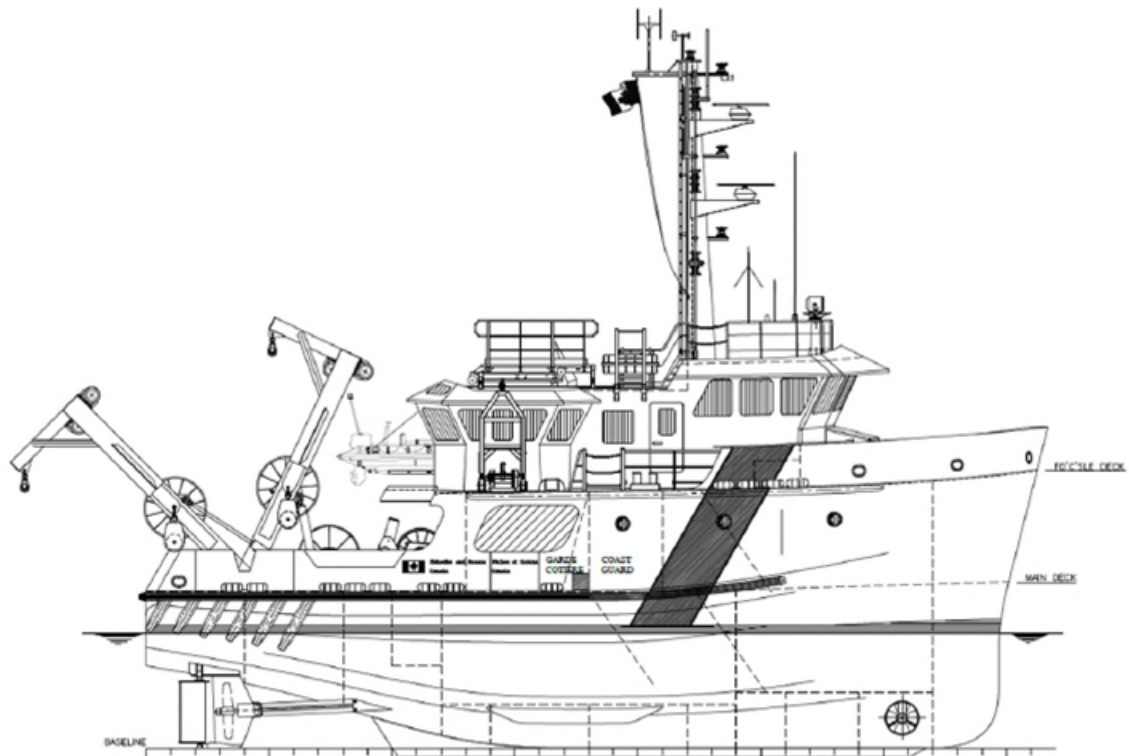


Annex A

CCGS Leim Drydock

F3065-210139



Fall 2021

Planned dates: 10 October to 14 March 2022

Prepared by: Marine engineering
101, Boul. Champlain
Québec (QC)
G1K 7Y7

Contents

G 1.0	GENERAL COMMENTS	5
G 1.1	Information about the vessel.....	5
G 1.2	References.....	6
G 1.3	Conditions and definitions	11
G 1.4	Various provisions.....	12
G 1.5	Documentation	21
G 1.6	Drawings.....	24
G 1.7	Manuals	24
G 1.8	Identification	26
S 1.0	SERVICES.....	28
S 1.1	General information.....	28
S 1.2	Berthing, Mooring, Dry-Docking And Refloating	28
S 1.3	Mooring Lines	30
S 1.4	Gangways	30
S 1.5	Power supply	30
S 1.6	Protection of decks of rooms and engine rooms.....	31
S 1.7	Heating.....	31
S 1.8	Workplace inspections.....	31
S 1.9	Fire protection.....	31
S 1.10	Project facilities	31
S 1.11	Crane Operation.....	32
S 1.12	TELEPHONE,INTERNET.....	32
S 1.13	Oily Water/Black Water	32
S 1.14	Cleanliness.....	33
S 1.15	Parking.....	33
S 1.16	Vessel Responsibility And Security	33
S 2.0	PRODUCTION Schedule	34
S 2.1	Scope	34
S 2.2	Technical description.....	34
S 2.3	Acceptance Work.....	35

S 2.4	Inspection	35
S 2.5	Deliverable Documents	35
10.0	Safety and security	36
10.1	Portable extinguisher inspection.....	36
10.2	Fire detection system	38
10.3	Annual inspection of the fixed fire extinguishing system	40
10.4	Inspection of Global davit, model rhs 13/3.5	43
10.5	Transportation of liferaft and zodiac frc.....	47
11.0	Hull and structure.....	49
11.1	Thickness measurement Hull survey and Steel repair.....	49
11.2	Hull Painting.....	56
11.3	Hull valves.....	74
11.4	Seachests.....	80
11.5	rub strake works.....	83
11.6	additional time for steel and aluminum repair and welding	88
11.7	Sacrificial Anodes.....	90
11.8	wet lab enclosure	95
11.9	Inclining experiment, trim and stability booklet	105
12.0	Propulsion and Manoeuvring systems.....	111
12.1	Inspection of shaft line and rudders.....	111
12.2	Stern tubes replacement (optionnal)	123
12.3	PROPELLER Shaft Grounding System.....	128
12.4	Bow-Thruster Survey	133
13.0	Electrical power generation.....	140
13.1	N/A	140
14.0	Electrical power distribution	140
14.1	Additional time for work on electrical distribution system.....	140
14.2	ELECTRICAL INSULATION TEST AND THERMOGRAPHY	142
15.0	Auxilliary systems.....	145
15.1	Forward and aft ballast tank inspections	145
15.2	Inspection of fuel tanks.....	148
15.3	CLEANING THE HYDRAULIC TANKS AND REMOVING THE ADDITIONAL OIL TANK.....	153

16.0	Domestic systems.....	156
16.1	Cleaning of Central hvac system.....	156
16.2	Potable water tank inspection.....	158
16.3	Inspection of grey and black water tanks	162
16.4	HEATING AIR CONDITIONING REFRIGERATION INSPECTIONInspection	164
17.0	Deck equipment	167
17.1	N/A	167
18.0	Communications and navigation.....	167
18.1	Radio and navigation equipment inspection.....	167
19.0	Control system	168
19.1	N/A	168
20.0	Scientific Equipment.....	169
20.1	Benthos Trackit Ultra Short Baseline (USBL) System installation	169

G 1.0 GENERAL COMMENTS

G 1.1 Information about the vessel

G 1.1.1 Details

Name:	CCGS Leim
Type:	Near-Shore Fisheries Research Vessel
Official Number:	836308
Year built:	2012
Main dimensions:	22 m
Length:	
Beam (moulded):	9.2 m
Draft at full load:	3.5 m
Tonnage (displacement):	153.3
Propulsion	Diesel reduction

G 1.1.2 Equipment

Equipment	Brand	Device model	Serial no.
2.0 T Crane	AMCO VEBA	V823M 4S	29005
A 5 T support	N/A	N/A	N/A
Davit	Global Davit	RHS 13/3.5	0851A03

G 1.2 References

G 1.2.1 Regulations

G 1.2.1.1 The latest version, in force at the time of signing the contract, of the laws, regulations, standards, publications and procedures mentioned below, must be used for reference. The Contractor shall ensure that all work performed in the specifications is performed in accordance with all federal and territorial standards and regulations. CCG procedures must be used as a guide if no other regulations take precedence.

Fleet Safety and Security Manual (FSSM) procedures	Title	Included Yes/No –
FSSM	Fleet Safety and Security Manual (latest edition)	yes
Specific to the vessel	Specific to the vessel: Asbestos risk appraisal report and management plan	no
Specific to the vessel	Specific to the vessel: Lead paint test report	no
Publications		
TP 127	Ships Electrical Standards	no
NFPA 306 2014	Standard for the Control of Gas Hazards in Vessels	no
TP 3669	Standards for Navigating Appliances and Equipment	no
TP 11469	Guide to Structural Fire Protection	no
TP 14231	Marine Occupational Safety and Health Program (Ships)	no
TP 14612	Procedures for Approval of Life-Saving Appliances and Fire Safety Systems, Equipment and Products	no
TP 4414 E	Guidelines Respecting Helicopter Facilities on Ships	no
IEEE 45	Institute of Electrical and Electronic Engineers, Recommended Practice for Electrical Installations on Shipboard	no
70-000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment	no
IEC 60533	Electrical and electronic installations in ships – Electromagnetic compatibility	no
IEC 60945	Maritime navigation and radio communication equipment and systems – Methods of testing and required test results	no
Publication – continued	Title	Included Yes/No –
EPS Report 1/RA/2	Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems (Environment Canada)	no

NFPA 10	Standard for Portable Fire Extinguishers	no
18-080-000-SG-003 (formerly DFO/5884 – TP 12445E)	PAINT AND COATINGS STANDARD	no
Standards	Title	Included – Yes/No
CCG	CCG CAD Using AutoCAD http://intra.coast-guard.ca/folios/00922/docs/ccgststden.zip	no
CCG	CCG Electronic Data Management Standard	no
CCG	Production of CCG trim and stability booklet MECTS No. 3350860	no
CCG	Colour Coding Standard for Piping Systems 30-000-000-ES-TE-001	no
CSA W47.1	Fusion Welding of Steel Company Certification, Section 2 (Certification)	no
CSA W47.2	Fusion Welding of Aluminum Company Certification	no
CSA W59	Welded Steel Construction (Metal Arc Welding)	no
CSA W59.2	Welded Aluminum Construction	no
ISO 9712:2005	International Standards on Non-destructive Testing	no
CT-043-EQ-EG-001-E	Welding Specification http://intra.coast-guard.ca/folios/00922/docs/WeldingSpecification-eng.pdf	yes
SSPC	The Society for Protective Coatings	no
ISO 8501-1:2007	Preparation of steel substrates before application of paints and related products	no
ISO 10816-1:1995	Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts – Part 1: General guidelines	no
ASME Y14.100	<i>American Society of Mechanical Engineers Y14.100 – 2017 Engineering Drawing Practices – Nov. 14 2017</i>	no
Regulations	Title	Included – Yes/No
MOHSR	<i>Maritime Occupational Health and Safety Regulations</i>	no
CSA	<i>Canada Shipping Act</i>	no
Fire safety regulations	Marine Machinery Regulations (SOR/90-264)	no
Fire safety regulations	Vessel Fire Safety Regulations (SOR/2017-14)	no
Hull regulations	Hull Inspection Regulations (C.R.C., c. 1432)	no
Regulations – continued	Title	Included – Yes/No
<i>Canada Labour Code</i>	Canada Labour Code (R.S.C. (1985), c. L-2)	no
Workplace Safety and Workers' Compensation Commission – Workplace safety regulations for the province or territory in	https://www.ccohs.ca/oshanswers/information/wcb_canada.html	no

which the work is performed		
-----------------------------	--	--

G 1.2.2 Reference Drawings

G 1.2.2.1 The following drawing list must be considered as reference drawings according to the definition provided in the drawing section of General Remarks.

Drawing number	Title	Type
ISV22-30009RMM13	General arrangement	PDF
ISV22-30400RMM7	Fire safety plan	
ISV22-61850RMM2	120 VAC & 24 VDC distribution plan	
ISV22-80500RMM1	Heating distribution plan	
ISV22-81100RMM6	Machinery space ventilation arrangement	
N/A	CCGS Leim Portable extinguishers	
728	FIRE EXTINGUISHING SYSTEMS, FIXED – SPECIFICATIONS	
N/A	Leim Electric circuits list	
N/A	Online electrical distribution	
LEIM-81500RMM16	HVAC System Diagram	
LEIM-81510RMM7	HVAC Ducting Diagram	
2015-03-06	Halocarbons inventory	
ISV22-90520RMM4	Steering Gear Arrangement	
ISV22-83200RMM4	Scupper and Drains	
ISV22- 83000RMM15	Black and Gray Water System	
ISV22-82000RMM5	Chiller Water System	
ISV22-71500RMM4	Bilge Ballast and Fire System Diagram	
ISV22-73500RMM11	Cooling Water System Diagram	
ISV22-73510RMM4	Sea Water Service Cross Connection Arrangement	
ISV22-71000RMM9	Fuel Oil System Diagram	
ISV22-58000RMM3	Bow Thruster Arrangement	
N/A	GLOBAL DAVIT instructions	
N/A	Datasheet-GD RHS13-3.5 Rescue Boat Davit	
ISV22-52600RMM6	Stern Tube & Shaft Bracket Arrangement	
905.4	STEERING GEAR – Installation and operation manual	
ISV22-52500RMM9	Shafting Arrangement	
ISV22-38541RMM4	Draft Marks	

ISV22-38400RMM3	Cathodic Protection Plan	
ISV22-21260RMM6	Transducer Housing	
ISV22-21210RMM6	Skeg Structure	
ISV22-21050RMM9	Structural Sections	
ISV22-21030RMM5	Shell Expansion	
ISV22-21010RMM10	Structural Arrangement	
ISV22-21000RMM10	Midship Section	
ISV22-14110RMM3	Docking Plan	
ISV22-10130RMM12	Tank Plan	
CT-043-EQ_EG-001-E	Welding Spec	
N/A	Craft Bearing VforWeb	
N/A	Bearing Clearance dimensions REFERENCE nstm	
710.3	FUEL OIL TRANSFER PUMPS-SPECIFICATIONS	
710.1	TANKS-FLOW ALARM-SPECIFICATIONS	
530.7	CATHODIC PROTECTION PROPULSION NOZZLES	
530.2	RUDDERS,NOZZLESAND RUDDER STOCK-BV approved DWG	
535.3	SHAFT BEARING-CRAFTBEARING PILLOW BLOCK S2 BCH 100MM	
523.3	SHAFT BEARING-JOHNSON CUTLESS SLEEVE & FLANGE-DIMENSIONNAL	
	3000SF	.DWG

G 1.2.3 Tanks

G 1.2.3.1 The following table give a list of all the tanks on board with a location indication with regards to frames and the capacity of each. For information purposes only.

Tank ID	Frame	Capacity
Ballast fore peak 1	32-35	6.6 m ³
Ballast Port Aft 12P	0-4	5.7 m ³
Ballast Starboard Aft 12S	0-4	5.7 m ³
Fuel Double bottom 3	13.5-24	12.52 m ³
Fuel side 9P	8-12	5.87 m ³
Fuel side 9S	8-12	3.09 m ³
Fuel day tank 10P	10-12	2.56 m ³
Fuel day tank 10	8-10	2.60 m ³
Fuel Overflow	10-12	2.1 m ³

Black Water 2P	24-26	0.51 m ³
Black Water 2S	24-26	0.51 m ³
Oily water double bottom	12-13.5	1.56 m ³
Sluge 4	12-14.5	0.45 m ³
Grey water 6P	26-29	2.3 m ³
Grey water 6S	26-29	2.3 m ³
Auxiliary grey water 18	26-28	0.038 m ³
Fresh Water 11P	4-8	3.08 m ³
Fresh Water 11S	4-8	3.08 m ³
Hydraulic oil Réservoir deck equip. 16	10-12	0.37 m ³
Hydraulic oil Réservoir fishing equip. 17	10-12	1.42 m ³

G 1.2.3.2 Abbreviations.

ACM : Asbestos Containing Material	MCA : Matériaux contenant de l'amiante
CFM : Contractor Furnished Material and/or Equipment	MFE : Matériel fourni par l'entrepreneur
CLC : Canada Labour Code	CCT : <i>Code canadien du travail</i>
CSA – Association canadienne de normalisation	CSA : Association canadienne de normalisation (ACNOR)
CWB : Canadian Welding Bureau	BCS : Bureau canadien du soudage
DFO/CCG : Department of Fisheries and Oceans, Canadian Coast Guard	MPO/GCC : Pêches et Océans Canada, Garde côtière canadienne
FSR : Manufacturer's Field Service Representative	RD : Représentant détaché (du fabricant)
FSSM : Fleet Safety and Security Manual	MSSF : Manuel de sécurité et de sûreté de la flotte
GSM : Government Supplied Material and/or Equipment	MFG : Matériel fourni par le gouvernement
HC : Health Canada	SC : Santé Canada
IEEE : The Institute of Electrical & Electronic Engineers Inc.	IEEE : Institut des ingénieurs électriciens et électroniciens
MSDS : Material Safety Data Sheet	FS : Fiche signalétique
NDT : Non Destructive Testing	END : Essais non destructifs
OEM : Original Equipment Manufacturer	FEO : Fabricant d'équipement d'origine
OHS : Occupational Health and Safety	SST : Santé et sécurité au travail
PWGSC : Public Works and Government Services Canada	TPSGC : Travaux publics et Services gouvernementaux Canada

RO : Recognized Organization as defined by Canada Shipping Act.	OR : Organisme reconnu au sens de la <i>Loi sur la marine marchande du Canada</i>
SSMS : Safety and Security Management System	SGSS : Système de gestion de la sécurité et de la sûreté
TBS : Treasury Board of Canada Secretariat	SCT : Secrétariat du Conseil du Trésor du Canada
TA : Technical Authority -CCG Superintendent, Marine Engineering Western Region, or her delegated Representative	AT : Autorité technique – Surintendant de la GCC, Ingénierie navale, région de l'Ouest, ou son représentant délégué
TCMS : Transport Canada Marine Safety	SMTC : Sécurité maritime de Transports Canada
TI : Technical Inspector – CCG delegated	IT : Inspecteur technique – Délégué de la GCC
VCS : Vessel Condition Survey	EEN : Examen de l'état d'un navire
VLE : Vessel Life Extension	PVN : Prolongement de vie d'un navire
WCB : Workers' Compensation Board	CNESST : Commission des normes, de l'équité, de la santé et de la sécurité du travail
WHMIS : Workplace Hazardous Materials Information System	SIMDUT : Système d'information sur les matières dangereuses utilisées au travail

G 1.3 **Conditions and definitions**

G 1.3.1 This present specification has two objectives; the five year regulatory certification of the vessel according to TCMS and ABS standards, and major structural work required to modify the wet laboratory to improve the floatability of the vessel, according to ABS approved plans.

G 1.3.1.1 **Work deadlines:** As a first step, the contractor must prioritize hull work requiring dry docking, such as shaft line and hull painting and hull valve inspection, this work must be completed before mid-December 2021. If the yard keeps the ship out of the water for the wintering period, this deadline will not change.

G 1.3.1.2 **Wintering:** The yard shall prove that the vessel once afloat will be protected from moving ice, aerators may be provided to keep the hull free of ice during the wintering afloat.

It is the Contractor's responsibility to ensure that :

- a) that the work indicated herein is performed in accordance with the mentioned requirements and those of the regulatory authorities;

- b) that all components and equipment supplied are deemed necessary to ensure the safe seaworthiness and operation of the vessel in accordance with the requirements for a vessel of this class;

G 1.4 Various provisions

G 1.4.A COVID-19

Reference documents:

5323-2020-13	COVID-19 - Health Screening Questionnaire for Canadian Coast Guard Personnel and Visitors Accessing Canadian Coast Guard Facilities and Vessels
5404-2020-08	COVID-19 - Information Concerning the Use of Non-medical Masks at Work
6102-515	Issuance of Contractor Designation Letters during the COVID-19 pandemic

G 1.4.1 Due to the Covid-19 pandemic, the Contractor must comply with CCC 12-2020 "COVID-19 - Health Screening Questionnaire for Canadian Coast Guard Personnel and Visitors Accessing Canadian Coast Guard Facilities and Vessels" during an outbreak of an infectious disease such as Covid-19.

G 1.4.2 The Contractor must ensure that all its employees and subcontractors wear nonmedical masks while on board the vessel. The Contractor must provide these masks to its employees and subcontractors. The Contractor must also provide hand sanitizer for use by employees and subcontractors.

G 1.4.3 Contractor Essential Service Letters will be issued in accordance with Procedure 515 if required for the prime contractor and any named subcontractors to facilitate travel and work.

G 1.4.1 Occupational health and safety

- G 1.4.1.1 The Contractor and all subcontractors shall comply with occupational health and safety (OHS) measures in accordance with relevant federal and provincial regulations so that the Contractor's activities are conducted safely and without compromising the safety of any staff member.
- G 1.4.1.2 When this document refers to the "Safety Management System," this means the Contractor's safety management system, which must be in effect for the entire time that the Contractor has material under its care and custody and must comply with the applicable OHS regulations and procedures.
- a) For all work on the Canadian Coast Guard vessel, the Contractor shall meet or exceed the Safety Management System defined in the FSSM, unless the Contractor has proposed a comprehensive safety management system that has been reviewed and accepted by the Technical Authority.
- G 1.4.1.3 The Contractor, while working on the vessel while it is under the care and custody of the Canadian Coast Guard, shall follow the CCG Safety Management System:
- a) The Contractor and all of its representatives shall attend a vessel safety orientation session prior to the commencement of any work to familiarize the Contractor's employees with the vessel's hazards and its work protocol permit systems, as well as with the procedures for safety, risk prevention, hazard response and the safety assessments prior to the work. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.
 - b) The Contractor shall comply with the Fleet Safety and Security Manual (DFO/5737), the instructions for working aboard the vessel, and the relevant requirements of the Canada Labour Code during performance of the following types of work:
 - i. Work at heights;
 - ii. Entry into confined spaces;
 - iii. Gas-freeing before entering confined spaces and for hot work;
 - iv. Lockout/tagout;
 - v. Safety assessments before the work.

- c) The Contractor and its representatives shall attend a vessel safety orientation session before beginning any work to familiarize the Contractor's employees with the vessel's hazards and its work protocol permit systems. During this session, CCG will review the procedures for safety, risk prevention, hazard response and safety assessment prior to the work. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.
- d) For lockout/tagout procedures, in addition to the devices provided to the vessel's crew by the Chief Engineer, the Contractor shall provide locks and locking devices to its employees.
- e) The Contractor shall comply with the land-based safety procedures and instructions for local facilities.

G 1.4.1.4 The Contractor shall designate a specific person who is responsible for the management of workplace safety. The Security Manager must ensure that daily safety rounds are conducted, safety issues are identified, and safety precautions are maintained.

G 1.4.1.5 Places that present a risk due to work included in the specifications must be secured by the Contractor. The Contractor shall clearly indicate these places by putting up posters to inform and protect all staff, in accordance with the applicable regulations.

G 1.4.2 Lead paints and coatings

G 1.4.2.1 The Contractor shall not use lead paint.

G 1.4.2.2 In the past, lead paint was used to paint CCG vessels. Consequently, some of the Contractor's processes, such as grinding, welding and burning, could release the lead contained in the coatings. The Canadian Coast Guard will provide copies of all available lead analysis results.

G 1.4.3 Damaged paint and retouching

G 1.4.3.1 The Contractor shall, at a minimum, repair paint systems that have been altered by the indicated work. Paint systems must match those of the vessel and be applied in accordance with procedures recommended by the paint manufacturer.

G 1.4.4 Asbestos-containing materials (ACM)

- G 1.4.4.1 The Contractor shall use insulation that contains 0% ACM.
- G 1.4.4.2 The Contractor will receive, upon request, the most recent asbestos risk assessment report and the CCG Asbestos Management Plan.
- G 1.4.4.3 Handling of asbestos-containing materials must be performed by trained personnel or a company certified in asbestos removal, in accordance with federal, provincial/territorial and municipal regulations.
- G 1.4.4.4 The Contractor shall provide the TA with certificates of disposal for all asbestos-containing materials removed from the vessel to demonstrate that the disposal has been performed in accordance with the federal, provincial and municipal regulations in force.
- G 1.4.4.5 The Contractor shall provide an "Observation Report" containing concerns or intentions related to asbestos-containing materials that have not previously been specified. Before performing the work, the Contractor shall determine all materials that may contain asbestos. Approved work resulting from the Observation Report must follow the procedures for additional work.

G 1.4.5 Confined spaces

- G 1.4.5.1 Access to confined spaces aboard the vessel during the contract period must comply with the Safety Management System determined at the meeting prior to the work. In addition to these requirements, the Contractor shall also perform the following tasks:
 - a) Ensure that a qualified person issues a gas-freeing certificate for the spaces to be visited and display the certificate near the entrance to these spaces. Ensure that certificates specify "No danger for persons" or "No danger for hot work," as applicable.
 - b) Provide the TA with a copy of all certificates produced, in accordance with the Documentation section of the General Remarks.

G 1.4.6 Hot work

- G 1.4.6.1 All hot work performed under the contract must comply with the Safety Management System. In addition to complying with the requirements of the Safety Management System, the Contractor shall also, at a minimum:
 - a) Certify that the confined spaces are "safe for hot work" in accordance with the Confined Spaces section of the General Remarks;

- b) Keep all portable combustible materials at a safe distance of at least two metres;
- c) Provide and install protective materials to prevent the spread of sparks and to protect electrical cables and other services;
- d) Provide and post fire watches in each space where welding, grinding or burning is performed on partitions, ceilings or decks, as well as in the space adjacent to this work;
- e) Provide appropriate fire extinguishers for fire watch members and ensure each member has been trained in the use of fire extinguishers. The fire watch shall monitor the designated location for a minimum of thirty (30) minutes after completion of the hot work. The Contractor shall record the fire watch monitoring time on all hot work permits, indicating the end time of the hot work and the time the fire watch left its post;
- f) Provide the TA with a copy of the hot work permits issued on site in accordance with the Documentation section of the General Remarks and named according to the task of the specifications generating the required work.

G 1.4.7 Working aloft

- G 1.4.7.1 All work done aloft in the masting of the vessel during the maintenance or refit period must comply with the Safety Management System. Notices must be posted to prevent operation of the radar while staff are working at heights on the mast or roof of the bridge.

G 1.4.8 Electrical equipment

- G 1.4.8.1 When work is performed on electrical equipment, the Contractor shall lock the equipment in accordance with the Safety Management System and, at minimum, perform the following:
 - a) Isolate the main power source and any other source of power to the equipment;
 - b) Install locks and warning labels on the main power source and any other power source for switches/disconnectors attached to the equipment being serviced;
 - c) Make sure there is no supply voltage to the terminals;

- d) Ensure padlocks and warning labels remain in place until all work is completed.

G 1.4.8.2 The TA must be notified of all work in progress.

G 1.4.8.3 All electrical installations and repairs must be performed in accordance with the latest versions of Transport Canada standard TP127E (Ships Electrical Standards) and IEEE 45 (Recommended Practice for Electric Installations on Shipboard). TP127 takes precedence over the IEEE standard.

G 1.4.9 Workplace Hazardous Materials Information System (WHMIS)

G 1.4.9.1 The Contractor shall provide the Technical Authority with Material Safety Data Sheets (MSDS) for all products that it and its sub-contractors provide and that are controlled in accordance with WHMIS. The MSDS must be presented in the formats requested in the Documentation section of the General Remarks.

G 1.4.9.2 All MSDS must be kept up to date in accordance with OHS procedures.

G 1.4.9.3 The TA must allow the Contractor to access the MSDS of all controlled products on board the vessel for all work items specified on the request.

G 1.4.10 Smoking in the workplace

G 1.4.10.1 The Contractor shall ensure compliance with the *Non-smokers' Health Act*. The Contractor shall ensure that no one smokes aboard the vessel, including its employees or subcontractors and the employees of any subcontractor.

G 1.4.11 Material and tools provided by the Contractor

G 1.4.11.1 The Contractor shall ensure that all replacement products, such as seals, gaskets, insulation, small hardware items, oils, lubricants, cleaning solvents, preservatives, paints, liners, coatings, etc., are compliant with the drawings, manuals and instructions of the equipment manufacturer.

G 1.4.11.2 Where no particular item is specified or where a replacement must be made, the Contractor shall provide the TA with an Observation Report indicating the replacement or unspecified items. The Contractor shall give the TA details on

the materials used and the grade and quality certificate of various materials before using them.

- G 1.4.11.3 The Contractor shall provide all equipment, devices, tools and machinery, such as cranes, scaffolding, trellising and couplings, required to perform the work under these specifications.
- G 1.4.11.4 The Contractor shall deliver all new equipment that it must provide to its facilities and store it there. Equipment supplied by the Contractor must be stored in a secure, environmentally-controlled space in accordance with the Equipment Storage section of these specifications.
- G 1.4.11.5 All tools must be provided by the Contractor unless otherwise specified in the technical specifications.

G 1.4.12 Material and tools provided by the government

- G 1.4.12.1 If the TA provides tools, the Contractor shall return them to the TA in the condition in which they were borrowed. Borrowed tools must be inventoried. The Contractor shall sign the inventory statement upon receipt of the tools and when they are returned to the TA.
- G 1.4.12.2 Government furnished equipment that is not specifically mentioned in the technical specifications must be sent to the Contractor and stored in accordance with the Equipment Storage section of these specifications. These activities must be described in the engineering change or additional work procedures. (PWGSC Form 1379).

G 1.4.13 Storage

- G 1.4.13.1 Equipment (i.e., covers, hoods and other elements that may need to be removed and stored) must be stored in accordance with the storage instructions of the equipment manufacturer or supplier. The Contractor shall make these instructions available to the Technical Authority.
- G 1.4.13.2 All equipment and items shall be stored so that they are easily accessible for inspection. No item shall be stored directly on the ground.

G 1.4.14 Regulatory verifications and classification surveys

- G 1.4.14.1 All modifications and work performed shall be performed in compliance with the regulations of the classification society ABS.

G 1.4.15 Contractor inspections

- G 1.4.15.1 In collaboration with the TA, the Contractor shall coordinate an inspection of the condition and location of items to be removed before performing the indicated work or accessing an area to perform work.
- G 1.4.15.2 The Contractor shall take a photo showing the condition of the item before removing it. Each photo must comply with the Documentation section of the General Remarks and be named in accordance with the section of the specifications that resulted in the removal of these items.
- G 1.4.15.3 Prior to completing a task under these specifications, the Contractor shall allow the TA to verify that the work has been completed in accordance with the specifications. The Contractor shall therefore have all the photos, documents, reports and test plans that relate to the task that is deemed complete.

G 1.4.16 Records of work in progress

- G 1.4.3.2 The TA may record work in progress in various ways, including using photos, videos, digital media and film.

G 1.4.17 Access for maintenance, installation and removal

- G 1.4.17.1 [N/A]

G 1.4.18 Assembly of components

- G 1.4.18.1 The Contractor shall ensure that during the installation of the specified equipment, the parts and equipment assembled are cleaned to remove stains, weld spatter or excess solder, filler metal, metal flakes or other foreign material that could interfere with the normal operation, function or appearance of the equipment. This includes any particles that could dislodge or move during the expected normal service life of the equipment. All corrosive materials must be eliminated. This cleaning must take place before assembly of the equipment parts.
- G 1.4.18.2 The Contractor shall replace damaged covers, hoods and components with new covers, hoods or components.

- G 1.4.18.3 If the manufacturer does not provide the necessary information, the bolt and nut tightening torques specified in the SAE, ANSI or BS 1083 standards must be used.

G 1.4.19 Equipment protection

- G 1.4.19.1 The Contractor shall take measures to ensure that the surfaces and components of equipment installed aboard the vessel are protected from damage, soiling and contaminants produced by the work.
- G 1.4.19.2 Throughout the work under the contract, all electrical and electronic equipment and components must be protected against physical and internal damage and the effects of temperature or other adverse environmental conditions.
- G 1.4.19.3 The Contractor shall protect equipment that may be damaged due to the movement of materials and equipment in the vicinity. The Contractor shall also protect the equipment from nearby sources of contamination including, but not limited to, burning, welding, spraying abrasives (sandblasting), grinding and painting.
- G 1.4.19.4 All surfaces and all equipment, furniture or decorations damaged before acceptance must be returned to the condition they were in before the Contractor's work.
- G 1.4.19.5 All openings of machines or systems must be equipped with full, well-fitting, solidly attached covers or plugs at all times while awaiting connections.
- G 1.4.19.6 The Contractor shall obtain and follow the instructions of its sub-contractors regarding the special protective measures required for the equipment they provide during the work. These instructions shall be transmitted to the TA.
- G 1.4.19.7 Protective devices including, but not limited to, plastic sheeting, flame retardant covers, heavy-duty cloths, wood stoppers, wooden enclosures and heating devices shall be used as needed.
- G 1.4.19.8 The Contractor shall protect the vessel against the risk of infestation by vermin (insects, mammals and birds). If an infestation occurs during the contract period, the Contractor shall bear the costs for extermination of the vermin prior to the vessel's departure and the end of the contract.

G 1.4.20 Systems containing halocarbons

- G 1.4.20.1 All work on systems containing halocarbons must comply with the Federal Halocarbon Regulations (2003)(SOR/2003-289). These regulations can be consulted at the following Internet address: <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-289/page-1.html>

G 1.4.21 Welding

- G 1.4.21.1 In addition to section 7.29 Certification for Welding Standards – Contract, all welding and weld inspection work must be conducted in accordance with CCG's CT-043-eq-eg-001 Welding Specification. This document will be delivered to the Contractor within 48 hours of a written request to the TA.
- G 1.4.21.2 The standards governing welding of material less than 3 mm thick must meet the requirements of CCG's CT-043-eq-eg-001 Welding Specification. For materials over 3 mm thick, the Contractor shall comply with the following requirements:
- a) For structural steel over 3 mm thick, welding must meet the requirements of CSA W47.1 and W59, except for the modifications specified in CCG's CT-043-eq-eg-001.
 - b) For structural aluminum over 3 mm thick, welding must meet the requirements of CSA W47.2 and W59.2, except for the modifications specified in CCG's CT-043-eq-eg-001.
 - c) For structural stainless steel over 3 mm thick, welding must meet the requirements of CSA W47.1 and AWS D1.6 and the requirements in CCG's CT-043-eq-eg-001.

G 1.5 Documentation

G 1.5.1 Text documents

- G 1.5.1.1 All text deliverables must be accompanied by a PDF file containing the complete document. The Contractor shall perform quality control to verify that the content exactly reproduces the content and formatting of the master document file. In case of amendments, a second PDF file containing only the amended pages must be provided.
- G 1.5.1.2 Further guidance is provided in Canadian Coast Guard specification CA-0140-00-NU-TD-002, Electronic Technical Data Deliverables.

G 1.5.2 Data collection

- G 1.5.2.1 The Contractor shall provide all documentation resulting from specified deliverables in electronic and printed versions. According to the contractors' quality assurance program, two hard copies of each document are required in two separate books. An electronic copy of all documentation must also be provided to the TA in accordance with the formats described in this section of the specifications.
- G 1.5.2.2 All copies of documents resulting from specified deliverables will be referred to as "Data Collection."
- G 1.5.2.3 The Contractor shall provide the TA with all files created as part of the Data Collection before the contract is deemed to have been executed. The files must be in physical format (CD-ROM, DVD-ROM and USB key). Each task in the specifications must have its own folder, named according to the specification task. For example, "G1.0 General Remarks."
- G 1.5.2.4 All documents, information materials and reports resulting from additional work must also be included in the data collection.

G 1.5.3 File identification

- G 1.5.3.1 [N/A]

G 1.5.4 Emails

- G 1.5.4.1 CCG Project Lead: to be determined at contract award
PSPC Procurement Officer: Refer to Contract

G 1.5.5 File formatting

- G 1.5.5.1 All documents, reports, test results, certificates or information obtained by the Contractor in paper format must be scanned into unprotected Adobe PDF formatted files that are searchable and named according to the File Identification section of these specifications.
- G 1.5.5.2 All reports, test results, certificates or raw data obtained by the Contractor in electronic format must be converted into unprotected Adobe PDF formatted files named according to the File Identification section of these specifications. The original copy and the converted copy must be included in the data collection.

G 1.5.6 Photographs

- G 1.5.6.1 All photographs obtained by the Contractor according to the requirements of the specifications must be provided in JPG format with a resolution of at least 640 x 480 and be named according to the File Identification section of these specifications.

G 1.5.7 Measurements, calibrations and readings

- G 1.5.7.1 Recorded measurements, calibrations and readings must all be accompanied by the signature of the person who made them and must be dated and digitized in electronic format for inclusion in the data collection.
- G 1.5.7.2 Unless otherwise indicated, the Contractor shall record dimensions in Imperial units with three significant digits and the equivalent in metric units.
- G 1.5.7.3 The Contractor shall provide the TA with valid and current control values and calibration certificates for all instruments used for the testing and trial plan to prove that the instruments were calibrated in accordance with the manufacturer's instructions. These documents must be included in the data collection for all tasks requiring measurements.

G 1.5.8 Inspection and test records and certificates

- G 1.5.8.1 Inspection or test records and certificates are referred to as deliverables in the tasks of the specification that requires them.
- G 1.5.8.2 Inspection or test records and certificates must be included in a separate section of the data collection and filed or organized by specification number.
- G 1.5.8.3 The Contractor shall maintain a complete and accurate record of all tests and trials performed on the vessel or on each piece of equipment. Before starting a test, all relevant test sheets and documents, including workshop test data, must be completed and attached to the test program.
- G 1.5.8.4 All test and trial data in paper and electronic format must be legible. If necessary, handwritten documents may need to be reproduced in an electronic medium to be acceptable. The original copy must be signed by the regulatory agency, the TA, the Contractor and, if applicable, the sub-contractors or FSRs who attended the tests. All data must be submitted to the TA in accordance with the Documentation section of the General Remarks.

- G 1.5.8.5 The Contractor shall also provide the TA with the original copies of each certification document in an envelope bearing the name of the vessel and the words "Original Certificates."

G 1.6 Drawings

- G 1.6.1 The Drawings section of the General Remarks is intended to be used as a reference for minimum standards where specified deliverables must be drawings.

G 1.6.2 Reference drawings - 3 copies

- G 1.6.2.1 [N/A]

G 1.7 Manuals

- G 1.7.1 Each instruction manual and register shall be bound in a hard cover book with 3 "D" rings with snap lock mechanisms that can accommodate 8 1/2" x 11" sheets. Larger drawings and documents shall be folded in an accordion style. The following information should be printed on the cover:

- i) NGCC Leim
- ii) Quotation identification number and contract number
- iii) Identification of equipment or systems
- iv) Equipment manufacturer
- v) Revision number and date

- G 1.7.2 All sections of the manuals should have laminated tabs. Major equipment components should be subdivided into separate sections in the manuals.

- G 1.7.3 All sections of manuals shall have laminated tabs. Major equipment components should be subdivided into separate sections in the manuals.

- G 1.7.4 A master index shall be located at the beginning of each binder and shall indicate all items included in each section.

- G 1.7.5 A list of the names, addresses and telephone numbers of contact persons associated with the equipment manufacturers should accompany the document for reference after project completion for maintenance and information management purposes.
- G 1.7.6 A copy of the final, approved version of the "conforming" drawings shall be included in the maintenance manual.
- G 1.7.7 The Contractor shall provide the Technical Authority with two hard copies of all manuals and data sheets in English and French (one copy of each) of the equipment items supplied by the Contractor prior to the end of the Contract.
- G 1.7.8 The Contractor must provide the Technical Authority with two copies of all manuals and data sheets on individual USB memory sticks, in PDF compatible format, prior to the end of the Work term.

G 1.7.9 Operating manuals

- G 1.7.9.1 Operating manuals shall include the following items :
 - a) a general description of the sequence of operation of the equipment in English and French;
 - b) a detailed procedure to be followed for the commissioning of the equipment in English and French;
 - c) a wiring diagram of the installed equipment;
 - d) all relevant operating criteria for the equipment.
- G 1.7.9.2 When systems are accompanied by software or hardware, an operator's manual shall include the following elements :
 - a) the complete software documentation manual specific to the system, and in digital format, so that Canada can review the programs without the need for the Contractor.
- G 1.7.9.3 The minimum software documentation shall include :
 - a) system level diagrams describing the overall software or hardware layout;

- b) functional specifications which must describe in detail the functional capabilities of the system and each software component;
- c) a list of project-specific programs, including any comments describing the specifics of the code functions;
- d) all lists, files, manuals and related documents shall be delivered and become the property of Canada.

G 1.7.9.4 The Contractor shall provide the number of copies, in hard copy and electronic format, of the operating manuals listed in section G.8.1.

G 1.7.10 Maintenance manuals

G 1.7.10.1 These manuals shall include the following :

- a) the manufacturer's maintenance instructions for each item of equipment to be maintained;
- b) the instructions shall include installation instructions, part numbers, parts lists, master drawings and exploded views with identification of all mechanical, electrical and electronic parts and the names of suppliers;
- c) a summary list of each item of equipment that requires lubrication, including the name of each item, the location of all lubrication points, the type of lubricant recommended and the frequency of lubrication;
- d) troubleshooting sections must be included for all equipment in the maintenance manual under a separate heading.

G 1.7.10.2 The Contractor shall provide, in hard copy and electronic format, the number of copies of the maintenance manuals specified in section G.8.1.

G 1.8 Identification

G 1.8.1 Identification plates

G 1.8.1.1 All mechanical and electrical equipment must have nameplates. Each nameplate shall identify the equipment and shall show the manufacturer's name, type, serial number, model number, power rating and date of manufacture of the equipment.

G 1.8.1.2 Any special precautions and instructions for maintenance or operation shall be recorded on the nameplate or on a separate plate attached to the equipment.

- G 1.8.1.3 All electrical equipment that operates on hazardous voltages and the compartments in which it is located must display a warning that a hazard exists and must specify the maximum system voltage.
- G 1.8.1.4 Switchboards shall have nameplates indicating the following :
- i) The name of the switchboard;
 - ii) The manufacturer;
 - iii) Serial number (if applicable);
 - iv) Date of manufacture.
- G 1.8.1.5 Each circuit breaker shall have a nameplate indicating the name and function of the circuit and the circuit breaker configuration. The contractor shall correctly identify the functions and name of each instrument, switch, etc. on the switchboard and mark with a red line the value of full load or normal operation.
- G 1.8.1.6 Distribution panels shall have nameplates indicating :
- i) The space, service, apparatus or circuits controlled and the designation of the supply conductor.
- G 1.8.1.7 Indoors, switchboards and motor control panels shall have nameplates to identify the bus bars and terminals. The phases of the bus bars shall be colour-coded.
- G 1.8.1.8 Electrical enclosures where more than one electrical or electronic appliance or device is housed shall have a unique identification code for each appliance, and each appliance shall be labelled accordingly. Mounting drawings of the enclosures shall clearly show the mounting and identification codes of the appliances in the enclosure.

G 1.8.2 Labelling of cables

- G 1.8.2.1 Terminal strips and terminal wiring must be marked with circuit designations and must be treated as devices within the enclosures. The terminal strips must be labelled consecutively and in ascending order from left to right and top to bottom.

S 1.0 SERVICES

S 1.1 GENERAL INFORMATION

S 1.1.1 The purpose of this specification is to provide the required services to the vessel as of the start of the refit and to remove them at the end of said refit. These services will be supervised by the Chief Engineer and will remain throughout the refit. The Contractor shall provide all the material and tools up to the connection points.

S 1.2 Berthing, Mooring, Dry-Docking And Refloating

S 1.2.1 BERTHING - Berthing and mooring facilities are appropriate for a vessel of this size and must satisfy the Commanding Officer. Throughout the contract, if the vessel is not in dry dock, it may be moored at the contractor's dock at a safe berth where the water level is sufficient even at low tides so that the vessel does not touch the bottom. The contractor is responsible for all vessel movements for the duration of the contract. The contractor is responsible for all services of mooring attendants, tugs, pilots, etc..

S 1.2.2 DRY-DOCKING - This specification is intended to ensure that the contractor provides all the services required for vessel dry-docking, vessel refloating and all services required for the duration of the contract. Therefore, the vessel must be placed in the yard in such a way as to return to the water on the date specified in the call for tenders. The contractor must allow for a seven (7) day period alongside after refloating to allow the crew to inspect, test, certify and start the vessel.

S 1.2.3 References

DRAWING #	Drawing Title	# of Sheets
	Docking plan	

S 1.2.4 Statement of Work

S 1.2.5 The contractor shall place the ship in dry dock in accordance with the Docking plan drawing.

S 1.2.6 The contractor shall include in its bid the costs of entering and leaving the basin with the time required to complete the work requested.

S 1.2.7 The contractor shall place the vessel in dry dock and refloat it under the direct supervision of a certified dock master.

- S 1.2.8** A copy of the Docking plan shall be provided to the contractor prior to the date of entry into the basin. The Contractor must prepare the blocks and any shoring required to maintain the true alignment of the ship's hull and machinery throughout the dry-docking period. The Contractor must align the blocks with a laser and submit an alignment report to the owner's representative before dry-docking.
- S 1.2.9** The contractor shall record the following details on the vessel's condition reports:
- S 1.2.10** Before entering the dry dock, all ship's tanks shall be sounded and their contents recorded. A copy must be signed by the ship's master, the chief engineer and the contractor's dock master.
- S 1.2.11** Upon entering the dry dock, all empty tanks shall be documented and copies shall be kept by the contractor and the chief engineer.
- S 1.2.12** Upon exiting the dry dock, all tanks shall be filled to the same draught and trim as at the dry dock and in the condition agreed upon by the dock master, the ship's captain and the chief engineer.
- S 1.2.13** The contractor shall provide diver services to confirm that the vessel is resting uniformly on the blocks.
- S 1.2.14** There must be a minimum clearance of 122 cm (4 ft.) under the keel.
- S 1.2.15** The contractor is responsible for the handling of ropes during mooring and undocking operations, as well as towing and/or pilotage service fees.
- S 1.2.16** The contractor shall avoid placing transducer plates on the blocks between frames no. 23 and 28.
- S 1.2.17** Frame shall be marked on the hull to facilitate inspection TCMS Surveyor and the owner's representative. Immediately after hull cleaning and before sand blasting the hull, the contractor must mark frames at five frame intervals from the stern (frame 0); the marks must be 6 feet high, on the curvature of the bilge well, port and starboard. The blocks aligned with the frames must be marked in the same way, on the starboard and port sides.
- S 1.2.18** The contractor shall remove the drain plugs to drain the accumulated water. All removed drain plugs must be labelled immediately after removal, stored in an appropriate container and given to the owner's representative. A ship's officer must be present when removing and replacing the drain plugs (9). The plugs to be removed are located near the frames 3.5,11.5,13,15.5,26.5 and 33 . The location of

the plugs is indicated on the docking plan. Any plug removed requires temporary filling of its opening with wooden plugs when performing work such as sandblasting, painting, etc. that could cause contamination of the tanks.

S 1.2.19 During refloating, the Contractor shall have sufficient personnel present to stand by all seawater outlets, stern tubes, sea intakes, etc. that were opened during the dry dock period to correct any deficiencies that may occur.

S 1.2.20 Proof of performance and documentation

S 1.2.21 All work must be approved by the TA. And the contractor will provide two hard copies and one electronic copy of the checklists and reports to the Chief Engineer and one electronic copy to the vessel's maintenance manager no later than five (5) days after the completion of each work.

S 1.3 Mooring Lines

S 1.3.1 Berthing and mooring facilities are appropriate for a vessel of this size and must satisfy the Commanding Officer. Throughout the contract, if the vessel is not in dry dock, it may be moored at the contractor's dock at a safe berth where the water level is sufficient even at low tides so that the vessel does not touch the bottom. The contractor is responsible for all vessel movements for the duration of the contract. The Contractor is responsible for all mooring services by mooring attendants, tugs, pilots, etc..

S 1.4 Gangways

S 1.4.1 The contractor shall provide and erect a gangway with safety nets, handrails and appropriate lighting to the satisfaction of the Commanding Officer. The walkways are safe, well lit and suitable for the passage of shipyard workers and crew. The contractor shall ensure that the walkways remain in good condition for the full duration of the dry dock. The vessel's gangways shall not be used during the refit/dry-dock period unless authorized by the dock master. In this case, CCG will not be liable. Any movement of the walkways required for the contractor's work is done at the contractor's expense.

S 1.5 POWER SUPPLY

S 1.5.1 S 1.5.1 The vessel is supplied with shore power from a single 100 amp source using cables and fittings provided by the contractor. The ship's shore power transformer requires a three phase 460 VAC, 60 Hz, 100 amp supply. The contractor provides a

price for 600 kWh x 158 days (94800 kWh). The contractor provides the price for one kWh. Final consumption will be corrected on PWGSC Form 1379.

S 1.5.2 S 1.5.2 Contractor provides meter to take kWh consumption readings. Meter readings shall be recorded by the contractor and the Chief Engineer at the time of connection and disconnection. The readings shall also be submitted twice a week to the Chief Engineer or TA

S 1.6 PROTECTION OF DECKS OF ROOMS AND ENGINE ROOMS

S 1.6.1 The Contractor shall repair, at its own expense, any damage resulting from its actions during performance of its work and that may be attributed to its performance. Any material used in a replacement or repair must comply with the criteria for the material provided by the Contractor as indicated above in the section Tools and Materials Provided by the Contractor.

S 1.6.2 The Contractor shall protect all equipment and all neighbouring areas against damage. Work areas must be protected against flooding and water leaks, debris from sandblasting, welding, etc. Temporary tarpaulins must be placed over work areas.

S 1.7 HEATING

S 1.7.1 Vessels are constantly heated. Extended power cuts must be made with the permission of the Chief Engineer or TA.

S 1.8 WORKPLACE INSPECTIONS

S 1.8.1 The Contractor shall coordinate an inspection of the condition and location of items to be removed with the TA and the IA before performing the specified work or accessing a location to work in it.

S 1.9 FIRE PROTECTION

S 1.9.1 The ship's fire main shall be supplied with water at a minimum pressure of 550 kPa (60 psi) at all times (24 hours a day). The supply line is equipped with a shut-off valve that blocks all water entry and a pressure relief valve (with pressure gauge) on the ship's international connection. If the ship is in winter condition, no liquid should flow into the fire hydrant supply line to prevent any risk of freezing. The ship's fire hydrant is drained for winter so the contractor will have to provide the installation of

a non-pressurized fire hose, but ready to be used at any time with the necessary lengths of hose.

S 1.10 PROJECT FACILITIES

S 1.10.1 The contractor shall provide and maintain washroom facilities for vessel crew use at the Contractor's facility for the duration of the contract.

S 1.10.2 Note that shipboard toilets will be out of service for the duration of the contract.

S 1.10.3 Contractor employee access to CCG non-work related areas is prohibited unless otherwise stated.

S 1.11 Crane Operation

S 1.11.1 The contractor must provide the hourly rate for the service of a 30T crane or lifting equipment and personnel capable of moving 5T anywhere on the vessel required for the transfer of components on board the vessel for Coast Guard purposes, this hourly rate will be used to correct the final amount on Form 1379. Include 30 hours of work in the contract. Obtain permission (signature, email or other) from the CCG representative for each request and record this in a logbook that will be provided to the CCG at the end of the contract with supporting documents.

S 1.12 TELEPHONE,INTERNET

S 1.12.1 Provide an office for CCG and PWGSC representatives (3 persons) with a telephone line and high speed internet access. (Minimum 25 MB per second)

S 1.13 Oily Water/Black Water

S 1.13.1 Oily Water: The contractor shall provide a price for the disposal of approximately 1500 litres of oily water mixture from the ship's holds. It must indicate a unit price for each additional 50 litres, regardless of the quantity. Disposal shall be adjusted up or down upon presentation of invoices by the contractor. The quantities of disposal depend on the needs of the vessel and should not be included in the contractor's requirements for performing work in the SOW. The contractor must provide the IA with the identity of the company or companies authorized to pump and dispose of used oil. Receipts for the disposal of oil from the ship for inclusion in the oil service booklet.

S 1.13.2 Black Water: The contractor must indicate a price for the disposal of approximately 200 litres of black water from the retention tank. It must indicate a unit price for each

additional 50 litres, regardless of the quantity. Disposal must be adjusted up or down upon presentation of invoices by the contractor. The quantities of disposal apply to the needs of the vessel and should not be included in the contractor's requirements for performing work in the SOW. The contractor must provide the IA with the identity of the company or companies approved to pump and dispose of black water.

S 1.14 Cleanliness

S 1.14.1 At the completion of the work, the Contractor shall remove all waste, debris and unnecessary equipment created by the work and return the vessel to a state of cleanliness similar to that which existed at the time the custody of the vessel was transferred to the Contractor at the beginning of the refit period.

S 1.14.2 Once all work has been completed and the last clean-up completed, the Contractor's Quality Assurance (QA) Representative and the TA will jointly visit the vessel to see all the locations and spaces where work has been performed by the Contractor. Any deficiencies or damage discovered during this visit will be recorded and compared to the digital images captured during the initial inspection of the vessel (section 1.10).

S 1.14.3 The Contractor shall at its own expense correct any damage or deficiencies caused by the Contract Work.

S 1.15 Parking

S 1.15.1 The Contractor shall provide two (2) parking spaces reserved for the Technical Authority, and four (4) crew members and suppliers for the duration of the contract. As well, the contractor will be required to provide snow removal service to maintain access to the vessel for Coast Guard personnel and various contractors.

S 1.16 Vessel Responsibility And Security

S 1.16.1 Safety - The yard will be responsible for conducting daily end-of-day safety patrols on board throughout the dry-dock period in addition to responding to alarms from the monitoring system. For each of the alarms responded to, the site will report to the Coast Guard official. This will be recorded in a logbook by the shipyard and given to the CCG representative when the vessel is delivered. Include five (5) alarm visits in the contract.

- S 1.16.2** Ship Responsibility - The Contractor shall be responsible for the ship during the period of the contract. The contractor shall ensure at the completion of the work that the vessel is delivered to the Coast Guard representative in a clean and dust-free condition both inside and out.
- S 1.16.3** The yard shall authorize the Coast Guard and certain contractors to work on board the vessel during the period at the yard. Among others, there will be the visit of:
- S 1.16.4** Five (5) crew members from the Coast Guard vessel will be present to perform minor maintenance and repairs on the vessel for a period of two (2) weeks. The crew members' schedule will be 14 consecutive days in the off-duty system, from 08:00 to 20:00.
- One (1) Integrated Technical Support Project Officer
 - A mechanic for a period of 8 weeks to do maintenance
 - Repair-dfo electronics technicians

S 2.0 PRODUCTION SCHEDULE

S 2.1 Scope

- S 2.1.1** This specification is intended to provide the owner's representatives with a precise schedule of work and completion for Coast Guard purposes.

S 2.2 TECHNICAL DESCRIPTION

- S 2.2.1** The contractor shall provide an electronic copy of MS Project 2010(.mpp) or later with a detailed Gantt chart that illustrates the planned schedule for the vessel refit. This chart must show each task in the specification with its start date, duration and expected and actual completion date. An electronic version shall also be sent to the TA, Chief Engineer, and the Contracting Authority no later than five (5) days after the contract award date.
- S 2.2.2** Any critical work sequences shall be identified, along with critical tasks that may delay the refit if it does not meet the planned work schedule. This may include manpower issues or tasks that cannot be performed in parallel with other tasks.
- S 2.2.3** All inspections, tests and trials shall be recorded in the production diagram.

- S 2.2.4** In the event of work affecting the critical work flow, the TA shall be notified immediately. Every effort should be made to avoid delaying the ship's refit. Regular quality assurance procedures shall be followed.
- S 2.2.5** The Gantt chart shall be updated weekly and in advance of each production meeting to show the actual progress of the refit and changes to the completion date of each item. The contractor shall include in his updates to the Gantt chart any special work requested on PWGSC Form 1379 indicating the impact that the additional work will have on the work schedule.

S 2.3 **Acceptance Work**

S 2.4 **Inspection**

- S 2.4.1** All work must be approved by the TA, and the ABS inspector for regulatory work.

S 2.5 **DELIVERABLE DOCUMENTS**

- S 2.5.1** The successful contractor shall provide three hard copies and one electronic copy of the work schedule to the ship's TA no later than five (5) days after the award of the contract.

10.0 Safety and security

10.1 PORTABLE EXTINGUISHER INSPECTION

10.1.A Identification

10.1.A.1 The contractor must inspect all extinguishers and certify all those whose recertification date has expired. Note: these inspections must be ----carried out between January and February in order to respect the annual certification schedule.

10.1.A.2 The contractor must proceed with the annual inspection of eighteen (18) portable extinguishers.

10.1.B References

10.1.B.1 Equipment information

10.1.B.1.2 Portable extinguishers

10.1.B.2 Drawings

10.1.B.2.1 All drawings are listed in the General Notes. The following drawings shall be considered reference drawings as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
ISV22 -30000RMM13	General arrangement	
N/A	NGCC Leim –extincteurs portatifs	

10.1.B.3 Regulations and guidelines

10.1.B.3.1 ABS Guidance on Fire-Fighting systems

10.1.B.3.2 NFPA 10 – Standard for Portable Fire Extinguishers

10.1.C Statement of work

10.1.C.1 The inspection and maintenance of the extinguishers must be carried out according to NFPA 10 – Standard for Portable Fire Extinguishers. The work must be carried out by an IACS member recognized third party subcontractor under the responsibility of the contractor.

- 10.1.C.2 Personnel performing inspection and maintenance work must be individually certified by one of the following means:
- a) Factory trained and certified for the specific equipment and system being serviced.
 - b) By an acceptable nationally or internationally recognized certification organization (ISO, NFPA, CFAA).
 - a) Employment and qualification by an organization used by a nationally (ULC) or internationally recognized (ISO or NFPA) testing laboratory for fire extinguishers.
- 10.1.C.3 The contractor must remove the extinguishers from the vessel, ensuring that the number of extinguishers removed is never exceeds a maximum of 6. The vessel's chief engineer will determine the order that the extinguishers are to be removed.
- 10.1.C.4 The contractor must return the extinguishers to the vessel as inspections and maintenance is completed, and put them back in the places as determined by the vessel's chief engineer.

10.1.D Proof of performance

10.1.D.1 Inspection points

- 10.1.D.1.1 All work must be completed according to the requirements stated in NFPA 10 chapter 7, and according to the vessel's chief engineer and the attending ABS inspector.

10.1.D.2 Tests

- 10.1.D.2.1 Testing of the extinguishers must conform to NFPA 10 chapter 7 and to ABS requirements.

10.1.D.3 Certification

- 10.1.D.3.1 All personnel performing the work must present their credentials or qualifications to the vessel chief engineer prior to beginning. The contractor must submit electronic copies to the CCG TA within 5 days of the beginning of work.
- 10.1.D.3.2 The contractor must provide the vessel's chief engineer or CCG TA two (2) paper copies of the inspection certificates with the original copy. The contractor must send an electronic copy to the CCG TA.

10.1.D.4 Documentation

- 10.1.D.4.1 The contractor must secure labels to the extinguishers that indicate the month and year that the work was performed, the name of the person who performed the work, and the name of the agency who employed that person.

10.1.D.5 Training

- 10.1.D.5.1 Not required (N/A)

10.2 FIRE DETECTION SYSTEM**10.2.A Identification**

- 10.2.A.1 The contractor is responsible for the supply of qualified man power to carry out the annual inspection and certification of the vessel's fire detection system. Note: these inspections must be carried out between January and February in order to respect the vessel's annual inspection schedule.

10.2.B References**10.2.B.1 Equipment information**

- 10.2.B.1.1 The vessel is equipped with Techsol designed, integrated fire detection system with a Notifier NFS2-3030 alarm panel. The Notifier NFS2-3030 panel is connected to the integrated fire alarm system which is part of the vessel's alarm and monitoring system.

10.2.B.2 Drawings

- 10.2.B.2.1 All drawings are listed in the General Notes. The following drawings shall be considered reference drawings as defined in the Drawings section of the General Notes.

Drawing number	TITRE DU DESSIN	Nombre de feuilles
ISV22-36000RMM7	Fire Safety Plan	5

10.2.B.3 Regulations and guidelines

10.2.B.3.1 SOLAS 2020 Chapter II-2 Regulation 7

10.2.B.3.2 NFPA 72 – National Fire Alarm and Signaling Code – Chapter 14

10.2.B.3.3 ABS Guidance on Fire-Fighting systems

10.2.C **Statement of work**

10.2.C.1 The contractor must contact the ABS inspector prior to beginning the work, permitting the inspector to attend the vessel to witness testing.

10.2.C.2 The contractor must supply the CCG TA a written inspection plan prior to beginning the work.

10.2.C.3 The contractor must supply qualified man power to carry out the annual inspection and certification of the fire detection system according to the equipment manufacturer and applicable requirements of NFPA 72 – Chapter 14, for visual and functional testing. The certificate of inspection must be issued by a company holding an IACS member service approval for fire detection system inspection and certification.

10.2.C.4 Personnel performing inspection and maintenance work must individually certified by one of the following means:

- a) Factory trained and certified for the specific equipment and system being serviced.
- b) By an acceptable nationally or internationally recognized certification organization such as ISO, NFPA, or CFAA.
- b) Employment and qualification by an organization used by a nationally (ULC) or internationally (ISO or NFPA) recognized testing laboratory for fire detection systems.

10.2.C.5 The Notifier NFS2-3030 alarm panel is located on the port side of the vessel's wheelhouse.

10.2.D **Proof of performance**

10.2.D.1 **Inspection points**

10.2.D.1.1 All work must be carried out to the satisfaction of the vessel's chief engineer and the attending ABS inspector.

10.2.D.1.2 All deficiencies or defects found during the inspection must be corrected. Where the contractor is unable to correct these

deficiencies during the course of the inspection, the contractor must inform the CCG TA in writing within 24 hours of finding the deficiency or defect.

10.2.D.2 **Tests and trials**

- 10.2.D.2.1 The vessel's chief engineer or the CCG TA must witness the testing of the system.

10.2.D.3 **Certification**

- 10.2.D.3.1 All personnel performing the work must present their credentials or qualifications to the vessel chief engineer prior to beginning. The contractor must submit electronic copies to the CCG TA within 5 days of the beginning of work.
- 10.2.D.3.2 The contractor must submit two (2) paper copies of the inspection and maintenance certificates to the vessel's chief engineer as well as the original copy. The contractor must also send electronic copies of the certificate to the CCG TA. The certificates must be valid for one (1) year.

10.2.D.4 **Documentation**

- 10.2.D.4.1 The contractor must submit one (1) paper copy of a report detailing the results of the inspections, including any repairs or modifications for CCG approval of the work described in this section of the SOW. The contractor must also send an electronic copy to the CCG TA within the five (5) days following the completion of the work.

10.2.D.5 **Training**

- 10.2.D.5.1 Not required (N/A)

10.3 **ANNUAL INSPECTION OF THE FIXED FIRE EXTINGUISHING SYSTEM**

10.3.A **Identification**

- 10.3.A.1 The contractor is responsible for carrying out the inspection and maintenance of the CCGS Leim's 1230 Novec fixed fire extinguishing system. Note: this work must be

carried out between January and February in order to respect the vessel's annual inspection schedule.

10.3.B References

10.3.B.1 Equipment information

- 10.3.B.1.1 The fixed fire extinguishing system was supplied by 3M and employs Novec 1230 as an extinguishing medium.

10.3.B.2 Drawings

- 10.3.B.2.1 All drawings are listed in the General Notes. The following drawings shall be considered reference drawings as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
728	FIRE EXTINGUISHING SYSTEMS, FIXED – SPECIFICATIONS	

10.3.B.3 Regulations and guidelines

- 10.3.B.3.1 SOLAS 2020 - II-2/10.
- 10.3.B.3.2 NFPA 2001 – Standard on Clean Agent Fire Extinguishing Systems Chapters 8 and 9.
- 10.3.B.3.3 ABS Guidance on Fire-Fighting systems

10.3.C Statement of work

- 10.3.C.1 Personnel performing inspection and maintenance work must individually certified by one of the following means:
- a) Factory trained and certified for the specific equipment and system being serviced.
 - b) By an acceptable nationally or internationally recognized certification organization such as ISO or NFPA.
 - c) Employment and qualification by an organization used by a nationally (ULC) or internationally recognized (ISO or NFPA) testing laboratory for fire extinguishing systems.

- 10.3.C.2 The contractor must supply the CCG TA a written inspection plan prior to beginning the work.
- 10.3.C.3 The contractor must communicate with the vessel's chief engineer before beginning the work described in this section. This work must be carried out in conjunction with the portable extinguisher inspections described in section 10.1 in order to order to reduce the impact on the vessel's on board fire fighting capabilities.
- 10.3.C.4 The contractor is responsible for the work, and must provide the necessary labour through an IACS member authorized service provider. Work must be carried out according to the equipment manufacturer's instructions and all applicable requirements in NFPA 2001 chapters 8 and 9.
- 10.3.C.5 The vessel's chief engineer must be present for all tests performed.
- 10.3.C.6 All work must be completed according to the attending ABS inspector's satisfaction.
- 10.3.C.7 The contractor must provided costs for all tests; alarms (signals, sirens, bells), all mechanisms, nitrogen release bottle tests, ventilation shutdowns, release controls and cables.
- 10.3.C.8 The contractor must clean the pneumatic actuators and associated piping with clean, compressed air and ensure that they function correctly. All piping and nozzles must be free of obstruction.
- 10.3.C.9 Upon completion of inspection and maintenance work, the contractor must reassemble dismantled components and systems, and place the fixed fire extinguishing system back in service.
- 10.3.C.10 The Novec 1230 system is located in the vessel's hold.

10.3.D Proof of performance

10.3.D.1 Inspection points

- 10.3.D.1.1 All work must be completed to the satisfaction of the vessel's chief engineer, the CCG TA, and the attending ABS inspector.
- 10.3.D.1.2 All deficiencies or defects found during the inspection must be corrected. Where the contractor is unable to correct these deficiencies during the course of the inspection, the contractor must inform the CCG TA in writing within 24 hours of finding the deficiency or defect.

10.3.D.2 Tests and trials

10.3.D.2.1 The vessel's chief engineer or CCG TA must witness the testing of the system.

10.3.D.3 Certification

10.3.D.3.1 All personnel performing the work must present their credentials or qualifications to the vessel chief engineer prior to beginning. The contractor must submit electronic copies to the CCG TA within 5 days of the beginning of work.

10.3.D.3.2 The contractor must submit two (2) paper copies of the maintenance and inspection certificates to the vessel's chief engineer as well as the original copy. The contractor must send an electronic copy to the CCG TA. The certificates must be valid for one (1) year.

10.3.D.4 Documentation

10.3.D.4.1 The contractor must submit one (1) paper copy of the maintenance and inspection report which details all inspection and maintenance work, deficiencies found, modifications made, or repairs carried out for CCG approval of the work described in this section of the SOW within the five (5) days following the completion of the work.

10.4 INSPECTION OF GLOBAL DAVIT, MODEL RHS 13/3.5**10.4.A Identification**

10.4.A.1 The contractor is responsible for the inspection and annual maintenance of the life boat davit Global Davit, RHS 13/3.5. The contractor must provide manpower for the work through an authorized service provider as defined by IMO resolution MSC 402 (96), sections 7 and 8.

10.4.A.2 The authorized service provider must issue the annual inspection certificate.

10.4.B References**10.4.B.1 Equipment information**

10.4.B.1.1 Global Davit Model RHS 13/3.5

10.4.B.1.2 Release hook

10.4.B.2 Drawings

- 10.4.B.2.1 All drawings are listed in the General Notes. The following drawings shall be considered reference drawings as defined in the Drawings section of the General Notes.

Numéro de dessin	TITRE DU DESSIN	Nombre de feuilles
	GLOBAL DAVIT instructions	
0851a3	Datasheet-GD RHS13-3.5 Rescue Boat Davit 0851a3 Operation and maintenance manual	68

10.4.B.3 Regulations and guidelines

- 10.4.B.3.1 SOLAS 2020 – III/3 and III/20
- 10.4.B.3.2 IMO Resolution MSC 402(96)
- 10.4.B.3.3 SOR/2007-128 – Cargo, Fumigation and Tackle Regulations
- 10.4.B.3.4 CAN/CGSB 48-9712 - Qualification and certification of NDT personnel

10.4.C Statement of work

- 10.4.C.1 All work must be carried out by personnel from an approved service provider.
- 10.4.C.2 The approved service provider must supply the CCG TA a written inspection plan prior to beginning the work.
- 10.4.C.3 All replacement parts must be supplied by the original equipment manufacturer.
- 10.4.C.4 The contractor must conduct a thorough examination and perform annual maintenance on the davit, wire ropes, pulleys, and release hook according to the manufacturer's instructions in section 12 of the operation and maintenance manual.
- 10.4.C.5 The wire rope must be removed and inspected in its entirety. The rope must be cleaned and lubricated with lubricant conforming to original equipment manufacture's recommended products. No attempt must be made to repair or shorten the wire rope if damage is found. The rope must be replaced where there exists
- a) any sign of corrosion,

- b) separation of the strands or wires,
- c) flats on individual wires,
- d) broken individual wires.

10.4.C.6 Where the rope is replaced, a certificate from the manufacture is required, that indicates at a minimum the certificate number, name and address of rope supplier, date supplied, traceable serial number, nominal diameter, rope classification, standard of manufacture, lay direction and type, and minimum breaking force.

10.4.C.7 The release hook must be thoroughly examined and maintenance performed according to the manufacture's specifications. Notwithstanding any conditions specified by the hook manufacturer, in general, the hook shall be removed from service and repaired where appropriate if:

- a) excessive pitting or corrosion is found;
- b) cracks, nicks or gouges are found;
- c) wear exceeding 10% (or as recommended by the hook manufacturer) of the original hook or load pin is found;
- d) bend or twist is observed;
- e) distortion has occurred causing the throat of the hook to open more than 5% its original value;
- f) the lock or latch mechanism is inoperative; damaged, missing, or malfunctioning hook attachment and securing means are observed.

10.4.C.8 Where repair is deemed possible and effected, the hook must be load tested in accordance with SOR-2007-128 clause 305.

10.4.C.9 The contractor must visually inspect all hydraulic hoses for damage or signs of leaks. Where hoses or fittings are found to be damaged, the contractor must replace them with those of identical rating and construction. New hose assemblies must be hydrostatically proof tested at the assembly's maximum working pressure and visually inspected for damage or changes in dimensions according to the hose manufacturer's recommended practices.

10.4.C.10 The contractor must visually inspect the pulley and davit structure for any defects. Where damage or possible cracks are found, the contractor must carry out liquid

penetrant dye testing to determine the extent of the damage. All non destructive testing must be carried out by personnel certified level II according to CAN/CGSB 48-9712.

- 10.4.C.11 The contractor must change the davit's hydraulic oil; 90 litres of ISO VG 15 HLP. All gaskets and seals must be replaced.
- 10.4.C.12 The contractor must change the davit's gear box oil; 1.1 litres of ISO VG VL 68. All gaskets and seals must be replaced.
- 10.4.C.13 The contractor must verify and correct as necessary the hydraulic pressure of the system and accumulator.
- 10.4.C.14 The contractor must inspect and perform any required maintenance of the davit's brakes according to the manufacturer's recommendations.
- 10.4.C.15 The contractor must verify the adjustment of the winch's limit switches.
- 10.4.C.16 The contractor must verify and record the slewing gear's play.
- 10.4.C.17 The contractor must repair all defects found during inspection and maintenance. Any additional work will require the CCG TA's approval prior to commencement. Costs for additional work will be addressed with a PWGSC 1379 form.

10.4.D Proof of performance

10.4.D.1 Inspection points

- 10.4.D.1.1 All work must be completed to the satisfaction of the vessel's chief engineer, the CCG TA, and the attending ABS inspector. The contractor must give 48 hours advance notice to the concerned parties before proceeding with an inspection.
- 10.4.D.1.2 The contractor's approved service provider must proceed with a final inspection with the attending ABS inspector. \$3000 CAD is allotted for this inspection.

10.4.D.2 Tests and inspections

- 10.4.D.2.1 The contractor must conduct a functional test of the davit in the presence of the vessel's chief engineer, the CCG TA, and the attending ABS surveyor. These tests must prove the correct operation of the davit and controls. A dynamic test of the winch brake at maximum lowering speed with a mass equivalent to that of the liferaft without occupants onboard must be performed. The contractor

must provide a minimum of 48 hour advanced notice to the concerned parties prior to proceeding with any testing. This testing must be coordinated to coincide with the vessel's annual certification.

10.4.D.3 Certification

- 10.4.D.3.1 All personnel performing the work, including the authorized service provider and those performing NDT, must present their credentials or qualifications to the vessel chief engineer prior to beginning. The contractor must submit electronic copies to the CCG TA within 5 days of the beginning of work.
- 10.4.D.3.2 The contractor must provide the vessel's chief engineer two (2) copies of the annual inspection certificate (T8) along with the original copy. The contractor must also send electronic copies to the CCG TA.

10.4.D.4 Documentation

- 10.4.D.4.1 The Contractor must provide a paper report detailing all findings, maintenance conducted, and repairs made during the work, both in paper and electronic formats, within 5 days of completion.
- 10.4.D.4.2 The report must detail the following elements:
 - a) Dates that the work was carried out.
 - b) Description of work carried out.
 - c) List of parts replaced or installed.

10.4.D.5 Training

- 10.4.D.5.1 Not applicable (N/A).

10.5 TRANSPORTATION OF LIFERAFT AND ZODIAC FRC

10.5.A Identification

- 10.5.A.1 The contractor must unload the two (2) vessel life rafts and the zodiac 472 and transport them to workshops chosen by the CCG.

10.5.B References

10.5.B.1 Zodiac 47m

- a) Length: 4.5m
- b) Weight: 112kg plus the 30 hp motor
- c) Serial number: 22309/A2 EC

10.5.B.2 2x 12 person liferafts

- a) Type: Survitech-Zodiac
- b) Serial numbers: XDC3FW31B717 & XDC3FW32B717

10.5.C Statement of work

10.5.C.1 During the first 5 days following the Leims entry into the drydock, the contractor must remove the Zodiac and 2 liferafts and transport them to external contractors as identified by the CCG TA. The cost of transport will be paid via a PWGSC 1379 form.

10.5.C.2 No crane time as described in the General section of this SOW will be deducted to complete this work.

10.5.C.3 Transport fees will be addressed with a PWGSC 1379 form.

10.5.D Proof of performance

10.5.D.1 Inspection points

10.5.D.1.1 All work must be completed to the satisfaction of the vessel's chief engineer and the CCG TA.

10.5.D.2 Tests and inspections

10.5.D.2.1 Not applicable (N/A)

10.5.D.3 Certification

10.5.D.3.1 Not applicable (N/A)

10.5.D.4 Documentation

10.5.D.4.1 The contractor must submit one paper copy of all transportation documentation to the vessel's chief engineer and an electronic copy to the CCG TA.

10.5.E Training

10.5.E.1 Not applicable (N/A)

11.0 Hull and structure

11.1 THICKNESS MEASUREMENT HULL SURVEY AND STEEL REPAIR

11.1.A Identification

- 11.1.A.1 The Contractor must clean and inspect the entire hull of the vessel and must obtain survey credit for the shell plating from ABS.
- 11.1.A.2 The Contractor must conduct an ultrasonic hull thickness survey of the ship's hull using a certified inspector recognized by an IACS member and/or Transport Canada. The Contractor must quote on retaining the surveyor on site for 2 days at 8 hours on site per day.
- 11.1.A.3 Prior to commencing hull survey work, the Contractor, TA, and the ABS surveyor must review the drawings to determine the areas for inspection.
- 11.1.A.4 Any temporary openings required for various specification items within this statement of work are not included under this section of the specification and are still considered additional survey requirements.
- 11.1.A.5 Additional work will include the gouging and welding of butts and seam welds.

11.1.B References

11.1.B.1 Equipment Data

- 11.1.B.1.1 Hull plating ABS AH36 grade A
- 11.1.B.1.2 The sub-contractor must use digital instrumentation capable of the “ Echo-to-Echo Method” to accurately measure plate thickness through paint coatings.

11.1.B.2 Drawings

- 11.1.B.2.1 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE	Number of Sheets
ISV22-21030RMM5	Shell Expansion	
ISV22-21010RMM10	Structural arrangement	
30000-SF	Symbolisation	

11.1.B.3 Regulations and Standards

- 11.1.B.3.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

FSM Procedures	Title	Included Yes/No
7.B.3	Entry Into Confined Spaces	Yes
7.B.4	Hot work	Yes
7.B.5	Lockout Tag out	Yes
10.A.6	Paint and Other Coatings	Yes

Publications		
CCG/CT-043-EQ-EG-001-E	CCG Welding Specification	Yes
IACS No. 47	Shipbuilding and Repair Quality Standard	No
ABS Publication #49	ABS Guidance Notes on The Application and Inspection of Marine Coating Systems https://ww2.eagle.org/en/rules-and-resources/rules-and-guides.html	No
Standards		
CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures - Division 1 or 2 Certification	No
SSPC-SP-WJ4/NACE WJ-4	Water Jet Cleaning of Metals – SSPC-SP-4/NACE WJ-4 - Light Cleaning	No
CAN/CGSB 48-9712	Qualification and certification of NDT personnel	

11.1.C Statement of Work

- 11.1.C.1 Within 24 hours of docking, the entire underwater hull, including the areas above the waterline up to the top of the bulwarks, rudders, propellers and the bow thruster tunnel must be cleaned by high pressure fresh water to remove all marine growth, and allow a preliminary hull inspection.
- 11.1.C.2 The contractor must ensure that the entire surface of the hull, from the main deck hand rail to the keel, including rudders, propellers, and the stern tube, is cleaned with fresh water according to NACE WJ4 LPWC (Low-Pressure Water Cleaning, 5000PSI) within 24 hours after drydocking the vessel. All contamination must be removed for a preliminary inspection. Before beginning hydraulic cleaning, all equipment mounted on the hull and all openings must be completely protected. The CCG TA or vessel's chief engineer will inspect the entire surface of the hull.
- 11.1.C.3 The Contractor must clean and remove loose scale, such as organic growth, damaged/flaking coatings, etc. in order to prepare the survey areas for testing/inspection for the instrument used. For example, digital instrumentation capable of the Echo-to-Echo method can measure plate thickness through existing paint coatings.
- 11.1.C.4 The Contractor must obtain the services of ABS to conduct a hull condition survey. As soon as possible after docking, the Contractor must hold a meeting attended by the Contractor, CCG TA, and the ABS surveyor, to review the drawings for determining the areas for inspection.

- 11.1.C.5 The Contractor must obtain the services of an ABS Certified company to carry out a minimum 300 ultrasonic readings from the keel to the load line mark and 100 above. The contractor must take at least four readings from each hull panel and at least four readings from each panel inside each seawater box, and four readings from the inside of each hull valve pipe fitting. A thickness measurement must be taken next to each overboard valve outlet. In addition at least 4 measurements in each seabay. 5 seabays must be surveyed.
- 11.1.C.6 **Optional.** Provide a price for 20 additional hours of UT readings and report writing. The contractor must assess and record the hull thickness as detailed below and submit the results to the ABS surveyor and obtain proof of inspection for readings. The contractor must also indicate the location and value of all thickness measurements taken on the vessel's shell expansion drawing ISV22-21030RMM5 and structural arrangement drawing ISV22-21010RMM10 modified and provided by the CCG for this purpose.
- 11.1.C.7 Particular attention must be paid to the shell plating near hull openings and areas of damage and corrosion.
- 11.1.C.8 The contractor must remove the damaged sacrificial zinc anodes secured to the hull and appendages, at the same time as performance of item.
- 11.1.C.9 The Contractor must make all prescribed repairs resulting from the inspection of the hull by ABS or a recognized organization. Repairs must comply with all applicable standards and regulations. The hull repair work will be negotiated using Form 1379.
- 11.1.C.10 The Contractor must prepare a price quotation per linear meter for performing the above mentioned work. For bid purposes the Contractor must quote on 10 meters of preparation, weld repair, inspection, and coating. The contractor is responsible for determining the number of welding passes necessary for each linear meter. The actual amount of weld seams to be repaired will be adjusted up or down via PWGSC 1379 action.
- 11.1.C.11 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 PWGSC 1379 action.
- 11.1.C.12 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.

- 11.1.C.13 Contractor must not apply any hull coatings (above or below waterline) until ABS Inspector has completed the required inspection, and CCG TA has provided permission to proceed. The Contractor must notify the CCG TA and ABS Inspector prior to the application of any coatings.
- 11.1.C.14 All materials used to carry out the prescribed proper section repairs must meet or exceed the original specifications and must comply with applicable rules and standards.
- 11.1.C.15 Once the prescribed repairs are completed, the contractor must reinstall all seawater intake grates, schedule an inspection with the ABS inspector or a recognized
- 11.1.C.16 organization for acceptance of repairs and modifications before the hull coating system is applied. The CCG TA and vessel's chief engineer must be present for this inspection.
- 11.1.C.17 All new steel surfaces or steel surfaces disturbed by prescribed repairs or modifications must be prepared and coated in accordance with these specifications of **11.2**.

11.1.D Proof of Performance

11.1.D.1 Inspection Points

- 11.1.D.1.1 The Contractor must provide the CCG TA with a detailed report of the hull condition within 48 hours after cleaning.
- 11.1.D.1.2
- 11.1.D.1.3 **Hold Point 1:** Any test results indicating wastage and requiring plate replacement must be brought to the attention of the CCG TA immediately.
- 11.1.D.1.4
- 11.1.D.1.5 **Hold Point 2:** The Contractor must present the CCG TA and vessel's chief engineer with the Welding Sequence Plan and Weld Design schedule for agreement prior to commencing any hot work.
- 11.1.D.1.6 The Contractor must allow the CCG TA, vessel's chief engineer, and ABS free access to witness the work at any point. The CCG TA and vessel's chief engineer must be allowed to witness that the Weld Sequence Plan is being followed correctly.

- 11.1.D.1.7 **Hold Point 3:** The Contractor must identify and present the prepared weld points to the CCG TA and vessel's chief engineer before welding commences.
- 11.1.D.1.8 **Hold Point 4:** The Contractor must notify the CCG TA and vessel's chief engineer and ABS 24 hours in advance of all visual inspections and allow the CCG TA, vessel's chief engineer and ABS to accompany the inspector during the inspections.
- 11.1.D.1.9 **Hold Point 5:** The Contractor must notify the CCG TA and vessel's chief engineer of any weld deficiencies within 24 hours of completing the weld inspections.
- 11.1.D.1.10 **Hold Point 6:** The Contractor must present the completed welding to the CCG TA, vessel's chief engineer, and ABS for acceptance.
- 11.1.D.1.11 **Hold Point 7:** The Contractor must prepare the areas to be coated to the satisfaction of the Nace inspectors and the CCG TA and vessel's chief engineer.
- 11.1.D.1.12 **Hold Point 8:** The Contractor must demonstrate to the Nace inspectors and the CCG TA and vessel's chief engineer that the coatings are applied under correct environmental conditions, using the correct application method, and to correct wet film thicknesses.

11.1.D.2 Testing/Trials

- 11.1.D.2.1 **Weld report.** The contractor must also report the joint welding and freeboard welding required. It must also indicate the location and length of each weld. The location must be identified on a hull plate plan.
- 11.1.D.2.2 The Contractor must complete visual inspection of 100% of the weld repairs.
- 11.1.D.2.3 The Contractor must include the cost of 24 hours of non-destructive MPI testing on the new welds; these tests must be as directed by the attending ABS Surveyor.
- 11.1.D.2.4 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.
- 11.1.D.2.5 **A thickness measurement report.** The report must include:
 - c) Name of company performing thickness measurement.

- d) Place and dates of measurement, including first date and last date of measurements.
- e) Credentials and qualification of the technician performing the work.
- f) Details of equipment used, including model, serial number and calibration date.
- g) Measurements taken must be:
 - i) Transversally and longitudinally located with respect to framing, structural member, or structural opening.
 - ii) Identified by letters or numbers,
 - iii) Tabulated to indicating thickness measured, as built thickness as indicated on shell expansion or structural arrangement drawings, and percentage of wastage.
 - iv) The contractor must also indicate the location and value of all thickness measurements taken on the vessel's shell expansion drawing ISV22-21030RMM5 and structural arrangement drawing ISV22-21010RMM10 modified and provided by the CCG for this purpose.

11.1.D.3 Certification

- 11.1.D.3.1 The Contractor must obtain a ABS survey credit for the Hull Inspection.
- 11.1.D.3.2 The Contractor must be certified by CWB to CSA Standard W47.1 – “Certification of Companies for Fusion Welding of Steel” in Division 1 or Division 2.
- 11.1.D.3.3 Welding Supervisors must be qualified by CWB to CSA Standard 47.1.
- 11.1.D.3.4 Welders must be qualified by CWB to CSA Standard 47.1 for the Mode and Class of weld being used.
- 11.1.D.3.5 Persons performing and interpreting Visual Inspection of welds must be certified by the CWB in accordance with CSA Standard W178.2, and must be Level 2 or 3 with the following endorsement: Ships and Marine Structures. Level 1 personnel may observe or assist.
- 11.1.D.3.6 Persons performing and interpreting Non-Destructive Examinations (NDE) – Liquid Penetrant (LP), Magnetic Particle (MP), Radiographic (RT) and Ultrasonic Inspection (UT) – must be currently qualified by the National Non Destructive Testing Certification body of Natural Resources Canada (NRCAN) to CAN/CGSB 48.9712 Level 2 or Level 3. Level 1 personnel may observe or

assist. Certificates must be in accordance with the Documentation section of the General Notes.

11.1.D.4 Documentation

- 11.1.D.4.1 All documentation must be provided to the CCG TA in the format specified in the Documentation Section G 1.5.
- 11.1.D.4.2 The Contractor must provide the CCG TA with a copy of a current Letter of Validation issued by the CWB proving that the Contractor is certified to CSA Standard W47.1 in Division 1 or 2.
- 11.1.D.4.3 The Contractor must provide the CCG TA with copies of valid Qualification cards and certificates issued by the CWB to CSA Standard 47.1 for all the welding supervisors working on this specification.
- 11.1.D.4.4 The Contractor must provide the CCG TA and ABS with copies of valid qualification cards issued by CWB to CSA Standard 47.1 for all the welders working on this specification.
- 11.1.D.4.5 The Contractor must provide the CCG TA and ABS with copies of the welding procedure specifications and welding procedure data sheets, stamped and approved by a Welding Engineer certified by the CWB prior to the work taking place. Welding procedure specifications must include port and starboard shell expansion drawing of the proposed work, and use symbols meeting CSA Standard W59.
- 11.1.D.4.6 The Contractor must provide the CCG TA with written weld inspection reports (visual) within 24 hours of weld inspections being completed. The reports must include interpretation of the inspection results by a qualified inspector. Any deficiencies listed in the report must detailed and their location be marked on a scale drawing of the weld repair for easy identification.
- 11.1.D.4.7 The Contractor must provide to the CCG TA copies of all Material Specification Sheets and Material Safety Data Sheets for all Contractor Furnished Materials. This includes welding consumables.
- 11.1.D.4.8 The Contractor must submit a final report to the ABS inspector 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.

- 11.1.D.4.9 The Contractor must provide the CCG TA with a copy of the report submitted to ABS, including a letter from the ABS inspector stating that the repair work has been accepted by ABS as satisfactory.
- 11.1.D.4.10 The Contractor must provide a revised shell expansion drawing, showing location of sections measured on the port side and on the starboard side.
- 11.1.D.4.11 The Contractor must provide the CCG TA with copies of all hot work permits and confined space entry permits for the affected spaces

11.2 HULL PAINTING

11.2.A Identification

11.2.A.1 The purpose of this specification is:

1. Build a shelter around the vessel (if needed, according to the climate, season, location).
2. Preliminary inspection of the vessel prior to coating (to evaluate sections to be repaired and to determined levels of surface preparation and coating according to this inspection)
3. General preparation (masking, parts removal prior to coating, obstruction of conduits, air vents).
4. Surface preparation for coating
5. Coating (exterior spar deck fairleads, all marking and signage, names, logos, all new installed steel, side keels).
6. This specification covers requirements for the furnishing of all grit blasting materials, labour, equipment, and tools for the surface preparation, application, and inspection of the coating system installed on the CCGS Leim.

11.2.B References

11.2.B.1 Equipment Data

- 11.2.B.1.1 Areas to be abrasive swept and/or spot blasted and coated is entire exterior hull and includes:

- a) Rudders
- b) Interior of sea chests
- c) Drafts and plimsolls marks
- d) The entire hull from the bottom to the height of the bulwark
- e) Hull from main deck to keel
- f) Appendages
- g) Sea water intakes
- h) Bow thruster tunnel

11.2.B.1.2 Areas to be protect from blast and coating includes:

- i) Hull valves
- j) Propellers
- k) Rudder bearings
- l) Sea water intake
- m) Plates covering the transducer for the acoustic sounder, sensors, sonars, etc.
- n) Deck scuppers
- o) Portholes
- p) All openings including ventilation
- q) Deck equipment
- r) Windows
- s) Vents
- t) Chimney openings
- u) Drains
- v) Appliances
- w) Chest grids
- x) Anodes
- y) Any other areas deemed necessary

11.2.C Drawings

11.2.C.1 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE	Number of Sheets
----------------	---------------	------------------

ISV22-30009RMM13	General Arrangment	
ISV22-38400RMM3	Cathodic Protection Plan	
ISV22-38541RMM4	Draft Marks	
ISV22-21260RMM6	Transducer Housing	
ISV22-21030RMM5	Shell Expansion	
380	Peintures et enduits-Paints specs Leim and Perley	
30000-SF	Symbolisation	

11.2.D Regulations and Standards

11.2.D.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

FSM Procedures	Title	Included Yes/No
Publications		
Standards		
	a) SSPC-SP1 Solvent Cleaning.	
	b) SSPC-SP2 Hand Tool Cleaning.	

	c) SSPC-SP3 Power tool Cleaning.	
	d) NACE no. 1 / SSPC-SP 5 White Metal Blast Cleaning.	
	e) NACE no. 2 / SSPC-SP 10 Near White Blast Cleaning.	
	f) NACE no. 3 / SSPC-SP 6 Commercial Blast Cleaning.	
	g) NACE no. 4 / SSPC-SP 7 Brush off Blast.	
	h) NACE WJ4 Low-Pressure Water Cleaning with light to moderate flash rusting.	
	i) NACE no. 8 / SSPC-SP 14 Industrial Blast Cleaning.	
	j) SSPC-PA 11 Protecting Edges, Crevices, and Irregular Steel Surfaces by Stripe Coating.	
	k) SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gauges	
	NACE No. 5/SSPC-SP 12 Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating	
	l) NACE RP0287-95 Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces using Replica Tape.	
	m) Any other reference (NACE ISO SSPC...) according to the system chosen and approved.	
	n) Detailed specifications about the actual existing coating on the ship (to be determined, may be different according to different type of vessel).	
	o) Detailed drawings with the actual localisation of the existing coating and new drawings with localisation of (marks, water line...), if any.	
	p) Any others deemed necessary.	
Regulations		
	Canada Shipping Act, 2001 (2001, c. 26)	

	TCMS; Ships' Machinery Regulations (SOR/90-264)	
	Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)	
	Maritime Occupational Health and Safety Regulations (SOR/2010-120)	
	Any others deemed necessary	

11.2.E Statements of work

11.2.E.1 Site conditions

- 11.2.E.1.1 The Contractor must assign a quality control representative to supervise all work on the vessel and liaise with the Technical authority and the Coast Guard's Nace Inspector.
- 11.2.E.1.2 The contractor must provide and install a temporary shelter covering the entire hull of the vessel. This shelter must go up to the top of the bulwarks, be ventilated and heated according to the time of year. It must be weatherproof and waterproof with the ship's hull. The contractor must ensure that ventilation is sufficient for drying and meets health and safety standards depending on the products applied and that the shelter is installed throughout the application and drying period.
- 11.2.E.1.3 The Contractor shall ensure that all areas of the hull, machinery and superstructure of the vessel are always adequately protected from the work in progress, these additional costs shall be included in the bid.
- 11.2.E.1.4 Work sites are to be maintained in a clean and safe condition always.
- 11.2.E.1.5 The Contractor shall be responsible for the removal of any snow or redirection of water from the bridge or other location, which may interfere with or directly affect the progress of the work in progress.
- 11.2.E.1.6 The contractor is responsible for removing any saltwater contamination.
- 11.2.E.1.7 The contractor is responsible to clean, collect and dispose of all abrasives used during the whole work.

11.2.E.2 Delivery, Storage and Handling

- 11.2.E.2.1 The Contractor is responsible for the timely ordering of coating materials as needed.
- 11.2.E.2.2 The Contractor is responsible for receiving coating material on site.
- 11.2.E.2.3 The Contractor is to provide storage facilities close to the worksite to store the material and equipment (ex: coating material, pumps, paint, abrasive, solvents, cleaning agents, etc). The storage facilities must be maintained at the temperature recommended by the coating manufacturer, at all time.
- 11.2.E.2.4 The mixing and spraying equipment must be heated and protected as required during use to ensure that the coating remains at the recommended temperature.
- 11.2.E.2.5 The Contractor must provide and the proper disposal of used containers, coating products and thinners. Copies of all relevant documentation must be forwarded to the Owner.
- 11.2.E.2.6 The Contractor is to provide all necessary MSDS and Product data sheets for all Contractor supplied materials

11.2.E.3 Lead

- 11.2.E.3.1 Until proven that the vessel's coatings are lead free, the contractor must assume that disturbing the vessel's existing coating could generate airborne lead hazards when disturbed by work involving welding, grinding, gouging, power tooling, chipping.
- 11.2.E.3.2 The contractor must engage a qualified person to perform tests to verify lead content of paint must be carried out. The contractor must bid for taking 10 samples to check painted surfaces for lead, subsequent analysis and reports. A qualified person is defined in SOR-2010-120, Part 1.
- 11.2.E.3.3 The qualified person must take these 10 samples from painted surfaces in areas affected by repair work prior to the beginning of work for analysis in a qualified lab. Reports detailing the results of the analyses must be submitted electronically to the CCG TA as soon as they are received. A qualified lab is one that is certified by the Standards Council of Canada or the Canadian Association for Environmental Analytical Laboratories.
- 11.2.E.3.4 Electronic copies of qualifications of personnel and laboratories conducting tests of samples must be provided to the CCG TA.

11.2.E.3.5 The contractor is responsible for the protection of all personnel on the worksite against lead where it is found to be present on the vessel. The contractor must therefore follow all regulations applicable in the jurisdiction in which the work will take place in the execution of the work described in this SOW.

11.2.E.3.6 The contractor must meet the requirements of SACC clause A0290C:

- a) The Contractor acknowledges that sufficient information has been provided by Canada with respect to the location and estimated amount of hazardous materials such as asbestos, lead, PCBs, silica or other hazardous materials or toxic substances.
- b) The price includes all costs associated with the removal, handling, storage, disposal and/or working in the vicinity of hazardous materials such as asbestos, lead, PCBs, silica and other hazardous materials or toxic substances on board the vessel, including those costs resulting from the need to comply with applicable laws and regulations in relation to the removal, handling, disposal or storage of hazardous materials or toxic substances.
- c) The completion date for the Work takes into account the fact that the removal, handling, storage, disposal and/or working in the vicinity of hazardous materials such as asbestos, lead, PCBs, silica and other hazardous materials or toxic substances may be affected by the need to comply with applicable laws or regulations and that this will not be considered to be an excusable delay.

11.2.E.4 Supervision of product application

11.2.E.4.1 The manufacturer must provide a warranty for the application of their paint products.

11.2.E.4.2 The contractor must bring onsite a manufacturer's representative for the complete time of application. Each step of surface preparation must be approved by this representative and a NACE inspector.

11.2.E.5 Environmental Protection

11.2.E.5.1 The contractor is responsible for all environmental protection and planning that is directly related to the work outlined in this statement of work. The contractor is also responsible to follow all provincial and federal regulations where ever the work is being carried out.

- 11.2.E.5.2 If lead is found, then all provincial and federal guidelines for lead on construction sites must be followed to ensure protection of the environment and personnel is achieved.

11.2.F General preparation

11.2.F.1 Hull inspection

- 11.2.F.1.1 Together with the Technical authority and the ABS Inspector the Contractor must inspect the exterior ship cleaned surfaces, within 36 hours of the vessel being placed in dry dock. Following the inspection, the Contractor must indicate on a copy of the shell expansion drawing all exterior surfaces which must be blasted, recoated and/or repaired. During the inspection, the contractor must take photographs of the actual paint scheme applied to the vessel and record it so that it can be reused for the application of the new coating in accordance with the proper layout.
- 11.2.F.1.2 For areas in the specification where washing is required, the Contractor must test for chlorides and areas found unacceptable for coating must be re washed. The acceptance criteria is in accordance with SSPC-SP 12 - NV-2<7µg/ cm² of Chloride on the hull prior to coating.

11.2.F.2 Protection preparation

- 11.2.F.2.1 The Contractor must protect the following from being blasted or coated: winches, electronics, hull valves, propellers, rudders bearings seawater intake, port hole glass, screw threads, oil grooves, grease fittings, gearing bronze pins, bearings, universal joints, cams, door screens, machined surfaces, nameplates, gaskets, electrical insulation, cable tray, electric motors, gearboxes, belt material, fittings, electrical panels, transducers, threaded brass plugs, light fixtures, windows, vents, chimney openings, drains, appliances and any area deemed necessary.
- 11.2.F.2.2 All the above must be protected as required prior to grit blasting and all protection must be removed after completion of coating. The cost of protection must be included in the bid price.
- 11.2.F.2.3 Before the grit blast process, all openings on the ship including ventilation openings must be sealed with polythene to prevent abrasives from entering the ship's accommodation and engine room. Protective coverings must be removed at the end of all work. Deck equipment also need to be protected.

- 11.2.F.2.4 Before grit blasting and coating, the contractor must seal all deck scuppers with a perforated wooden plug with a section of pipe in the centre so that water drainage does not meet the hull. Protectives must be removed after completion of the work.
- 11.2.F.2.5 Care must be taken to protect the plates covering the acoustic sounder transducer and other scientific equipment.
- 11.2.F.2.6 In the event of ingress during abrasive blasting and coating, the contractor must correct, repair and clean at his own expense.
- 11.2.F.2.7 All surface preparation and coatings work will be performed strictly in accordance with the paint manufacturer's instructions. If painting is performed prior to the completion of scheduled steel work, touch-up of the entire paint system will be at the Contractor's expense.
- 11.2.F.2.8 On completion of grit blasting and before application of any coating or primer, the steel surfaces must be blown free of dust using dry, oil free air. No paint is to be applied without the surface preparation being verified.
- 11.2.F.2.9 Prepared areas must be coated or have an owner approved holding primer applied before flash rusting occurs or the blast will be considered unacceptable and will require re-blasting at no additional cost.
- 11.2.F.2.10 The contractor will be responsible for any coating damage to new and / or existing coatings in non-specified areas during grit blasting and coating operations and any damaged coatings must be touched-up to match existing paint system and is to the contractor's account.
- 11.2.F.2.11 All lines of graphics, names and numbers are to be cut in by brush or masked and are to be cut sharp, square, and aesthetically pleasing. Lines of colour change and between the cosmetic topcoat and coating are to be cut straight and where practical are to terminate at an existing weld.
- 11.2.F.2.12 Humidity, surface, and ambient temperatures must be monitored and always recorded during coating operations. All this data must be made available for the owner's representative for review upon request.
- 11.2.F.2.13 An ongoing general cleanup of debris and blast grit in way of work areas must be conducted by the contractor in a timely fashion.

11.2.F.3 Surface preparation

- 11.2.F.3.1 The Contractor is to remove the entire hull coating surface from the keel to the rail on top of bulwark.
- 11.2.F.3.2 All areas subject to surface preparation will be solvent cleaned to SSPC SP1.
- 11.2.F.3.3 Abrasive blast all tightly adhered coated surfaces to be coated in accordance with new paint chosen, NACE no 2 / SSPC SP 10 /SA 21/2 to receive a surface profile.
- 11.2.F.3.4 Surface preparation profile must comply at all time with the coating manufacturer specification.
- 11.2.F.3.5 Surfaces that have been blasted must be properly cleaned with oil free compressed air before coating.
- 11.2.F.3.6 Precautions must be taken to prevent any rusting or flash rusting before coating. In case of rusting, the surface must be prepared again to comply with the surface preparation needed in this specific area. Dispositions must be taken to prevent as much as possible this kind of problem.
- 11.2.F.3.7 Surface preparation describe in this section is the minimal requirement. If required minimal surface preparation is higher for a coating according to the Technical Data Sheet, then the latter must be followed.

11.2.F.4 Application

- 11.2.F.4.1 All coating work will be done by airless spray application.
- 11.2.F.4.2 All coatings will be applied as per instructions supplied by the coating manufacturer applicable data sheets.
- 11.2.F.4.3 All areas in-accessible to spray application will be coated by brush for each coating in the specified system. These exceptions would be discussed with the Coating Certified Inspector of the Owner, prior to coating works.
- 11.2.F.4.4 Areas in each coat of the specification not meeting the minimum DFT will be subject to further application of the same coating to bring it to the specified thickness.
- 11.2.F.4.5 Care shall be taken during coating application to achieve the minimum dry film thickness (DFT) over the entire surface in accordance with SSPC-PA2. Avoid dripping and sagging during application. In the event of non-compliance, if the overcoating window is exceeded, the affected area shall be re-prepared, per

11.2.D.3 If permitted by the paint manufacturer, an additional coat may be applied to achieve the minimum DFT.

11.2.F.4.6 In the case of any kind of defects, corrections must be made properly prior the application of a further coat. In the case of a topcoat, this last need to be corrected prior to the acceptance of the section by the NACE certified inspector of the Owner.

11.2.F.4.7 Allow the proper curing period as indicated on the coating manufacturer specification prior the next coat, operation.

11.2.F.4.8 Allow the proper curing period as indicated on the coating manufacturer specifications prior to launched the vessel back at water.

11.2.F.5 Draft Marks and symbolisation

11.2.F.5.1 Cover all the draft marks in white (paint general to precise). It includes the followings:

Reference document : 30000-SF

Name of the vessel port side)

Name of the vessel ahead, starboard side

Name of the vessel aft

Identification at the back

Inscription "COAST GUARD / GARDE CÔTIÈRE" (on the stern of the vessel)

The Canadian flag (on the stern of the vessel)

The inscription "Fisheries and Oceans Canada / Pêches et Océans Canada" (on the stern of the vessel)

Any others deemed necessary.

11.2.F.6 Products

11.2.F.6.1 **Green Hull Paint Criteria.**

Mandatory criteria	Painting 1 Yes / No	Painting 2 Yes / No	Painting 3 Yes / No	Painting 4 Yes / No
1. Have a certification from a classification society recognized in Canada Ex: ABS, BV, DNVGL etc ...				
2. Free from heavy metals, such as zinc, copper and lead.				
3. Be safe for aquatic species				
4. Without biocides, but with protection against algae and molluscs.				
5. Can be applied with a paint gun (airless) and a brush.				
6. Must have proven protection for cavitation.				
Criteria with score, 10 pts, 5 pts, 1 pt				
7. Need as few coats as possible; 1-2 = 10pts, 3-4 = 5pts,				
8. Total dry application thickness; 1000 microns and more = 10 pts, 999 and less = 5 pts				
9. The lowest drying time between coats; 10 pts for the best, 5 pts for the second and a point for the following ones.				
10. Application temperature in celcius; 0 and less = 10pts, 1-5 = 5pts, 6 and more 1pt				
11. Must be flexible waterproof and ice resistant; 10pts				
12. Quantity of application product required; 1-2 = 10pts, 3-4 = 5pts				
13. Estimated durability with evidence; over 20 = 10pts, 10 to 19 = 5pts, 1-9 years 1 pt				
14. Surface repair; Pressure machine = 10pts, mechanical = 5pts, sandblast = 1pt				
15. Manufacturer's warranty; 10 years and over = 10pts, 5 to 9 years = 5 pts, 1 to 4 years = 1pt				
16. Provide a study on fuel economy; 10 pts				

17. Provide a letter of recommendation from clients; 10 pts				
Total				

- 11.2.F.6.2 Coatings must be approved by the owner's representative, the manufacturer and the NACE inspector prior to drydocking and inspection of the vessel to ensure compliance with the foregoing criteria a maximum of \$30,000 is allowed for coating
- 11.2.F.6.3 The coatings shown in the specification are for reference only, these can be used as well as any other manufacturers coating.
- 11.2.F.6.4 Each new coating proposed by the contractor must be endorsed by the Owner as well as the NACE certified inspector, the TA, the TCMS inspector. It also needs to be at least as most effective and durable as the product in place. Finally, if it needs to be merge with an existing coating, the compatibility needs to be approved by a competent representative.
- 11.2.F.6.5 Thickness in accordance with the supplier specification (exception if some sections that may need thicker coat, e.g., bow thruster tunnel, rudders, etc).
- 11.2.F.6.6 See the table in the annex to know which product is currently in place for each sections of the vessel. *Note that the coating is not limited to AkzoNobel International. Coatings in table are for reference of performance criteria only. Any other coating from other brand can be submitted if the product offers a performance at least as much as the one in place. **Note that every new coating should be approved by a Certified Coating Representative of the Owner, the Owner, the TA, and the TCMS inspector.
- 11.2.F.6.7 Existing Paint (see table in annex).

11.2.F.7 Equipment

- 11.2.F.7.1 The Contractor will provide all abrasives, transportation, labour, and equipment necessary for the surface preparation and application of each coating in the paint scheme.
- 11.2.F.7.2 The Contractor is to submit a list of equipment and materials (i.e., grit type etc.) that he intends to use to complete this project.

- 11.2.F.7.3 The Contractor must provide all scaffolding, platforms, crane services, grills, lighting systems, cherry pickers and other services and equipment necessary to perform the work in this specification, including inspections by ABS and the Technical Authority.
- 11.2.F.7.4 The Contractor must provide the services of a telescopic boom lift for inspection of Nace inspectors.

11.2.F.8 COATING SCHEDULE

- 11.2.F.8.1 The contractor shall provide a coating schedule to the TA and inspectors, which shall follow the manufacturer's data sheet during surface preparation, coating, curing, and more if required. It shall be approved by the owner.
- 11.2.F.8.2 The area to be painted is from the keel to the 3.4 m waterline and from there to the top of the boat, including the items in 11.2.B1.1 Estimate area of top side coating is 395 m2.
- 11.2.F.8.3 Leim price sheet

Area	Total surface area	Estimate to be redone %	Price
Sand Blast Sspc10/SA 2.5	395 m2	100	
Marking	11 m2	100	
Underwater Hull at draft line	220 m2	100	
Top side	175 m2	100	

11.2.G Proof of Performance

11.2.G.1 Inspection Points

- 11.2.G.1.1 During the paint process each inspection will be done with the Coast Guard NACE inspector and the Yard's third party NACE inspector. A report will be presented to the Technical Authority after each inspection.
- 11.2.G.1.2 A paint pre job meeting will be held onboard the vessel between the Contractor, applicable ships staff, quality assurance of the contractor, and Owners Representative before start of project both the yard's and coast guard's NACE inspector must attend. Minutes of the meeting must be taken by the Contractor and given to technical authority 3 days after the meeting. This meeting will take place before the initial hull inspection, once the hull fresh water cleaning is completed.
- 11.2.G.1.3 The Contractor must provide a quality assurance report indicating all locations mentioned in this specification that have been inspected by the Contractor's Quality Assurance Department including all locations where failures have been discovered and require correctives actions.
- 11.2.G.1.4 The Contractor must test for Chlorides for each item in the coating schedule on an "ongoing" basis and chloride levels must be acceptable for the coating used.
- 11.2.G.1.5 The Contractor is maintain quality assurance through the paint process and document the application process. to retain the services of an inspector accredited by NACE/SSPC/AMPP level 2 minimum who will ensure that the surfaces are prepared and coated in accordance with the manufacturer's instructions.
- 11.2.G.1.6 The Contractor must provide a report of the conclusions, completed work and final status of the work. The Contractor must provide a written report in electronic form no later than five days after the Work.
- 11.2.G.1.7 The contractor must provide the technical authority with a coating application report, completed by the yard's third party NACE, containing all information on the contractor's coating application process. The report must include the environmental conditions, (before, during, and after) coatings were applied and the parts of the hull on which they were applied. Information includes, but is not limited to, dry and wet thermometer temperatures, relative humidity, dew point and times when painting was started and completed. The temperature of the product at the time of application and the wet and dry film thickness gauge readings must also be recorded.

11.2.G.2 Inspection

- 11.2.G.2.1 Sandblast and surface preparation must be accepted by the Coast Guard Nace representative before any paint is applied.
- 11.2.G.2.2 The minimum specified coating dry film thickness will be achieved. The inspection must meet the target DFT: 90/10/85. i.e., 90 percent of the DFT measurements must meet or exceed the target DFT, and 10 percent may be less, but that 10 percent must be at least 85% of the target DFT.
- 11.2.G.2.3 Humidity, surface, and ambient temperatures must be monitored and always recorded during coating operations. All this data must be made available for the Owner's Representative for review upon request. The Contractor must provide written documentation showing what conditions range the paint application process will continue or stop.
- 11.2.G.2.4 All blasting and coating will be inspected by the Contractor's Nace and Coast Guard Nace as per Contractor's submitted Quality Assurance plan.
- 11.2.G.2.5 Surface profile will be measured by the Contractor in accordance with NACE RP0287-95.
- 11.2.G.2.6 Each coat in the coating system will be inspected to SSPC PA2. However additional DFT readings are required if unsatisfactory conditions are found.
- 11.2.G.2.7 Hold point. The Coast Guard Nace must witness application of the Stripe coating. The Coating will be applied as per SSPC PA 11.
- 11.2.G.2.8 All coating or specification related defects noted by the Contractor or Owner that may develop during the project will be repaired in a timely fashion, before the next Contractor invoice and where applicable, as per the Coating Manufacturers written recommended coating repair procedures.
- 11.2.G.2.9 The full curing period of the coating must be respected and record as per the supplier technical data sheet TDS.
- 11.2.G.2.10 A NACE Inspector will be mandated and paid by the CCGS to supervise and inspect the painting work. The inspector must be present at times deemed critical by the TA, the Contractor will be responsible for planning and informing the inspector and the TA at least 48 hours in advance when these times approach.
- 11.2.G.2.11 All work must be performed to the satisfaction of the Chief Engineer, the Coast Guard Representative, and the NACE inspector. During and after each phase

of this work, the contractor must plan and permit the inspection and presence of the NACE inspector who must be mandated by the Coast Guard to supervise the work.

11.2.G.2.12 The contractor must have the surface preparation inspected and approved by the NACE inspector. The NACE inspector, in the presence of the technical authority, must ensure that all bare surfaces have been stripped to standard and that all rough edges of the current hull paint have been primed in accordance with the paint manufacturer's recommendations.

11.2.G.2.13 Surveys of paint coating thickness as well as the environmental conditions are to be recorded. The temperature of the hull, the temperature of the air and the levels of humidity are to be taken, among others.

11.2.G.3 Testing/Trials

11.2.G.3.1 The contractor must comply with all paint system application requirements. The contractor must record the ambient temperature and dew point temperature in the presence of the technical authority before each coat is applied. These readings must be recorded and presented in the final paint application report.

11.2.G.4 Certification

11.2.G.4.1 Qualification of the third-party site inspector: NACE / SSPC / AMPP level 2 minimum

11.2.G.4.2 Anti-fouling paint approbation must be approved by a classification society. If antifouling is needed with the chosen paint system.

11.2.G.5 Documentation

11.2.G.5.1 Surveys of paint coating thickness as well as the environmental conditions are to be recorded. The temperature of the hull, the temperature of the air and the levels of humidity are to be taken, among others.

11.2.G.5.2 Target spread sheet

Following the coordinated inspection between the NACE from the shipyard and the Coast Guard hired NACE, a target spread sheet must be provided in 48 hours following the inspection. At a minimum the following items must be present

1. Item No.
2. Area Type (under water, icebelt, top side, superstructure, deck)
3. Area Location
4. Area Sq.m.
5. No. of Measurement Points
6. Type of Surface Prep Required
7. Surface Prep Insp'n Target Date
8. Coating Material Content or Identification
9. First Coating Target DFT
10. First Coating Insp'n Target Date
11. Second Coat Target DFT
12. Second Coat Insp'n Target Date
13. The Contractor is to provide all necessary MSDS and Product data sheets for all Contractor supplied materials.

11.2.G.5.3 The contractor will submit a final detailed quality assurance report

11.2.G.5.4 The contractor must provide the technical authority with a coating application report, completed by the yards quality control team, containing all information on the contractor's coating application process. The report must include the environmental conditions, (before, during, and after) coatings were applied and the parts of the hull on which they were applied. Information includes, but is not limited to, dry and wet thermometer temperatures, relative humidity, dew point and times when painting was started and completed. The temperature of the product at the time of application and the wet and dry film thickness gauge readings must also be recorded.

11.2.G.6 Training

11.2.G.6.1 N/A

11.3 HULL VALVES

11.3.A.1 Identification

- 11.3.A.1.1 The contractor shall isolate, disassemble the valves listed in the reference table so as to facilitate inspection by the ABS inspector and provide an inspection report. The contractor shall assemble and test the valves after the vessel is re-floated.

11.3.B References

11.3.B.1 Valve table

No	Description	Valve number – drawing reference	Size	Location
1	High seachest suction – port. Globe valve, cast iron.	V001 - 73500RMM11 sheet 3 of 4	DN150 (6’')	Frame #23 E/R fwd, port side
2	High sea chest return – port. SDNR, cast iron.	V026 - 73500RMM11 sheet 3 of 4	DN80 (3’)	Frame #23 E/R fwd, port side
3	High sea chest vent – port. Ball valve, cast steel.	V042 - 70500RMM9, sheet 4 of 4.	DN40 (1 ½’)	Frame #23 E/R fwd, port side
4	High sea chest deicing/purge – port. SDNR, brass/bronze.		DN25 (1’)	Frame #23 E/R fwd, port side

5	Low sea chest suction – port. 90 degree globe valve, cast iron.	V-002 - 73500RMM11 sheet 3 of 4	DN150 (6’')	Frame #22 E/R fwd, port side, below deck plates
6	Low sea chest return – port. SDNR, cast iron.	V027 - 73500RMM11 sheet 3 of 4	DN80 (3’)	Frame #22 E/R fwd, port side, below deck plates
7	Low sea chest vent – port. Ball valve, cast steel.	V041 - 70500RMM9, sheet 4 of 4.	DN40 (1 ½’)	Frame #22 E/R fwd, port side, below deck plates
8	Low sea chest deicing/purge - port Globe valve, brass/bronze.		DN25 (1’)	Frame #22 E/R fwd port side, below deck plates
9	High seachest suction – stbd. Globe valve, cast iron.	V004 - 73500RMM11 sheet 3 of 4	DN150 (6’)	Frame #23 E/R fwd, stbd
10	High sea chest return – stbd. SDNR, cast iron.	V043 - 73500RMM11 sheet 3 of 4	DN80 (3’)	Frame #23 E/R fwd, stbd
11	High sea chest vent – stbd. Ball valve, cast steel.	V039 – 70500RMM9 sheet 4 of 4	DN40 (1 ½’)	Frame #23 E/R fwd, stbd
12	High sea chest deicing/purge – stbd. SDNR, brass/bronze		DN25 (1’)	Frame #23 E/R fwd, stbd
13	Low sea chest suction – stbd. 90 degree globe valve.	V003 - 73500RMM11 sheet 3 of 4	DN150 (6’)	Frame #22 E/R fwd, stbd, below deck plates

14	Low sea chest return –stbd. SDNR, cast iron.	V003 - 73500RMM11 sheet 3 of 4	DN80 (3’')	Frame #22 E/R fwd, stbd, below deck plates
15	Port manifold overboard discharge – 90 degree SDNR, cast iron.	V014 - 73500RMM11 sheet 3 of 4	DN150 (6’)	Frame #23 E/R fwd, port side
16	Stbd manifold discharge – 90 degree SDNR, cast iron.	V055 - 73500RMM11 sheet 3 of 4	DN150 (6’)	Frame #23 E/R fwd, port side
17	Port stern tube inlet – ball valve, cast steel.	V069- 73500RMM11 sheet 3 of 4	DN15 (1/2’)	Frame #12 E/R aft, port at stern tube
18	Stbd stern tube inlet – ball valve, cast steel.	V071 - 73500RMM11 sheet 3 of 4	DN15 (1/2’)	Frame #12 E/R aft stbd at stern tube
19	Bilge overboard discharge, SDNR, brass/bronze	V029 - 71500RMM5, sheet 4 of 4	DN50 (2’)	Frame #17 port, above vent duct at deck head
20	Black water overboard discharge, ball valve, cast steel	V019 - 8300RMM16, sheet 3 of 4	DN40 (1 ½’)	Frame #17 stbd above vent duct at deck head
21	Black water overboard discharge, check valve, brass/bronze	V018 - 8300RMM16, sheet 3 of 4	DN40 (1 ½’)	Frame #17 stbd above vent duct at deck head
22	Grey water overboard discharge, ball valve, cast steel	V059 – 8300RMM16, sheet 4 of 4	DN40 (1 ½’)	Frame #17 stbd above vent duct at deck head

23	Grey water overboard discharge, check valve, brass/bronze	V058 – 8300RMM16, sheet 4 of 4	DN40 (1 ½’')	Frame #17 stbd above vent duct at deck head
24	OWS overboard discharge, SDNR, brass/bronze	V029 – 75000RMM5	DN15 (1/2’')	Frame #14 port above hydraulic tank at deck head
25	Seawater chiller coolant pump suction, ball valve, cast steel	V001 – 82000RMM5 sheet 3 of 3	DN50 (2’')	Frame #7, center, aft of doorway, below deck plates
26	Live catch seawater supply pump suction, ball valve, cast steel	V005 - 82000RMM5 sheet 3 of 3	DN50 (2’')	Frame #7, center, aft of doorway, below deck plates
27	Aft sea chest vent, ball valve, cast steel	V038 – 70500RMM9, sheet 4 of 4	DN40 (1 ½’')	Frame #7, center, aft of doorway, below deck plates
28	Aft sea chest de-icing/purge, SDNR, brass/bronze		DN25 (1’')	Frame #7, center aft of doorway, below deck plates
29	Seawater chiller coolant pump overboard discharge, SDNR, brass/bronze	V053– 70500RMM9, sheet 4 of 4		Frame #4, port, outboard of potable water tank, at deck head
30	Dry lab floor drain overboard discharge, ball valve, cast steel	V002 – 83200RMM14, sheet 3 of 3	DN50 (2’')	Frame # 14, port, above hydraulic tank, at deck head

31	Dry lab floor drain overboard check valve, brass/bronze	V001 – 83200RMM14, sheet 3 of 3	DN50 (2’')	Frame # 14, port, above hydraulic tank, at deck head
32	TrackLink 1500 HA transducer housing vent valve	21260RMM6, sheet 3 of 10	DN25 (1’)	Frame # 24, center, accommodations, below deck
33	Simrad 120kHz transducer housing vent valve	21260RMM6, sheet 3 of 10	DN25 (1’)	Frame # 25, center accommodations, below deck
34	WASSP transducer housing vent valve	21260RMM6, sheet 3 of 10	DN25 (1’)	Frame # 25, center accommodations, below deck
35	Simrad 38kHz transducer vent valve	21260RMM6, sheet 3 of 10	DN25 (1’)	Frame # 26, center accommodations, below deck
36	ADCP transducer glycol/water header tank connection valve	21260RMM6, sheet 3 of 10	DN25 (1’)	Frame # 27, center accommodations, below deck

11.3.B.2 Drawings

Drawing number	Drawing title	Number of sheets
ISV22-30000MM13	General arrangement	6 sheets
ISV22-73500RMM11	Cooling Water System Diagram	4 sheets

ISV22-71500RMM5	Bilge, ballast, and fire	4 sheets
ISV22-8300RMM16	Black, grey water system	4 sheets
ISV22-8200RMM5	Chilled sea water system	3 sheets
ISV22-75000RMM5	Sludge-oily water	3 sheets
ISV22-70500RMM9	Fill, vent and sounding	4 sheets
ISV22-83200RMM4	Scuppers and drains	3 sheets
ISV22-21260RMM6	Transducer housing	10 sheets

11.3.B.3 Regulations

11.3.B.3.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)

11.3.B.3.2 Marine Machinery Regulations (SOR/90-264)

11.3.B.3.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)

11.3.C Statement of work

11.3.C.1 General

11.3.C.1.1 The contractor must coordinate the work of this section with that of the other sections of this specification. Where the hull valves are removed and the hull blasting is being performed, the contractor shall ensure that no debris from the blasting or excessive spraying of paint enters the system from which the valves have been withdrawn. The contractor must also ensure that no debris from blasting or excessive spraying enters the machinery compartment.

11.3.C.1.2 The Contractor shall mark and then label all valves and associated parts so that they are readily identifiable once they have been removed from the vessel. The contractor must physically disassemble the valve body and clean all components listed in the equipment data section. Valves should be displayed so that the ABS inspector can inspect them. Proof of inspection and report must be obtained for all valves listed.

- 11.3.C.1.3 The contractor shall grind all discs and valve seats as required. A final lapping will be carried out to ensure that the entire surface of the valve discs completely touches the surface of the seat.
- 11.3.C.1.4 The contractor shall machine the discs, seats and valve stems as required. The contractor must submit a quotation for the provision of 25 hours of machining which will be adjusted upward or downward using form 1379.
- 11.3.C.1.5 The contractor shall reassemble the valves to the hull and provide new seals and gaskets. All valves must be installed and kept in the closed position. All temporary labels placed by the contractor must be removed at the end of the work.

11.3.D Proof of performance

11.3.D.1 Inspection points

- 11.3.D.1.1 The contractor must report all valves that are no longer usable as soon as possible to the CCG TA to avoid any delay in launching the vessel.
- 11.3.D.1.2 The Contractor must allow the ABS Inspector and CCG TA to examine all disassembled valves.
- 11.3.D.1.3 During the re-floating of the vessel, the contractor shall provide sufficient personnel to ensure the control of potential leaks from the valves listed in section 11.3.B.1. When the depth of the water is sufficient, all closed valves will be opened to check for leaks. The contractor must ensure that the leaks are sealed before the end of the contract.

11.3.D.2 Tests and trials

- 11.3.D.2.1 The contractor must demonstrate to the Technical Authority that all valves function correctly.

11.3.D.3 Certification

- 11.3.D.3.1 The contractor must provide the ABS inspector with the work inspection documents provided for in this section.

11.3.D.4 Documentation

11.3.D.4.1 The contractor shall provide a report of the findings, work completed and the final status of work in this section.

11.3.D.4.2 The contractor must provide a detailed report of all work performed on the valves. This report should include information on machining and repairs (if required), as well as valves that have been serviced. The report should also include information on the valves that were replaced. The contractor must provide a certificate for each new valve.

11.3.D.5 Training

11.3.D.5.1 N/A

11.4 SEACHESTS

11.4.A Identification

11.4.A.1 The purpose of this specification is to open sea water intakes for cleaning, repainting and inspection by the attending ABS inspector.

11.4.B References

11.4.B.1 Location of seachests :

- High seachest port - Frames 19 to 20
- Low seachest port – Frames 18-19, inboard of high seachest port
- High seachest starboard- Frames 19 to 20
- Low seachest starboard – Frames 18-19, inboard of high seachest starboard
- Aft seachest – slightly starboard from center line, frames 7 to 8

Drawing number	Drawing title	Number of sheets
ISV22-73500RMM11	Cooling Water System Diagram	Pdf
ISV22-10130RMM12	TANK PLAN	Pdf
ISV22-8200RMM5	Chilled Sea Water Diagram	Pdf

11.4.B.2 Regulations

11.4.B.2.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)

11.4.B.2.2 Marine Machinery Regulations (SOR/90-264)

11.4.B.2.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)

11.4.C Statement of work

- 11.4.C.1 The contractor must remove the grills that cover the seachest inlets and clean them with a pressurized water jet. The contractor must clean the area where the grill was attached to the seachest water inlet. The contractor must also ream the grill holes back to their original diameter. The contractor must remove all dirt, scale and rust from the seachest water inlets..
- 11.4.C.2 In addition to Section 11.2, Hull Valves, of this specification, the contractor shall clean piping between the seachests and the hull valves, and inspect their condition. The contractor must replace damaged sacrificial anodes, according to section 11.6 of this SOW.
- 11.4.C.3 The contractor shall plug all the openings left by the removal of the valves to allow shot blasting of the chests and grills of the vessel's seachest inlets. The contractor will provide a price for 1 m² of blasting to SSPC-SP10 / SA21 / 2, the final quantity will be adjusted using PSPC form 1379.
- 11.4.C.4 The contractor must apply the coating chosen in 11.1, it must be applied according to the recommendations and supervision of the NACE inspector:

Current paint system

- a) One coat of Intershield 300 (5 mils dry) on all exposed surfaces. There should be an overlap of 3 cm with the old coating.
- b) One coat of Intergard 263 gray (4 mils dry film) on all surfaces coated with a primer
- c) One full coat of Interclene 245NA black (6 mils dry film) on all primer coated surfaces.

11.4.D Proof of performance

11.4.D.1 Inspection points

11.4.D.1.1 All work must be completed to the satisfaction of the Chief Engineer and the CCG TA and ABS Inspector.

11.4.D.1.2 Preparation and painting work must be completed to the satisfaction of the NACE paint inspectors.

11.4.D.2 Tests and trials

11.4.D.2.1 The contractor must follow the instructions in section 11.1 for the thickness readings of the paint layers as well as for the environmental conditions.

11.4.D.3 Certification

11.4.D.3.1 For the coating follow section 11.2 .

11.4.D.4 Documentation

11.4.D.4.1 The contractor must prepare a report in accordance with the conditions of section 11.1 of this SOW.

11.4.D.4.2 The Contractor shall provide the Chief Engineer with hard copies of reports and checklists. The contractor also sends an electronic copy of all reports to the vessel's maintenance officer.

11.4.D.4.3 For the coating Follow section 11.2 .

11.4.D.5 Training

11.4.D.5.1 N/A

11.5 RUB STRAKE WORKS

11.5.A Identification

11.5.A.1 The Contractor must remove the existing rub strakes located on the port and starboard side of the main deck AFT and must modify the mounting channels and Trawl Guards in accordance with this specification and the references contained within.

11.5.B References

11.5.B.1 Equipment Data

- 11.5.B.1.1 Following all removal activities, the contract must extend and cap the existing six (6) Trawl Guards located AFT of Frame 8 on both the port and starboard sides of the vessel.



Figure 1: Existing Rub Strake and Trawl Guards (6 Pcs/side) P&S

- 11.5.B.1.2 The Contractor must remove, clean, modify and paint the existing port and starboard rubber fender mounting flanges.
- 11.5.B.1.3 The Contractor must replace the port side fender with 150x150 Fentek Square Rubber “SD-Series” (or equivalent).
- 11.5.B.1.4 Starboard side rubber fender shall be re-used.

11.5.B.2 Drawings and Documents

- 11.5.B.2.1 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE
F3065-2021-11.5	FENDERING MODIFICATION, 2021 REFIT
21010	STRUCTURAL ARRANGEMENT
Document Number	DOCUMENT TITLE

11.5.B.3 Regulations and Standards

11.5.B.3.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

	Title	Supplied by:
Standards		
EKME#3049715v6	CCG Welding Specification-eng (Apr 2020)	CCG
18-080-000-SG-003	CCG Paint and Coatings Std	
Regulations		
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
WorkSafe BC.	Occupational Health and Safety (OHS) Regulation http://www2.worksafebc.com/publications/OHSRegulation/Home.asp?_ga=1.6448368.352535453.1408987357	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

11.5.C Statement of Work

- 11.5.C.1 The Contractor must perform all removal activities specified in drawing 'F3065-2021-11.5' Sht. 2.
- 11.5.C.2 Prior to executing any removal activities involving hot-work, the Contractor must ensure that all bulkhead / deckhead deckhead lining and equipment located on the internal side of the hull / main deck has been stripped-back to a minimum of 350mm from affected areas. All materials shall be set aside for re-use. The Contractor must allow for removal / reinstallation of 6m² of insulation. All equipment removal / reinstallation shall be addressed by PWGSC 1379 arising procedure.
- 11.5.C.3 All items for re-use must be stored in a Contractor supplied facility. With the exception of the Rubber Fender removed from the Starboard side, all items must be protected from the weather.
- 11.5.C.4 Following removal of the Rubber Fender from the Starboard side, the Contractor must provide the TA the opportunity to inspect that the material state is suitable for re-use. If the material is unsuitable for re-use, the TA shall provide new GSM and/or a PWGSC 1379 arising, as required.
- 11.5.C.5 The Contractor must clean the Port and Starboard Rubber Fender Mounting Channels (ref. drawing F3065-2021-11.5 sht. 4), including the upper and lower flanges, to SSPC-SP10 to ensure the surface is free of visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products, and other foreign matter.
- 11.5.C.6 The Contractor must test the hull thickness within Rubber Fender Mounting Channels using Ultrasonic Testing (UT). The Contractor must allow for fifteen (15) test points on each side of the vessel. The Contractor must provide the TA with a report of the hull thickness testing and shall highlight any areas with material degradation greater than or equal to 10% of the original plate thickness (ref. drawing 21010 for hull plating). Any repairs required as a result of Non Destructive Examination (NDE) shall be addressed via the PWGSC 1379 arising procedure.
- 11.5.C.7 **The Contractor must perform the following steel modifications:**
- 11.5.C.8 The Contractor must fabricate and install extensions to each of the six (6) Trawl Guards, located on both the Port and Starboard sides of the vessel, in accordance with drawing F3065-2021-11.5 sheets 1, 3, 4, 5.
- 11.5.C.9 The Contractor must fabricate and install one (1) Split Pipe Rail, complete with end-caps, on both the Port and Starboard sides of the transom, in accordance with F3065-2021-11.5 sheets 3 & 4.

- 11.5.C.10 The contractor shall cut the rail and the fixed fender vis-à-vis the wet laboratory fish chute, the length will be the width of the chute plus 2 inches on each side.
- 11.5.C.11 All welding, Non-Destructive Testing (NDT), and acceptance criteria shall be in accordance with 'CCG Welding Specification-eng (Apr 2020)'. Each weld shall be subject to 100% Visual Inspection (VI) and 30% Magnetic Particle Inspection (MPI).
- 11.5.C.12 The Contractor must perform surface preparation and recoat all disturbed areas in accordance with the CCG Paint and Coatings Standard (same color as previous) and the paint manufacturer's instructions.
- 11.5.C.13 The Contractor must install new 150x150 Square Rubber Fender material supplied by GCC on the Port side and must re-use the existing material (removed at Para. 11.5.C.1) on the Starboard side in accordance with drawing F3065-2021-11.5 sheets 3 & 4. All hardware must be new 316SS CFM.
- 11.5.C.14 The Contractor must re-install all material removed as work-in-way in Para.11.3.C.2.

11.5.D Proof of Performance

11.5.D.1 Inspection Points

- 11.5.D.1.1 Following removal of the Rubber Fender from the Starboard side, the Contractor must provide the TA the opportunity to inspect that the material state is suitable for re-use. The Contractor must notify the TA following removal.
- 11.5.D.1.2 **HOLD POINT 1:** The Contractor must provide the TA the opportunity to witness the UT testing of the hull plating within the fender's mounting flange. A report of the hull plate thickness testing, taken at Para. 11.5.C.6 , must be provided to the TA prior to recoating the surface. The TA shall provide direction on any areas with material degradation greater than or equal to 10% of the original plate thickness.
- 11.5.D.1.3 **HOLD POINT 2:** Following removal, modification, and installation of all items described in this specification, the Contractor must provide the TA the opportunity to verify that the completed work has been carried out in accordance with the direction provided herein.

11.5.D.2 Testing / Trials

- 11.5.D.2.1 Testing associated with systems affect by removal activities at Para. 11.5.C.1 shall be carried out in accordance with the PWGSC 1379 arising procedure.

11.5.D.3 Certification

- 11.5.D.3.1 The Contractor must provide a copy of the welder's certification in accordance with the Documentation section of the General Notes. The welders must be qualified in accordance with CSA Standard W47.1 for the weld procedure used. The Contractor must supply copies of the welder's certification prior to commencement of work.
- 11.5.D.3.2 The Contractor must supply copies of certification of the NDT inspectors. The inspectors must be qualified to the Canadian General Standards Board (CGSB) Standard CAN/CGSB-48.9712-2014 (Qualification and Certification of Non-Destructive Testing Personnel), at Level 2 or higher.

11.5.D.4 Documentation

- 11.5.D.4.1 The Contractor must provide copies of the weld procedures in accordance with the Documentation section of the General Notes.
- 11.5.D.4.2 The Contractor must provide results of all weld inspections in accordance with the Documentation section of the General Notes.
- 11.5.D.4.3 The Contract must supply copies of all mill certifications for all structural steel used.
- 11.5.D.4.4 The Contractor must supply a final 'As Fitted' (redlined) copy of drawing F3065-2021-11.5.

11.5.D.5 Training

- 11.5.D.5.1 Not used. (or specify requirement)
- 11.5.D.5.2

11.6 ADDITIONAL TIME FOR STEEL AND ALUMINUM REPAIR AND WELDING

11.6.A Identification

- 11.6.A.1 The contractor must provide a price for 50 hours of diverse welding and steel repair work.
- 11.6.A.2 The price must be provided in linear feet. This work will be carried out to repair hull welds as required.

11.6.B References

11.6.B.1 Required competencies

- 11.6.B.1.1 Welders must have current and valid qualification cards as indicated in section G.1.4.5. Welders must have a minimum of three (3) years experience of performing welding work on marine vessels.

11.6.B.2 Drawings

- 11.6.B.2.1 All drawings are indicated in the General Remarks section of this SOW. The drawings in the following list are to be used as reference.

Drawing number	Drawing title	Number of sheets
	N/A	

11.6.B.3 Regulations and guidelines

	Title	Supplied by:
Standards		
EKME#3049715v6	CCG Welding Specification-eng (Apr 2020)	CCG
18-080-000-SG-003	CCG Paint and Coatings Std	
Regulations		
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor

WorkSafe BC.	Occupational Health and Safety (OHS) Regulation http://www2.worksafebc.com/publications/OHSRegulation/Home.asp?_ga=1.6448368.352535453.1408987357	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

11.6.C Statement of work

- 11.6.C.1 Grinding, Travaux de meulage, oxy-fuel cutting and arc welding of steel and aluminum (50 hrs).
- 11.6.C.2 Bulkhead penetrations, piping repair, deck repair as required.
- 11.6.C.3 Repair of existing hull welds as required following the hull inspection as described in section 11.1.
- 11.6.C.4 In conjunction with the CCG TA, the contractor must plan the work so that a maximum is completed during the work allotted work period for the contract, thereby avoiding lost time and for vessel mobilisation.
- 11.6.C.5 All work must be approved by the CCG TA and the worker's hours approved by either the CCG TA or the vessel's chief engineer.
- 11.6.C.6 The hourly rate charged for any hours if there are additional hours, or hours that need to be credited to the contractor will be calculated prorata.
- 11.6.C.7 Costs for all material used, not supplied by the CCG will be paid for with a PWGSC form 1379.

11.6.D Proof of performance

11.6.D.1 Inspection points

- 11.6.D.1.1 All work must be carried out to the satisfaction of the CCG TA, the vessel's chief engineer, and the attending ABS inspector.

11.6.D.2 Tests and trials

- 11.6.D.2.1 Liquid test penetrant NDT will be required depending on the type of work carried out.

11.6.D.3 Certification

- 11.6.D.3.1 Copies of welder certification cards must be provided to the CCG TA and vessel's chief engineer.

11.6.D.4 Documentation

- 11.6.D.4.1 A written report, in electronic format, detailing all work carried out must be provided to the CCG TA and vessel's chief engineer.

11.6.D.5 Training

- 11.6.D.5.1 N/A

11.7 SACRIFICIAL ANODES**11.7.A Identification**

- 11.7.A.1 The Contractor must replace all the eroded and missing sacrificial anodes on the exterior hull, bow thruster, rudder, rudder trunk, sea chest and water ballast tanks.

11.7.B References**11.7.B.1 Equipment Data**

- 11.7.B.1.1 There are eleven 2.5kg zinc sacrificial anodes on the rudder and thruster arrangement.
- 11.7.B.1.2 There are five 2.5kg zinc sacrificial anodes in the sea chest matching the rudder and thruster nozzle anodes.
- 11.7.B.1.3 There are twelve 10.4kg, Z22 anodes on the hull.
- 11.7.B.1.4 There are three 10.4kg, Z22 anodes in the water ballast tanks

11.7.B.2 Drawings and Documents

- 11.7.B.2.5 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE
ISV25-38400RMM3	Cathodic Protection Plan

ISV25-90520RMM4 - Rudder and Nozzle Arrangement	Rudder and Nozzle Arrangement
Document Number	DOCUMENT TITLE
N/A	

11.7.B.3 Regulations and Standards

11.7.B.3.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

	Title	Supplied by:
FSM Procedures		
DFO/5737	Fleet Safety Manual (Latest Edition)	CCG
Publications		
CT-043-EQ-EG-001-E	CCG Welding Specification	CCG
18-080-000-SG-003	CCG Paints and Coatings Standards	CCG
Standards	N/A	
Regulations		
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor
Workers' Safety & Compensation Commission work-safe regulation of the province or territory	http://www.ccohs.ca/oshanswers/information/wcb_canada.html	Contractor

where the work is performed		
-----------------------------	--	--

11.7.B.4 Safety Statements

- 11.7.B.4.1 The Contractor must adhere to, as a minimum, Fleet Safety Manual (DFO/5737), 7.B.5 – Lock-out and Tag-out for the mechanical and electrical isolations associated with this specification item. All isolations must be verified by the TA prior to the work commencing and all work must be verified by the TA prior to removal.
- 11.7.B.4.2 Prior to performing any hotwork, the Contractor is responsible to verify all affected areas have been certified safe for hotwork by a competent person. The Contractor must be responsible for the arranging and cost of any such person required for this specification item.

11.7.C Statement of Work

- 11.7.C.1 The Contractor must supply all materials and equipment, including staging or aerial platforms to perform the specified work.
- 11.7.C.2 The Contractor must provide the TA safe access to inspect the condition of the existing anodes and decide the final number of anodes that need to be replaced.
- 11.7.C.3 The Contractor must cut off and properly dispose of the sacrificial anodes and mounting brackets on the hull, rudder, rudder trunk, sea chests and sea bays, etc. all old straps must be removed from the hull and ground flush.
- 11.7.C.4 The wasted or missing anodes must be replaced with new anodes. All new anodes must be affixed in the same locations as the removed anodes prior to hull coating. The anodes must be protected during hull painting and the protection is to be removed prior to refloating. Any new anodes that are covered with coating are to be renewed at the Contractor's expense.
- 11.7.C.5 Any disturbed steel work must be coated as per the paint scheme in the area.
- 11.7.C.6 The Contractor must quote on supplying and installing eleven, 2.5kg steel strapped bar anodes as described in attached Nozzle and Rudder Arrangement drawing. Contractor shall quote on the cost of a single anode for adjustment purposes by PWGSC 1379

action. A unit price per anode replacement is to be included in the pricing data sheet. The unit price includes welding, grinding, and coating touch up.

- 11.7.C.7 The Contractor must quote on supplying and installing fifteen Z22 10.4kg steel strap zinc anodes and five 2.5kg zinc anodes as described in attached ISV25-38400RMM3 - Cathodic Protection Plan. Contractor must quote on the cost of single anodes for adjustment purposes by PWGSC 1379 action. A unit price per anode replacement is to be included in the pricing data sheet. The unit price includes welding, grinding, and coating touch up.

11.7.D Proof of Performance

11.7.D.1 Inspection Points

- 11.7.D.1.1 **HOLD POINT 1:** The Contractor must notify the TA upon completion of this work item to afford the TA the opportunity to verify the work has been completed as detailed in this section.
- 11.7.D.1.2 The Contractor must provide the TA safe access to inspect the installation at the completion of the work. Safe access is to be defined as touching distance, either by scaffolding or cherry-picker.
- 11.7.D.1.3 **HOLD POINT 2:** Verification of this work must be completed before the Sea Chests and Sea Bays are boxed up.

11.7.D.2 Testing / Trials

- 11.7.D.2.1 The Contractor must complete visual inspection of 100% of the welds.

11.7.D.3 Certification

- 11.7.D.3.1 The Contractor must provide a copy of the welder's certification in accordance with the Documentation section of the General Notes. The welders must be qualified in accordance with CSA Standard W47.1 for the weld procedure used.

The Contractor must supply copies of the welder's certification prior to commencement of work.

- 11.7.D.3.2 The Contractor must supply copies of certification of the NDT inspectors. The inspectors must be qualified to the Canadian General Standards Board (CGSB) Standard CAN/CGSB-48.9712-2014 (Qualification and Certification of Non-Destructive Testing Personnel), at Level 2 or higher

11.7.D.4 Documentation

- 11.7.D.4.1 The Contractor must provide copies of the weld procedures in accordance with the Documentation section of the General Notes.
- 11.7.D.4.2 The Contractor must provide results of all weld inspections in accordance with the Documentation section of the General Notes.
- 11.7.D.4.3 The Contractor must supply final As Fitted drawings, in accordance with the Documentation section of the General Notes, for the following drawings ...
- 11.7.D.4.4 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 the TA. All checklists and reports must be delivered at least 14 days prior to scheduled refit end date.
- 11.7.D.4.5 The Contractor must provide a copy of the Product Data Sheets and Safety Data Sheets for the anodes provided to the TA and Chief Engineer.

11.7.D.5 Training

- 11.7.D.5.1 Not used.

11.8 WET LAB ENCLOSURE

11.8.A Identification

The Contractor must render the existing Wet Lab, located on the Starboard side of the Main Deck between Frames 13 – 18, watertight by performing the following activities:

Removal and modification of the outboard bulkhead stiffeners and deckhouse plating between Fr. 13 – 18, including installation of a watertight hatch;

Removal of redundant hand rail at Fo'c'sle Deck;

Relocation of HVAC intake at Fr.18 to Fr. 13 Fo'c'sle Deck;

Relocation of fuel fill valves V-024 and V-25 aft of Fr. 13;

Relocation of Wet Lab floor and sink drain lines to ship's grey water tank;

Relocation of Sea Chest Vent at Fr. 18 to to Fo'c'sle Deck;

Modification to existing Offal Chute located between Fr 17-18 and incorporation of a electrically operated, spring-return knife valve;

Modification to existing electrical system to accommodate electrically operated knife valve in Offal Chute and wet lab ventilation;

Installation of wet lab ventilation Fo'c'sle Deck, Fr. 17

Installation of deck insert at Fo'c'sle Deck, Fr. 18, and

Installation of a Watertight Bulkhead (WTB) and Watertight Door (WTD) at FR.13.

11.8.B References

Equipment Data

11.8.B.1.1 The Contractor must complete visual inspection of 100% of all welds.

11.8.B.1.2 The Contractor must complete Ultrasonic Testing of 100% of plate welds with special attention paid to the corners.

11.8.B.1.2 The Contractor must perform Magnetic Particle Testing of 100% of the frame and stiffener joining welds.

Drawings and Documents

11.8.B.1.3 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE
30000	GENERAL ARRANGEMENT – 22m, REV 14 (REFERENCE ONLY)
21010	STRUCTURAL ARRANGEMENT – 22m, REV 10 (REFERENCE ONLY)
81510	HVAC DUCTING DIAGRAM – 22m, REV 7 (REFERENCE ONLY)
71000	FUEL OIL DIAGRAM SYSTEM, REV 9 (REFERENCE ONLY)
400164-001	WATERTIGHT BHD, FR 13, STRUCTURE, REV '1'
400164-002	WT ENCLOSURE AT STBD DECKHOUSE, REV '-'

400164-003	WATERTIGHT BHD, FR 13, DETAIL DWG, REV ‘-‘
400164-004	WT ENCLOSURE AT STBD DECKHOUSE, DETAIL DWG, REV ‘-‘
83000	BLACK GREY WATER SYSTEM, REV 17
83200	SCUPPERS AND DRAINS, REV 5
81510	HVAC DUCTING DIAGRAM, REV. 8
400164-005	RELOCATION, FUEL FILL VALVES & SPILL COAMINGS, REV ‘-‘
400164-006	RELOCATION OF STBD SEA CHEST VENT, FR 18, REV ‘-‘
400164-007	MODIFICATION, OFFAL CHUTE
400164-008	INSTALLATION OF WET LAB VENTILATION
400164-011	FOC’SLE DECK INSERT, FR. 18
400164-009	FR. 13, STRIPOUT DRAWING
400164-010	STBD DECKHOUSE, STRIPOUT DRAWING
009-60000	ELECTRICAL ONE LINE DIAGRAM
70500	FILL, VENT, AND SOUNDING, REV. 10

Regulations and Standards

11.8.B.1.4 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

	Title	Supplied by:
Standards		Contractor
TP 7301E	Stability, Subdivision, and Load Line Standards	Contractor
TP 127E	Ships Electrical Standards	
EKME#3049715v6	CCG Welding Specification-eng (Apr 2020)	CCG
18-080-000-SG-003	CCG Paint and Coatings Standard	CCG
Regulations		
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
WorkSafe BC.	Occupational Health and Safety (OHS) Regulation http://www2.worksafebc.com/publications/OHSRegulation/Home.asp?_ga=1.6448368.352535453.1408987357	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

11.8.C Statement of Work

General Notes

- 11.8.C.1.1 Prior to the commencement of work, the Contractor must arrange an onboard meeting with CCG and ABS to review the scope of work and confirm all necessary Hold Points and Inspection Points.
- 11.8.C.1.2 Prior to commencing any work, the Contractor must install /remove locks and tags accordingly during the scope of work. The vessel's TA will assist the Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. The Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the TA must be in attendance when all locks/tags are removed.
- 11.8.C.1.3 The Contractor must provide a fire watch for the duration of the hot work. There must be a firewatch for all compartments being affected by the hotwork zone during the hot work. The fire watch must remain in place during cool down periods for a minimum of 30 minutes.
- 11.8.C.1.4 The Contractor must certify any spaces affected by the hot work as "safe for entry" and "safe for hot work", and maintain certification for the duration of the work.
- 11.8.C.1.5 The Contractor must follow the standards and repair methods outlined in International Association of Classification Societies (IACS) No. 47 Shipbuilding and Repair Quality Standard.
- 11.8.C.1.6 All welding, Non-Destructive Testing (NDT), and acceptance criteria shall be in accordance with 'CCG Welding Specification-eng (Apr 2020)'.
- 11.8.C.1.7 For all deck enclosure work, the Contractor must provide the TA with a Weld Design Schedule and Welding Sequence Plan approved by ABS in advance of the steel replacement work being commenced. This exact area to be included in this plan must be informed by Condition Assessment and Inspection by the TA and ABS in Section **Error! Reference source not found..**
- 11.8.C.1.8 Each Weld Design Schedule and Welding Sequence Plan is to include detailed drawings of materials to be cut out, detailed drawings of the materials to be inserted, details of preheating, detailed plans for the sequence of welds that show the order welds must occur, the direction of travel, the length of each weld pass and the number of passes required to complete.

11.8.C.1.9 Generic weld pass test procedures will not be considered equivalent to a welding plan from the Contractor.

11.8.C.1.10 The Weld Design Schedule and Welding Sequence Plan must follow CSA W59 standards for symbols.

11.8.C.1.11 The Weld Design Schedule must detail the following:

- a) Welding procedure;
- b) Base metals type and thickness;
- c) Filler Metals;
- d) Electrodes;
- e) Welding Position;
- f) Preheat;
- g) Heat Treatment and Stress Relieving;
- h) Electrical Characteristics;
- i) Welding Technique,
- j) Preparation of Base Material
- k) Weld Quality;
- l) Weld Metal Cleaning;
- m) and Treatment of Underside of Welding Groove.

11.8.C.1.12 The Welding Sequence Plan must be a scale drawing of the insert and detail the following:

- a) HAZ Hardness Control Method being applied;
- b) Start point and stop point of each route pass;
- c) Minimum rest period (in minutes) between welding passes to allow for heat dissipation;
- d) Location of jigs, clamping devices, strong backs, etc. for securing the insert in place;
- e) Details of transition between plate butt joints and framing welds;
- f) Start and stop points for layering passes;
- g) Details of techniques to be used for layering passes (i.e. backstep, block, cascade, etc.)
- h) Details of welding sequence at intersecting butts and seams.

Removal Items

11.8.C.1.13 Prior to executing any modification or installation activities involving hot-work, the Contractor must ensure that all bulkhead / deckhead lining and equipment located within all adjacent compartments has been removed to a minimum of 350mm

from heat affected areas. All materials shall be set aside for re-use. The Contractor must allow for removal / reinstallation of 6m² of insulation. All equipment requiring removal / reinstallation shall be addressed by PWGSC 1379 arising procedure.

11.8.C.1.14 All items for re-use must be stored in a Contractor supplied facility protected from the elements.

11.8.C.1.15 Any equipment damage resulting from hot work in an adjacent compartment / deck must be repaired at the Contractors expense.

11.8.C.1.16 The Contractor must remove and discard the existing (now redundant) inboard hand rail located at the Fo’c’sle Deck, Fr. 18 (ref. Figure 2). The Contractor must cut the hand rail approximately 12mm (1/2”) above the deck and grind flush while taking care to ensure parent deck material is not removed.



Figure 2: Redundant Handrail. Fo’c’sle Deck, Fr.18

Modification Items

11.8.C.1.17 The Contractor must remove and modify the stiffeners and deckhouse-plating at the outboard deckhouse between Frames 13 – 18, in accordance with drawing 400164-002, 400164-004 and 400164-010. All removed structure must be recycled.

11.8.C.1.18 The Contractor must specify, procure, and install a Watertight Hatch between Frames 14 – 15 in the newly modified bulkhead as shown in drawings 400164-002 and 400164-004. The watertight hatch must be:

of a watertight design in accordance with the applicable Class Society Rules and ISO Standards, and suitable for use on a watertight bulkhead;

at least 1000mm (39.4'') High x 1000mm (39.4'') wide;

fit with a single handle operation mechanism from the inside, and

equipped with a locking mechanism made to hold the door in the open and closed positions. Open position release mechanism must be accessible from within the wet-lab enclosure.

NOTE: The Contractor must provide the TA the hatch specification for approval prior to purchase.

11.8.C.1.19 The Contractor must relocate the HVAC intake at Fr.18 to Fr. 13 at the Fo'c'sle Deck in accordance with drawing 81510 sheet 4. The Contractor must supply and install ducting material required. The Contractor must ensure that the total cross-section area of all duct modifications in equal-to or greater than that of the total existing intake grills.

11.8.C.1.20 The Contractor is to procure and install a new mushroom style closable vent at Fr. 13 at the Fo'c'sle Deck in accordance with drawing 81510 sheet 3 & 4. The mushroom vent must be closable, galvanized steel Bronswerk Marine BRW-416-001-P06C (or equivalent). Contractor to confirm diameter, in accordance cross sectional area determined at Para. 11.8.C.1.19, prior to purchase.

11.8.C.1.21 The Contractor must relocate fuel fill valves V-024 and V-25, drains, and spill coamings in accordance with drawing 400164-005.

11.8.C.1.22 The Contractor must relocate the Wet Lab floor and sink drain lines to ship's grey water tank in accordance with drawings 83000 and 53200.

11.8.C.1.23 The Contractor must relocate the Sea Chest Vent line located on the aft side of the Fr 18 bulkhead in accordance with drawing 400164-006.

11.8.C.1.24 The Contractor must specify, procure, and install a watertight, electrically operated, 12 inch diameter, spring return, stainless steel knife valve to be fitted in the newly installed outboard deckhouse per 400164-007.

Example of 12" Diameter Electrically Actuated Knife Gate Valve may be found here:

Sure Flow Equipment Inc.
5010 North Service Road

Burlington, Ontario L7L 5R5

Electric Actuator on 12” Dia. Knife Gate Valve:

<https://www.sureflowequipment.com/solution/electric-actuator-on-knife-gate-valve/>

NOTE: The Contractor must provide the TA and ABS the knife valve specification for approval prior to purchase.

- 11.8.C.1.25 The Contractor must modify the existing work station and offal chute located between Fr 17-18 and incorporate the newly procured knife valve for overboard discharge in accordance with drawing 400164-007.

Note: Drawing 400164-007 shows only a pictorial representation of the replacement Stainless Steel Work Station, sink, and Offal Chute. The Contractor must enlist the services of an Industrial Stainless Steel Fabricator to provide the design, manufacture (per best industry practices), and installation of the workstation. At a minimum the workstation must have:

- a. Space for two (2) persons to stand side-by-side;
- b. A faucet with hot and cold fresh water leading to Ships Grey Water system;
- c. Seawater water wash-down;
- d. Industrial sink;
- e. A work-top with smooth transitions to starboard side offal chute leading to newly installed discharge (knife) valve.

- 11.8.C.1.26 The Contractor must procure and install electrical push-button actuation for the discharge valve installed at Para. 11.8.C.1.25. The push-button must be suitable for an exposed marine environment and must be placed in close proximity to the wet-lab work station. The Contractor must select a ‘spare’ fuseway in the appropriate panel shown on drawing 009-60000 – Electrical One Line Diagram. Electrical installation must be in accordance with TP127E.

NOTE: The Contractor must provide the TA and ABS the push-button specification and location for approval prior to purchase and install.

Installation Items

- 11.8.C.1.27 The Contractor must install a Deck Insert in way of the legacy staircase at Fr. 18 (previously removed) in accordance with drawing 400164-011.

- 11.8.C.1.28 The Contractor must procure and install new wet lab ventilation, including gooseneck intake, deck penetration, and in-line fan in accordance with drawing 400164-008.
- 11.8.C.1.29 The Contractor must procure and install a manual closing louver, approx. 140x140 at frame 13 in accordance with drawing 400164-008, sheet 3.
- 11.8.C.1.30 The Contractor must procure and install an electrical switch for the in-line fan installed at Para. 11.8.C.1.28. The switch must be suitable for use in an exposed marine environment and must be placed within the enclosed wet-lab. The Contractor must select a 'spare' fuseway in the appropriate panel shown on drawing 009-60000 – Electrical One Line Diagram. Electrical installation must be in accordance with TP127E.
- 11.8.C.1.31 The Contractor must fabricate and install a Watertight Bulkhead (WTB), complete with opening for Watertight Door, at FR.13 in accordance with drawing 400164-001, 400164-003, 400164-009.
- 11.8.C.1.32 The Contractor must specify, procure, and install a Watertight Door at Fr. 13. The watertight door must be:
- of a watertight design in accordance with the applicable Class Society Rules (ABS) and ISO Standards, and suitable for use on a watertight bulkhead;
 - at least 1140mm (45'') High x 790mm (31'') wide;
 - fit with a single handle operation mechanism, and
 - equipped with a locking mechanism made to hold the door in the open and closed positions.
- NOTE:** The Contractor must provide the TA the hatch specification for approval prior to purchase.
- 11.8.C.1.33 The Contractor must perform surface preparation and recoat all new, modified, and disturbed areas in accordance with '18-080-000-SG-003 - CCG Paint and Coatings Standard' and the paint manufacturers instructions.
- 11.8.C.1.34 The Contractor must re-install all insulation and equipment removed as work-in-way in Para. 11.5.C.2 .

11.8.D **Proof of Performance**

Inspection Points

- 11.8.D.1.1HOLD POINT 1: Prior to modification and installation of items identified in Paras 11.8.C.1.17 and 11.8.C.1.31, the Contractor must line-out proposed locations and provide the TA the opportunity to confirm final placement of items.
- 11.8.D.1.2HOLD POINT 2: The Contractor must provide the TA the hatch and watertight door specifications for approval prior to purchase.
- 11.8.D.1.3HOLD POINT 3: For each test identified in Section D.2, the Contractor must provide the TA and ABS representative (as required) the opportunity to witness the tests. The Contractor must provide both parties with 24 hours notice.
- 11.8.D.1.4HOLD POINT 4: Following re-installation of all insulation and equipment removed as work-in-way, the Contract must provide the TA with the opportunity to inspect and approve all re-instated items.

Testing / Trials

- 11.8.D.1.5Any testing activates associated with equipment removals identified at Para. 11.5.C.1 shall be carried out in accordance with the PWGSC 1379 arising procedure.
- 11.8.D.0.1The Contractor must perform a Chalk Test on the seals of both the new watertight hatch on the starboard side deckhouse between Fr. 13 – 18 as well as on the new watertight door at Fr. 13. The Contractor must ensure continuous contact on all seals. The TA and ABS Representative must be present for each test. A test with water must must be performed if requested by ABS.
- 11.8.D.0.2The Contract must test the relocated HVAC intake at the Fo’c’sle Deck by energizing the HVAC system and ensuring undisturbed flow through the intake. This may be achieved by covering the intake with a sheet of paper to prove adequate suction. The Contractor shall check each down-stream outlet to ensure no obstructions within the system and that all outlets are balanced. The Contract must adjust the system, as required, to ensure all outlets are balanced. The TA must be present for each test.
- 11.8.D.0.3The Contractor must demonstrate to the TA operation of the newly installed in-line fan at Fr. 17.
- 11.8.D.0.4The Contract must test the relocated fuel fill valves V-024 and V-25 by performing a pressure test at each of the CamLock filler connections, with the TA and ABS representative present, as follows:

Flush newly installed pipework with parent fluid to remove build debris until clean;

Pressure test pipework from fill valves to relief valve, transfer pump discharge valves, and manifold inlet valves to 1.5x working pressure.

11.8.D.0.5 The Contractor must test relocated Wet Lab floor and sink drain lines by pouring 40 liters of fresh water down each drain while examining for leaks below. The Contractor and TA must confirm the modified joints leak-free.

11.8.D.0.6 The Contractor must test the relocated Sea Chest Vent at the Fo'c'sle Deck by blowing air from the sea-chest through the vent. Undisturbed air flow must be witnessed by both the TA and ABS representative.

11.8.D.0.7 The Contractor must demonstrate to the TA the use of hot and cold water at the newly installed stainless steel work station. This demonstration must also include the use of seawater wash-down.

11.8.D.0.8 The Contractor must test the newly installed knife valve in the Offal Chute by demonstrating electrical actuation and uninterrupted automatic spring-return closure. This test must be witnessed by both the TA and ABS representative.

11.8.D.0.9 The Contractor must demonstrate watertight integrity of the newly installed discharge valve to the satisfaction of ABS. This test must be witnessed by both the TA and ABS representative.

11.8.D.0.10 The Contractor must demonstrate that the newly installed vent cowling at Fo'c'sle Deck, (Fr. 17), provides unobstructed air flow to the newly enclosed space. This test must be witnessed by both the TA.

Certification

11.8.D.1.6 The Contractor must provide a copy of the welder's certification in accordance with the Documentation section of the General Notes. The welders must be qualified in accordance with CSA Standard W47.1 for the weld procedure used. The Contractor must supply copies of the welder's certification prior to commencement of work.

11.8.D.1.7 The Contractor must supply copies of certification of the NDT inspectors. The inspectors must be qualified to the Canadian General Standards Board (CGSB) Standard CAN/CGSB-48.9712-2014 (Qualification and Certification of Non-Destructive Testing Personnel), at Level 2 or higher.

Documentation

11.8.D.1.8 The Contractor must provide copies of the weld procedures in accordance with the Documentation section of the General Notes.

11.8.D.1.9 The Contractor must provide results of all weld inspections in accordance with the Documentation section of the General Notes.

11.8.D.1.10 The Contract must supply copies of all mill certifications for all structural metals used.

11.8.D.1.11 The Contract must supply copies of all Class certification(s) associated with the newly installed Watertight Door.

11.8.D.1.12 The Contract must supply copies of all Class certification(s) associated with the newly installed Watertight Hatch.

11.8.D.1.13 The Contract must supply copies of all certification(s) associated with the newly installed electrically operated, spring-return knife valve located in the Offal Chute.

11.8.D.1.14 The Contractor must supply a final 'As Fitted' (redlined) copies of all drawings listed in Section 11.8.B.1.3. All drawings which do not require updates shall be marked 'INSTALLED WITHOUT CHANGE'.

Training

11.8.D.1.15 Not used. (or specify requirement)

11.9 INCLINING EXPERIMENT, TRIM AND STABILITY BOOKLET

11.9.A Identification

11.9.A.1 The Contractor must sub-contract a naval architecture firm to conduct a lightship survey, perform an inclining experiment on the ship and produce the resulting new Trim and Stability Booklet. The Contractor must produce an inclining experiment report and must submit it for ABS approval. The results from the inclining experiment must form the baseline for the Trim and Stability Booklet.

11.9.A.2 The inclining experiment must be done after the ship is undocked and after completion of all core work and all anticipated lightship weight changes.

11.9.A.3 The Contractor must record all weight movement within the vessel and all weight removed and added to the vessel as a result of the work.

11.9.A.4 The Inclining experiment and lightship survey must be carried out as directed by the attending ABS Surveyor and as described in the IMO International Code on Intact Stability, 2008 (2008 IS Code). This task involves moving a series of known weights, normally in the transverse direction, and then measuring the resulting change in the equilibrium heel angle of the vessel. By using this information and applying basic naval architecture principles, the vessel's vertical center of gravity KG will be determined.

11.9.B **References**

11.9.B.1 **Equipment Data**

11.9.B.1.2CCGS LEIM Stability Booklet 2013

11.9.B.1.3CCGS LEIM Stability Booklet 2015

11.9.B.2 **Drawings and Documents**

11.9.B.2.1 All ship's drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings.

Drawing Number	DRAWING TITLE
ISV22-38541RMM4	Draft Marks
ISV22-30002RMM3	Inboard Profile
ISV22-30000RMM13	General Arrangement
ISV22-10130RMM12	Tank Plan
ISV22-10010RMM12	Lines Plan

11.9.B.3 **Regulations and Standards**

11.9.B.3.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

Publications	Title	Supplied by:
MECTS-#3350860-v5	Trim and Stability Book Production	CCG
MECTS-#4052524-v1	Inclining Experiment and Lightship Survey Checklist	CCG

Standards	Title	Supplied by:
TP 7301E	Transport Canada: Stability, Subdivision and Load Line Standards, STAB 2 and STAB 6	Contractor
TP 10943	Transport Canada, Marine Safety, TP 10943, Part II Damage Stability	Contractor
2008 - IS Code	IMO International Code on Intact Stability, 2008 (2008 IS Code).	Contractor
Regulations	Title	Supplied by:
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

11.9.C Statement of Work

11.9.C.1 The Contractor must provide the manpower and certified weights to conduct a lightship survey and inclining experiment, in the presence of the ABS Surveyor, upon completion of the work and prior to vessel redelivery.

11.9.C.2 The Contractor's naval architect must prepare an inclining experiment procedure. The procedure must be submitted to ABS for review and approval at least 4 weeks prior to the planned date of the inclining experiment.

11.9.C.3 At the completion of the Inclining Experiment the Contractor must produce an Inclining Experiment Report which must be reviewed and approved by the Contractor's naval architecture firm, and must be submitted to the TA and ABS for review and approval.

11.9.C.4 The report must include as a minimum the following sections and subsections:

11.9.C.4.1 **Executive Summary**

11.9.C.4.2 **General**

- 1) References
- 2) General Information
- 3) Software
- 4) Coordinate System
- 5) Datum Locations
- 6) Hull Form

11.9.C.4.3 **Inclining Experiment**

- 1) Location and Date
- 2) Personnel Present
- 3) Vessel Mooring Arrangement
- 4) Water Depth
- 5) Vessel Condition
- 6) Bilges and Tanks
- 7) Weather Condition
- 8) Water Density and Temperature
- 9) Inclining Weights
- 10) Pendulum Location and Lengths
- 11) Freeboards and Derived Drafts (including photographs of draft readings)
- 12) Weight Shifts and Pendulum Deflections

11.9.C.4.4 **Derivation of Lightship**

- 1) As-Inclined Condition
- 2) Derivation of Lightship
- 3) Weights to Come Off
- 4) Lightship Weights to Go On
- 5) Table of all surveyed non-lightship items per compartments.
- 6) Summary table of all surveyed non-lightship items per weight groups.

11.9.C.5 Annexes

- 11.9.C.6 The baseline for the new Stability Booklet must be the lightship centers of gravity determined from the inclining experiment as detailed in Section 10.1.C.1.1-C.1.3 of this specification.
- 11.9.C.7 The Contractor must provide a new Trim and Stability Booklet, in metric units, on her last condition for his return to service for Canada.
- 11.9.C.8 The Trim and Stability Booklet must be produced by the Contractor's naval architecture firm, and must be submitted to TA and ABS for review and approval in accordance with the **Documentation** section of this specification. Prior to submission to ABS, the Contractor must submit the book to the TA for a two week review and preliminary CCG approval.
- 11.9.C.9 The Contractor must assess the stability of the vessel for all operating conditions. Intact stability must be assessed for all operating conditions against the requirements of TP 7301. If the vessel is found to not meet the requirements in any respect, the TA and the ABS surveyor must be notified immediately.
- 11.9.C.10 The stability booklet must be prepared according to Transport Canada, Marine Safety, TP 10943, Part II.

11.9.D Proof of Performance

11.9.D.1 Inspection Points

- 11.9.D.1.1 The Contractor is responsible for, and must schedule, all regulatory inspections. The ABS surveyor must be given 48 hours notice for attendance.

11.9.D.2 Testing / Trials

- 11.9.D.2.1 The Contractor must hold a planning/scheduling meeting with the TA, to include CCG staff, one month prior to the inclining experiment. This meeting is to focus on requirements, scheduling and necessary CCG resources.
- 11.9.D.2.2 The Contractor must notify the TA 24 hours before the inclining experiment of the expected time of arrival of the ABS Surveyor and the expected time of the start of data gathering. The Contractor must provide at least 48 hours' notice to the ABS Surveyor.
- 11.9.D.2.3 The Contractor must provide the TA and the ABS Surveyor access to compartment survey, tank soundings, draft mark readings, pendulums, and water density readings as they are taken.

11.9.D.3 Certification

- 11.9.D.3.1 The Contractor must submit the Trim and Stability Booklet to ABS for approval.
- i) Prior to submission to ABS, the Contractor must submit the book to the TA for a two week review and preliminary CCG approval.
 - ii) If required, the Contractor must resubmit the Trim and Stability Booklet to ABS, after first review, to correct errors relating to its production.

11.9.D.4 Documentation

- 11.9.D.4.1 The Contractor must submit to the TA and ABS the certificate for the weights used for the inclining experiment.
- 11.9.D.4.2 The Contractor must submit the calibration certificate for the scale used to weigh the inclining experiment weights.

- 11.9.D.4.3 The Contractor must prepare and submit to the TA for review and to ABS for approval, the Inclining Experiment Report within two weeks after the inclining experiment.
- 11.9.D.4.4 The Contractor must prepare and supply four (4) stamped and ABS approved paper copies of the CCGS Leim's Inclining Experiment Report, in metric units, for the modernized vessel. These reports must be delivered to the TA prior to the completion of the contract.
- 11.9.D.4.5 The Contractor must supply four (4) electronic copies of the Inclining Experiment Report to the TA via email, FTP server or USB device in a PDF file format. This copy must be a scanned copy of the ABS approved Inclining Experiment Report and must be delivered prior to the completion of the contract.
- 11.9.D.4.6 The Contractor must submit the preliminary Trim and Stability Booklet to the TA for a 2 week review by CCG. This document can be send in electronic format.
- 11.9.D.4.7 Following CCG review, the Contractor must review and prepare the final Trim and Stability Booklet and must submit it to ABS for review and approval.
- 11.9.D.4.8 The Contractor must provide to the TA four (4) stamped and ABS approved paper copies of the Trim and Stability Book in English and French after they are returned from ABS. The Contractor must deliver these copies to the TA prior to the completion of the contract.
- 11.9.D.4.9 The Contractor must supply an electronic copy of the Trim and Stability Booklet to the Technical Authority via email, FTP server or USB device in a PDF file format. This copy must be a scanned copy of the ABS approved Trim and Stability Booklet and must be delivered prior to the completion of the contract.
- 11.9.D.4.10 The Contractor must supply a USB device with the Trim and Stability Booklet in both Adobe PDF and Microsoft Word format. Source files for any tables and graphics embedded in the Word file must also be included (e.g. Excel tables, photographs, etc.). This USB must also include all stability program files required to generate the information within the Trim and Stability Booklet including, but not limited to, all hull geometry, tank & compartment definition, library, macro, loading, intact stability and damaged stability run files.

11.9.D.1.2 All deliverables must be in an unprotected format to allow CCG full editing rights in the future.

11.9.D.5 Training

11.9.D.5.1 Not used.

12.0 Propulsion and Manoeuvring systems

12.1 INSPECTION OF SHAFT LINE AND RUDDERS

12.1.A Identification

- 12.1.A.1 The objective of this element of the SOW is to perform the five (5) year inspection of the vessel's shaft lines during the dry dock. Prior to entry into the dry dock while the vessel is still afloat, the contractor must verify the port and starboard shaft alignments with a dial gauge. This work must be done in the presence of the vessel's chief engineer and a written report detailing the measurements must be submitted to both the vessel's chief engineer and the CCG TA.
- 12.1.A.2 The contractor must remove the rudders and shaft lines from the ship and prepare them for inspection by the attending ABS inspector. The contractor must repaint the rudders, and then reinstall and put them back into service.
- 12.1.A.3 **Known work is:** Replace the packing material of the forward stuffing boxes and the air seal rings that are non functional (refer to image in 12.1.B.3). The starboard stern tube has a hole at its bottom in way of frame 11, and there are possibly other holes in the tube's interior according to prior UT inspection. If the stern tubes are repairable in situ, the cost for these repairs will be addressed with a PWGSC form 1379 for work arising. The contractor must provide a firm price for the replacement of both stern tubes if they are not repairable (refer to section 12.2 of this SOW).
- 12.1.A.4 **Work for suspected problems (optional):** Advanced wear of the shaft wear rings or the Cutless bearings. The contractor must provide two (2) prices; 1 for the replacement of the wear rings, 1 for the replacement of the Cutless bearings.

12.1.B References

12.1.B.1 List of equipment requiring inspection

12.1.B.1.1 Propellers : 2 X Rices Propellers

Propeller Type.: Kaplan	B.T.F.....: 2.396	Material.....: NIBRAL_(CU3)
Diameter.....: 53.25	Tip.....: 0.505	Tensile strenght.: 590_N/MM2
Pitch.....: 64	Rake.....: 0°	Engine.....: MOTOR
No. of blades.: 5	Width at 0.25 R.....: 10.556	H.P.....: 478.5
Rotation.....: RH/LH	Thickness at 0.25 R: 1.877	R.P.M.....: 1800
Disc area ratio: 0.7		Reduction.....: 5.05

12.1.B.1.2 Stuffing box model : 2 X Johnson model 1786 with marine high performance packing, Ultra-X de 3/4 de po de Duramax.

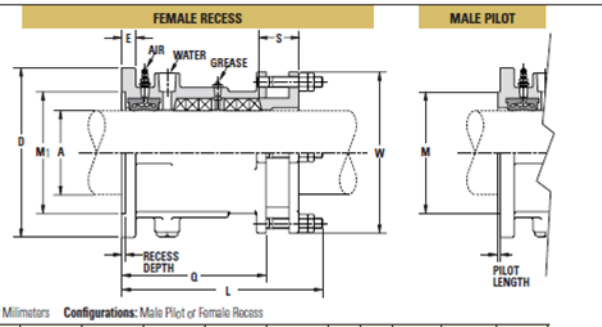
Forward Stern Tube Stuffing Boxes

Model 1786

Water and Grease Service with Air Seal Ring



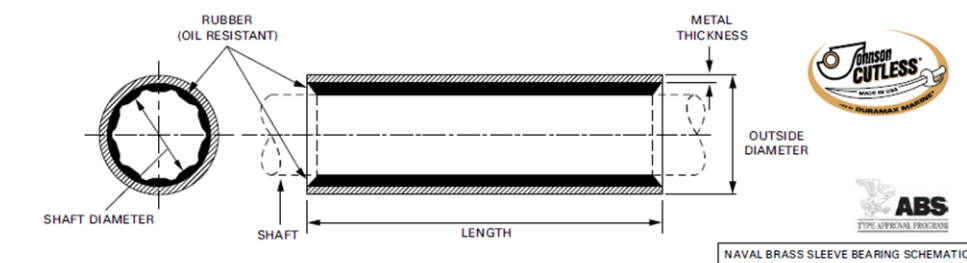
MALE PILOT / FEMALE RECESS DIMENSIONS		
For Shaft Diameter Size	Male Pilot	Female Recess
2-1/2" - 5-3/4"	3/16"	3/16"
6" - 15"	3/8"	1/4"



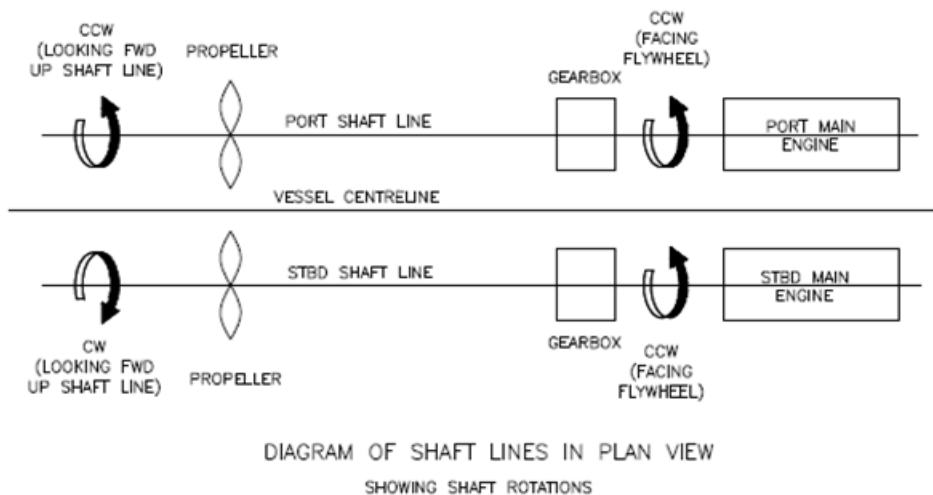
SPECIFY WHEN ORDERING:

Model Number: Alloy: Bronze (standard) or Aluminum Shaft Diameter: In Inches or Millimeters Configurations: Male Pilot or Female Recess

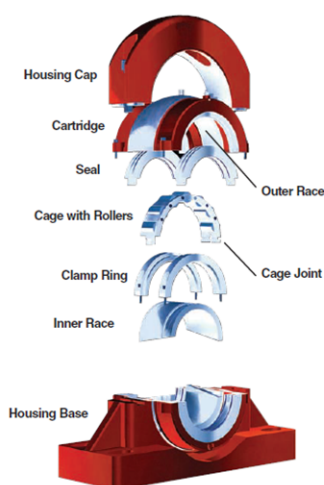
12.1.B.1.3 Cutless Bearings : 4 x Johnson Cutless Duramax Marine No 871022101 EASE 4 inches.



12.1.B.1.4 Propeller shafts : 2 x 4 inch shafts made of Aquamet 22. Located port and starboard under of the cargo hold, under the floor planks.



12.1.B.1.5 **Bearings :** 4 x Pillow Block S2 BCH 100mm



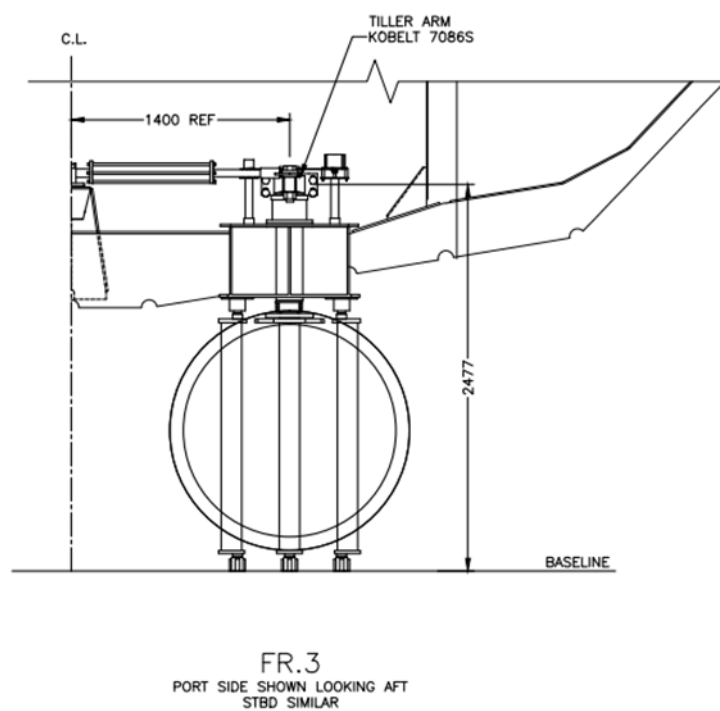
12.1.B.1.6 **Couplings :** 2 x LO-REZ 20RT

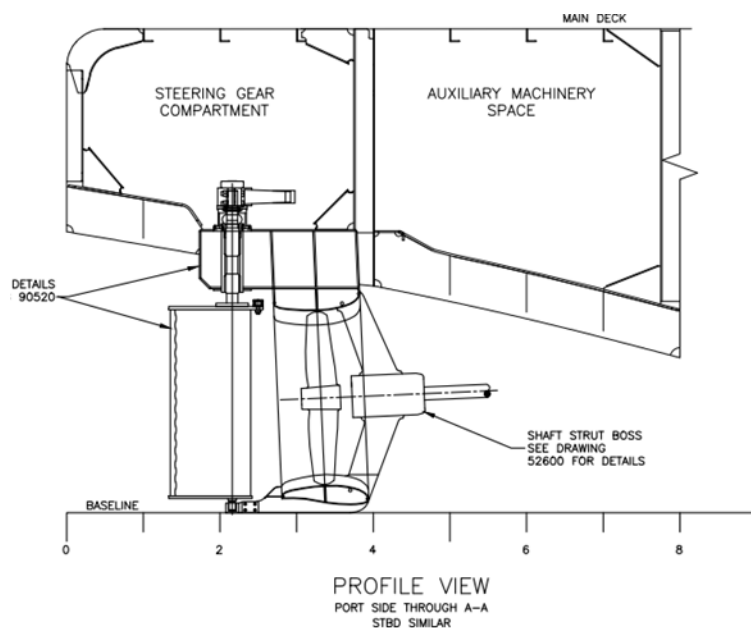
12.1.B.1.7 **Rope guard :** 2 x with rope cutter

12.1.B.1.8 Nozzles and triple rudders

- **Nozzle:** 2 x Rice Nozzle 1371 mm, 357 Bkw, 356 Rpm Steel A36

- **Rudders :** 6 x 1592.48 x 665.67 mm Steel A36
- **Gudgeon:** 8 x S.Steel 316L
- **Pintle:** 12 x S.Steel 316L with Thordon bearings
- **Rudder stocks :** 2 x rudder stocks, 975.26 mm, SS 316L, 4x Thordon bearings, 2 x bronze locking nuts 3''-8 UNC





12.1.B.2 Drawings

12.1.B.2.1 All drawings are identified in the General remarks section. The following drawings are to be referenced during the work in this section of the SOW.

Drawing number	Drawing title	Number of sheets
ISV22-52500RMM9	Shafting Arrangement	
ISV22-52600RMM6	Stern Tube & Shaft Bracket Diagram	
ISV22-90520RMM4	Rudder and Nozzle Arrangement	
523.3	Shaft Bearings – Johnson Cutless Sleeve & Flange	
523.3	Shaft Bearings – Craftbearing Pillow Block S2 BCH 100mm	
	Bearing clearance dimensions REFERENCE nstm	
530.2	RUDDER,NOZZLE,AND RUDDER STOCK_BV APPROVED_DRW	
527	Shaft Seals – Johnson Model 1786	

12.1.C Regulations and guidelines

- 12.1.C.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)
- 12.1.C.2 Marine Machinery Regulations (SOR/90-264)

12.1.D Statement of work

- 12.1.D.1 The contractor must coordinate all work described in this section of the SOW. Where sandblasting occurs near the stern tubes, the openings must be protected or covered in order to prevent blasting media or debris, debris, or paint from entering the tubes.
- 12.1.D.2 The contractor must ensure that the shaft line remains supported throughout the duration of the work on the shaft line and propellers as described in this section of the SOW. The exposed shaft ends must not be lowered, raised or bent so as not to interfere with the removal of the bearing and not to damage the shaft line or the supporting surfaces. The contractor is responsible for any damage caused to the stern tube bearings, propeller shafts, shaft liners, propeller shafts and stern tube liners during disassembly and reassembly of the stern tube equipment, and must repair all damage at its own expense.
- 12.1.D.3 The contractor must disassemble the Johnson gaskets forward of both shaft lines. The contractor must mark the orientation of the sealing parts and the locations from which they were removed.
- 12.1.D.4 The contractor must protect the surfaces of the shaft sleeves from mechanical damage during removal, transport and reinstallation of the shaft line. Damage to any shaft line component must be repaired at the contractor's expense.
- 12.1.D.5 The contractor must follow the commissioning instructions in the manuals and stern tube drawings provided by the CCG.
- 12.1.D.6 The 6 rudders must be removed, as well as the rudder stocks, in order to take measurements of the bearings, when reassembling all the hardware and bolts must be replaced by renewed.
- 12.1.D.7 The propellers must be disassembled according to the manufacturer's recommended methods. They should be cleaned and inspected, if any damage is found, the repairs must be carried out to the satisfaction of the attending ABS inspector and the CCG TA. Costs of the unknown work arising will be paid using PWSGC form 1379.

12.1.E Inspection of propeller shafts and stern tube bearings

- 12.1.E.1 The contractor must disassemble the coupling forward of each shaft line and verify the alignment of each shaft. The alignment verification will be done again when the vessel is put back in the water.
- 12.1.E.2 The contractor must remove the port and starboard propeller shafts and conduct a thorough inspection of the shafts and bearings in the presence of the attending ABS inspector.
- 12.1.E.3 The contractor must pressure wash the port and starboard stern tubes in order to permit a thorough inspection of internal surfaces of the tube bearings. The bearings must be protected against mechanical damage during cleaning.
- 12.1.E.4 The contractor must conduct a thorough inspection of the starboard stern tube to verify its condition and evaluate repair alternatives. The inspection must be conducted using a camera or other means accepted by the CCG TA. If a repair solution is found to be acceptable by the CCG TA and attending ABS inspector, repair costs including those related to drawings, technical specifications, and replacement parts will be addressed using PWGSC form 1379. If the tubes are deemed by the CCG TA and attending ABS inspector to be beyond repair, the tubes will be replaced by applying the option described in section 12.2 of this SOW.
- 12.1.E.5 The contractor must take three sets of measurements of the bearing diameter. Measurements must be taken equidistant along the length of the bearing in the horizontal and vertical planes. The measurements taken must be submitted in an electronic copy of a written report to the CCG TA.
- 12.1.E.6 The contractor must remove the port and starboard propeller shafts and conduct a thorough inspection of the shafts and bearings in the presence of the attending ABS inspector.
- 12.1.E.7 The contractor must take wear-down measurements of the shaft bearings once they have the shafts have been reinstalled and the couplings reconnected. If repairs or additional parts are necessary, their costs will be adjusted on form PWGSC 1379. Particular care should be taken to remove the sleeves on the shaft so as not to damage the shaft.

12.1.F **Installation of propeller shafts and bearings**

- 12.1.F.1 The installation and removal of bearings must be supervised and approved by a manufacturer's field service representative (FSR). FSR amount allocated \$ 10,000.
- 12.1.F.2 The contractor must supply and replace the Johnson model 1786 packing with Duramax ¾" Ultra-X high performance marine packing, and new air seals.
- 12.1.F.3 The contractor must take particular care when replacing the shafts so as not to damage the seals and bearings of the stern tube. Alignment of the shafts with the gearboxes must be done by following the instructions provided by the manufacturer. Necessary clearances will be verified in the presence of the attending ABS inspector and the CCG TA.
- 12.1.F.4 The contractor must take wear down measurements of the shaft bearings once they have the shafts have been reinstalled and the couplings reconnected.

12.1.G **Rudder inspection**

12.1.G.1 **General**

- 12.1.G.1.1 The contractor must lay out the port and starboard rudders and rudder stocks for inspection by the attending ABS inspector. The contractor must refer to the drawing 530.2 **RUDDERS, NOZZLE AND RUDDER STOCK_BV APPROVED_DWG**.

12.1.G.2 **Upper and lower rudder pintles and gudgeons**

- 12.1.G.2.1 The contractor must take measurements of the clearance between both the port and starboard pintle and gudgeon, and measure the clearance between both the port and starboard rudder stocks and carrier bearings at the lower end. Details 1 and 2 of drawing 530.2 – Rudders, Nozzles, and Rudder Stocks, page 3/4. Measurements must be submitted in an electronic report to the CCG TA within the 24 hours following the removal of the rudders from the ship.
- 12.1.G.2.2 Measurements taken by the contractor will be used to determine whether or not new pintles and gudgeon sleeve bearings must be machined and installed.
- 12.1.G.2.3 The contractor must take final measurements of the external diameters of pintles and the internal diameter of gudgeon bearings in 3 places along the bearing (top, center, lower), in the port and starboard plane, and the forward and aft plane.

- 12.1.G.2.4 Final measurements must be presented to the attending ABS inspector and CCG TA for review and approval prior to re-installing the rudders. .

12.1.G.3 Sleeve and bearing

- 12.1.G.3.1 The contractor must document the final clearance measurements of the port and starboard rudder stocks and bearings, making reference to the manufacturer's recommended clearance. These measurements must be submitted to the CCG TA and the attending ABS inspector.
- 12.1.G.3.2 The final measurements of the exterior diameter of the pintles, and the interior diameter of the gudgeons bearings must be taken at 3 places along the length of the pintle and gudgeon (top, center, bottom), in the port/starboard plane, and the forward/aft plane. These measurements must be presented to the CCG TA and the vessel's chief engineer for review and approval prior to the re-installation of the rudders. All repairs resulting from unknowns arising from the work will be addressed with a PWSGC form 1379.

12.1.G.4 Rudders

- 12.1.G.4.1 To remove the rudders, the contractor must disconnect the hydraulic rams from the tiller, remove the lock nut and locking tabs, tiller, control and feedback linkages, carrier bearing, as well as all locking and securing devices used to attach the rudders to the rudder stock, and to the pintle links as indicated on drawing 530.2 – Rudders, Nozzles, and Rudder Stock. Any damage to this equipment, the rudder, rudder stock, or bearings must be repaired to the CCG TA and attending ABS inspector's satisfaction at the contractor's expense.
- 12.1.G.4.2 The contractor must remove and dispose of the packing material grease from the rudder stock stuffing box. The contractor must supply new packing and grease for the reinstallation.
- 12.1.G.4.3 The contractor must perform magnetic particle inspection (MPI) on the rudder stock keyways and threads. The contractor must perform this test in the presence of the CCG TA and attending ABS inspector and provide the CCG TA with an electronic copy of a written report detailing the results of the test.

12.1.G.5 Rudder stocks

- 12.1.G.5.1 On both port and starboard rudder stocks, the contractor must take measurements of the two (2) rudder stock sleeve bearings (upper and lower shaft bearings) in the at three (3) positions; top, center, bottom, in both the port/starboard and the forward/aft planes.
- 12.1.G.5.2 On both port and starboard rudder trunks, the contractor must take measurements of the two (2) rudder trunk bearings (upper and lower tube bearings) at locations corresponding to those taken on the rudder stock bearings in section 12.1.G.5.1. in the same planes. These measurements will be used to determine the clearance between the rudder trunk and rudder stock bearings.
- 12.1.G.5.3 The contractor must take measurements of the clearance ~~between the 10 pintles~~ and 8 gudgeons (pintle links). Refer to drawing 530.2 – Rudders, Nozzles, and Rudder Stocks, page 3 / 4 - link/pintle, details 1 and 2.
- 12.1.G.5.4 The contractor must measure and record the dimensions of the radial bearings (SKF 51217) and their gyratory plates, and corresponding rudder stock diameters in order to determine the clearance between the components. Refer to drawing 530.2 – Rudders, Nozzles, and Rudder Stocks, page 4 / 4.
- 12.1.G.5.5 The contractor must perform non destructive testing (NDT) on the rudder stocks. The contractor must obtain a rudder stock condition report and obtain a classification certificate attesting to their condition from the attending ABS inspector. The Contractor must ensure that any damage to the rudder stock is properly examined and documented in the certification.
- 12.1.G.5.6 Repairs and defects to the rudder stock will be dealt with using form 1379. If any bearing need to be replaced, the work will be supervised by the FSR cited above.

12.1.G.6 Protective coating

- 12.1.G.6.1 The rudders and ducts must be repainted according to section 11.1.C
- 12.1.G.6.2 The contractor must proceed with the application of the product Drew Magnakote Plus, or equivalent and compatible product, present on the interior of the rudders, according to the manufacturer's recommendations.

12.1.G.7 Installation and return to service

- 12.1.G.7.1 The contractor must re-install the rudders, and all equipment removed in section 12.1.G.4.1 and return the steering system to service..

- 12.1.G.7.2 The contractor must replace the Burlap ½’’x ½’’ packing and re-grease as required.
- 12.1.G.7.3 The contractor must measure and record the clearance between the fitted keys and keyways and tie bar tiller arms end bearings of the port and starboard rudderstocks-
- 12.1.G.7.4 The contractor must re-install the control and feedback linkage. Linkages must be installed so that angle indicator readings match those as indicated on the tiller. The contractor must perform a full test of the control and feedback system when the vessel is afloat and make any necessary adjustments, to the satisfaction of the CCG TA and attending ABS inspector.
- 12.1.G.7.5 The contractor must ensure that the weight of the rudders is not supported by the lower gudgeons. The rudders are designed to be supported by the carrier bearings inside the vessel. In the case where they weight is supported by the lower gudgeons, the contractor must reposition the rudder stocks to the original positions as per the original design of the vessel. Il est essentiel de vérifier que les gouvernails ne reposent pas sur le talon d'étambot, car ceux-ci sont conçus pour être suspendus et doivent être supportés par le palier de support (Carrier Bearing). Dans le cas d'une telle éventualité, repositionnez les mèches dans la position initialement prévue à la construction du navire.
- 12.1.G.7.6 The contractor must take particular care to tighten the pintle links on the top of the rudders, as there have been problems encountered with these in past.

12.1.H Proof of performance

12.1.H.1 Inspection points

- 12.1.H.1.1 All work must be completed to the satisfaction of the vessel's chief engineer, the CCG TA and ABS Inspector.
- 12.1.H.1.2 **Hold point :** The contractor must allow the CCG TA or the vessel's chief engineer to witness the measurements of the bearings of the propeller shafts and the stern tube.
- 12.1.H.1.3 **Hold point :** The contractor is responsible for carrying out the taper percentage fit up tests (in Prussian Blue). 80% surface area fit is

required; the test must be conducted in the presence of the attending ABS inspector and the CCG TA.

12.1.H.1.4 The contractor must conduct a hydrostatic test of the rudders.

12.1.H.1.5 In order to detect the presence of cracks, the contractor must perform liquid penetrating non-destructive testing on the following items:

- a) (2) propellers
- b) (2) shafts
- c) (6) rudders
- d) (8) pintles
- e) (12) gudgeons
- f) (2) rudder stocks
- g) (2) Kort nozzles

Inspection points will be determined by the attending ABS inspector.

12.1.H.2 Tests and trials

12.1.H.2.1 The contractor must record the temperatures of the Johnson packing for the two shafts during the dock and sea trials of the vessel, and adjust them if necessary for optimum lubrication and cooling of the seals, the quantity of water must not exceed 250ml / h.

12.1.H.3 Certification

12.1.H.3.1 Provide the attending ABS inspector evidence of inspection of the two shafts and any parts that may have been replaced during the work.

12.1.H.3.2 Provide certificates of replaced parts.

12.1.H.4 Documentation

12.1.H.4.1 The contractor shall provide a report on the findings, work and final condition in accordance with the inspection, test and trial plan.

12.1.H.4.2 The contractor must submit the following documents to the CCG TA before the end of the contract:

- a) Propeller shaft bearing readings for each shaft bearing;
- b) Readings of the stern tube bearings;
- c) Forward seal temperature readings during dockside and sea trials;
- d) Results of all non-destructive tests carried out on propeller shafts, attachments, and rudder parts.
- e) A report with photos of the repairs carried out.
- f) Inspection reports for both shafts and propellers for ABS.

12.1.H.5 Training

N/A

12.2 STERN TUBES REPLACEMENT (OPTIONNAL)

12.2.A Identification

- 12.2.A.1 The Contractor must provide and install two new stern tubes (PORT & STBD) to replace the existing ones, on the CCGS Leim, due excessive wear and a perforation on the starboard side..
- 12.2.A.2 The work of this section must be carried out in conjunction with the following specification items:
- g) 12.1 Shaft Line Work.

12.2.B References

12.2.B.1 Equipment Data

- 12.2.B.1.1 Contractor Furnished Materials (CFM) are listed below. The Contractor must purchase and install the following parts for the replacement of the stern tubes:

Description	Qty
Tubing - 6" Sch. 80 mild steel, Grade ASTM A-106	2

Flange – Steel – Grade ABS A-36	2
---------------------------------	---

12.2.B.2 Drawings and Documents

12.2.B.2.1 All ship's drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings.

Drawing Number	DRAWING TITLE
ISV22-52600RMM6	Stern Tube & Shaft Bracket Arrangement
ISV22-52500RMM9	Shafting Arrangement

12.2.B.3 Regulations and Standards

12.2.B.3.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

Standards	Title	Supplied by:
n/a	CCG paint and coatings Standard	CCG
IACS Rec No 47	Shipbuilding and Repair Quality Standard http://www.iacs.org.uk/publications/	Contractor
EKME#3049715v5	CCG Welding Specification-eng (Apr 2020)	CCG
CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures - Division 1 or 2 Certification	Contractor
CSA W59	Welded Steel Construction – Metal Arc Welding	Contractor
CSA W178.2	Certification of Welding Inspectors Endorsement: Ships and Marine Structures; and Buildings and Industrial Structures	Contractor
Regulations	Title	Supplied by:
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

CCG/5737	Fleet Safety Manual (Latest Edition)	CCG
Workers' Safety & Compensation Commission work-safe regulation of the province or territory where the work is preformed	http://www.ccohs.ca/oshanswers/information/wcb_canada.html	Contractor

12.2.C Statement of Work

- 12.2.C.1 The Contractor must supply all parts, consumable products, hardware, tools, equipment, temporary shelters and labour required to complete the work in this specification.
- 12.2.C.2 After removing the shafts (specification item 12.1 Shaft Line Work), the Contractor must gouge out the welds between the Bearing Bosses and the stern tube pipes to remove the existing stern tubes on both sides (PORT and STBD). The contractor must discard both stern tube assemblies.
- 12.2.C.3 Care must be exercised when cutting the tube out of the hull so as not to enlarge the opening beyond the existing hole as a new stern tube with the same dimensions will be fitted in the same location.
- 12.2.C.4 The Contractor must remove all existing stern tube support brackets and framing, ensuring that the immediate area is completely clean and free of obstructions.
- 12.2.C.5 The Contractor must provide the materials to replace the stern tubes as per drawing "ISV22-52600RMM6 - Stern Tube & Shaft Bracket Arrangement". The Contractor must fabricate 2 new stern tube assemblies with a flanged connection on one end, to accept the Johnson model 1786 FWD stern tube stuffing box.
- 12.2.C.6 The Contractor must align and install the two new stern tubes as per the instructions in the Drawing "ISV22-52600RMM6 - Stern Tube & Shaft Bracket Arrangement".
- 12.2.C.7 The Contractor must ensure that the stern tube alignment remains true during the installation process. As such, the Contractor is to produce a welding procedure that is CWB certified indicating the order and sequence that the stern tube will be welded.

- 12.2.C.8 This welding procedure must also take into account the pre and post heat treatments required to ensure that the stern tube alignment does not change due to thermal stresses.
- 12.2.C.9 All welds, Non-Destructive Testing (NDT), and acceptance criteria shall be in accordance with 'CCG Welding Specification-eng (Apr 2020)'. Each weld shall be subject to 100% Visual Inspection (VI) and 100% Magnetic Particle Inspection (MPI).
- 12.2.C.10 Inspection of the welds must be performed by a Level II certified NDT technician with the capacity to inspect and certify the welds, in the presence of the TA and ABS surveyor. Any welds that fail the inspection shall be repaired by the Contractor at the Contractor's expense.
- 12.2.C.11 The Contractor must produce a final report showing the final alignment readings of the stern tube, the welding procedures used and the NDT weld inspection report.
- 12.2.C.12 The Contractor must supply new gaskets material to install the stern tube stuffing box to the flange of the stern tube (as per specification item 12.1 Shaft Line Work). It should be noted that the final hardening up of the bolts shall be done after the shaft installation to ensure minimal distortion of the packing with in the gland. The Contractor must supply new packing for the stuffing box gland.
- 12.2.C.13 The Contractor must attend dockside and sea trials to fine tune the amount of water leaking through the stern tube stuffing box packing by adjusting the bolts as required to achieve only a steady drip rate of no more than **250ml per hour**.
- 12.2.C.14 All disturbed areas of work and the newly installed stern tubes must be painted in accordance with the existing DFO/CCG Paint Specification standard. Preparation and application of coatings must be in accordance with the manufacturer's instructions.
- 12.2.C.15 Following completion of all work, the TA must be provided the opportunity to perform an installation inspection to verify the work has been carried-out in accordance with this specification. The TA must be provided 24 hours notice of work completion.

12.2.D Proof of Performance

12.2.D.1 Inspection Points

- 12.2.D.1.1 **HOLD POINT 1:** The Contractor must provide a welding procedure that is CWB certified indicating the order and sequence that the stern tube will be welded.

- 12.2.D.1.2 **HOLD POINT 2:** The Contractor must present the prepared weld points to the TA/IA before final welding commences.
- 12.2.D.1.3 The Contractor must allow the TA/IA and ABS free access to witness the work at any point. The TA/IA must be allowed to witness that the Weld Sequence Plan is being followed correctly.
- 12.2.D.1.4 **HOLD POINT 3:** The Contractor must notify the TA/IA of any weld deficiencies within 24 hours of completing the weld inspections.
- 12.2.D.1.5 **HOLD POINT 4:** Following completion of all work, the TA must be provided the opportunity to perform an installation inspection to verify the work has been carried-out in accordance with this specification. The TA must be provided 24 hours notice of work completion.
- 12.2.D.1.6 The Contractor must prepare the areas to be coated to the satisfaction of the CCG Nace inspector and the TA/IA.
- 12.2.D.1.7 The Contractor must demonstrate to the CCG Nace inspector and the TA/IA that the coatings are applied under correct environmental conditions, using the correct application method, and to correct wet film thicknesses.

12.2.D.2 Testing / Trials

- 12.2.D.2.1 The Contractor must complete visual inspection of 100% of the weld repairs.
- 12.2.D.2.2 The Contractor must include the cost of 8 hours of non-destructive MPI testing on the new welds; these tests must be as directed by the attending ABS Surveyor. The final amount shall be negotiated by PWGSC 1379 upon receipt of invoice with actual hours and prices.

12.2.D.3 Certification

- 12.2.D.3.1 The Contractor must be certified by CWB to CSA Standard W47.1 – “Certification of Companies for Fusion Welding of Steel” in Division 1 or Division 2.
- 12.2.D.3.2 Welding Supervisors must be qualified by CWB to CSA Standard 47.1.
- 12.2.D.3.3 Welders must be qualified by CWB to CSA Standard 47.1 for the Mode and Class of weld being used.
- 12.2.D.3.4 Persons performing and interpreting Visual Inspection of welds must be certified by the CWB in accordance with CSA Standard W178.2, and must be Level 2 or 3 with the following endorsement: Ships and Marine Structures. Level 1 personnel may observe or assist.

12.2.D.4 Documentation

- 12.2.D.4.1 The Contractor must provide the TA with a copy of a current Letter of Validation issued by the CWB proving that the Contractor is certified to CSA Standard W47.1 in Division 1 or 2.
- 12.2.D.4.2 The Contractor must provide the TA with copies of valid Qualification cards and certificates issued by the CWB to CSA Standard 47.1 for all the welding supervisors and welders working on this specification.
- 12.2.D.4.3 The Contractor must provide the TA and ABS with copies of the welding procedure specifications and welding procedure data sheets, stamped and approved by a Welding Engineer certified by the CWB prior to the work taking place. Welding procedure specifications must include port and starboard shell expansion drawing of the proposed work, and use symbols meeting CSA Standard W59.
- 12.2.D.4.4 The Contractor must provide the TA with written weld inspection reports (visual) within 24 hours of weld inspections being completed. The reports must include interpretation of the inspection results by a qualified inspector. Any deficiencies listed in the report must be detailed and their location be marked on a scale drawing of the weld repair for easy identification.
- 12.2.D.4.5 The Contractor must provide to the TA copies of all Material Specification Sheets and Material Safety Data Sheets for all Contractor Furnished Materials. This includes welding consumables.

- 12.2.D.4.6 The Contractor must provide the TA with a copy of the report submitted to ABS, including a letter from the ABS inspector stating that the repair work has been accepted by ABS as satisfactory.

12.2.D.5 Training

- 12.2.D.5.1 Not used.

12.3 PROPELLER SHAFT GROUNDING SYSTEM

12.3.A Identification

- 12.3.A.1 The Contractor must provide two propeller shaft grounding systems, consisting of a shaft grounding slipring, a grounding brush holder installation and a shaft potential monitor for indicating correct operation of the grounding set.

12.3.B References

12.3.B.1 Equipment Data

- 12.3.B.1.1 There must be one full set fitted on each of the propeller shafts and each set must consist of:

Description	Notes	Qté
Shaft Grounding Slipring		1
Slipring Clamps	Mat'l - Stainless Steel	2
Brush Assembly	Provides for both Grounding and Monitoring	1
Shaft Potential Monitor	0-250 mV Range, Dual Scale, 0-100 and 0-250mV	1

- 12.3.B.1.2 The shaft grounding rings are to be of a slipring type held in place by stainless steel clamp bands and utilizing a brush installation that provides for both grounding and monitoring.

12.3.B.1.3 The shaft potential monitor must enable the operator to determine that the system is operating correctly.

12.3.B.1.4 The correct size of shaft grounding ring shall be determined by the contractor from the shafting arrangement drawing.

12.3.B.2 Drawings and Documents

12.3.B.2.1 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE
ISV22-52500RMM8	Shafting Arrangement
ISV22-38400-RMM3	Cathodic Protection Plan
Document Number	DOCUMENT TITLE
	Not Used

12.3.B.3 Regulations and Standards

12.3.B.3.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

Normes	Titre	Fourni par:
MECTS-#4154313-v1-MECTS-#3049715-v6-Welding_Specification	CCG Welding Specification, Ver 4	GCC
TP 127E	Ships Electrical Standards	Contractor
IEEE 45.1-2017	IEEE Recommended Practice for Electrical Installations on Shipboard	Contractor
CCGS Leim Paint Standard	Leim & M,Perley paint schedule 380 Peintures et enduits- Paint spec Leim and M. Perley	GCC

IACS No. 47	Shipbuilding and Repair Quality Standard	Contractor
Règlements		
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
WorkSafe BC.	Occupational Health and Safety (OHS) Regulation	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

12.3.C Safety Statements

- 12.3.C.1 The Contractor must adhere to, as a minimum, Fleet Safety Manual (DFO/5737), 7.B.5 – Lock-out and Tag-out for the mechanical and electrical isolations associated with this specification item. All isolations must be verified by the TA prior to the work commencing and all work must be verified by the TA prior to removal.
- 12.3.C.2 Prior to performing any hotwork, the Contractor is responsible to verify all affected areas have been certified safe for hotwork by a competent person. The Contractor must be responsible for the arranging and cost of any such person required for this specification item.

12.3.D Statement of Work

- 12.3.D.1 The Contractor must supply and install a propeller shaft grounding and potential monitoring system on each propeller shaft in the approximate locations shown in ISV22-52500RMM8
- 12.3.D.1.1 Prior to procurement of the system, the Contractor must provide the TA the opportunity to review and approve the proposed system.
- 12.3.D.2 The Contractor must install all new equipment, including all associated cabling for interconnection of brush gear and millivolt meter. The contractor is responsible for manufacturing the required bracketry for the mounting of the brush assembly and mV meter.
- 12.3.D.2.1 In the first choice the system must be able to be bolted to the structure. All welding required for bracketry shall be in accordance with MECTS-#4154313-v1-MECTS-#3049715-v6-Welding_Specification. All welds are to be 100% visually inspected.

- 12.3.D.2.2 Prior to installation, the Contractor must provide the TA the opportunity to confirm final placement of both the sliprings and shaft potential monitors.
- 12.3.D.3 The Contractor must supply all material required.
- 12.3.D.4 All cables used must be of the approved marine type. Cables must be secured using approved fastening methods. Cable terminations in enclosures must have fittings approved for the application and environment.
- 12.3.D.5 The Contractor is responsible for any cleaning and disposal of residues resulting from the cleaning in any spaces under the requirement of this specification.
- 12.3.D.6 All new and disturbed work must be painted in accordance with instructions provided within this specification and as noted on the drawings, and coatings must be in accordance with the existing paint scheme and the applicable DFO/CCG Paint Specification. Preparation and application of coatings must be in accordance with the manufacturer's instructions.
- 12.3.D.7 On completion of work, all debris, foreign materials, and protective coverings must be removed.

12.3.E Proof of Performance

12.3.E.1 Inspection Points

- 12.3.E.1.1 HOLD POINT 1: Prior to procurement of the system, the Contractor must provide the TA the opportunity to review and approve the proposed system.
- 12.3.E.1.2 HOLD POINT 2: Prior to installation, the Contractor must provide the TA the opportunity to confirm final placement of both the sliprings and shaft potential monitors.
- 12.3.E.1.3 Hold Point 3: Prior to first operation the grounding set must be inspected using the OEM post-installation checklist to ensure proper installation.

12.3.E.2 Testing / Trials

- 12.3.E.2.1 The Contractor must test the system in accordance with the OEM testing instructions. As a minimum this will require both shafts to be turned under power to monitor the 'smoothness' of the passage of the brushes over the join

of the shaft grounding ring, the mV indication is below that which indicates malfunction of the system and there are minimum vibrations at the monitoring unit. The TA must be present for the Testing / Trials of the system.

12.3.E.3 Certification

- 12.3.E.3.2 The Contractor must provide a copy of the welder's certification in accordance with the Documentation section of the General Notes. The welders must be qualified in accordance with CSA Standard W47.1 for the weld procedure used. The Contractor must supply copies of the welder's certification prior to commencement of work.
- 12.3.E.3.3 The Contractor must supply copies of certification of the NDT inspectors. The inspectors must be qualified to the Canadian General Standards Board (CGSB) Standard CAN/CGSB-48.9712-2014 (Qualification and Certification of Non-Destructive Testing Personnel), at Level 2 or higher

12.3.E.4 Documentation

- 12.3.E.4.1 The Contractor must provide copies of the weld procedures in accordance with the Documentation section of the General Notes.
- 12.3.E.4.2 The Contractor must provide results of all weld inspections in accordance with the Documentation section of the General Notes.
- 12.3.E.4.3 The Contractor must supply completed copies of all Test / Trials documentation required by the OEM.
- 12.3.E.4.4 The Contractor must supply final As Fitted drawings, in accordance with the Documentation section of the General Notes.
- 12.3.E.4.5 The Contractor must supply a copy of all technical data related to the chosen system(ie. OEM drawings, manuals, etc.) to the TA and Chief Engineer for CCG records.

12.3.E.5 Training

- 12.3.E.5.1 Not used.

12.4 BOW-THRUSTER SURVEY

12.4.A Identification

- 12.4.A.1 The Contractor must arrange the services of a Jastram FSR to perform required disassembly of the vessel's Bow Thruster unit in order to carry out maintenance and inspection.
- 12.4.A.2 The Contractor must include in the bid an allowance of \$10,000.00 for Jastram Field Service Representative (FSR) expenses; to be adjusted up or down by PWGSC 1379 action on proof of invoice. The manufacturer's field technician will supervise the work.
- 12.4.A.3 The Contractor must overhaul the electric motor of the Bow Thruster's unit.
- 12.4.A.4 Upon completion of all specification items, sea trials must be carried out as a functional test of the bow-thruster's operation. Jastram FSR must be present for the sea trials.
- 12.4.A.5 This work must be in conjunction with Hull Coating and anodes replacement.

12.4.B References**12.4.B.1 Equipment Data**

- 12.4.B.1.1 All materials for this section are CFM unless otherwise stated.

12.4.B.2 Bow Thruster Gear:

- a) Maker: Jastram
- b) Gear Type: BU 20 F – Transverse Thruster Unit
- c) Serial Number: BU 4014
- d) Propeller Diameter: 840mm
- e) Input Speed: 1500rpm
- f) Engine power: 110kW
- g) Oil Volume Gear: 18L
- h) Oil Volume Tank: 35L

12.4.B.3 Bow Thruster Motor:

- a) Model: MODR225L-4bb/SFB16H
- b) Three Phase – A.C. Slipring Motor
- c) Protection class: IP 23
- d) Weight: 705Kg
- e) Bow thruster brake SFB16H

12.4.B.4 Drawings and Documents

- 12.4.B.4.1 All ship's drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings.

Drawing Number	DRAWING TITLE
580.1.1	Bow Thruster - Isv_Bowthruster_System Binder.Pdf
580.1.2	Bow Thruster - Techsol Control Manual.Pdf
580.1.3	Bow Thruster - Jastram Bu20f – Instruction Manual.Pdf
580.1.4	Bow Thruster- Hydraulic Oil - Nuto H 46 .Pdf
580.1.5	Bow Thruster - Jastram Bu20f - Drawing.Pdf
580.1.6	Bow Thruster - Jastram Bu20f - Part List.Pdf
580.1.7	Bow Thruster - Jastram Bu20f - Spare Parts Diagram.Pdf
580.1.8	Wölfer-Käfigläufer-englisch.pdf
580.1.9	Pintsch Bedienungsanleitung SFB-englisch.pdf

12.4.B.5 Regulations and Standards

- 12.4.B.5.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

Standards	Title	Supplied by:
n/a	CCG paint and coatings Standard	CCG
Regulations	Title	Supplied by:
CSA 2001	Canada Shipping Act 2001	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor

CCG/5737	Fleet Safety Manual (Latest Edition)	CCG
----------	--------------------------------------	-----

12.4.C **Statement of Work**

- 12.4.C.1 The Contractor must supply all equipment, staging, chain falls, cranes, 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 an adequate safe working load for the expected duties.
- 12.4.C.2 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 Std. W47.1, Div. 1 or 2. Proof of certification must be provided to both the PWGSC IA and the TA prior to commencement of steel work.
- 12.4.C.3 Prior to any hot work taking place the Contractor must ensure the area of work is gas freed suitable for hot work and the appropriate gas free certificates issued and posted as per the requirements of CCG Fleet Safety Manual.
- 12.4.C.4 The Contractor must ensure that the bow thruster is electrically and hydraulically isolated before starting any work on this system. Bow Thruster's electrical power must be locked-out at the breakers.

12.4.D **Electrical**

- 12.4.D.1 The Contractor must uncouple the thruster motor. The electric motor must have its associated wiring disconnected and locked-out at the breakers and must be uncoupled and lifted clear of the thruster housing. The motor must be adequately supported while out of operating position.
- 12.4.D.2 The contractor must remove the end housings of the electric motor, clean out and re-grease the bearings or replace all bearings with new ones if deemed necessary. The TA must inspect the bearings to assess their condition. The contractor must supply the bearings for the motor. Bearings and housings must be packed with new grease. Allow \$600.00 for each bearing and the final amount must be adjusted up or down by PWGSC 1379 upon receipt of invoice.
- 12.4.D.3 Sliprings: the Contractor must clean the running surfaces of the sliprings to ensure good electrical contact. Should the sliprings have become eccentric to a great extent,

they will have to be skimmed and the cost for the skimming will be addressed via PSPC 1379 action.

- 12.4.D.4 Carbon Brushes: the Contractor must check the degree of wear of the carbon brushes and if it is greater than 1/3 of the normal length then they should be replaced by new ones and the cost will be addressed via PSPC 1379 action.
- 12.4.D.5 Check all electrical connections on the entire system including all motor connections and terminals for tight fit as per TBT-BT-2021-0-2 - Electrical Termination Maintenance.
- 12.4.D.6 Check coupling by measuring the radial coupling clearance.
- 12.4.D.7 Clean thoroughly and inspect windings. The Contractor must perform visual inspection of the internal components of the motors for signs of overheating of the windings such as burn marks, cracks and test the winding insulation to measure its resistance. A report must be provided to the TA with the overhauling work performed on the motor.
- 12.4.D.8 The motor must be megger tested and insulation reports provided as per requirements upon completion.
- 12.4.D.9 Check that the cabinet fan will start when the temperature is too high. The blue thermostat can be temporarily adjusted to a lower lever to confirm that the fan would start properly. Do not forget to re-adjust at the initial level as stated in section 3. Also make sure that the filter is clean to allow a sufficient air flow to the VDF.
- 12.4.D.10 Check that the open/close operation of the brake is working properly.
- 12.4.D.11 Check that the harmonic filter is working properly (open/close of the main contactor).
- 12.4.D.12 Check that the emergency stop push button on aft helm and main helm console are working properly.
- 12.4.D.13 Space heater will come active when the thruster is not in use for a certain time. Make sure with a meter that the voltage is present on the space heater terminal and check heater for proper operation.
- 12.4.D.14 Motor must be re-assembled as original.
- 12.4.D.15 Upon completion of installation of the gearbox, the Contractor must install the electric motor back in place and couple it up with the alignment being made good. The

contractor must adjust the coupling as required to give the correct clearances as laid out in the manufacturer's specification sheet.

12.4.E **Mechanical**

- 12.4.E.1 The Contractor must remove the bow thruster tunnel grids for access to the propeller and must be secured back in place upon completion of the work below. The Contractor must supply and erect all scaffolding required.
- 12.4.E.2 The Contractor must drain the oil from the Bow Thruster System as per the manufacturer's manual.
- a) The first four (4) liters of oil to be drained in a clear container for visual inspection by the TA for water content.
 - b) The TA must be present when the hub is to be drained. The total amount of oil is approximately 70 liters.
 - c) The Contractor must dispose of the oil or sludge as per provincial regulations.
 - d) The Contractor must remove the magnetic plug and check for particles and clean prior to reinstallation.
 - e) The oil lines connecting the thruster to the header tank must be removed and capped off.
 - f) The header tank must be opened up and wiped out internally using lint free rags to remove any oil residue, dirt or debris. The lines to the thruster must be flushed with new clean oil to prove clear. The TA must inspect the tank prior to closing it up.
 - g) Upon completion of the work the Contractor must fill the system, as per manufacturer procedure, with new Hydraulic oil NUTO-H-46.
 - h) The Contractor must quote on 70 liters of oil; the final amount will be adjusted up or down upon proof of invoice by PWGSC 1379 action.
- 12.4.E.3 The gearbox must be removed ashore for opening up, cleaning, and inspection by the TA and the attending ABS Surveyor. Prior to removing the gearbox ashore, the tooth flank (Backlash) clearance on the periphery of the gearwheel must be measured and recorded, under the guidance of the attending Jastram FSR. The Contractor must

inspect the shafts and cog wheels of the gearbox and replace the shaft seals with new ones.

- 12.4.E.4 The contractor must disassemble the propeller and clean (polish) all parts for inspection by the TA and ABS. The propeller must be balanced by recognized propeller shop prior to reinstallation on the hub. Upon completion of the inspection, the propeller unit must be assembled in good order using new OEM seals and O-rings. All fasteners must be torqued as required and all locking devices must be replaced, under the guidance of the attending FSR. The Contractor must include in their bid an allowance of \$5000.00 for repairs to the blades. Actual amount to be adjusted up or down via PSPC 1379 action as required.
- 12.4.E.5 The propeller shaft seals and the drive shaft sealing must be replaced with new OEM parts. This work must be completed by the attending Jastram FSR.
- 12.4.E.6 The gearbox unit must be reassembled and re-installed by the Contractor, but supervised by FSR. Upon installing the gearbox in the thruster tunnel, the contractor must "blue" the teeth of the gearwheel and check that the correct contact surface is obtained. The gearwheel must be adjusted as required to obtain the correct contact surface. The tooth flank clearance (Backlash) on the periphery must be measured and should be within the range provided by the attending FSR.
- 12.4.E.7 Upon Completion of the work the bow thruster system must be tested by the ship's personnel for leaks and correct operation on dock. Any leaks found must be the responsibility of the Contractor to repair.
- 12.4.E.8 The thruster unit must be tested for operation during undocking.
- 12.4.E.9 All disturbed areas of work must be painted in accordance with the existing DFO/CCG Paint Specification standard. Preparation and application of coatings must be in accordance with the manufacturer's instructions.
- 12.4.E.10 Following completion of all work, the TA must be provided the opportunity to perform an installation inspection to verify the work has been carried-out in accordance with this specification. The TA must be provided 24 hours notice of work completion.

12.4.F Proof of Performance

12.4.F.1 Inspection Points

- 12.4.F.1.1 HOLD POINT 1: The TA must inspect the motor bearings, sliprings contact surfaces and carbon brushes, to assess their condition.

- 12.4.F.1.2 HOLD POINT 2: The gearbox and propeller must be removed ashore for opening up, cleaning, and inspection by the TA and the attending ABS Surveyor.
- 12.4.F.1.3 HOLD POINT 3: All work must be completed to the satisfaction of the Jastram FSR, ABS and the TA.
- 12.4.F.1.4 The Contractor must prepare the areas to be coated to the satisfaction of the International Paint FSR and the TA/IA.

12.4.F.2 Testing / Trials

- 12.4.F.2.1 The thruster unit must be tested for operation during undocking.
- 12.4.F.2.2 A dock trial must be performed and witnessed by the TA, ABS and the Jastram FSR. The duration of the trials will be decided in situ. In conjunction with this test trials the FSR must perform controls and zero/maximum pitch adjustments to correspond with manufacturer's unit initial settings and to the satisfaction of the TA and ABS Class surveyor.

12.4.F.3 Certification

- 12.4.F.3.1 As per ABS for this item.
- 12.4.F.3.2 The Contractor must provide a copy of the welder's certification in accordance with the Documentation section of the General Notes. The welders must be qualified in accordance with CSA Standard W47.1 for the weld procedure used. The Contractor must supply copies of the welder's certification prior to commencement of work.

12.4.F.4 Documentation

- 12.4.F.4.1 A detailed report from the FSR for the work that was done during the overhaul must be given to the TA. This must include all measurements clearances, invoicing, etc.

12.4.F.5 Training

- 12.4.F.5.1 Not used.

13.0 Electrical power generation

13.1 N/A

14.0 Electrical power distribution

14.1 ADDITIONAL TIME FOR WORK ON ELECTRICAL DISTRIBUTION SYSTEM

14.1.A Identification

- 13.1.A.1 The contractor must provide a block of time of 50 hrs The block can be divided by one or two electricians with experience in the marine environment (3-5 years of minimum experience), to carry out maintenance on the electrical distribution.

14.1.B References

14.1.B.1 Equipment information

- 14.1.B.1.1 Control circuits 24 VDC, circuits 120 VAC, power circuits 460 VAC.

14.1.B.2 Drawings

- 14.1.B.2.1 All drawings are indicated in the General remarks. The following drawings are to be considered as reference drawings, as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
	List of electric circuits on the Leim	
ISV22-61850RMM2	120VAC & 24VDC Distribution Plan	
	Online electrical distribution	

14.1.B.3 Regulations and guidelines

- 14.1.B.3.1 IEEE 45-2002: Recommended Practice for Electrical Installations on Shipboard.
- 14.1.B.3.2 Ships Electrical Standards (2018) - TP 127 ESMTTC

14.1.C Statement of work

14.1.C.1 The contractor must provide the service of qualified marine electricians for 50 hours to carry out the following work:

- 14.1.C.1.1 Diagnose and repair electrical insulation problems identified in section 14.2 (Ground).
- 14.1.C.1.2 Modify or redline electrical plans (Sketches).
- 14.1.C.1.3 Installation and connection of electrical appliances.
- 14.1.C.1.4 Equipment connections.
- 14.1.C.1.5 All work must be approved by the CCG TA and time sheets signed off by the vessel's chief engineer
- 14.1.C.1.6 The hourly rate charged if there is additional hours, or credited if there was less work than expected, will be prorated.
- 14.1.C.1.7 Electrical equipment not supplied by the CCG will be treated with PSPC form 1379.

14.1.D Proof of performance

14.1.D.1 Inspection points

- 14.1.D.1.1 All work must be completed to the satisfaction of the CCG TA, the vessel's chief engineer, and the attending ABS inspector.

14.1.D.2 Tests and trials

- 14.1.D.2.1 N/A

14.1.D.3 Certification

- 14.1.D.3.1 N/A

14.1.D.4 Documentation

- 14.1.D.4.1 The contractor must prepare a detailed report, the document will be titled "Electrical work of the Leim" digitally completed, signed and dated by the contractor, and submitted to the CCG TA.

14.2 ELECTRICAL INSULATION TEST AND THERMOGRAPHY

14.2.A Identification

14.2.A.1 Perform insulation tests on the various electrical circuits of the ship

13.1.A.2 Carry out the tightening of the bus bars and a thermographic inspection by a qualified contractor - electrician certified level 1 in thermography, of all the distribution panels of the ship 120 VAC, 240 VAC, 460 VAC, for the 24 VDC one tightening will be sufficient, in reference to GCC bulletin CGCC 11-2021.

14.2.B References

14.2.B.1 Equipment information

14.2.B.1.1 Control circuits 24 VDC, circuits 120 VAC, power circuits 460 VAC.

14.2.B.2 Drawings

14.2.B.2.1 All the drawings are indicated in the General remarks. The following drawings are to be considered as reference drawings, as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
	List of Leim's electrical circuits	
ISV22-61850RMM2	120VAC & 24VDC Distribution Plan	
CGCC 11-2021	Bulletin technique de la GCC : Entretien de bornes électrique	
	Online electrical distribution	

14.2.B.3 Regulations and guidelines

14.2.B.3.1 IEEE 45-2002: Recommended Practice for Electrical Installations on Shipboard.

14.2.B.3.2 Ships Electrical Standards (2018) - TP 127 E

14.2.B.3.3 **Fleet safety and security manual**

- a) 7.A.1 Assessing Risk
- b) 7.B.5 Lockout and tagout

- c) 7.B.6 Electrical Safety - Working on Energized Electrical Conductors or Circuit Parts
- d) 10.A.7 Contractor Safety and Security

14.2.C Statement of work

- 14.2.C.1 Perform the insulation tests on all the ship's electrical circuits and the alternators, then record the results in the document "List of Leim's electrical circuits".
- 14.2.C.2 All tests are done between a phase and ground. For circuits with more than one phase, each phase should be tested independently.
- 14.2.C.3 The contractor is responsible for using the appropriate voltage for each insulation test depending on the circuit under test and must record this in the "Leim Electrical Circuit List" document.
- 14.2.C.4 The contractor is responsible for any damage to the various circuits and devices during the insulation tests, in the event of a breakage, the contractor must bear the cost of the repairs.
- 14.2.C.5 Any defect found during the test must be reported to the chief engineer and the TA as soon as possible to be authorized, these repairs will be made using the block of hours from point 14.1.

14.2.C.1 120 VAC distribution circuits :

- 14.2.C.1.1 Disconnect all equipment connected to the circuit under test (anything in an outlet) all switches on the circuit must be closed (ON) to perform the test. Open (OFF) the circuit breaker of the circuit to be tested. After the tests, reposition the circuit breakers in their original state.

14.2.C.2 Generators :

- 14.2.C.2.1 Open (OFF) the generator circuit breaker. Remove the fuses from the earth leakage detection lamps. Disconnect the voltage regulator and the "Voltage Sensing Unit".

14.2.C.3 Electric motors:

- 14.2.C.3.1 Open (OFF) the motor circuit breaker. Test all phases independently downstream of the circuit breaker (between the circuit breaker and the motor) open the starter of the motor to be tested, and test all the phases downstream of the starter, secondary to the contactor (between the starter and the motor).

- 14.2.C.3.2 The contractor must inform the CCG TA of any anomalies observed in the starter, they must be noted so that corrective measures can be taken.

14.2.C.4 Maintenance of electrical terminals

- 14.2.C.4.1 Perform a thermographic inspection simultaneously with the insulation test, the electrician must be certified level 1 in thermography and be certified according to American standards for non-destructive testing ASNT SNT-TC-1A.
- 14.2.C.4.2 Inspection by tightening using a torque wrench for the bus bar joints, according to the recommended tightening values for the diameter of the bolts present.
- 14.2.C.4.3 Visual inspection of the bus bar connections for alignment of the permanent marker marks on the bolt and nut heads.
- 14.2.C.4.4 Visual inspection of terminal connections for signs of shearing, discoloration, oxidation and excessive heat build-up. In case of damage, the device must be changed or the wire cut and shortened sufficiently until the copper is in good condition.
- 14.2.C.4.5 Small screw connections, generally used in control circuits, should be checked with a standard or torque screwdriver. Caution should be exercised to avoid over tightening which could damage the thread or terminal block. Any terminal block failure should be reported to the vessel's chief Engineer, and if the chief engineer decides whether to replace it or use and identify another terminal, these repairs will be conducted using the hours required in section 14.1 and using PSpC form 1379.

14.2.D Proof of performance

14.2.D.1 Inspection points

- 14.2.D.1.1 All work must be completed to the satisfaction of the vessel's chief engineer, the CCG TA, and the attending ABS inspector.

14.2.D.2 Tests and trials

- 14.2.D.2.1 N/A

14.2.D.3 Certification

- 14.2.D.3.1 N/A

14.2.D.4 Documentation

- 14.2.D.4.1 The contractor must provide the vessel's chief engineer with two hard copies of the original inspection report. The contractor must also send an electronic copy of the certificates to the CCG TA vessel no later than five (5) days after the end of the work.
- 14.2.D.4.2 The report must be drafted with the document "List of Leim's electrical circuits", digitally completed, signed and dated by the contractor.
- 14.2.D.4.3 The report must detail the make, model and serial number of the electrical insulation measuring device, as well as its certification / calibration.
- 14.2.D.4.4 The report shall include thermography and any anomalies detected and repaired.

15.0 Auxilliary systems

15.1 FORWARD AND AFT BALLAST TANK INSPECTIONS

15.1.A Identification

- 15.1.A.1 The ballast tanks are located at the bow and aft end of the vessel. The contractor must clean these tanks with a high pressure water jet (3000 psi) and evacuate all residues so that they can be inspected by the CCG and ABS. An enclosed space work certificate must be issued.

15.1.B References

15.1.B.1 Equipment information

Description	Location	Capacity
Forepeak ballast tank	Frames 32 to 35	6.6m ³
Port aft ballast tank	Frames 0 to 4	5.7m ³
Starboard aft ballast tank	Frames 0 a 4	5.7m ³

15.1.B.2 Drawings

- 13.1.A.0.2 All drawings are indicated in the General remarks. The following drawings are to be considered as reference drawings, as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
ISV22-10130RMM12	Tank plan	pdf

15.1.B.3 Règlementation

- 15.1.B.3.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)
- 15.1.B.3.2 Marine Machinery Regulations (SOR/90-264)
- 15.1.B.3.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)SMTC;
- 15.1.B.3.4 Canadian Coast Guard - Fleet safety and security manual - (MPO 5737)

15.1.B.4 Standards

- 15.1.B.4.1 Ships Electrical Standards (2018) - TP 127 E
- 15.1.B.4.2 Standards for Navigating Appliances and Equipment - TP 3668 E

15.1.C Statement of work

- 15.1.C.1 The contractor must bid for the removal of 0.5 cubic meters of solid debris from each ballast tank which will be adjusted accordingly using form 1379.
- 15.1.C.2 The contractor's bid must relate to the removal of 0.5 cubic meters of solid debris from the forepeak ballast which will be adjusted accordingly using form 1379.
- 15.1.C.3 The contractor's bid must include the removal and disposal of 400 liters of wastewater and sludge from each black water, grey water, oily water and sludge tanks. Actual price will be addressed with an PSPC form 1379.
- 15.1.C.4 The contractor must open and ventilate the tanks, then have them certified by a marine chemist or a qualified person, to ensure that it is safe to enter or perform hot work prior to commencing cleaning.

- 15.1.C.5 The contractor shall post an entry and hot work certificate at the opening of the tank in a visible location and as close to the entry as possible. This certificate must be signed by a marine chemist or other qualified person and must be valid for the entire period the tank is open and must be valid for the entire period when the tank is open.
- 15.1.C.6 The contractor shall clean the tank and inspect all sounding pipes and remove any foreign material or obstructions from them. Mud and debris in tanks must be disposed of ashore in accordance with applicable federal, provincial and municipal regulations.
- 15.1.C.7 The contractor must make arrangements to have the tanks inspected by the attending ABS inspector or to obtain proof of inspection. Upon completion of the inspection, the contractor shall close all tank manhole covers with 1/8-inch thick fiber-reinforced neoprene gaskets capable of withstanding seawater.
- 15.1.C.8 The contractor must install the drain plugs using new rubber seals that he will provide, tightening will be done in the presence of the technical authority or the chief engineer.
- 15.1.C.9 The contractor must perform a pressure test on the tanks according to the attending ABS inspector's requirements.

15.1.D Proof of performance

15.1.D.1 Inspection points

- 15.1.D.1.1 **Hold point :** The Contractor must allow the CCG TA to examine all disassembled valves and coordinate the inspection with the ABS inspector.
- 15.1.D.1.2 **Hold point :** The Contractor must allow the CCG TA to examine the interior of all tanks before closing them and coordinate the inspection with the attending ABS inspector.
- 15.1.D.1.3 The contractor must ensure that an entry certificate is issued for all tanks opened for inspection, throughout the period they are open.
- 15.1.D.1.4 To comply with the Transport Canada Marine Safety (TCMS) regulations, a hydrostatic test must be carried out on each of the four (4) tanks so that the test pressure is equivalent to the pressure that a column would exert 8 feet of water above the full tank level.
- 15.1.D.1.5 The contractor must supply, install and then remove shut-off fittings, if applicable, to perform the pressure test. The contractor must ensure that valves

present in the piping system are returned to the open position and that all gaskets are replaced.

- 15.1.D.1.6 **Hold point :** Installation of drain plugs in the presence of the CCG TA or the vessel's chief engineer.

15.1.D.2 Certification

- 15.1.D.2.1 The contractor must submit copies of inspection reports detailing the work described in this section of the SOW to the attending ABS inspector, the vessel's chief engineer, and the CCG TA.
- 15.1.D.2.2 The contractor must submit the waste oil and oily water disposal certificates to the CCG TA before the end of the contract.
- 15.1.D.2.3 The Contractor must submit certificates of approval for all replaced components.

15.1.D.3 Documentation

- 15.1.D.3.1 The contractor shall provide a report on the findings, work and final status of work provided for in section G1.5 in accordance with the inspection, test and testing plan.
- 15.1.D.3.2 The report must include the dates of inspections, photos and work done on each valve or tank.
- 15.1.D.3.3 Before the end of the contract, the contractor must provide the CCG TA with the confined space entry and hot work certificates relating to each tank.
- 15.1.D.3.4 Before the end of the contract, the contractor must submit to the CCG TA all certificates for the entry of tanks.

15.1.D.4 Formation

- 15.1.D.4.1 N/A

15.2 INSPECTION OF FUEL TANKS

15.2.A Identification

- 15.2.A.1 The Contractor must open, clean and prepare the fuel tanks to be reviewed and inspected by the attending ABS inspector. Tanks must be visually inspected and then pressure tested. Once the work is completed, the tanks must be returned to operational readiness.
- 15.2.A.2 The fuel tanks are located on each side of the workshop between frames 8 and 12 and in the double bottom of the engine room between frames 13 and 23. The contractor must dismantle and overhaul quick-closing valves of the fuel tanks , as well as the pressure relief valve indicated in table 15.2.B.1 and prepare them for inspection by the attending ABS inspector and the CCG TA,. Parts to be replaced will be processed using PSPC Form 1379.
- 15.2.A.3 The contractor must disassemble and overhaul both Viking Series 4193 Fuel Transfer Pumps and prepare them for inspection by the attending ABS inspector and the CCG TA. Parts to be replaced will be processed using PSPC Form 1379.

15.2.B References

15.2.B.1 Equipment information

Description	Location	Capacity at 98%
Port day tank No10P	Frames10 a 12 port side	2.56 m ³
Overflow tank No8	Frames10 to 12 port side, lower	2.10 m ³
Port lateral tank No9P	Frames 8 to 12	3.77 m ³
Stbd lateral tank No9S	Frames 8 to12	3.09 m ³
Stbd lateral tank, upper No10S	Frames 8 to 10	2.60 m ³
Double bottom No3	Frames 13.5 to 24 S/M	12.52 m ³
Fuel valves to be inspected	Location	Reference 15.B.3
Remote quick close V001	Tank 9S	1
Remote quick close V004	Tank 9P	1
Remote quick close V005	Tank 8 (overflow)	1
Remote quick close V006	Tank 10S	1
Remote quick close V007	Tank 10P	1
Remote quick close V038	Tank 10P	1
Remote quick close V039	Tank 10S	1
Drain valve V049	Tank 10P	2
Drain valve V050	Tank 10S	2
Relief valve V026	DN65 overflow pipe	3

15.2.B.2 Pump reference

- 2 X Pompe Viking HJ 4193 S/N 12239499 and S/N 122339501
- 2 X Pressure relief valve DHB Model FULFL VSF 7150

15.2.B.3 Références Valves

- 1- Medena & Visca Quick closing valves straight type DN40/150RF Steel carbon cable 25-710
- 2- Medeno & Visca Self closing ball valve DN 1'' NPT 150PSI SST AISI 316 25-735
- 3- Pressure relief valve Kunkle Model91 H-J01 AMS DN 65 (2 ½'') 184 GPM S/N 1465711-1-3

15.2.B.4 Drawings

- 13.1.A.1.1 All drawings are indicated in the General remarks. The following drawings are to be considered as reference drawings, as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
ISV22-10130RMM12	Tank plan	pdf
ISV22-71000RMM9	Fuel oil System Diagram	Pdf
710.1	Tanks – Flow Alarm - Specifications	Pdf
710.3	FUEL OIL TRANSFER PUMPS-SPECIFICATIONS	Pdf

15.2.B.5 Regulations

- 15.2.B.5.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)
- 15.2.B.5.2 Marine Machinery Regulations (SOR/90-264)SMTC
- 15.2.B.5.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)
- 15.2.B.5.4 CCG Fleet Safety and Security Manual (MPO 5737)

15.2.B.6 Standards

- 15.2.B.6.1 NFPA 306 – Standard for the control of gas hazards on vessels
- 15.2.B.6.2 SMTC; TP3668F Normes concernant les appareils et le matériel de navigation

15.2.C Statement of works

- 15.2.C.1 The contractor shall record the soundings of all fuel tanks on board. The contractor must remove fuel from the ship and store it, then refuel the ship once the tanks have been inspected and returned to service. The Contractor's bid must be for the removal, storage and return of approximately 2000 liters of Type 2 colored marine diesel fuel to the vessel.
- 15.2.C.2 Upon completion of this work, the tanks must contain the same amount of fuel as they did upon arrival of the vessel at the contractor's facility.
- 15.2.C.3 The contractor must open all tanks and then aerate them. A qualified marine chemist as defined in section 3.3.22 of NFPA 306 must be on site to determine if it is safe to enter the tank before beginning the cleanup. The Contractor shall obtain Marine Chemist Certificates in accordance with Chapter 8 of the NFPA and submit them to the Chief Ship Engineer and the CCG TA..
- 15.2.C.4 The contractor must post entry and hot work certificates at the opening of each tank in a visible location and as close to the entry as possible. These certificates must be signed by a Marine Chemist and must be valid for the entire period the tank is open.
- 15.2.C.5 The contractor must clean all tanks and have them inspected by the ABS inspector to obtain proof of inspection.
- 15.2.C.6 The contractor's bid must contain the removal and disposal of .25 cubic meters of mud and debris from the fuel tanks which will be adjusted accordingly using form 1379.
- 15.2.C.7 Mud and debris in tanks must be disposed of ashore in accordance with applicable federal, provincial and municipal regulations.
- 15.2.C.8 The contractor shall perform a pressure test for each tank as per the requirements of the ABS inspector..

- 15.2.C.9 Any defects found will be addressed using PSPC Form 1379.
- 15.2.C.10 Upon completion of the ABS inspection, the contractor shall close all tanks, install the drain plugs and apply new diesel fuel resistant gaskets to the manhole covers.
- 15.2.C.11 The valves must be identified according to the nomenclature in table 15.2.B.1 and according to the plan ISV22-71000RMM9.
- 15.2.C.12 The contractor must remove, dismantle and clean the quick-closing valves and all components of the spring-loaded drain valves (See table 15.2.B.1). The valves should be disassembled and displayed on a table for inspection by the TCMS or Classification Society inspector. Costs for repairs and parts will be addressed with PSPC Form 1379.
- 15.2.C.13 The contractor must rectify all valve discs and seats after inspection. A final lapping should be done to ensure that the entire surface of the valve discs completely contacts the surface of the valve seat.
- 15.2.C.14 The contractor shall reassemble the valves with new gaskets (gaskets must be supplied by the contractor). All valves must be installed and kept in the closed position.

15.2.D Inspection and overhaul of Viking fuel pumps

- 15.2.D.1 The contractor must remove the pumps and their pressure control valves and disassemble them for inspection by the ABS inspector.
- 15.2.D.2 The contractor must provide all the parts necessary for reassembling the pumps, including new mechanical seals. Any other parts deemed necessary to be replaced by the ABS inspector and CCG TA will be addressed using the PSPC Form 1379.
- 15.2.D.3 Once the pumps have been reinstalled, the contractor must ensure that they are in good working order, in the presence of the ABS inspector and the vessel's chief engineer.

15.2.E Proof of performance

15.2.E.1 Inspection points

- 15.2.E.1.1 The Contractor must permit the CCG TA and ABS inspector to examine all disassembled valves. The contractor must coordinate the inspection with the CCG and ABS.

- 15.2.E.1.2 The Contractor must allow the CCG TA and ABS inspector to examine the interior of all tanks prior to closing them. The contractor must coordinate the inspection with the CCG and ABS.
- 15.2.E.1.3 The contractor must ensure that an entry certificate is issued for all tanks opened for inspection, throughout the entire period they are open.
- 15.2.E.1.4 To comply with the Transport Canada Marine Safety (TCMS) regulations, a hydrostatic test will be done on each of the four (4) tanks so that the test pressure is equivalent to the pressure of a column of 8 feet of water above the full tank level.
- 15.2.E.1.5 The contractor must supply, install and then remove shut-off fittings, if applicable, to perform the pressure test. The contractor must ensure that the valves present in the piping system are returned to the open position and that all gaskets are replaced.

15.2.E.2 Certification

- 15.2.E.2.1 The contractor must provide the ABS inspector with the work inspection documents required in this section.
- 15.2.E.2.2 The contractor must submit the waste oil and oily water disposal certificates to the CCG TA before the end of the contract.
- 15.2.E.2.3 The Contractor must submit the certificates of approval for the replaced components.

15.2.E.3 Documentation

- 15.2.E.3.1 The contractor shall provide a report on the findings, work and final status of work provided for in section G1.5 in accordance with the inspection, test and testing plan.
- 15.2.E.3.2 The report must include the dates of inspections, photos and work done on each valve or tank..
- 15.2.E.3.3 Before the end of the contract, the contractor must provide the CCG TA with the confined space entry and hot work certificates relating to each tank.

15.3 CLEANING THE HYDRAULIC TANKS AND REMOVING THE ADDITIONAL OIL TANK

15.3.A Identification

- 15.3.A.1 The two hydraulic tanks located on the starboard side must be emptied and cleaned, all hydraulic equipment must be in the retracted position, so that as much oil as possible is in the tanks when pumping.
- 15.3.A.2 The 300 liter reserve oil tank located on the port side should be removed from the vessel as it is not in use and it blocks access to the port hull valves.

15.3.B References

15.3.B.1 Equipment information

Tank	Location	Volume
Deck equipment hydraulic oil tank 16	Frames 10 to 12 stbd	0.37 m ³
Fishing equipment hydraulic oil tank 17	Frames 10 to 12 stbd	1.42 m ³
Reserve hydraulic oil tank	Frames 12 to 13 S/M port	0.31 m ³

15.3.B.2 Drawings

Drawing number	Drawing title	Type
ISV22-1013RMM12	TANK PLAN	Pdf
		Pdf

15.3.B.3 Regulations

- 15.3.B.3.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)Loi de 2001 sur la marine marchande du Canada (2001, ch. 26)
- 15.3.B.3.2 Marine Machinery Regulations (SOR/90-264)
- 15.3.B.3.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)

15.3.B.4 Standards

- 15.3.B.4.1 ISO 4406:2021 - Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles

15.3.C Statement of work

- 15.3.C.1 The hydraulic tanks are located to starboard between frames 10 and 12 in the bulkhead between the ER and the workshop, the reserve oil tank is in the engine room between frames 12 and 13 .
- 15.3.C.2 The oil from the hydraulic reservoirs must be pumped through a 10 micron filtration system supplied by the contractor, into clean barrels, then an oil analysis must be taken according to ISO 4406, to determine the quality of the oil, if the quality of the oil is judged to be good, it must be pumped back into the tanks using the filtration system fitted with a new 10 micron filter. If the quantity of oil needs to be readjusted or replaced this will be dealt with using the PSPC form 1379, a price per liter should be provided for Petro Canada XV 46 oil (see 15.3.D.4) or an equivalent if it must be replaced entirely.
- 15.3.C.3 The Contractor must open, clean and prepare the hydraulic tanks to be inspected by the attending ABS inspector and CCG TA. Tanks should be visually inspected and then pressure tested. Once the work is completed, the tanks must be returned to operational readiness.
- 15.3.C.4 The 300-liter reserve oil tank located on the port side must be removed from the vessel as it is not in use and it blocks access to the port hull valves. The oil in this tank must be recuperated and used in other systems.
- 15.3.C.5 The tank shall be weighed and the weight given to the vessel's commanding officer and the CCG TA for the vessel's stability records.
- 15.3.C.6 We offer the tank to the shipyard in exchange for a credit, reflecting the market value of the tank.

15.3.D Proof of performance

15.3.D.1 Inspection points

- 15.3.D.1.1 The CCG TA must examine the interior of the tanks before closing them.
- 15.3.D.1.2 The contractor shall ensure that an entry certificate is issued for all tanks opened for inspection, throughout the period they are open.
- 15.3.D.1.3 The contractor must seal the fittings. The contractor must remove all plugs or obstructions prior to closing the tanks.
- 15.3.D.1.4 If the hydrostatic test is performed with water, the contractor shall empty the tank upon completion of the test. The contractor must dispose of all water used in the hydrostatic test in accordance with applicable federal, provincial and municipal regulations.

15.3.D.2 Certification

- 15.3.D.2.1 Before the end of the contract, the contractor must provide the CCG TA with all documents relating to the work.

15.3.D.3 Documentation

- 15.3.D.3.1 The contractor must provide a report on the findings, work and final status of work provided for in this section in accordance with the inspection, test and testing plan.
- 15.3.D.3.2 Before the end of the contract, the contractor must submit the tank entry certificates to the technical authority.
- 15.3.D.3.3 Before the end of the contract, the contractor must provide the technical authority with the documents relating to the ABS inspection.

15.3.D.4 Formation

- 15.3.D.4.4 N/A

16.0 Domestic systems

16.1 CLEANING OF CENTRAL HVAC SYSTEM

16.1.A Identification

- 16.1.A.1 Thoroughly clean the ventilation system after the work. A large part of the ducts are made with 4 inch aluminum pipes, so they are fragile. If they are damaged or too dirty to be cleaned effectively, they will need to be replaced. This work will be addressed using the PSPC Form 1379.

16.1.B References

16.1.B.1 Equipment information

- 16.1.B.1.1 Rigid and flexible ventilation ducts

16.1.B.2 Drawings

- 16.1.B.2.1 All drawings are indicated in the General remarks. The following drawings are to be considered as reference drawings, as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
LEIM-81500RMM16	HVAC System Diagram	
LEIM-81510RMM7	HVAC Ducting Diagram	

16.1.B.3 Regulations and standards

- 16.1.B.3.1 N/A.

16.1.C Statement of work

- 16.1.C.1 Perform a complete cleaning of the vessel's ventilation system using the mechanical suction / pulse / brushing method and an extractor vacuum fitted with a HEPA filter.

- 16.1.C.2 The ventilation system includes the following components; central ventilation ducts for the dryer and bathroom extractors, heat exchangers, diffusers, as well as outside air intakes.
- 16.1.C.3 Degrease the kitchen hood, including its fan and its exhaust duct. Deactivation of the fixed extinguishing system must be done beforehand by a qualified fire technician.
- 16.1.C.4 Take the necessary measures to adequately protect the furnishings and equipment of the vessel during the work.

16.1.D Proof of performance

16.1.D.1 Inspection point

- 16.1.D.1.1 All work must be completed to the satisfaction of the vessel's chief engineer.

16.1.D.2 Tests and trials

- 16.1.D.2.1 N/A

16.1.D.3 Certification

- 16.1.D.3.1 The contractor shall provide the TA and the vessel's chief engineer with an electronic PDF copy of the inspection certificates with their original copy.

16.1.D.4 Documentation

- 16.1.D.4.1 The contractor must provide the CCG TA and the vessel's chief engineer with a report indicating the general condition of the ventilation system before and after the work. This report must include photos of the various components of the ventilation system before and after cleaning. The Contractor must deliver an electronic copy of all such reports to the CCG TA no later than five (5) days after completion of the contract award work.

16.1.D.5 Training

- 16.1.D.5.1 N/A

16.2 POTABLE WATER TANK INSPECTION

16.2.A Identification

- 16.2.A.1 The contractor must open, clean and prepare the two stainless steel potable water tanks for ABS and CCG TA inspection. Tanks should be cleaned, visually inspected, and then pressure tested. Once the work is completed, the tanks must be returned to operational readiness.

16.2.B References

16.2.B.1 Equipment information

Tank	Location	Volume
Potable water tank port 11P	Frames 4 to 8	3.08 m ³
Potable water tank stbd 11S	Frames 4 to 8	3.08 m ³

16.2.B.2 Drawings

Drawing number	Drawing title	Type
ISV22-1013RMM12	TANK PLAN	Pdf
ISV22-82500 RMM8	Potable Water Diagram	Pdf

16.2.B.3 Regulations

- 16.2.B.3.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)
- 16.2.B.3.2 Marine Machinery Regulations (SOR/90-264)
- 16.2.B.3.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)

13.1.B Standards

- 13.1.B.1 CCG Fleet Safety and Security Manual section 7.A.12
- 13.1.B.2 NSF/ANSI 61 – 2020 – Drinking water system components – Health effects

16.2.C Statement of work

- 16.2.C.1 The contractor must empty and open the tanks, clean them and then proceed with the CCG TA to conduct a thorough inspection of the tanks.

- 16.2.C.2 After cleaning, the tanks must be inspected by the ABS inspector. The contractor must obtain proof of inspection for the items inspected.
- 16.2.C.3 The contractor shall close all tank access covers after the final inspection by the ABS inspector and the technical authority. The contractor must replace the gaskets on the access covers with new gaskets made of non-toxic 1/8 "thick neoprene resistant to chlorinated drinking water.
- 16.2.C.4 The contractor shall perform a hydrostatic pressure test in the potable water tank, the method used will be at the discretion of the ABS inspector.
- 16.2.C.5 Any defects found will be addressed using PSPC form 1379.
- 16.2.C.6 All materials used to effect repairs, including pipes, fittings, gaskets, sealing compounds, must be NSF/ANSI 61 compliant. The contractor must provide CSA certificates of compliance for products used.

16.2.D Tank disinfection

- 16.2.D.1 The Contractor must provide the equipment for disinfection and disinfect the tanks in accordance with procedure 7.A.12 of the Fleet Safety and Security Manual, once it has carried out, as follows, conclusive hydrostatic pressure tests. The Contractor shall provide the equipment for disinfection and disinfect the tanks in accordance with procedure 7.A.12 of the Fleet Safety and Security Manual, following the conclusive hydrostatic pressure tests.
- 16.2.D.2 Following the 24 hour disinfection period, the contractor must empty and rinse the potable water tanks, then analyze the water for the presence of the following:

Free chlorine	0,2 et 0,4 ppm		
E. coli	0 par 100 ml	Nitrate/Nitrite	45 mg/L
Coliformes totaux	0 par 100 ml	Mercury	0,001 mg/L
Turbidity	1 uTN	Selenium	0,01 mg/L
Antimony	0,006 mg/L	Uranium	0,02 mg/L
Baryum	1 mg/l	Benzene	0,005 mg/L
Boron	5 mg/L	Xylenes	0,3 mg/L

Cadmium	0,005 mg/L	Florine	1,5 mg/L
Chrome	0,05 mg/L	Lead	0,01 mg/L
Copper	1 mg/l	Sodium	200 mg/L
Iron	0,3 mg/L	Zinc	5 mg/l
Manganese	0,05 mg/L	Ethyl benzene	0,00024 mg/L
pH	Unités de pH entre 6,5 et 8,5	Toluene	0,024 mg/L
Colour	15 UCV	Sulfates	500 mg/L
Total dissolved solids	500 mg/L	Chlorine	250 mg/L

- 16.2.D.3 These measurements must be verified by an independent laboratory approved by the province to perform drinking water tests. A copy of all final results must be submitted to the CCG TA.
- 16.2.D.4 The contractor must rinse the potable water tank until the free chlorine level decreases to an acceptable level of 5 ppm maximum.
- 16.2.D.5 The contractor must dispose of all hyperchlorinated water in accordance with applicable federal, provincial and municipal regulations.
- 16.2.D.6 The contractor must fill the tank with municipal drinking water to the same level as on arrival of the vessel, before undocking.

16.2.E Proof of performance

16.2.E.1 Inspection points

- 16.2.E.1.1 The CCG TA must examine the inside of the tanks before the contractor closes them.
- 16.2.E.1.2 The contractor shall ensure that an entry certificate is issued for all tanks opened for inspection, throughout the entire period they are open.

- 16.2.E.1.3 The contractor must seal the connections and supply, install and remove all plugs.
- 16.2.E.1.4 If the hydrostatic test is performed with water, the contractor shall empty the tank upon completion of the test. The contractor must dispose of all water used in the hydrostatic test in accordance with applicable federal, provincial and municipal regulations.

16.2.E.2 Certification

- 16.2.E.2.1 Upon the completion of the work described in this section, the contractor must provide the CCG TA with the documents relating to the inspection of the ABS inspector.

16.2.E.3 Documentation

- 16.2.E.3.1 The contractor must provide a report on the findings of the work provided for in this section in accordance with the inspection, test and testing plan.
- 16.2.E.3.2 Upon completion of the work described in this section, the contractor must provide the CCG TA with the waste and hyper chlorinated water disposal certificates.
- 16.2.E.3.3 Upon completion of the work described in this section, the contractor must submit the tank entry certificates to the technical authority.
- 16.2.E.3.4 Upon completion of the work described in this section, the contractor must provide the technical authority with the documents relating to the ABS inspection.
- 16.2.E.3.5 Upon completion of the work described in this section, the contractor must submit to the technical authority the drinking water analysis reports of the independent laboratory.

16.2.E.4 Formation

- 16.2.E.4.1 N/A

16.3 INSPECTION OF GREY AND BLACK WATER TANKS

16.3.A Identification

- 16.3.A.1 The contractor must open, clean and prepare the two black water tanks and the two gray water tanks which are to be examined and inspected by the ABS inspector. The tanks must be cleaned, visually inspected, then pressure tested. Once the work is completed, the tanks must be returned to operational readiness.

16.3.B References

16.3.B.1 Equipment information

Tank	Location	Volume
Black water tank port	Frames 24 to 26	0.51 m ³
Black water tank stbd	Frames 24 to 26	0.51 m ³
Grey water tank port	Frames 26 to 29	2.3 m ³
Grey water tank stbd	Tanks 26 to 29	2.3 m ³
Auxiliary grey water tank	Frames 27 to 28	0.038 m ³

16.3.B.2 Drawings

Drawing number	Drawing title	Type
ISV22-1013RMM12	TANK PLAN	Pdf
ISV22-83000RMM15	Black and Gray Water System Diagram	Pdf
ISV22-		

16.3.B.3 Regulations

- 16.3.B.3.1 Canada Shipping Act, 2001 (S.C. 2001, c. 26)
- 16.3.B.3.2 Marine Machinery Regulations (SOR/90-264)
- 16.3.B.3.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)

16.3.B.4 Standards

16.3.B.4.4 N/A

16.3.C Statement of work

- 16.3.C.1 The contractor must open and clean the tanks, then proceed with a thorough inspection with the CCG TA.
- 16.3.C.2 The contractor must dismantle and clean the sensor and vent pipes..
- 16.3.C.3 The contractor must verify the suction lines, and clean them as necessary.
- 16.3.C.4 After cleaning, the tanks must be inspected by the attending ABS inspector. The contractor must obtain proof of inspection for the items inspected.
- 16.3.C.5 The Contractor shall close all tank access covers after final inspection by the ABS inspector and CCG TA. The contractor must replace all gaskets on the access covers with new gaskets made of fiber-reinforced neoprene 1/8-inch thick, acid-resistant.
- 16.3.C.6 Any defects found will be addressed using PSPC Form 1379.

16.3.D Proof of performance**16.3.D.1 Inspection points**

- 16.3.D.1.1 The CCG TA must examine the interior of the tanks before the contractor closes them.
- 16.3.D.1.2 The contractor must ensure that an entry certificate is issued for all tanks opened for inspection throughout the entire period they are open.
- 16.3.D.1.3 The contractor must seal the connections and supply, install, and remove all required plugs.
- 16.3.D.1.4 If the hydrostatic test is performed with water, the contractor shall empty the tank upon completion of the test. The contractor must dispose of all water used in the hydrostatic test in accordance with applicable federal, provincial and municipal regulations.

16.3.D.2 Certification

- 16.3.D.2.1 Upon the completion of the work described in this section, the contractor must provide the CCG TA with the documents relating to the inspection of the ABS inspector.

16.3.D.3 Documentation

- 16.3.D.3.1 Upon the completion of the work described in this section, the contractor must provide a report on the findings, work and final status of work provided for in this section in accordance with the inspection, test and testing plan.
- 16.3.D.3.2 Upon the completion of the work described in this section, the contractor must submit the tank entry certificates to the technical authority..
- 16.3.D.3.3 Upon the completion of the work described in this section, the contractor must provide the technical authority with the documents relating to the ABS inspection.

16.4 HEATING AIR CONDITIONING REFRIGERATION INSPECTION

16.4.A Identification

- 16.4.A.1 Perform the annual inspection of refrigeration systems by a qualified air conditioning-heating technician, and make a detailed report. This work will have to be done in February.

16.4.B References

16.4.B.1 Equipment information

item	ID	Model	Location
Refrigerator/freezer	#LAU8857	RST-45C1E	Dry lab
Refrigerator/freezer	#LAU8861	RST-45C1E	Dry lab
BlueAir refrigerator	#LAU8858	BASR-1	Galley
Freezer	#LAU8860	KeepRite KLP209LE	Pantry

Residential refrigerator	#8856	True T12	Entry
Heat exchanger	#8855	Fujitsu ASU12RLF	
Heat exchanger	#8854	Fujitsu modèle ASU18RL	

16.4.B.2 Drawings

16.4.B.2.1 All drawings are indicated in the General remarks. The following drawings are to be considered as reference drawings, as defined in the Drawings section of the General Notes.

Drawing number	Drawing title	Number of sheets
2015-03-06	Inventaire des halocarbures Leim	

16.4.B.3 Regulations

16.4.B.3.1 The following regulations and standards apply to the work performed in this section; the contractor must ensure that all work performed in this section meets regulations and standards, as well as federal and territorial regulations and standards.

CCG Fleet Safety and Security Manual	Title	Inclus – Oui/Non
Section 7.0 7.E.8	Use of Halocarbons	

16.4.C Statement of work

- 16.4.C.1 The contractor must perform a complete inspection of all components of the heating, ventilation, air conditioning and refrigeration systems. All defects will be addressed as additional work on a 1379 form.
- 16.4.C.2 The contractor must perform a refrigerant leak detection test on all components of the air conditioning and refrigeration systems. (List **Error! Reference source not found.**)
- 16.4.C.3 The contractor must check the operating parameters.
- 16.4.C.4 Before starting work, the refrigeration technician must present a valid refrigeration technician certificate to the CCG TA or the vessel's chief engineer.

- 16.4.C.5 For each equipment item identified in table 16.4.B.1, the contractor must apply a label with including contact details, attesting that the equipment has been inspected and tested.

16.4.D Proof of performance

16.4.D.1 Inspection points

- 16.4.D.1.1 All work must be completed to the satisfaction of the vessel's chief engineer.
- 16.4.D.1.2 Any defects shall be reported to the AT and chief engineer (MC) as soon as possible to avoid delays.

16.4.D.2 Tests and trials

- 16.4.D.2.1 The technician shall demonstrate to the MC that the systems are functioning properly.

16.4.D.3 Certification

- 16.4.D.3.1 The Contractor must provide the vessel's chief engineer with two (2) hard copies of the inspection certificates with their original copy. The contractor will also send an electronic copy of the certificates to the CCG TA.

16.4.D.4 Documentation

- 16.4.D.4.1 The contractor shall provide the vessel's chief engineer with a hard copy of a report which details the inspections, modifications and repairs made before acceptance of this item. The Contractor will also send an electronic copy of the report to the CCG TA no later than five (5) days after the completion of of the work in this section.

16.4.D.5 Formation

- 16.4.D.5.1 [N/A]

17.0 Deck equipment

17.1 N/A

18.0 Communications and navigation

18.1 RADIO AND NAVIGATION EQUIPMENT INSPECTION

18.1.A Identification

18.1.A.1 The contractor will be responsible for having the radio and associated navigation equipment inspected, producing an inspection certificate according to the requirements of the ABS classification organization. **These inspections should be done in January or February.**

18.1.B References

18.1.B.1 Equipment data

- a) 2 x VHF DSC including antennas
- b) 2 x GMDSS VHF
- a) 1 x HF / MF DSC including antennas
- b) 2 x SART
- c) 1 x Class 1 EPIRB
- d) Navtex Furuno NX-700 A-B
- e) 2 x VisionMaster FT radar
- f) Radio power supply
- g) Batteries
- h) DGPS-AIS SAAB-R4

18.1.B.2 Drawings

18.1.B.2.1 All drawings are shown in the General Remarks. The following drawings should be considered reference drawings, as per the definition given in the Drawings section of the General Remarks.

Drawing Number	DRAWING TITLE	Number of sheets
	N/A	

18.1.B.3 Regulations and standards

18.1.B.3.1 Law of 2001 on the Canadian merchant marine

18.1.C Statement of work

18.1.C.1 Carry out inspection and maintenance of the equipment listed in 18.1.B.1 as per the manufacturers' manuals and in compliance with ABS rules and procedures.

18.1.D Proof of performance**18.1.D.1 Inspection points**

18.1.D.1.1 The work must all be completed to the satisfaction of the chief engineer and ABS inspector.

18.1.D.2 Tests and trials

18.1.D.2.1 Tests will be carried out according to ABS rules.

18.1.D.3 Certification

18.1.D.3.1 The contractor must provide the chief engineer with two (2) paper copies of the maintenance certificates as well as the originals. The contractor will also send a digital copy of the certificates to the ship's maintenance officer.

18.1.D.4 Documentation

18.1.D.4.1 N/A.

18.1.D.5 Training

18.1.D.5.1 [N/A]

19.0 Control system

19.1 N/A

20.0 Scientific Equipment

20.1 BENTHOS TRACKIT ULTRA SHORT BASELINE (USBL) SYSTEM INSTALLATION

20.1.A Identification

- 20.1.A.1 The Contractor must provide and install a removable aluminum mounting Z-pole system for adapting the new Benthos TrackIt Ultra Short Baseline (USBL) system on the STBD side of the CCGS Leim.
- 20.1.A.2 The Contractor must electrically isolate and remove the existing TrackLink system and weld a new plate between Frames 24 and 25 to close the underwater hull opening.

20.1.B References

20.1.B.1 Equipment Data

20.1.B.1.1 Government Supplied Materials (GSM) are listed below:

- a) The TrackIt USBL System main components which are shown in Figures 1 and 1-1, are the following:
- USBL Transducer
 - USBL Transponder
 - USBL Deck Box
 - Transducer cable
 - Serial cable with a USB/RS-232 adapter
 - AC power cable
 - Flash drive with the TrackIt USBL software and this manual



20.1.B.2 Contractor Furnished Materials (CFM) are listed below.

20.1.B.2.1 The Contractor must purchase and install the following parts for the mounting of the Benthos TrackIt components from www.universalsonarmount.com (or an approved and proven equivalent design.).

Part Number	Description	Qty
500-001-9001-01	High Tower Base Unit	1

500-9435	Z-CLAMP, 4.5" ROUND	2
500-9420-05	Z-POLE, 96" (Minimum Length of segments)	2
500-001-9022-03	Bolted Down Steel Sub Plate W/Hardware	1
FAB-000+	Fabrication-USM-USBL Flange Kit	1
500-9503-03-02	Flange Kit Double 5.3 B.C.,SSt	1
505-001-9001	Worm Gear Drive	1

b)

20.1.B.3 Drawings and Documents

20.1.B.3.1 All ship's drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings only.

Drawing Number	DRAWING TITLE
n/a	POLE MOUNT_Option 2B.pdf
C-270-541	OUTLINE, POLE MOUNT, DAT-91X
ISV22-21010RMM10	Structural Arrangement.pdf
ISV22-21050RMM9	Structural Sections.pdf
ISV22-21260RMM6	Transducer Housing.pdf
Document Number	DOCUMENT TITLE
n/a	Benthos_TrackIt_Brochure (1)
n/a	M-270-66 (1)
n/a	M-270-69 TRACKit USBL System (1)

20.1.B.4 Regulations and Standards

20.1.B.4.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

Standards	Title	Supplied by:
18-080-000-SG-003	CCG paint and coatings Standard	CCG
CSA CWB Standards W59	Canadian Standards Association - Welded Steel Construction (Metal Arc Welding)	Contractor
IACS Rec47 SARQS	Shipbuilding and Repair Quality Standard http://www.iacs.org.uk/publications/	Contractor
CT-043-eq-eg-001-E	Canadian Coast Guard – Welding Specification	CCG
Regulations	Title	Supplied by:
CSA 2001	Canada Shipping Act 2001	Contractor
ABS	ABS's Shipping Rules and Regulations for the design and Construction, 2020	Contractor
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	Contractor
MOHS	Maritime Occupational Health and Safety	Contractor
CCG/5737	Fleet Safety Manual (Latest Edition)	CCG
OHSa	Occupational Health and Safety Act, R.S.O. 1990, c. O.1 - Web Link: OHSa	Contractor

c)

20.1.C Statement of Work

Benthos TrackIt USBL Mounting Pole

- 20.1.C.1 The Contractor must supply and install a mounting pole system for the Benthos TrackIt USBL system installation. The Contractor must obtain TA approval of the final system prior to purchase and installation.
- 20.1.C.2 The Contractor must install the mounting pole system on the STBD side Bulwark (Location roughly between Frames 8 - 10 – as per drawing POLE MOUNT_Option 2B.pdf). The Contractor must provide the TA the opportunity to confirm final placement.
- 20.1.C.3 The contractor must supply and install on the bulwark between Frames 8-10 a Steel Sub Plate with all associated hardware for the securing of the mounting pole system.

- 20.1.C.4 The steel sub plate must be bolted down on the bulwark.
- 20.1.C.5 The mounting pole system must be removable and operated with a worm gear drive.
- 20.1.C.6 The new mounting Z-pole system must consist of two segments of hollow aluminum pipes.
- 20.1.C.7 The length of each segment must be a minimum of 8feet with a total length of not less than 16 feet excluding the length of the Benthos Transducer sleeve which is 20.4'' as per Drawing C-270-541.
- 20.1.C.8 The O.D. of the Z-pole segments must be 4.5'' maximum with ½'' wall thickness.
- 20.1.C.9 The material of the two pole segments must be Aluminum 6000 series.
- 20.1.C.10 The two segments must be flanged (bolted) together using a double flange kit and another flange kit must be used for adapting (bolting) the USBL Benthos transducer sleeve to the pole end. Figure – 2.

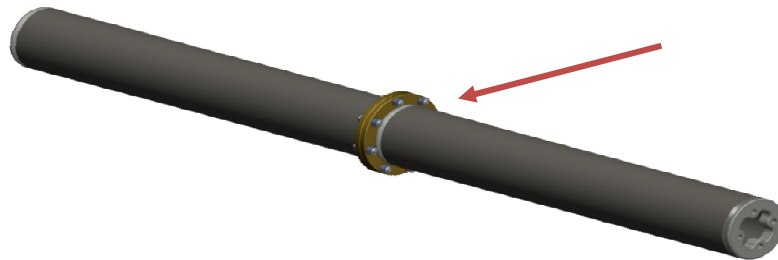


Figure - 2

- 20.1.C.11 The Transducer pole must be installed in a way that will allow the pole to retract from position 2 to position 1 (AFT) as per drawing (POLE MOUNT_Option 2B.pdf).
- 20.1.C.12 The transducer's cable must be routed inside the aluminum hollow pipe from the lower to the upper part of the Z-poles.
- 20.1.C.13 All disturbed areas of work must be painted in accordance with the existing DFO/CCG Paint Specification standard. Preparation and application of coatings must be in accordance with the manufacturer's instructions.

- 20.1.C.14 Following completion of all work, the TA must be provided the opportunity to perform an installation inspection to verify the work has been carried-out in accordance with this specification. The TA must be provided 24 hours notice of work completion.

20.1.D Removal of TrackLink

- 20.1.D.1 The Contractor must Electrically isolate the TrackLink system.
- 20.1.D.2 The Contractor must completely remove the existing TrackLink USBL system between frames 24 and 25 with the full length of cable attached.
- 20.1.D.3 The Contractor must disconnect all cables at their termination point. Care must be taken to ensure that the cables are not damaged in any way during removal.
- 20.1.D.4 The Contractor must weld a new ABS approved hull insert plate to close the opening of the underwater hull. The dimension of the TrackLink hole is D=375mm. The thickness of the plate in that area is 25mm.
- 20.1.D.5 The Contractor must use as per IACS No.47 either a (circular) round plate or square insert plate to close the hull opening with a thickness of 25mm.
- 20.1.D.6 For structural steel > 3 mm in thickness, welding must meet the requirements of CSA Standards W47.1 and W59, except as modified by the CCG "Welding Specification n-eng CT-043-eq-eg-001-E" requirements.
- 20.1.D.7 For any item requiring the application of fusion welding for steel structures, the Contractor and all Sub-contractors must be certified by the Canadian Welding Bureau to CSA W47.1 – latest edition, Division 1 or 2.
- 20.1.D.8 The Contractor must provide documentation to the TA clearly identifying compliance with the welding certification requirements specified herein and the CCG Welding Specification CT-043-eq-eg-001. Typical documents include but are not necessarily limited to: Letter of Validation, Welding Procedures, Welder Performance Qualification Cards, Inspection Personnel Qualification Cards, Inspection Reports, etc.
- 20.1.D.9 All welds are to be subject to 100% visual inspection.
- 20.1.D.10 All welds are to be subject to MPI inspection and X-ray inspection to a percentage agreed between the Contractor, the TA and the ABS surveyor.
- 20.1.D.11 Welds are to be NDT tested by a RO approved person in accordance with the requirements of CSA CWB W59, CCG Welding Specification CT-043-eq-eg-001, and

ISO 9712:2005 International Standards for NDT. In the event of any conflict between the two requirements, CSA CWB W59 must take precedence.

- 20.1.D.12 Copies of the NDT testing must be provided to the TA within 24 hours. Any defects found are to be repaired at the Contractor's expense.
- 20.1.D.13 All disturbed areas and new hull plates and welds must be painted in accordance with Canadian Coast Guard Paints and Coatings Standard 18-080-000-SG-003. The specification of the paint must be confirmed with the TA prior to application.
- 20.1.D.14 The Contractor must follow the paint specification provided by the paint supplier for the surface preparation and proper environmental conditions for curing and application of the new coatings.

20.1.E Proof of Performance

20.1.E.1 Inspection

- 20.1.E.1.1 HOLD POINT 1: The Contractor must obtain TA approval of the final system prior to purchase and installation.
- 20.1.E.1.2 HOLD POINT 2: Prior to installation, the Contractor must provide the TA the opportunity to confirm the final placement location of the steel weld down plate on the bulwark.
- 20.1.E.1.3 HOLD POINT 3: Following completion of all work, the TA must be provided the opportunity to perform an installation inspection to verify the work has been carried-out in accordance with this specification. The TA must be provided 24 hours notice of work completion.
- 20.1.E.1.4 HOLD POINT 4: The Contractor is responsible for coordinating inspections by ABS and must afford the TA to inspect at the same time.
- 20.1.E.1.5 HOLD POINT 5: The Contractor must carry out weld inspections in accordance with the CCG Welding Specification CT-043-eq-eg-001. NDT reports must be provided to the TA within 24hours after completion of the inspection. Any defects found must be reported to the TA immediately.
- 20.1.E.1.6 HOLD POINT 6: The Contractor, the TA and the ABS surveyor must agree on the inspection points for MPI's and X-rays.

20.1.E.2 Testing / Trials

- 20.1.E.2.1 The Contractor must test the system in accordance with the OEM testing instructions. As a minimum this will require the mounting pole system to be retracted as indicated in paragraph C.3.5 of this specification. The TA must be present for the Testing / Trials of the system.

20.1.E.3 Certification

- 20.1.E.3.1 Not Used

20.1.E.4 Documentation

- 20.1.E.4.1 The Contractor must supply completed copies of all Test / Trials documentation required by the OEM.
- 20.1.E.4.2 The Contractor must supply a final As Fitted drawing, in accordance with the Documentation section of the General Notes.
- 20.1.E.4.3 The Contractor must supply a copy of all technical data related to the chosen system (i.e. OEM drawings, manuals, etc.) to the TA and Chief Engineer for CCG records.
- 20.1.E.4.4 The Contractor must submit to the TA a report of all NDT test results.
- 20.1.E.4.5 The Contractor must provide copies of all approved welding procedures.

20.1.E.5 Training

- 20.1.E.5.1 The contractor shall instruct the crew in the safe and effective use of the pole.