of \$50,000.00 for Madsen Diesel FSR labor and travel expenses. Final amount to be adjusted up or down via PSPC 1379 action.

- 3.1.2.1** The Contractor must bid an allowance of \$50,000.00 for parts required to

	CCGS Leonard J Cowley	
Spec Item #: L15	Specification	F7049-210183
SYNCHRONIZATION CONTROL UPGRADE		

complete the job. Final amounts to be adjusted up or down via PSPC 1379 action.

3.1.3 Madsen Scope of Work to include but not limited to

3.1.3.1 EMERGENCY GENERATOR AND SHORE POWER – FSR to upgrade all wiring and sensors, install an Easygen control and bring the emergency gen and shore power fully into the Woodward system.

3.1.4 Before disposing of any removed equipment, the Contractor must consult with the FSR and CG TA to determine if any component must be kept for other vessels or as spares.

3.1.5 The Contractor must bid on providing 500 hours of assistance to FSR as required. Assistance may be laborer, electrical or other trade as required by FSR. Contractor must provide hourly rate for assistance to be used for adjustment purposes based on PSPC 1379 action. Any materials required will be addressed via PSPC 1379 action.

3.1.6 The Contractor must bid on supplying and installing 3 new Class Approved deck/bulkhead 6x2 weld in multi transit frames. Contractor must provide a unit cost per additional new transit. Actual number required to be adjusted up or down via PSPC 1379 action.

3.1.7 Contact information for the FSR:

Madsen Diesel and Turbine

Jason Pearcey - Operations Manager

141 Glencoe Drive, Donovan's Industrial Park

Mt. Pearl (St. John's), NL, Canada A1N 4S7

Tel: (709) 726-6774 Fax: (709) 726-6701

E-m: Jason.pearcey@madsen.ca

3.2 Location

3.2.1 Engine Room and Emergency Gen Compartment

	CCGS Leonard J Cowley	
Spec Item #: L15	Specification	F7049-210183
SYNCHRONIZATION CONTROL UPGRADE		

3.3 Interferences

3.3.1 The Contractor is responsible for the identification of interference items, their temporary removal, and storage and refitting to vessel. The Contractor must re-install interference items back to their original position and ensure their proper functioning, as applicable.

Part 4 – Proof Of Performance

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the CG TA, Madsen Diesel FSR and ABS Class Surveyor.

4.2 Testing

4.2.1 Function test must be performed and witness by CG TA and ABS Class Surveyor.

4.3 Certification

4.3.1 The Contractor must provide the CG TA with all documentation for equipment being used during overhaul.

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must supply CG TA with both a typed and electronic copy of the overhaul report.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 The Contractor must provide any documentation and/or manuals for components used during the overhaul.

	CCGS Leonard J Cowley	
Spec Item #: L16	Specification	F7049-210183
ELECTRICAL DISTRIBUTION PANEL REPLACEMENT AND INSTALLATION		

L-16 CANCELLED

	CCGS Leonard J Cowley	
Spec Item #: L17	Specification	F7049-210183

L-17 CANCELLED..

	CCGS Leonard J Cowley	
Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

L-18 LAN Upgrade..

Part 1 – Scope

- 1.1** The objective of this spec item is to remove the Fiber Optic cabling infrastructure and replace it with new DUAL Type approved CAT6A Network cable throughout the vessel for all workstations and single wire replacement for the wireless access points.
- 1.2** The Contractor must supply all materials and parts required to perform the specified work unless otherwise stated.
- 1.3** All terminations must be the responsibility of CCG installation technicians with the exception for those relating to electrical supply.
- 1.4** All equipment must be relocated by CG installation technicians to the new server rack.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

Drawing Number	Description	Electronic Number
59014001	Local Area Network Wiring diagram	59014001.pdf
590-70 Sheet1/2	General Arrangement-Profile Nav Bridge, Bridge Deck and Forecastle Deck	590-70S1.pdf
590-70 Sheet2/2	General Arrangement- Upper, Main Deck and Hold	590-70S2.pdf

2.2 Standards

- 2.2.1** TP127E – Ships Electrical Standards
- 2.2.2** IEEE 45:2002- Recommended Practice for Electrical Installations on Ships
- 2.2.3** Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-Jan-001)
- 2.2.4** See General Notes

	CCGS Leonard J Cowley	
Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

2.2.5 Fleet Safety and Security Manual (DFO 5737)

2.3 Regulations

2.3.1 General Information for the Rules and Regulations for the Classification of Ships.

2.3.2 See General Notes

2.4 Owner Furnished Equipment

2.4.1 N/A

2.5 Contractor Furnished Equipment

2.5.1 The Contractor must supply all materials, equipment and parts to perform specified work unless otherwise stated.

2.5.2 Six (6) Bergen cabling 24 port patch panels, fully populated Black with CAT6a jack connectors PN: BC-13-203 and PN: BC-11-004-24

2.5.3 Thirty five (35) Bergen cabling outlet 2X RJ45 STP CAT6A angle keystone with wall box PN: BC-12-254

2.5.4 2000M of Bergen cabling maritime LAN CAT6A cable PN: BC-10-021.

2.5.4.1 The Contractor must provide a unit cost per m for LAN CAT6A cable. Actual length required to be adjusted via PSPC 1379 action.

Part 3 – Technical Description

3.1 General

3.1.1 The Contractor must remove all fiber cable from network patch panel located in ships office to each workstation identified in the removal drawing No. 59014001.

3.1.2 The Contractor must install all CAT6A as per new 590-70S1/590-70S2 drawing referenced above. The Contractor must return all unused equipment, components and cabling to CCG technical authority upon project completion.

3.1.3 All cabling, once installed, must be marked with heat shrink or wire wrap tags. The labels must be securely affixed to the cable at each end and through any deck, deck heads, and/or gland penetrations with the designation for each cable as provided in the *Cable Label* column for each table in this specification.

3.1.4 The Contractor is responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering with the running of any cables and mounting of any equipment.

	CCGS Leonard J Cowley	
Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

- 3.1.5** All cabling must follow existing cable trays throughout the vessel where fitted. Once installed, all cabling must be secured as per TP127.
- 3.1.6** The Contractor must supply and install any transit blocks that are required in any deck penetrations throughout the vessel for any of the new cables.
- 3.1.7** The Contractor must be responsible to ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.1.8** Prior to the commencement of any electrical work, The Contractor must ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tag out procedure. The Contractor must ensure that Chief Engineer or Electrical Officer is notified of any lockout/tag out completed.
- 3.1.9** The Contractor must supply and install a marine AC cable (Duplex outlet box inside rack next to existing outlet) from emergency 110V AC feed in the existing ships office LAN rack location. The Contractor must contact CG CE for electrical supply.
- 3.1.10** The Contractor must label the electrical breaker feeds with metal labels for the new Emergency AC cable stated in 3.1.9 as decided by CCG electronics technicians/representative at both the electrical panel and junction boxes.
- 3.1.11** The Contractor must work in conjunction with Coast Guard electronic technicians to oversee the move of equipment to ensure compliance with applicable Coast Guard standards. Terminations of all equipment will be completed by CCG installation technicians with the exception of those for electrical supply. The Contractor will also be responsible for all electrical terminations and grounding requirements.
- 3.1.12** The Contractor will be responsible for all new cable runs as outlined in this specification.
- 3.1.13** CCG Technicians will be responsible for removing all equipment in ships office LAN rack. CCG Technicians will be responsible for terminations/reconnection of all equipment.
- 3.1.14** The Contractor must supply and install all cables listed in the Cable List below. All cables must be shipboard approved marine grade cable as described.

Cable List – Bridge

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Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

ITEM #	Cable Label	Cable Type	From	To	Length (m)
1	LAN-SW1.14/AP01	Bergen CAT6	Bridge LAN rack	FAP01 Bridge Deck	
2	LAN-SW1.15/WS01	Bergen CAT6	Bridge LAN rack	Workstation Port Side Dual Jack 1	
3	LAN-SW1.16/WS02	Bergen CAT6	Bridge LAN rack	Workstation Port Side Dual Jack 2	
4	LAN-SW1.17/Spare	Bergen CAT6	Bridge LAN rack	STBD Side Dual Jack 1	
5	LAN-SW1.18/Spare	Bergen CAT6	Bridge LAN rack	STBD Side Dual Jack 2	
6	LAN-SW1.22/IMIC3	Bergen CAT6	Bridge LAN rack	IMIC3	

Note: All item listed with "To" column ending in "1" and "2" represents 1 two (2) BC-12-254 CAT6A cables at the same dual wallbox

Cable List – Ships Office

ITEM #	Cable Label	Cable Type	From	To	Length (m)
1	LAN-SW2.01/WS01	Bergen CAT6	Ships Office LAN Rack	Ships Office Workstation 1	
2	LAN-SW2.02/WS02	Bergen CAT6	Ships Office LAN Rack	Ships Office Workstation 2	
3	LAN-SW2.03/WS03	Bergen CAT6	Ships Office LAN Rack	CO Workstation 1	
4	LAN-SW2.04/WS04	Bergen CAT6	Ships Office LAN Rack	CO Workstation 2	
5	LAN-SW2.05/WS05	Bergen CAT6	Ships Office LAN Rack	CE Workstation 1	
6	LAN-SW2.06/WS06	Bergen CAT6	Ships Office LAN Rack	CE Workstation 2	
7	LAN-SW2.07/WS07	Bergen CAT6	Ships Office LAN Rack	CHO Workstation 1	
8	LAN-SW2.08/WS08	Bergen CAT6	Ships Office LAN Rack	CHO Workstation 2	
9	LAN-SW2.09/WS09	Bergen CAT6	Ships Office LAN Rack	SR FO Workstation 1	
10	LAN-SW2.10/WS10	Bergen CAT6	Ships Office LAN Rack	SR FO Workstation 2	

	CCGS Leonard J Cowley	
Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

11	LAN-SW2.11/WS11	Bergen CAT6	Ships Office LAN Rack	2nd FO Workstation 1	
12	LAN-SW2.12/WS12	Bergen CAT6	Ships Office LAN Rack	2nd FO Workstation 2	
13	LAN-SW2.13/WS13	Bergen CAT6	Ships Office LAN Rack	Jr FO Workstation 1	
14	LAN-SW2.14/WS14	Bergen CAT6	Ships Office LAN Rack	Jr FO Workstation 2	
15	LAN-SW2.15/WS15	Bergen CAT6	Ships Office LAN Rack	Lounge #1 Workstation	
16	LAN-SW2.16/WS16	Bergen CAT6	Ships Office LAN Rack	Lounge #2 Workstation	
17	LAN-SW2.17/WS17	Bergen CAT6	Ships Office LAN Rack	Senior Eng Workstation 1	
18	LAN-SW2.18/WS18	Bergen CAT6	Ships Office LAN Rack	Senior Eng Workstation 2	
19	LAN-SW2.19/WS19	Bergen CAT6	Ships Office LAN Rack	1rst Engineer Workstation 1	
20	LAN-SW2.20/WS20	Bergen CAT6	Ships Office LAN Rack	1rst Engineer Workstation 2	
21	LAN-SW2.21/WS21	Bergen CAT6	Ships Office LAN Rack	2rst Engineer Workstation 1	
22	LAN-SW2.22/WS22	Bergen CAT6	Ships Office LAN Rack	2rst Engineer Workstation 2	
23	LAN-SW2.23/WS23	Bergen CAT6	Ships Office LAN Rack	1rst Officer Workstation 1	
24	LAN-SW2.24/WS24	Bergen CAT6	Ships Office LAN Rack	1rst Officer Workstation 2	
27	LAN-SW2.25/WS25	Bergen CAT6	Ships Office LAN Rack	2rst Officer Workstation 1	
28	LAN-SW2.26/WS26	Bergen CAT6	Ships Office LAN Rack	2rst Officer Workstation 2	
29	LAN-SW2.27/AP02	Bergen CAT6	Ships Office LAN Rack	Forecastle Deck existing FAP location	
30	LAN-SW2.17/PRT01	Bergen CAT6	Ships Office LAN Rack	Printer 1	
31	LAN-SW2.18/ PRT02	Bergen CAT6	Ships Office LAN Rack	Printer 2	

Cable List – LAN Room

ITEM #	Cable Label	Cable Type	From	To	Length (m)
1	LAN-SW3.01/AP03	Bergen CAT6	Ships Office LAN Rack	Upper deck hallway outside	

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Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

				Bosun's Cabin	
2	LAN-SW3.02/ AP04	Bergen CAT6	Ships Office LAN Rack	Officers Mess, Upper Deck	
3	LAN-SW3.03/ AP05	Bergen CAT6	Ships Office LAN Rack	Crews Mess, Main Deck	
4	LAN-SW3.04/ AP06	Bergen CAT6	Ships Office LAN Rack	Fwd Lounge, Main Deck	
5	LAN-SW3.05/ AP07	Bergen CAT6	Ships Office LAN Rack	Gym	

Note: All item listed with "To" column ending in "1" and "2" represents 1 two (2) BC-12-254 CAT6A cables at the same dual wallbox

3.2 Interferences

3.2.1 The Contractor must be responsible for the identification of interference items, their temporary removal, storage protection and refitting to the vessel.

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 ABS class surveyor and the CG TA must be present at the inspection of the work.

4.1.2 For cables other than the CAT6A cables, there is not any continuity testing requirement, however, all cables which have been installed by the Contractor that are found defective (fail Fluke continuity test) or damaged must be replaced at the Contractor's expense (material and labour).

4.1.3 For cables that are CAT6A cables which have been installed by the Contractor that are found defective (fail Fluke cable analyzer testing done by CCG technical authority) or damaged must be replaced at the Contractor's expense (material and labour).

4.2 Testing

4.2.1 The CG TA, FSR, and CG CE will perform an Installation Check (IC) of all work specified herein to ensure conformity with this specification. The Contractor will be responsible for any necessary corrections.

4.2.2 All Testing and Commissioning activities related to the affected system(s) will be conducted by CCG.

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Spec Item #: L18	Specification	F7049-210183
LOCAL AREA NETWORK UPGRADE		

4.3 Documentation

4.3.1 N/A

Part 5 - Deliverables

5.1 Drawings/Reports

5.1.1 The Contractor must provide the Chief Engineer a report of The Contractor's work in both electronic and hardcopy formats outlining the details of the inspections and any alterations/repairs prior to the acceptance of this item.

5.2 Spares

5.2.1 N/A

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

L-19 LAN Room Electrical Upgrades..



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LAN ROOM AND HOSPITAL ELECTRICAL UPGRADES

	CCGS Leonard J Cowley	
Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

Part 1 - Scope

- 1.1** This specification describes the extent of work required for electrical upgrades to both the LAN Room and Hospital onboard the vessel.

Part 2 - References

2.1 Supplied Drawings

- 2.1.1** N/A

2.2 Standards

The following Standards must be adhered to during the completion of the work scope:

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** IACS No. 47 - Shipbuilding and Repair Quality Standard
- 2.2.3** CSA W59-08 (R2008) - Welded Steel Construction
- 2.2.4** CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- 2.2.5** Society for Protective Coatings (SSPC) Standards

2.3 Regulations

The following Regulations are to be adhered to during the completion of the work scope:

- 2.3.1** Canada Shipping Act 2001
- 2.3.2** Maritime Occupational Health and Safety Regulations-MOHS SOR 2010-120
- 2.3.3** A.B.S. Rules and Regulations for Steel Vessels Under 90 Meters

2.4 Owners Requirements

The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

Part 3 – Technical Description

3.1 General

	CCGS Leonard J Cowley	
Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

- 3.1.1** It is The Contractor's responsibility to follow all applicable Federal, Provincial, and local regulations. The Contractor must adhere to all DFO-Coast Guard/PSPC work requirements and must complete the work to the satisfaction of both the vessel's Chief Engineer and the attending American Bureau of Shipping (A.B.S.) Class Surveyor.
- 3.1.2** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriately sized for the expected duties and be accompanied by current certification indicated or be permanently marked as to being of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB certified welders, certified to Welding Standard W47.1, Div. 1 and 2. The Contractor is also responsible for all temporary enclosures to facilitate the work, and also, all clean-up and disposal of debris generated due to the work.
- 3.1.3** Prior to any hot work taking place, The Contractor must ensure that the area of work and any adjacent space are certified as gas-free and suitable for hot work. Ceiling, bulkhead linings, and insulation materials shall be removed in way of the steel renewal hot work zone. Removed linings and insulation shall be re-used where possible. Any such required new replacement materials shall meet structural fire protection standards requirements as per Transport Canada Marine Safety (TCMS) Guide to Structural Fire Protection TP11469 and the approval of the A.B.S. Class Surveyor.
- 3.1.4** The Contractor must be responsible to protect the interior of the vessel from physical damage and contamination by generated smoke. This shall include the provision of suitable extraction fans as well as suitable coverings for decks, decking, deck heads, bulkheads, and outfit as required to limit additional damages. Fire watches shall be maintained by the Contractor at all times while hot work is being conducted.
- 3.1.5** The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from welding or any other work prior to the acceptance of the items noted within this specification.

	CCGS Leonard J Cowley	
Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

3.1.6 The Contractor must be responsible to ensure that the integrity of the vessel structure is maintained for the full duration of repairs.

3.2 Materials

3.2.1 The Contractor must use new Lloyd's Grade 'A' or equivalent steel as per A.B.S. approval for all plating. Any proposal for material substitution shall be made in writing and must be approved by the Owner prior to fabrication.

3.2.2 All repairs must follow the International Association of Classification Societies (IACS) No. 47 - Shipbuilding and Repair Quality Standard.

3.2.3 All materials used must be approved by A.B.S. or equivalent Classification Society.

3.2.4 Linings and insulation material that are damaged during removals must be supplied and replaced by The Contractor. Any linings and insulation materials found to be damaged prior to removal to be informed to CCG TA and to be addressed via PSPC 1379 action. All such materials and their install shall also be to the satisfaction of the vessel's Chief Engineer and/or the Vessel's Representative.

3.3 Welding

3.3.1 N/A

3.4 Coatings and Paint Work

3.4.1 N/A

3.5 Testing & Inspections

3.5.1 The work is to be completed to the satisfaction of the attending A.B.S. Class Surveyor and Owner's representative. Costs for any testing requirements, as required by ABS, to be included. The Contractor must update CG provided drawings and submit to ABS for approvals. These cost are to be included in The Contractors bid.

3.5.2 The Owner requires full access to the vessel for inspections by the Owner's personnel and or other Owner-appointed representatives.

3.6 Documentation

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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

3.6.1 The Contractor must provide the Chief Engineer with a typewritten report in both electronic and hardcopy formats outlining the details of the inspection with ABS signature/ certification for any alterations/repairs made prior to acceptance.

3.7 Scope of Work

3.7.1 NEW LAN Room Power Feeds

3.7.1.1 The Contractor must supply and install a new 20A circuit to the new LAN Room from Power Panel EL5.

3.7.1.1.1 Power Panel EL5 is located in the port hallway on the upper deck.

3.7.1.1.2 The Contractor must run approximately 42 meters of 2c #12+E cable in stbd hallway cable tray from EL5 fwd through two roxtec transits into new LAN Room.(Picture 1 and Picture 2). The Contractor must provide a unit cost per meter to supply and install the above listed cable. Actual amounts to be adjusted up or down via PSPC 1379 action.

3.7.1.1.3 The Contractor must supply and install 2p 20 amp Siemens circuit breaker.

3.7.1.2 The Contractor must supply and install a new 15A circuit to the LAN Room from Power Panel L5.

3.7.1.2.1 Power Panel L5 is located on the next deck down almost directly under the new LAN room.

3.7.1.2.2 The Contractor must run approximately 20 meters of 2c#14+E cable through 3 roxtec transits into new LAN room. One round Roxtec transit (Picture 3) is located in the bulkhead above L5, another is located in the bulkhead (Picture 4) of the storage room adjacent to the L5 and the final transit(Picture 5) is in the deckhead of the storage room/new LAN room. The Contractor must provide a unit cost per meter to supply and install the above listed cable. Actual amounts to be adjusted up or down via PSPC 1379 action.

3.7.1.2.3 The Contractor must reuse existing 2p 15A circuit breaker.

	CCGS Leonard J Cowley	
Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

3.7.1.3 The Contractor must supply and install new 20A circuit to the LAN Room from Power Panel L%.

3.7.1.3.1 Circuit #25/27 in power panel L5 is currently feeding a receptacle in existing LAN room. The Contractor must remove existing breaker and supply and install new 20A 2p breaker in its slots.

3.7.1.3.2 The Contractor must run approximately 20 meters of 2c#12+E using same route as section 3.7.1.2.2.

3.7.2 NEW Hospital Emergency Circuit

3.7.2.1 The Contractor must supply and install new 15A circuit to the Hospital from Power Panel EL5.

3.7.2.2 The Contractor must run 27meters of 2c#14 cable using same route as section 3.7.1.2.2. Hospital is located just before the new LAN room.

3.7.2.3 The Contractor must supply and install new siemens 2p 15A breaker in Power Panel EL5.

3.8 Removals and Reinstallation

3.8.1 The Contractor must be responsible for all temporary and permanent removals and storage for the completion of the work scope. All permanent removals described in Section 3.7 are to be disposed of by the Contractor unless otherwise directed by the vessel's Owner.

3.8.2 The Contractor must be responsible for the removal, storage, and reinstallation of all fittings deemed to interfere with steel renewals as outlined.

3.8.3 The Contractor must be responsible for the removal, storage, and reinstallation of any/all electrical components (wiring, junctions, and panels) deemed to interfere with the renewals as outlined.

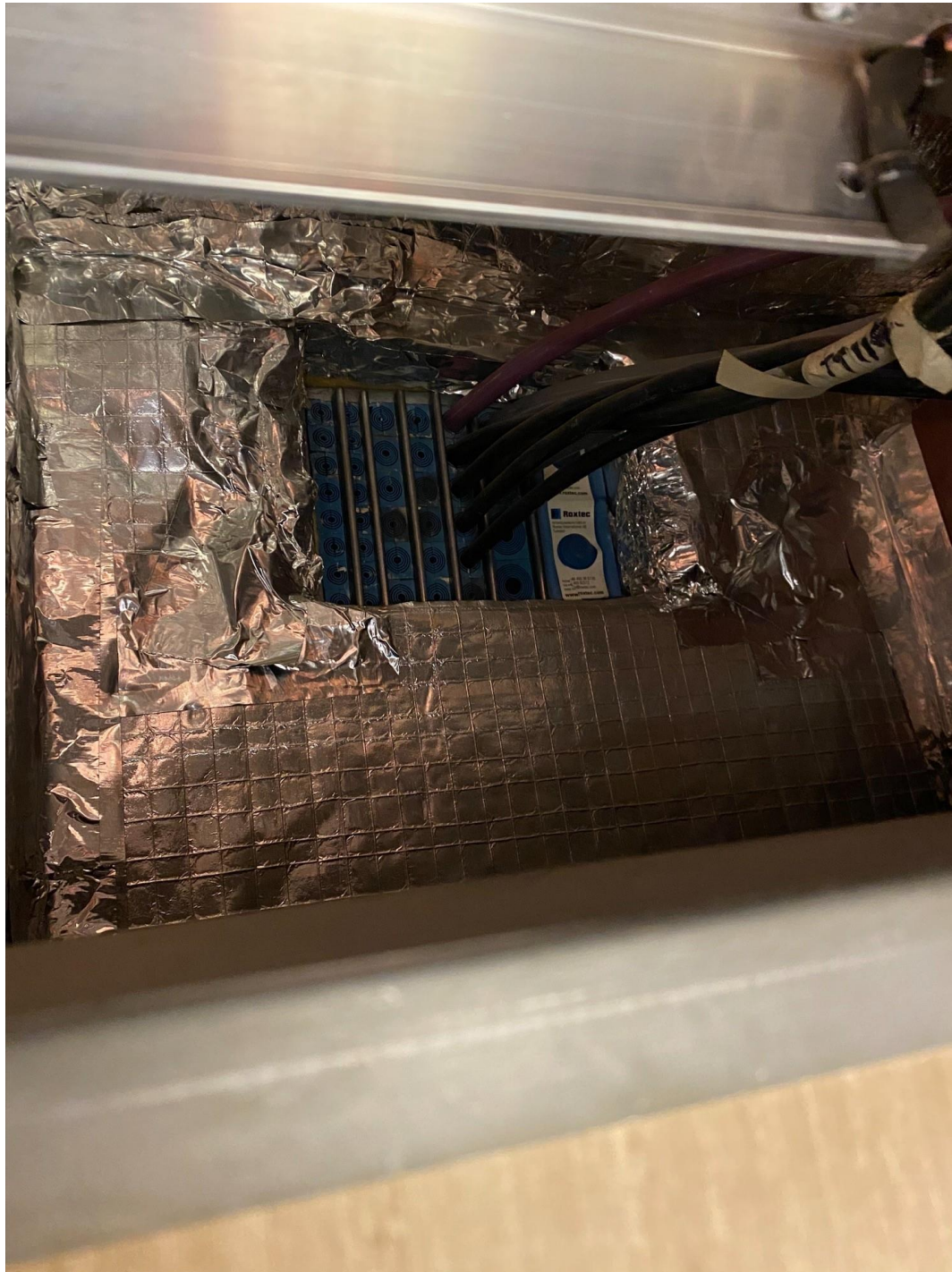
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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

Picture #1



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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

Picture #2



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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

Picture #3



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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

Picture #4



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Spec Item #: L-19	Specification	F7049-210183
LAN ROOM and HOSPITAL ELECTRICAL UPGRADES		

Picture #5



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Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

L-20 LAN Room Rack Relocation Bridge Rack Modification – ADDED

Part 1 - Scope

- 1.1** This specification serves as a guide for the complete relocation of equipment currently located in the LAN room, upper deck (aft), to the newly renovated Eng Stores Office, upper deck (aft) and the Bridge deck locations. Exact equipment moving to either location is listed within this specification.
- 1.2** The Contractor must supply all materials and parts required to perform the specified work unless otherwise stated.
- 1.3** All terminations will be the responsibility of CCG installation technicians with the exception for those relating to electrical supply.

Part 2 - References

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Leonard J. Cowley Antenna layout MM692-001-AL.pdf

2.2 Standards

- 2.2.1** TP127E – Ships Electrical Standards
- 2.2.2** IEEE 45- Recommended Practice for Electrical Installations on Ships
- 2.2.3** Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-Jan-001)
- 2.2.4** See General Notes

2.3 Regulations

- 2.3.1** General Information for the Rules and Regulations for the Classification of Ships.
- 2.3.2** See General Notes

2.4 Owner Furnished Equipment

- 2.4.1** All materials and equipment will be provided by CG unless otherwise stated.

Part 3 – Technical Description

4.0 General

- 3.1** The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, carnage, crane, slings, and shackles necessary to perform the work. All lifting

	CCGS Leonard J Cowley	
Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

equipment must be appropriate for the expected duties, and be accompanied by current certification indicating or be permanently marked as to being safe with the required working load for the expected duties.

- 3.1.2** All cabling, once installed, must be marked with a stamped stainless steel metal tag for all cabling. The labels are to be securely affixed to the cable at each end and through any deck, deck heads, and/or gland penetrations with the designation for each cable as provided in this specification.
- 3.1.3** The Contractor is responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering with the running of any cables and mounting of any equipment.
- 3.1.4** All cabling must follow existing cable trays throughout the vessel where fitted. Once installed, all cabling must be secured as per TP127.
- 3.1.5** The Contractor must supply and install any transit blocks that are required in any deck penetrations throughout the vessel for any of the new cables.
- 3.1.6** The Contractor must be responsible to ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.1.7** Prior to the commencement of any electrical work, the contractor must ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tag out procedure. Contractor must ensure that Chief Engineer or Electrical Officer is notified of any lockout/tag out completed.
- 3.1.8** Electrical Isolations for AC power are as follows:
 - 3.1.8.1** Panels and breakers TBD.
- 3.1.9** The Contractor must label the electrical breaker feeds for the new LAN/SAT equipment accordingly, as decided by CCG electronics technicians/representative.
- 3.1.10** The Contractor must work in conjunction with Coast Guard electronic technicians to oversee the move of equipment to ensure compliance with applicable Coast Guard standards. Terminations of all equipment will be completed by CCG installation technicians with the exception of those for electrical supply. The contractor will also be responsible for all electrical terminations and grounding requirements.
- 3.1.11** The Contractor will be responsible for all new cable runs as outlined in this specification.

	CCGS Leonard J Cowley	
Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

3.1.12 The Contractor will be responsible to remove the old cabling that is being replaced within this specification.

3.1.13 The Contractor must fabricate and install brackets for all equipment as required.

3.1.14 The Contractor must purchase and install equipment racks as specified by CCG. New racks must be installed in newly renovated Eng. Stores, upper deck.

3.1.15 CCG Technicians will be responsible for removing all equipment and mounting in the newly installed racks in Eng. Stores and Bridge locations.

3.1.16 CCG Technicians will be responsible for terminations/reconnection of all equipment and interconnections between some equipment.

3.1.17 EQUIPMENT RELOCATION LIST (INFORMATION PURPOSES ONLY)

Equipment	Location
LXMP	Bridge
MXP	Bridge
iDirect Modem	Bridge
Sat Multi-switch #2	Bridge
Power Bar (x2)	Bridge
UPS with Transformer	Bridge
Splitters (x2)	Bridge
F/F Connectors (x10)	Bridge
HP-2530-24G-POEP Switch	LAN Room
Fortigate FG-100D	LAN Room
CCTV Equipment	LAN Room
Servers (x2)	LAN Room
NAS	LAN Room
UPS with Transformers (x2)	LAN Room
Workstation	LAN Room
Naval Distribution Box	LAN Room

3.1.18 The Contractor must supply and properly seal all deck penetrations with appropriate marine approved fire stop material. Contractor must use stainless steel hardware for mounting equipment, plates, and panels listed within this specification

3.1.19 The Contractor must supply and install all cables listed in the cable lists below. All cables must be shipboard approved marine grade cable as described.

	CCGS Leonard J Cowley	
Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

3.1.20 For the purpose of adjustment contractor must include a unit cost for the supply and install for one (1) roxtec, or equal class approved transit with glands.

3.1.21 The contractor will be responsible for running the following cables as listed in the tables below:

3.1.22.1 LAN Room – Newly renovated Eng. Stores area, Upper Deck, Aft

3.1.21.2 Bridge Rack – Bridge rack behind chart table, aft Nav. Bridge

3.1.22 Cable List – Bridge Rack

Cable Label	Cable Type	From	To	Length (m)
TVRO1	14/3 SB	Seatel J/B (Main Mast)	Bridge Rack	
TVRO2	Belden 7731 SB	Seatel Antenna (Main Mast)	Bridge Rack	
TVRO5	Belden 9322	NMEA Distribution, Chart Table	Bridge Rack	
TVRO13	Belden 1694SB	LAN Room, Upper Deck, Aft	Bridge Rack	
TVRO13	Belden 1694SB	LAN Room, Upper Deck, Aft	Bridge Rack	
TVRO31	LMR400	Captains Cabin, Bridge Deck	Bridge Rack	
TVRO32	LMR400	Ch Engineers Cabin Bridge Deck	Bridge Rack	
TVRO33	LMR400	Officers Lounge, Main Deck	Bridge Rack	
TVRO34	LMR400	Crews Lounge, Main Deck	Bridge Rack	
TVRO35	LMR400	Ch Officers Cabin, Bridge Deck	Bridge Rack	
TVRO36	LMR400	Sr Eng Cabin, Foc'sle Deck	Bridge Rack	
TVRO37	LMR400	Ch Program Officer, Main Deck	Bridge Rack	

	CCGS Leonard J Cowley	
Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

TVRO38	LMR400	Sr Program Officer, Bridge Deck	Bridge Rack	
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3.1.23 Cable List – LAN Room

Cable Label	Cable Type	From	To	Length (m)
TVRO3	Belden 7731SB	Seatel Antenna, Main Mast	LAN Room	
TVRO4	Belden 7731SB	Seatel Antenna, Main Mast	LAN Room	
W104	TBD	Bridge Rack (iDirect Modem), Nav Bridge	LAN Room (FG)	
W103	TBD	Bridge Rack (iDirect Modem), NAV Bridge	LAN Room (FG)	
CE-16	CAT6	Master Clock – Crews Mess, Main Deck	LAN Room	
CE-17	CAT6	Master Clock – Crews Lounge, Main Deck	LAN Room	
CE-18	CAT6	Master Clock – Main Deck, Aft	LAN Room	
CE-19	CAT6	Master Clock – MCR	LAN Room	
CE-20	CAT6	Master Clock – Galley, Main Deck	LAN Room	
CE-21	CAT6	Master Clock – Rec Room, Main Deck	LAN Room	
CE-22	CAT6	Master Clock – Main Deck Hall	LAN Room	
CE-23	CAT6	Master Clock – Upper Deck Hall	LAN Room	
CCTV-9	CAT6	CCTV – Port Gangway	LAN Room	

	CCGS Leonard J Cowley	
Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

CCTV-10	CAT6	CCTV – Stbd Gangway	LAN Room	
CCTV-11	CAT6	CCTV – Aft Deck	LAN Room	
Backbone 1	Fiber	Ships Office, Foc’sle Deck	LAN Room	
Backbone 2	Fiber	Bridge Rack, Aft, Nav Bridge	LAN Room	
FAP-03	CAT6	Upper Deck Hallway Outside Bosun Cabin	LAN Room	
FAP-04	CAT6	Officers Mess, Upper Deck	LAN Room	
FAP-05	CAT6	Crews Mess, Main Deck	LAN Room	
FAP-06	CAT6	Fwd Lounge, Main Deck	LAN Room	

Part 4 – Proof of Performance

4.1 Inspection

4.1.1 All work must be subject to witness by the Chief Engineer or delegate and the attending surveyor if applicable.

4.2 Testing

4.2.1 All cables must be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable must be replaced at The Contractors expense.

4.2.2 All cable testing must be verified by CG Technician.

4.2.3 New AC/DC circuits must be proven operational.

4.2.4 Electronic equipment which has been removed for the performance of this specification item must be returned to operational condition as it will be used as spares for similar equipment used in CCG Fleet.

4.2.5 All original Class approval certificates for all system components must be submitted to the owner prior to acceptance of this item.

Part 5 - Deliverables

5.1 Drawings/Reports

	CCGS Leonard J Cowley	
Spec Item #: L-20	Specification	F7049-210183
LAN ROOM RACK RELOCATION BRIDGE RACK MODIFICATION		

5.1.1 The Contractor must provide the Chief Engineer a report of The Contractor's work in both electronic and hardcopy formats outlining the details of the inspections and any alterations/repairs prior to the acceptance of this item.

5.2 Spares

5.2.1 All owner supplied cable which has not been used must be returned to the owner prior to the acceptance of the item.

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A