

Annex A

CCGS PIERRE RADISSON DRYDOCK

F3065-210001

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G GENERAL NOTES

G 1 INTRODUCTION

G 1.1 These project requirements are provided to the Contractor to define the objectives, performance, engineering standards and requirements for the refit of the CCGS Pierre Radisson for the Canadian Coast Guard, Department of Fisheries and Oceans Canada.

G 1.2 It is the Contractor's responsibility to ensure that:

- a) The execution of the work specified herein meets the requirements described and those of Regulatory Bodies.
- b) All items and equipment supplied are deemed necessary to ensure the seaworthiness and safe operation of the vessel, as required for a vessel of this class.

G 1.3 Sections of this statement of work package define the individual work items for which the Contractor must address as part of the refit project for the CCGS Pierre Radisson.

G 1.4 The crew will not be lodge on board the ship during the work period, except for the first week upon arrival at the Contractor's facilities and one week prior to completion of the work. The ship must be habitable during these two periods and include accommodations, galley services, sewage systems, potable water, and the ship's alarm and monitoring system. During this period, unless otherwise specified, there will be 32 crew members on board. The custody of the ship will be entrusted to the Coast Guard only once the sea trials are completed.

G 1.5 A minimum crew of 10 will be present during the complete duration of the work. Two weeks prior to the completion of work there will be 15^{^full^} crew members present. These crew members will not be accommodated on board.

G 1.5.1 The 10 crew members will be on board mainly to perform work supervision and perform various maintenance tasks.¹ ~~The 5 crew members arriving two weeks before the end of the contract period will prepare the ship to accommodate the crew.~~

¹Rev 1- G 1.5.1 information removed for specific crew arrivals.

G 2 VESSEL PARTICULARS**G 2.1 Main Characteristics**

Name:	CCGS Pierre Radisson
Type:	Medium / Fluvial Icebreaker – Type 1200
Class:	
Ice class:	Lloyd's Register _100A1 Ice Class 1A Super _LMC Arctic Shipping Pollution Prevention Regulations
Arctic Class:	4
Voyage Class	Unlimited more than 200nm
Year Built:	1982
Built Shipyard	Port Weller Dockyards, St. Catherines, ON
Principle Dimensions:	
Length overall:	98.2 m
Breadth (molded):	19.5 m
Loaded Draft:	7.43 m
Loaded displacement:	8415 LT
Power:	13 2000 kW (6x diesel ALCO 251F, V16 of 2200 kW/ea)
Propulsion:	Diesel electric (2x DC electric motor 5073 kW/ea)

G 2.2 Equipment – Not Used

G 3 REFERENCES

G 3.1 Acts, regulations, standards, publications and procedures

G 3.1.1 The latest edition, at the time of contract signing, of all Acts, regulations, standards, publications, and procedures listed below are to be used as reference. The Contractor will ensure all work completed in the statement of work are done to all pertinent federal and territorial regulations and standards. CCG procedures are to be used as a guide if no other regulation takes precedence.

Document No.	Title	Included Yes/No
	Technical statement of works (This Statement of work document and annexes)	Yes
	Design plans – electronic format	Yes
	Applicable CCG Standards and Guidelines – electronic format	Yes
171-09529-55	Annual Monitoring of Hazardous Materials Management	Yes
DFO 9415	Welding of Aluminum and Aluminum Alloys	Upon request
DFO 5737	Fleet Safety Manual	Yes
30-000-000-ES-TE-001	Colour Coding Standard for Piping Systems	Yes
18-080-000-SG-003	Paints and Coatings Standard	Yes
	1200 Icebreaker Coating paint schemeV5	Yes
CT-043-EQ-EG-0001-E	CCG Welding specification	Yes
CA-014-000-NU-TD-001	CCG Specification for Electronic Technical Data Deliverables	Yes
ASTM F1321-14	Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to determine the Light Ship Displacement and Centers of Gravity of a Vessel	No
ASTM G82-98 (2014)	Standard Guide for Development and Use of a Galvanic Series for Predicting Galvanic Corrosion Performance	No
CAN/CGSB-1.193-99	High-Build Epoxy Marine Coating	No
CAN/CGSB 1.61-2004	Exterior and Interior Marine Alkyd Enamel	No
CGSB 3.11-2017	Naval Distillate Fuel, 2002-11-01	No

978-1-100-25421-0	Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems - Environment Canada	No
CAN/CGSB 4.155-M88	Flammability of Soft Floor Coverings - Sampling Plans	No
CAN/CGSB 51.53-95	Poly(Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts	No
CAN/ULC-S102-03	Method of Test for Surface Burning Characteristics of Building Materials and Assemblies	No
CAN/ULC-S109-03	Flame Tests of Flame-Resistant Fabrics and Films	No
Canada Shipping Act, 2001	Marine Hull and Machinery Regulations of the Canada Shipping Act which apply to research vessel as defined under General Notes of Section G 2	No
CSA C22.1 SB-06	Canadian Electrical Code, Part I (20th Edition), Safety Standard for Electrical Installations	No
CSA C22.2--No 0-M91 (R2006)	General Requirements - Canadian Electrical Code, Part II	No
CSA CAN3-Z299.3-85 (R2002)	Quality Assurance Program – Category 3	No
CSA W47.1 039	Fusion Welding of Steel Company Certification	No
CSA W47.2-11 M1987 (R2015)	Certification of Companies for Fusion Welding of Aluminum	No
IEC 60092-504 Ed. 3.0 en : 2001	Electrical installations in ships - Part 504: Special features - Control and instrumentation	No
CAN/CSA-C22.2 No 60529-05	Degrees of Protection Provided by Enclosures (IP Code)	No
CEI 60533 Second edition	Electrical and electronic installations in ships – Electromagnetic compatibility	No
IEEE 45.1-2017	Recommended Practice for Electrical Installations on Shipboard--Design	No
IEEE 315-1975 (1993)	Standard for Graphic Symbols for Electrical and Electronics Diagrams	No
ISO 4406 – 1999	Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles	No
ISO 18413:2002	Hydraulic fluid power -- Cleanliness of parts and components -- Inspection document and principles related to contaminant collection, analysis and data reporting	No

ISO/TR 10949:2002	Hydraulic fluid power -- Component cleanliness -- Guidelines for achieving and controlling cleanliness of components from manufacture to installation	No
ISO/TS 16431:2002	Hydraulic fluid power -- Assembled systems -- Verification of cleanliness	No
ISO 15748-1:2002	Ships and marine technology -- Potable water supply on ships and marine structures -- Part 1: Planning and design	No
ISO 15748-2:2002	Ships and marine technology -- Potable water supply on ships and marine structures -- Part 2: Method of calculation	No
ISO 2081 – 1986	Metallic coatings -- Electroplated coatings of zinc on iron or steel	No
	ABS and Lloyd's Classification Society Rules for the Classification of Ships	No
DORS/2010-120	Maritime Occupational Health and Safety Regulations	No
Guide PMBok 5 th edition	A Guide to the Project Management Body of Knowledge (PMBOK® Guide)–Fifth Edition	No
	Provincial Department of Labor Industrial Health Regulations respecting removal and disposal of Asbestos	No
SNAME	Rules/Guidelines for Shop and Installation Trials – latest edition	No
SNAME (3-47)*1989	Rules/Guidelines for Sea Trials – latest edition	No
SOLAS	Recommendations	No
TP 3177	Standard for the Control of Gas Hazards in Vessels	No
TP 11469 E	Guide to Structural Fire Protection	No
TP 127 E (2002)	Ships Electrical Standards	No
TP 11469 E	Guide to Structural Fire Protection – 1993	No
TP 1861 E	Standards for Navigation Lights, Shapes, Sound Signal Appliances and Radar Reflectors (1991)	No
TP 2072 E	Deck Cargo Safety Code (1974)	No
TP 7301	Stability, Subdivision and Load Line Standards (1975)	No
06/1989	Transport Canada Marine Safety Bulletin 06/1989 – “Grounding Safety in Drydock”	No
UL 1309	Standard for Safety for Marine Shipboard Cable	No
ASME B31.1	Power Piping	No
ASME B31.3	Process Piping	No

G 3.2 Technical reference documents

G 3.2.1 The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Document No. No du doc.	Title - Document description_ Titre - Description du document	Nb of pages Nb de pages
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G 3.3 Tanks

G 3.3.1 Listed are the tanks found on board, their Location by frame number and capacity (Where available). These are to be used as reference only and will not supersede any specification.

COM PARTM EN T	FRAM ES	CAPACITY (m³)		
OIL FU EL			W ATER BALLAST (S.W .)	
NO. 1 D.B OIL FU EL P.	123 - 165	91.2	FORE PEAK W .B . TANK	83 - FWD 112.3
N O. 1 D.B OIL FU EL S.	123 - 165	95.3	AFT PEAK W .B . TANK	AFT 101.3
			FWD TRIM T ANK	176 - 183 181.8
NO. 2 D.B OIL FU EL P.	97 - 123	102.6	AFT TRIM T ANK	0 - 18 113.5
N O. 2 D.B OIL FU EL S.	97 - 123	113.0	HEELING TANK W ORKING LEVEL P.	138 - 165 101.5
			HEELING TANK W ORKING LEVEL S.	138 - 165 105.6
N O. 3 D.B OIL FU EL P.	61 - 23	141.2	HEELING TANK FU LL P.	138 - 165 200.5
NO. 3 D.B OIL FU EL S.	61 - 23	141.2	HEELING TANK FU LL S.	138 - 165 211.8
FW D. CENTRE OIL FUEL DEEP TANK P.	146 - 165	139.8	FLUME TANKS (S.W .)	
FW D. CENTRE OIL FUEL DEEP TANK S.	146 - 165	139.8	FLUM E T ANK U PPER FULL	127 - 138 268.0
OIL FU EL DAY TANK	123 - 127	42.7	FLUM E T ANK U PPER W ORKIN G LEVEL	127 - 138 188.3
OIL FU EL SETTLING TANK P.	123 - 127	70.1	FLUM E T ANK LOW ER FU LL	127 - 138 275.8
OIL FU EL SETTLING TANK S.	123 - 127	70.1	FLUM E T ANK LOW ER W ORKIN G LEVEL	127 - 138 131.8
FW D. LOWER OIL FUEL W ING TANK P.	138 - 158	55.0	FLUME T ANKS (O.F.)	
FW D. LOWER OIL FUEL W ING TANK S.	138 - 158	55.0	FLUME T ANK U PPER FULL	127 - 138 255.7
			FLUM E T ANK U PPER W ORKIN G LEVEL	127 - 138 189.0
AFT . OIL FUEL DEEP TANK P.	18 - 30	104.0	FLUM E T ANK LOW ER FU LL	127 - 138 262.3
AFT . OIL FUEL DEEP TANK S.	18 - 30	104.0	FLUM E T ANK LOW ER W ORKIN G LEVEL	127 - 138 132.0
FW D. ENGINE R. OIL FUEL WING TANK P.	95 - 123	107.7		
FW D. ENGINE R. OIL FUEL WING TANK S.	95 - 123	107.7	BOILER FUEL OIL TANK	84 - 87 2.91
AFT. ENGINE R. OIL FUEL WING TANK P.	61 - 95	133.9	PURI FIER L.O. STORAGE	109 - 112 2.89
AFT . ENGINE R. OIL FUEL WING TANK S.	61 - 95	133.9	SLUDGE TANK	107 - 115 1.82
HELICOPTER FUEL TANK	4 - 11	28.3	BOILER FEED TANK	95 - 100 4.55
LUB OIL			HELICOPTER FUEL SUMP TANK	13 - 16 0.14
LUBE OIL STORA GE TANK INNER	114 - 123	9.8	LUB OIL TANK	103 - 104 0.23
LUBE OIL STORA GE TANK OUTER	114 - 123	9.8	LUB OIL TANK	104 - 105 0.23
LUBE OIL STORA GE	30 - 34	3.7	LUB OIL TANK	83 - 84 0.23
LUBE OIL STORA GE	34 - 38	3.7	LUB OIL TANK	84 - 85 0.23
FRESH WATER			LUB OIL TANK	85 - 87 0.23
FEED WATER TANK P.	27 - 30	16.4	EM ERGY. GENER ATOR F.O.TANK	72 - 76 3.86
FEED WATER TANKS.	27 - 30	16.4	GREY WATER RETENTION TANK	142 - 144 0.45
FRESH WATER TANK P.	13 - 27	68.8	PROP M OTOR L.O. CIRC. TANK	40 - 43 0.45
FRESH WATER TANK S.	13 - 27	68.8	PROP M OTOR L.O. CIRC. TANK	40 - 43 0.45
			HOT F.W . HEADER TANK	102 - 104 0.21
			DIRTY LUB OIL TANK	112 - 116 4.77
			BILGE RETENTION TANK	116 - 120 4.55
			D.B. #4 BILGE RETENTION P.	30 - 61 64.6
			D.B. #4 BILGE RETENTION S.	31 - 61 63.2

G 3.4 Abbreviations

ABS: American Bureau of Shipping	
ACM: Asbestos Containing Material	MCA: Matériaux contenant de l'amiante
CFM: Contractor Furnished Material and/or Equipment	MFE: Materials Provided by Contractor
CLC: Canada Labour Code	CCT: Code canadien du travail
CSA: Canadian Standards Association	ACNOR: Association canadienne de normalisation
CWB: Canadian Welding Bureau	BCS: Bureau canadien du soudage
DFO/CCG: Department of Fisheries and Oceans, Canadian Coast Guard	MPO/ GCC: Ministère des Pêches et des Océans, Garde côtière canadienne
FSR: Manufacturer's Field Service Representative	RSF: Représentant de service du fabricant
FSM: Fleet Safety Manual	MSF : Manuel de sécurité 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: Institute of Electrical and Electronic Engineers
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: organismes reconnus par la Loi sur la marine marchande du Canada
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 – Représentant du propriétaire (GCC)
TCMS: Transport Canada Marine Safety	SMTC: Sécurité Maritime de Transports Canada
TI: Technical Inspector – CCG delegated	AI: Autorité de l'Inspection – Inspecteur technique (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 (CNESST)
WHMIS Workplace Hazardous Materials Information System	SIMDUT: Système d'information sur les matières dangereuses utilisées au travail

G 4 CONDITIONS AND DEFINITIONS**G 4.1 General technical**

G 4.1.1 The following conditions and definitions are applicable to all work contained in the Statement of works and are intended to outline the quality of workmanship and practice that is the minimum acceptable level:

G 4.2 Equipment operational conditions – [Not Used]**G 5 MISCELLANEOUS PROVISIONS****G 5.1 COVID-19**

G 5.1.2 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 5.1.3 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 5.1.4 The Contractor must ensure that all its employees and subcontractors wear non-medical 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 5.1.5 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 5.1 ²

G 5.2 Occupational Health and Safety

² Rev 1- Numbering change to fit French version G5.1 was used twice.

- G 5.2.1 The Contractor and all sub-Contractors must follow Occupational Health and Safety (OHS) procedures in accordance with applicable federal and provincial OHS regulations ensuring that Contractor activities are carried out in a safe manner and do not endanger the safety of any personnel.
- G 5.2.2 Where “Safety Management System” is referenced in this document, it is referring to the Contractor’s Safety Management System, which must be in affect while in the Contractor’s Care and Custody and must be in accordance with the applicable OHS regulations and procedures.
- a) The Contractor must, for all work on Canadian Coast Guard Vessel, meet or exceed the Safety Management System defined in the FSM unless a Contractor proposed comprehensive Safety Management System is presented and accepted by the TA.
- G 5.2.3 When the Contractor works on the vessel while in the Care and Custody of the Canadian Coast Guard, the Safety Management System of CCG must be followed:
- a) Contractor and all its representatives must attend an orientation session on vessel safety before beginning any work to familiarize the Contractor’s employees with the dangers specific to the vessel and with its permit systems for work protocols as well as with the procedures for safety, risk prevention, hazard response and pre-work safety assessments. The Contractor will have access to an uncontrolled copy of the Fleet Safety Manual DFO/5737.
- b) The Contractor must comply with the Fleet Safety Manual, DFO/5737, as well as with the instructions for working on board the vessel, in addition to the relevant requirements of the Canada Labour Code during performance of the following types of work:
- i) Work at heights;
 - ii) Entry into enclosed spaces;
 - iii) Degassing before entering into confined spaces and for hot work;
 - iv) Lockout and Tagout;
 - v) Pre-work safety assessments.
- c) For the purpose of the Lockout and identification procedure, the Contractor must provide the padlocks and locking devices for the Contractor’s employees in addition to those provided by the Chief Engineer for the vessel’s crew.
- d) The Contractor must adhere to local facilities shore based safety instructions and safety procedures.
- G 5.2.4 The Contractor must identify a specified person that is responsible for the safety management of the work site. The Safety Manager must insure that daily safety rounds are carried out and that safety issues are identified and safety precautions are maintained.

- G 5.2.5 Areas that pose a hazard as a result of the statement of work are to be secured and clearly identified by the Contractor with signage to advise and protect all personnel from the hazard in accordance with applicable regulations.

G 5.3 Lead Paint and Paint Coatings

- G 5.3.1 The Contractor must not use lead based paints.

- G 5.3.2 The contractor must provide the services to perform the testing, removal and disposal of lead in the areas affected by the work in this estimate. We estimate at 500 man-hours the level of effort to perform all tasks related to the removal of lead contained in the coating, but will be adjusted in proportion to the actual hours confirmed by both parties. The costs associated with the acquisition of various materials to perform the removal and disposal of contaminated materials will be negotiated on Form PWGSC 1379. The contractor must demonstrate to the technical authority that the work area has been cleaned and is lead-free by submitting a test report conducted to the standards (see below) following the clean-up. Contaminated materials must be disposed of in accord with current federal, provincial and municipal environmental standards. If this work is to be negotiated through The PWGSC Form 1379. All lead disposal certificates must be provided to the technical authority before the completion of the work.

Standards for collecting and analyzing paint samples and air analysis for lead dust:

ASTM E1729 - 05 Common practice for field sampling of dried paint samples for subsequent lead content determination.

ASTM E1645 - 01(2007) Common practice for the preparation of dried paint samples using a hot plate or microwave digestion for further analysis of lead content.

ASTM E1613 - 04 Common test method for determining lead content by atomic emission spectrometry to inductive coupling plasma (ICP-AES), atomic flame absorption spectrometry (FAAS) or atomic absorption spectrometry with graphite furnace.

ASTM D4185 - A routine analysis method for measuring the concentration of metals in working atmospheres by atomic flame absorption spectrophotometry.

NIOSH 7082 - Analysis of lead content by atomic flame absorption spectrometry.

G 5.4 Primer coats

- G 5.4.1 Unless otherwise stated, all steel surfaces that have been renewed or added must be coated with two coats (2.0 mils dry film thickness per coat) of marine primer Interprime 234 or equivalent. Unless otherwise stated, the primer must be supplied by the Contractor and the

work must be approved by the IA immediately after completion of the work. All welds must be deburred and cleaned prior to applying the first coat of primer.

G 5.5 Touch-up / Disturbed Paint

G 5.5.1 The Contractor, at a minimum, must repair coating systems disturbed as a result of the specified work. Coating systems must be in accordance with the coating system of the vessel, and be applied in accordance with the paint manufacturer's recommended procedures.

G 5.5.2 All types of coatings required must be applied in accordance with their manufacturer's instructions and specifications on surface preparation, ambient conditions, drying/curing time, time between each layer, thickness of layers and preparation of coatings.

G 5.6 Painting

G 5.6.1 The Contractor must prepare a painting schedule and present it to the Technical Authority and to the Inspection Authority for review and acceptance. The painting schedule must list all areas and compartments on the vessel affected by the project work and indicated the proposed paint type, painting scheme, surface preparation, type of coating, number of coats, thickness and colors. All paint used must be compatible with the existing paint on the vessel. CCG may require chemical expertise to demonstrate the compatibility of a new paint with the existing paint. The expertise must be confirmed by a chemist. The cost of the expertise will be borne by the Contractor.

G 5.6.2 All pipe markings must comply with the standard CGFM 308-00-03, Color Coding Standard for Piping Systems.

G 5.6.3 All new and disturbed steel and aluminum work must be painted in accordance with publication DFO 5847 and with the paint manufacturer's specifications.

G 5.6.4 All paint must be suitable for use in the marine environment and comply with standards CAN/CGSB 1.61-2004 – Enamel Alkyd Exterior and Interior Marine Paint and CAN/CGSB 1.193-99 – Epoxy Resin Coatings, Marine. Paints, varnishes and other coatings used on interior surfaces must be included in the list of TCMS approved products, TP 438.

G 5.6.5 Each coat of paint must be of a different shade to indicate proper coverage, and must be completely dry before application of subsequent coats. At minimum, the first coat of primer must be applied by brush or airless spray.

G 5.6.6 The final topcoats must be protected from dirt or damage until the vessel is delivered to Canada. The Contractor must ensure that furnishings and equipment liable to more serious damage due to overspray are adequately protected during the painting process.

G 5.6.7 Without limitation, the following elements must NOT be painted. When in doubt, the Contractor must consult the IA:

- a) screw threads;
- b) grease fittings;
- c) bronze pins;
- d) door screens;
- e) nameplates;
- f) gaskets;
- g) stainless steel or monel metal fittings;
- h) machined surfaces;
- i) instrumentation;
- j) interior gratings;
- k) electrical wires, insulation and fittings;
- l) electrical panels;
- m) rubber seals on watertight doors and hatches;
- n) fire door seals;
- o) Hydraulic hoses;
- p) in general, all working parts or other exceptions stipulated by the IA.

G 5.6.8 In the case of partial repairs, the Contractor must supply only paint that the compatibility can be proven by the Contractor to ensure adherence thereof.

G 5.6.9 The paint covering the hull at the moment is INTERSHIELD 163 INERTA 160.

G 5.7 Cleanliness

G 5.7.1 The Contractor must ensure that all spaces, compartments and areas of the ship, both interior and exterior, are returned to their original state (upon delivery of the ship). The cost of removing dust, debris and other materials must be included in the bid price.

G 5.8 Asbestos Containing Materials (ACM)

G 5.8.1 The Canadian Coast Guard has detected the presence of various materials containing non-friable asbestos on board the CCGS Radisson. An inventory report of materials containing asbestos, indicating the locations and quantities of materials is available for consultation from the Technical Authority. In addition, a study was conducted on the vessel in 2019 and is included with this statement of work (see document: 171-09529-52 Annual Monitoring

of Hazardous Materials Management). The studies on the vessel's materials carried out by WSP list the type of asbestos, quantities and locations where asbestos and other hazardous materials are found.

G 5.8.2 The Contractor must become familiar with the content of this report.

G 5.8.3 The Contractor is responsible to ensure that its employees, sub-Contractors and the employees of sub-Contractors are informed of the presence of various materials containing non-friable asbestos onboard the CCGS Pierre Radisson.

G 5.8.4 It is prohibited to use new materials or to reuse materials containing asbestos. If required, any handling of material containing asbestos must be done by trained and certified personnel. The Contractor must provide the certificates of certified personnel to the Inspection Authority prior to beginning any handling or work.

G 5.8.5 It is the Contractor's responsibility to eliminate all material containing asbestos in a safe manner and it must provide the Inspection Authority with copies of certificates pertaining to the disposal of material containing asbestos, in accordance with federal, provincial and municipal regulations.

G 5.9 Confined Spaces

G 5.9.1 Entry into any confined space onboard the vessel during the contract period must be conducted in accordance with the safety management system. The Contractor must prepare a schedule of access to the confined spaces on a weekly basis. The Contractor must supply the schedule one week ahead of the work to the TA and IA. In addition to those requirements, the Contractor must also conduct the following:

- a) Have a qualified person in accordance with TCPS TP 3177E issues a "Gas Free Certificate" for spaces that will be entered and post the certificate outside the entrance to the space. Certificates must specify, "Safe for persons" or "Safe for hot work" as appropriate.
- b) The certificates must clearly indicate the type of work authorized and must be renewed in accordance with the regulations in force.
- c) Provide copies of all certificates generated to the TA in accordance with the Documentation section of the General Notes.

G 5.10 Hot Work

G 5.10.1 All hot work of this specification conducted during the work period must be in accordance with the Safety Management System. In addition to the requirements of the Safety Management System the Contractor must as a minimum also:

- a) Certify confined spaces affected by hot work as “safe for hot work” in accordance with the Confined Spaces section G 5.9 of the General Notes.
- b) Remove all portable combustible materials from the vicinity, to a safe distance not less than two meters away;
- c) Supply and install protective material to prevent the spread of sparks, protect electrical cables and other services;
- d) Supply and post fire sentries in each space and in the adjacent space where welding, grinding, or burning is being carried out on bulkheads, deckheads or decks;
- e) Supply and provide appropriate fire extinguisher(s) to the fire sentries and ensure each sentry is trained in the extinguisher’s use. The fire sentry must maintain a watch in his designated area for a minimum of thirty (30) minutes after any hot work has been completed. The Contractor must record the sentry attendance time on all hot work permits indicating when hot work stopped, and time sentry left post;
- f) A safety round of the hot work area must be completed one hour and four hours after the end of hot work. The Contractor must record the time the fire watch was made on all hot work permits;
- g) Provide a copy of the site generated hot work permits to the TA in accordance with the Documentation section G 8 of the General Notes; Named in accordance with the specification item generating the required work.

G 5.11 Work Aloft

- G 5.11.1 Any work aloft onboard the vessel during the work period must be conducted in accordance with the Safety Management System. Notices must be placed to prevent operation of Radars while personnel are working aloft on the mast or on the wheelhouse top.

G 5.12 Electrical Equipment

- G 5.12.1 When working on electrically operated equipment, the Contractor must lock-out equipment in accordance with the Safety Management System, and as a minimum conduct the following:
- a) Isolate the main power source and any alternative power source to the equipment;
 - b) Install Electrical lock-outs and place electrical caution tags on the main power source and any alternate power sources for the switches/disconnects supplying the equipment under maintenance;
 - c) Verify at the terminals to ensure power is not present.
 - d) Ensure the lock-outs and electrical caution tags remain in place until completion of all work.
- G 5.12.2 The TA must be notified of all such ongoing work.

G 5.12.3 All electrical installations and repairs must be done in accordance with the latest revisions of TP127 - Electrical Standards of Transport Canada Marine Safety and of standard 45-Recommended Practice for electrical installation on ships – of the IEEE. Standard TP127 takes precedence over the IEEE standard.

G 5.13 Workplace Hazardous Materials Information System (WHIMS)

G 5.13.1 The Contractor must provide the TA with Material Safety Data Sheets (MSDS) for all Contractor and sub-Contractor supplied WHIMS controlled products. MSDS sheets are to be the formats requested in the Documentation section of the General Notes.

G 5.13.2 All MSDS sheets must be maintained in accordance with OHS procedures.

G 5.13.3 The TA will provide the Contractor with access to MSDS sheets for all controlled products on the ship for all specified work items on request.

G 5.14 Smoking in the Work Space

G 5.14.1 The Contractor must ensure compliance with the Non-Smokers' Health Act. The Contractor must ensure that there is absolutely no smoking onboard the vessel by their employees, sub-Contractors, including the employees of any sub-Contractor.

G 5.15 Contractor Furnished Materials (CFM) and Tools

G 5.15.1 The Contractor must ensure replacement material such as jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings etc. are in accordance with the equipment manufacturer's drawings, manuals and/or instructions.

G 5.15.2 Where no particular item is specified or where substitution must be made, the Contractor must submit an Observation Report indicating the substitution or item not specified to the TA. The Contractor must provide information about materials used, certificate of grade and quality of various materials to the TA prior to use.

G 5.15.3 The Contractor must provide all equipment, appliances/devices, tools and machinery such as crane, staging, scaffolding, hoardings, and rigging necessary for the completion of the work in this specification.

G 5.15.4 The Contractor must deliver and store all new CFM equipment at their facility. The CFM must be stored in a secure, environmentally controlled space in accordance with the equipment storage section of this specification.

G 5.15.5 All tools are Contractor supplied unless otherwise stated in the technical specifications.

G 5.16 Government Supplied Materials (GSM) & Tools

G 5.16.1 Where tools are supplied by the TA they must be returned by the Contractor in the same condition as when they were borrowed. Borrowed tools must be inventoried and signed for by the Contractor on receipt and return to the TA.

G 5.16.2 Any GSM not specifically stated in the Technical Specification must be received by the Contractor and stored in accordance with the Equipment Storage section of this specification. These activities are to be covered by the Procedures for Design Change or Additional Work. (PWGSC 1379).

G 5.17 Storage

G 5.17.1 Equipment (i.e. covers, cowling and other items that may need to be removed and stored) must be stored in accordance with the equipment manufacturer's or equipment vendor's specific storage instructions. The Contractor must make these instructions available to the TA.

G 5.17.2 All equipment and items must be stored in such a manner so as to be easily accessible for inspection. No items are to be stored directly on floors.

G 5.18 Regulatory Inspections and/or Class Surveys

G 5.18.1 Prior to the close out of any item under this specification, the Contractor must afford the TA the opportunity to verify the work has been completed in accordance with the specification. At that time the Contractor must have available all photographs, documents, reports, and trials in relation to the item being closed out as completed.

G 5.18.2 The Contractor must demonstrate that the completed work and equipment comply with the performance requirements described in this Specification package or those of the equipment suppliers. The Contractor must develop test and trial procedures, and must conduct all tests and trials required by this Specification package, as well as those recommended by manufacturers or by regulatory bodies following written approval by CCG in order to obtain all appropriate certificates required for the ship. The Contractor must obtain all certificates required herein this specification to ensure that the vessel is fully certified and seaworthy, for a vessel of its class, prior to the completion of the contract.

G 5.18.3 The Contractor must prepare the trials schedule showing dates, sequence, procedures and duration of each trial or set of trials. This schedule, including the proposed trial record sheets for all trials, must be submitted to the Technical Authority and the Inspection Authority for review and approval 20 business days prior to the start of any tests and trials.

G 5.18.4 The Contractor must coordinate the testing schedule with ABS Classification Society and Health Canada (HC) to ensure their participation, where applicable. The Contractor must ensure the availability of a Field Service Representative (FSR) or obtain written

authorization from the manufacturer before initial start-up of the installed or modified equipment.

- G 5.18.5 The Inspection Authority must be present for all tests, as indicated in each section of this specification as well as the ABS, FSR or sub-Contractors, where applicable.
- G 5.18.6 Tests must follow the recommended procedures described below. Any defects must be corrected to the satisfaction of the Inspection Authority, ABS and the attending FSR on site. Once defects are corrected, the tests and trials must be repeated upon request of the Inspection Authority, and where necessary ABS.
- G 5.18.7 Upon completion of each specification item, the Contractor must notify the IA and ABS (as required) so they can inspect the work prior to final acceptance of each specification item or reassembly of equipment/components. Failure to notify the IA does not absolve the Contractor from its responsibility to provide the opportunity to inspect any completed item in accordance with regulatory and contract requirements.
- G 5.18.8 Inspections completed by the IA do not in any way, replace those inspections required by TCMS, ABS and/or HC.
- G 5.18.9 Shop testing, dock and sea trials must be to the standards required by ABS. Where ABS has no requirements for shop test procedures, the Contractor must adhere to SNAME guidelines as referenced in section G 3 of this Specification package. The minimum standard for all electrical dock and sea trial must comply with ABS, TP127E and IEEE 45-2002. All electronic equipment static tests must be completed prior to seal trials, with only the operational tests to be carried out at sea.
- G 5.18.10 Hydrostatic testing of piping and components forming part of any system must be completed prior to any operational testing of the system. The Contractor must have on hand signed and witnessed test sheets showing the results of hydrostatic tests prior to the operational tests of a system. As a minimum, the Inspection Authority must be notified when any components are being hydrostatically tested.
- G 5.18.11 The Contractor must provide the Technical Authority with a complete list of disturbed services aboard the ship that require functional and operational tests prior to the completion of each specification requirement. The Contractor must develop specific test procedures to test the operational and functional condition of each of the disturbed services and/or ship's systems. The Contractor must submit the list of disturbed services and ship's systems and the associated specific test procedures for review to the Inspection Authority and Technical Authority twenty (20) working days prior to the testing of these systems.

G 5.19 Contractor Inspections – Initial condition and location of work areas

- G 5.19.1 In collaboration with the TA, the Contractor must conduct an inspection of the condition and location of items to be removed prior to either carrying out the specified work or gaining access to a location to carry out the work.
- G 5.19.2 All parties present during this evaluation process must sign the report. This activity must be done prior to the commencement of work by the Contractor.
- G 5.19.3 The Contractor must make reference to Section G 8.6 with respect to documentation requirements for tests, trials and inspection registers.
- G 5.19.4 The Contractor must take a before picture of conditions prior to removing any items. These photographs are to be in accordance with the Documentation section G 8.3 of the General Notes, named according to the specification section G 8.3 that resulted in removing those items.
- G 5.19.5 The Contractor is responsible to produce and supply a photographic inspection survey report to TA.

G 5.20 Mechanical and Piping Systems Inspection

- G 5.20.1 All piping systems and sub-assemblies fabricated by the Contractor must be hydrostatically tested to 1.5 times the system's working pressure and proven tight to the Inspection Authority prior to installation onboard the ship. ABS requirements must be met.
- G 5.20.2 An engineer approved welding procedure for the type and thickness of pipe used must be subject to AT verification prior to commencement of welding.
- G 5.20.3 100% visual inspection of welds must be done on all hoses with operating pressures below 6 bar. In addition to the visual inspection, a radiographic inspection must be carried out on 100% of the welding of pipes whose operating pressure is greater than or equal to 6 bars. The ABS and ASME B31.1 and B31.3 standards must be applied.
- G 5.20.4 Machinery and equipment must not be exposed to pressures higher than the maximum allowable operating pressure during system pressure tests. Valves at the components may be closed, or the connection blanked off to protect such components from excessive pressure. Where there any flanged joints in the piping between a tank isolating valve and the open end of the tail pipe, or where a tank isolating valve has not been installed, the flanged joint next to the open end of the tailpipe must be temporarily blanked off so the system may be pressure tested up to that point. Instruments, pressure switches and other components that may be damaged by excessive pressure must be removed or otherwise protected during hydrostatic testing.

- G 5.20.5 For tests, calibrated pressure gauges must be installed at the connections provided in the gauge piping for this purpose. During the tests, readings of installed gauges must be checked with the calibrated test gauges. Installed pressure gauges must be adjusted where necessary, to indicate the correct pressure. The Contractor must provide all calibration certificates for all instrumentation used for the testing of systems to the IA and TA.
- G 5.20.6 When the duration of a pressure test is not specified, the test pressure must be maintained for a sufficient length of time (minimum 30 minutes) to allow a thorough examination of the system for leaks, to the satisfaction of the IA.
- G 5.20.7 Relief and safety valves and all other components installed to limit the operating pressure of a system must be removed, blanked, or bypassed where necessary, in order to build up the required pressure for the test. After a system has satisfactorily passed these tests, all components previously removed must be reinstalled and tested under pressure to ensure they are operating at their approved set pressures. Set pressures, as indicated on identification plates of these components must conform to the approved set pressures.
- G 5.20.8 All components required for the safe operation of the system must be examined and adjusted during the operating tests to demonstrate that they comply with the requirements specified and approved for the system. Operating testing must demonstrate that the design and installation of the piping adequately meets the service requirements.
- G 5.20.9 Components, such as spring clamps, must be adjusted where necessary. Flexible piping connections, slip joints, expansion joints and noise isolation pipe fittings must be checked for satisfactory operation while the system in which they are installed is being operated.
- G 5.20.10 Where pumps or ejectors have suctions from tanks or compartments, the operating test must demonstrate the system's ability to remove the service liquid down to the level of the open end of the suction line.
- G 5.20.11 Open systems such as vent lines, overflows and deck drains must be tested for unobstructed flow. This test must be conducted using a compressed air or water not exceeding 690 kPa (100 psi). Manual pump systems, portable drainage facilities and other various systems must undergo an operating test, as well as the specified pressure test. Pressure tests must precede operating testing.
- G 5.20.12 All systems must undergo visual inspection and must be leak free during the specified tests.
- G 5.20.13 All pressure and operating tests must be completed before system trials.
- G 5.20.14 Where tanks have been opened for the purpose of conducting work, they must be cleared, cleaned and inspected by the IA prior to being closed. Failure to notify the IA does not

absolve the Contractor of its responsibility of providing the opportunity to inspect any completed items.

- G 5.20.15 Inspections completed by the IA do not in any way, replace those inspections required by ABS and/or TCMS.
- G 5.20.16 Upon completion of the inspection, new gaskets must be installed on all tank covers prior to closing. The Contractor is responsible for producing a register using an MS Excel spreadsheet, containing the signatures of those responsible for each inspection of each task to be inspected in the tanks. This register must include signature spaces for the Inspection Authority (CCG), ABS inspector and the Contractor responsible representative attesting that all work and inspections have been completed.
- G 5.20.17 Where work has been conducted in or on any structural part of a tank, that tank must be subjected to a hydrostatic pressure test at a water column height of 8 ft. (2.5 m). The hydrostatic pressure test must be witnessed by the Inspection Authority and ABS. Hydrostatic pressure tests must be documented and recorded.

G 5.21 Ship Performance Sea Trials

- G 5.21.1 In addition to dock trials commissioning tests of individual ship's systems specified with in this Specification package, the Contractor must perform a full set of sea trials in accordance with the "Guide for Sea Trials" as published by SNAME. The Contractor must develop all sea trial procedures and data sheets. The sea trial procedures with attached data sheets, must be submitted to the IA and TA for review and approval 20 days before the start of sea trials.
- G 5.21.2 After the refloating of the ship and once all the work in this Specification package has been completed, sea trials of a minimum of 8 hours must be performed. The Contractor must also provide an hourly rate, in its bid, permitting the price of these trials to be adjusted (up or down) in order to ensure they meet the regulation requirements of this Specification package.
- G 5.21.3 The sea trials must be completed over the course of one day. During the sea trails, the Contractor must provide four shipyard personnel, including one supervisor, for the duration of the trials in order to make all necessary adjustments.
- G 5.21.4 Where necessary, the Contractor must organize and assume all docking costs associated with the sea trials. The Contractor must provide the necessary resources required for handling the ship's mooring lines and any tugs required for the ship's departure from and return to the dock.

G 5.22 Recording of Work in Progress

- G 5.22.1 The TA may record any work in progress using various means including, but not limited to, photography and video, digital or film.

G 5.23 Access for Maintenance, Installation, and Removal. [– Not Used]**G 5.24 Assembly of Components**

- G 5.24.1 The Contractor must ensure that during installation of specified equipment, that parts and assembled equipment are cleaned of smudges, spatter or excess solder, weld metal and metal chips or any other foreign material which might detract from the intended operation, function, or appearance of the equipment. (This would include any particles that could loosen or become dislodged during the normal expected life of the equipment). All corrosive material must be removed. This cleaning must take place before the parts are assembled into the equipment.
- G 5.24.2 Upon written approval of CCG and prior to performing the work, covers, cowlings and components damaged by the Contractor must be replaced with a new CFM cover, cowling, or component.
- G 5.24.3 Where torque specifications are not provided by the manufacturer, the applicable SAE, ANSI, or BS1083 nut and bolt standard torque must be used.

G 5.25 Protection of Equipment

- G 5.25.1 The Contractor must take measures to ensure that surfaces and components of equipment installed on the vessel are protected against damage, soiling, and contamination as a result of contracted work.
- G 5.25.2 All electrical and electronic equipment and components must be protected during the contract against physical damage, internal damage, and by the effects of adverse temperatures or other environmental conditions.
- G 5.25.3 The Contractor must protect equipment that could be damaged as a result of movement of materials and equipment nearby. The Contractor must also protect equipment from nearby sources of contamination including but not limited to burning, welding, media (sand) blasting, grinding and painting.
- G 5.25.4 Any damage to surfaces, equipment, furnishings or decor incurred prior to acceptance must be returned to As-Delivered condition by the Contractor.
- G 5.25.5 All openings in machinery and/or systems prior to connections being made must be kept covered by fitted secure solid inserts or covers at all times.

G 5.25.6 The Contractor must obtain and follow instructions from its sub-Contractors for any special protection required for their equipment during the project work. Such instructions must be made available to the TA.

G 5.25.7 Physical protection including but not limited to plastic sheets, fireproof covers, heavy weight material covers, wood plugs, wood encasements and heaters must be used as required.

G 5.25.8 The ship is currently exempt of vermin. The Contractor must protect the vessel from an vermin infestation (insect/mammal/bird). If an infestation does occur during the contract period, the Contractor must bear all costs to ensure the vessel is made vermin free before the vessel's departure and contract completion.

G 5.26 Halocarbon containing Systems

G 5.26.1 All work conducted on Halocarbon containing systems, must be in accordance with the Federal Halocarbon Regulations, 2003 (SOR/2003-289). For information purposes, these regulations are available on the internet at the following address: <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-289/page-1.html>

G 5.26.2 A control policy for halocarbons used on CCG ships is in vigor. This policy is in Section 7.D.4 of the Fleet Safety Manual. The Contractor must ensure its employees and sub-Contractors respect this policy.

G 5.27 Disposal of Waste Oil and Hydrocarbons

G 5.27.1 The Contractor must dispose of all waste oil and hydrocarbons or assign the task to sub-Contractors holding the provincial permits required for disposal of petroleum products. Copies of these permits must be presented on request, and disposal of waste oil and hydrocarbons must be done in accordance with Canadian Coast Guard policy on handling of fuel, oil and waste oil, described in Chapter 7.C.1 of the Fleet Safety Manual.

G 5.28 Waste Disposal

G 5.28.1 Disposal of waste generated by sandblasting and mechanical cleaning must be done by the Contractor while respecting provincial or municipal regulations, or by a sub-Contractor holding a permit from provincial authorities for the disposal of such material. Copies of these permits must be presented on request.

G 5.29 Workmanship

G 5.29.1 The Contractor must use qualified, certified and competent tradesmen and supervisors to ensure a high quality and standard of work in accordance with ship construction/building standards and to the satisfaction of the Inspection Authority.

G 5.30 Supervision

- G 5.30.1 During all phases of the work, the Contractor must supervise the work of its staff and sub-Contractors. Personnel designated by the Inspection Authority will accompany the Contractor's employees at all times in accommodations and cabin spaces.

G 5.31 Welding

- G 5.31.1 In addition to the welding qualification required in the contract; All welding and weld inspection must be in accordance with the CCG Welding Specification CT-043-EQ-EG-0001. This document is provided to the Contractor as part of the Technical Reference Documents of the tendering documents.
- G 5.31.2 The Contractor must provide CWB's most recent audit report.
- G 5.31.3 The Contractor must provide access to a customer-determined and hired third party at the welding facilities to perform a verification of the equipment, personnel qualifications, procedures and quality plan.
- G 5.31.4 The governing standards for welding of materials less than 3 mm in thickness must be in accordance with the requirements of the CCG Welding Specification CT-043-EQ-EG-0001. For materials greater than 3 mm in thickness, the Contractor must meet the following:
- a) For structural steels greater than 3 mm in thickness, welding must meet the requirements of CSA Standards W47.1-2019 - Annex M, W59-2018, and the CCG Welding Specification CT-043-EQ-EG-001.
 - b) For structural aluminum greater than 3 mm in thickness, welding must meet the requirements of CSA Standards W47.2 – 11 (R2015), W59.2-2018, and the CCG Welding Specification CT-043-EQ-EG-001.
 - c) For structural stainless steels greater than 3mm in thickness, welding must meet the requirements of CSA Standard W47.1-2019 – Annex K, AWS D1.6-2017, and the CCG Welding Specification CT-043-EQ-EG-001.
 - d) ABS welding standards are accepted.
 - e) Provide a welding procedure specific to the work approved by an engineer.
 - f) Inspections must be performed by a Level II Inspector CSA W178.2.
 - g) The Contractor must provide a 100% visual inspection of the welds that confirms acceptance.
 - h) When the Contractor performs welds on the hull, in addition to the visual inspection, the Contractor must perform Ultrasonic NDT (Non-Destructive Testing) on 100% of the welds and provide a quality control report that confirm the acceptance.

- G 5.31.5 Consumables must meet the following requirements: Canadian Coast Guard Welding Specification CT-043-EQ-EG-001 section 5.4
- G 5.31.6 The welding procedure must meet the following requirement:
- a) The welding procedure (piping and structure) must be stamped by the Contractor's welding engineer and available on site for review by the CCG and the ABS Classification Society.
- G 5.31.7 The Welding Procedure Qualification Test (WPQT) and Welding Procedure Qualification Record (WPQR) must meet the following requirements:
- a) The WPQT and WPQR must be available for review by the CCG and the classification society (exception: unless the classification society has approved and stamped the welding procedure, then no revision is required).
 - b) The WPQR must be included in all the classification test requirements.
- G 5.31.8 The Contractor must provide a list of welders intended to be used in the completion of the work; The list of welders must identify the Canadian Welding Bureau welding procedure qualifications attained by each listed welder and must be accompanied by a copy of each person's current Canadian Welding Bureau welding certification.
- G 5.31.9 Welders certification must meet the following requirements:
- a) Structure: Steel welding must be performed by a welder currently certified by the Canadian Welding Bureau in accordance with Canadian Standards Association standard W47.1 Annex M Qualification of Welding Personnel and Procedures for marine applications. W47.2 for Aluminum.
 - b) Pipe: All welders must be certified to ASME Sections IX and B31.1 / B31.3.
- G 5.31.10 Welding inspection and qualification of inspectors must meet the following requirements:
- a) Structure: The Welding Inspector must be Level II certified in accordance with CSA W178.2 or an equivalent standard.
 - b) Pipe: The Welding Inspector must be Level II certified to ASME Section IX.
- G 5.31.11 Non-destructive testing must meet the following requirement:
- a) Inspector must be certified level II according to NRCan (Natural Resource Canada)

G 6 GOVERNMENT PROPERTY

G 6.1 General

- G 6.1.1 All materials and equipment removed from the vessel by the Contractor remain the property of Canada, unless the project requirements explicitly provide for their disposal.
- G 6.1.2 The Contractor must keep and maintain these materials and equipment in their original condition while awaiting instructions from the Technical Authority.
- G 6.1.3 The Contractor must obtain the approval of the CA to dispose of the materials and equipment, whose market value is void after being removed from the vessel.

G 6.2 Categorization

- G 6.2.1 Any property of Canada that must be removed from the vessel either temporarily or permanently must be placed in one of the following three categories:
- a) Category A:
These items must be permanently removed from the vessel and remain the property of Canada. The Contractor must store and protect these parts from weather, physical damage, or loss. The Contractor must store these parts on palettes, platforms, or containers adapted for shipping until Canada has inspected them and has accepted to take charge and store them. The Contractor is responsible for storing these parts for Canada for the duration of the contract period. It is the responsibility of Canada to remove these parts from the Contractor's premises.
 - b) Category B:
These items remain the property of Canada and must be temporarily removed from their location on board the vessel during the contract work. They must be returned to their original location on board the vessel before it leaves the Contractor's facility. The Contractor must protect these items from weather, physical damage, or loss. These items must be stored to allow movement of the items to permit access for inspection, refurbishment and/or maintenance of these items as necessary. The Contractor must take care not to damage the equipment and the materials.
 - c) Category C:
Upon removal, these items become the property of the Contractor, who must dispose of them in accordance with all applicable laws, rules, and regulations.
- G 6.2.2 Prior to removal of any item from the vessel, the items must be clearly identified with wire tags clearly indicating if it belongs to Category A, B, or C, in accordance with the instructions of the Technical Authority.
- G 6.2.3 This requirement is in addition to those concerning any spare parts required for regulatory purposes. All such spare parts must be supplied packaged and individually identified with the description of the equipment, the model number, and the catalogue/part number.

G 6.3 Spare Parts

- G 6.3.1 All new equipment that is procured by the Contractor for installation on the vessel must be supplied complete with sufficient manufacturer's recommended original spare parts (OEM) for six months or 2,000 hours of operation whichever is greater or unless otherwise specified by the Technical Authority.
- G 6.3.2 All system spares must be provided in a spare parts list supplied by the Contractor in an electronic MS Excel or equivalent spreadsheet format. The spreadsheet must identify, for each component of a system, the number of spare parts recommended in the previous paragraph. The list must include the following fields:
- a) The supplier;
 - b) The manufacturer;
 - c) The manufacturer's part number;
 - d) The unit price;
 - e) The definition of the quantities (unit, case, etc.);
 - f) The recommended number;
 - g) The associated system/equipment
- G 6.3.3 An electronic copy of the spare parts list must be must be submitted to both the Inspection Authority and the Technical Authority.
- G 6.3.4 The Contractor must notify the Inspection Authority and the Technical Authority when such spare parts have been received.
- G 6.3.5 The Contractor must store the spare parts in accordance with the manufacturer's requirements and ensure that they are protected from weather, physical damage, or loss.

G 7 PROJECT MANAGEMENT**G 7.1 Introduction**

- G 7.1.1 As part of this project, project management refers to the management needs for ensuring the integration of both upstream and downstream activities and sub-activities, technical control, and management of deadlines required for the refit project of the CCGS Pierre Radisson. The Contractor must provide, during the preparatory meeting for the refit, a draft of a Gantt bar chart in a MS Project 2013.

G 7.2 Project Action Plan (PAP)

- G 7.2.1 The Contractor must document the management of the project work in a PAP, and must update this plan every month or more frequently as required by the Contracting Authority.

G 7.2.2 As a minimum, the PAP must include organization structure charts, a schedule, support schedules, sub-Contractor schedules and work, and delivery dates for Government and Contractor furnished equipment (GFE and CFE).

G 7.2.3 The monthly updates to the PAP must include schedule updates, a progress report, and review meetings. The components of the PAP and the updates are described in the following sub-sections.

G 7.3 Project Integration Management

G 7.3.1 Included with its bid, the Contractor must provide an organization chart of the entire project, indicating all key personnel and sub-Contractors. In addition, the Contractor must identify, in whole or in part, the work assigned to each sub-Contractor.

G 7.4 Change Management Log

G 7.4.1 The Contractor must provide a Change Management Log that must be used for the duration of the project to manage changes to the project.

G 7.4.2 The Change Management Log must track project issues using the following criteria:

- a) Individual tracking number;
- b) Identification in the Specifications section;
- c) Date issue was raised;
- d) Expected resolution date;
- e) Date issue was resolved;
- f) Date resolution is accepted by the Inspection Authority;
- g) Brief note of resolution on issue;
- h) Individual who raised the issue;
- i) Individual assigned to resolve issue;
- j) Risk factor.

G 7.5 Risk management

G 7.5.1 Using an MS Excel spreadsheet or equivalent, the Contractor must prepare a risk management plan of emerging risks, and classify them according to their impact on the work and the production schedule. Mitigation strategies must be developed for all high risks. This risk management plan must be updated at least every two weeks and submitted to both the TA and CA. The Risk Management Plan must be included in the monthly progress meetings record of decisions.

G 7.6 Scheduling

- G 7.6.1 The project management and planning file as per Sub-Section G 7.1.1 must contain a minimum of the following planning elements:
- a) The Work Breakdown Structure (WBS) on at least three or more levels for each section of the Specification package. More specifically, the WBS must include the strip outs, production, assembly, installation, bench testing, system commissioning and tests and trials, the expected and required resources, and the necessary sea trials;
 - b) Predecessors and successors;
 - c) The start and end dates for each item;
 - d) The critical path to the acceptance of the work;
 - e) The sub-Contractors' schedules up to the same level;
 - f) Long lead items and GFE;
- G 7.6.2 The Contractor must update the schedules for each progress meeting and present the updates to the Contracting Authority, the Inspection Authority, and the Technical Authority.
- G 7.6.3 The schedules must identify all work in the project, main milestones, and all interrelationships between the tasks. The schedules must be baseline.
- G 7.6.4 The initial schedule must be delivered 21 calendar days after the contract is awarded.
- G 7.6.5 A schedule of milestones must be provided in the bidder's presentation.
- G 7.6.6 The Guide to the Project Management Body of Knowledge, 5th edition, must be used as a reference for planning.
- G 7.7 Project reports Not used**
- G 8 DOCUMENTATION**
- G 8.1 Text Documentation**
- G 8.1.1 All text deliverables must be accompanied by a PDF file that must contain the complete document. The Contractor must check the quality to verify that the content reflects the same content/formatting as the Master Document file. In the case of changes, a second PDF file that contains only the changed sheets must be supplied.
- G 8.1.2 Further guidance is available from the Canadian Coast Guard Specification for Electronic Technical Data Deliverables (CA-014-000-NU-TD-001).
- G 8.2 Data Book**

G 8.2.1 The Contractor must provide all documentation generated as a result of specified deliverables, in both electronic and paper formats. There must be 2 paper copies of each document, in two separate binders, as part of the Contractors QA program. An electronic copy of all documentation must also be provided to the TA in accordance with the formats described in this specification section.

G 8.2.2 All copies of documents generated as a result of specified deliverables will be referred to as the “Data Book”.

G 8.2.3 The Contractor must provide to the TA all the files generated as part of the Data Book prior to the contract requirement being considered complete. The files must be in hard format (CD-ROM, DVD-ROM, Flash Drive / Memory Stick). Each specification item is to have its own folder named according to the specification item. For example “G General Notes”.

G 8.2.4 Any documentation, media, and reports that are the result of Additional Work must be included as part of the Data Book.

G 8.3 File Naming

G 8.3.1 File naming must be in the following format: Specification#.# – Date (yyyy-mm-dd) – File Name Describing Information. For Example: “G_1.0_2013-12-01_Details of file naming.pdf”.

G 8.4 E-mails

G 8.4.1 Any files sent to the CA/TA by e-mail must be named as per the “File Naming” section G 8.3 of this specification. All files that are e-mailed must have the Contract # – Specification Item # - Date - Keywords short description of the content in the subject name.

G 8.5 File Formatting

G 8.5.1 All documentation, reports, test results, certificates, or data obtained by the Contractor in paper form must be scanned into unprotected, searchable, Adobe PDF formatted files and named according to the “File Naming” section of this specification.

G 8.5.2 All reports, test results, certificates, or raw data obtained by the Contractor in electronic format must be converted to unprotected Adobe PDF formatted files and named according to the “File Naming” section G 8.3 “File Naming” of this specification. Both the original and the converted copy must be provided as part of the Data Book.

G 8.6 Photographs

G 8.6.1 All photographs obtained by the Contractor as requested in the specification must be provided in .JPG formatted files at a resolution of at least 640 x 480 and named according to the “File Naming” section G 8.3 of this specification.

G 8.7 Measurements, Calibrations, and Readings.

G 8.7.1 All measurements, calibrations and readings recorded, must be signed by the person taking the measurements, dated and scanned into electronic format as part of the Data Book.

G 8.7.2 Unless otherwise specified the Contractor must record dimensions to a precision of three significant digits in imperial along with the metric equivalent.

G 8.7.3 The Contractor must provide to the TA current and valid calibration certificates, and control values for all instrumentation used in the Test and Trials Plan, showing that the instruments have been calibrated in accordance with the manufacturer’s instructions. These copies are to be provided as part of the Data Book, under any specification where measurements are required.

G 8.8 Test/Inspection Records and Certificates Register

G 8.8.1 Test and/or Inspection Records and Certificates are identified as a deliverable in the individual specification item requesting them.

G 8.8.2 Test and/or Inspection Records and Certificates, must be included as a separate section in the Databook and indexed/arranged in numeric order by specification number and dated.

G 8.8.3 The Contractor is responsible for maintaining a complete and accurate record of all tests and trials conducted on the vessel and on each piece of equipment. Prior to the commencement of a trial, all relevant documentation and associated test sheets, including shop test data, must be complete and attached to the trials agenda.

G 8.8.4 All tests and trials data must be legible both in hard copy and electronic format. If necessary, handwritten records may require transcription into electronic format in order to be acceptable. The original must be signed by the regulatory body, the TA, the Contractor and where necessary, by the sub-Contractors and/or FSR’s who witnessed the tests. All the data must be submitted to the TA in accordance with the Documentation section G 8 of these General Notes.

G 8.8.5 The Contractor must maintain a complete and accurate register of all certificate records for the work performed. Certificates records must be up-to-date and correspond to the type of equipment installed by the Contractor. When certificates of approval from a Classification Society are required, the Contractor must ensure that they are inserted within the Certificate register binder. When manufacturers provide equipment certificates in operating manuals,

copies of these certificates must also be indexed in the Certificate register binder. The Contractor must also obtain and index all certificates issued by its sub-Contractors.

- G 8.8.6 The originals of tests, trials and inspections registers must be signed by ABS, the Contractor and where applicable, the sub-Contractor and/or Field Service Representative who witnessed the tests.
- G 8.8.7 Tests and inspections carried out for the specific purpose of satisfying the ABS requirements for the Ship Inspection Reporting System (SIRS) update of the vessel must be recorded and signed on documents meeting the requirements of ABS, to clearly indicate which piece of equipment or system with associated field number was tested and the results of tests performed. All copies of the documents must be dated and signed by the ABS inspector present and by the Contractor.
- G 8.8.8 The Contractor must prepare a separate binder for the documentation of all Certificate records as well as in electronic format. The binder must be indexed for each element or piece of equipment for which Certificate records are available.
- G 8.8.9 The Contractor must maintain a complete and accurate register of all certificate records for the work performed. Certificates records must be up-to-date and correspond to the type of equipment installed by the Contractor. When certificates of approval from a Classification Society are required, the Contractor must ensure that they are inserted within the Certificate register binder. When manufacturers provide equipment certificates in operating manuals, copies of these certificates must also be indexed in the Certificate register binder. The Contractor must also obtain and index all certificates issued by its sub-Contractors.
- G 8.8.10 The Contractor must provide the number of paper copies and electronic copies of the tests, trials and inspection records.
- G 8.8.11 Where original certificates are provided, especially ABS certificates, one of the three paper copies submitted must be the original document.
- G 8.8.12 The Contractor must, in addition, provide originals of each certificate document to the TA in an envelope marked with the vessel's name and the words "Original Certificates".

G 9 DRAWINGS

G 9.1 General

- G 9.1.1 The Contractor must provide all drawings & diagrams necessary for the design and execution of work on the new or modified systems, including drawings & technical manuals produced by the manufacturers or the sub-Contractors.

- G 9.1.2 All new drawings must be submitted as individual files compatible to DWG (AutoCAD Version 2013). The files must be provided to the TA on a DVD storage media, clearly identified with the title and number of the project.
- G 9.1.3 The drawings must provide a complete and detailed visualization of all new or modified systems (Electrical & mechanical). The drawings must include all the information so that a qualified technician can conduct a quick, complete and specific search in case of malfunction or for any other reasons.
- G 9.1.4 Generally, the drawings must include or describe all of the following elements:
- a) Detailed cover page and index;
 - b) Abbreviations and symbols used;
 - c) Identification and specification of equipment;
 - d) Location, physical representation and mechanical dimension;
 - e) Block diagrams, overview of the systems;
 - f) Electrical circuits: Controls, power, cables and wiring;
 - g) All other references or details required to understand the system
- G 9.1.5 It is the responsibility of the Contractor to update or redraw all original vessel drawings affected by the modernization project. Changes made to the old drawings must be denoted in a different colour or style. If more than 50% of an original diagram is changed, the diagram must be redrawn in full, compatible to DWG (AutoCAD) format. Although some original diagrams are kept in a series, this should not prevent all drawings from being homogenous in presentation, numbering and method of interpretation.
- G 9.1.6 The Contractor must have an effective method to produce and update drawings throughout the work period. The Contractor must maintain an up-to-date list of drawings & revisions, and must provide this list to the TA at the monthly progress meeting. This list must include a column of all drawings sent to ABS for approval.
- G 9.1.7 The Contractor must provide the Inspection Authority and Technical Authority all drawings required by or generated by sub-Contractors.
- G 9.1.8 A final version of the “As Fitted” drawings must be provided at the end of the project. DWG (AutoCAD) files must not be electronically protected, and the CCG must be able to modify all elements as needed in any future changes.

G 9.2 Conceptual design drawings

- G 9.2.1 The Canadian Coast Guard provides all technical reference drawings to the Contractor for reference purposes only. The Contractor must produce working drawings and ensure that all of these drawings receive relevant regulatory approval. The Contractor must note that

the reference drawings provided are not all "As Fitted" drawings. The Contractor must physically verify each element affected, as well as all dimensions required for the work.

G 9.3 Working drawings

G 9.3.1 The Contractor must prepare the details of the project working drawings in accordance with the requirements of the regulatory agency. All changes must be included in the revisions of working drawings.

G 9.3.2 Working drawings must clearly indicate the materials or equipment being supplied, all construction details, precise dimensions, capacity, operating characteristics and performance. Each working drawing must include a unique identification number, and blocks of numbers must be used to identify the various elements of the specification items. When multiple working drawings are required, each drawing must indicate the total number of sheets within the series.

G 9.3.3 Each working drawing for non-catalogue items must be prepared specifically for this project. Working drawings and brochures for catalogue items must be clearly marked to show the items being supplied.

G 9.3.4 The Contractor must approve all working drawings and indicating:

- a) The drawing's compliance with all specification requirements has been verified;
- b) The equipment has been coordinated with the other equipment to which it is attached or connected;
- c) All dimensions have been verified to ensure the correct installation of equipment within the available space.

G 9.4 Working drawings – Submission for Review by PWGSC and CCG for review

G 9.4.1 The Contractor must submit to the Technical Authority and Inspection Authority by email or other electronic means the working drawings, shop drawings and schedules required for the work. The TA may request up to three paper copies of these drawings. Drawings must be submitted at least 10 business days before the start of the work for the affected drawings. The Inspection Authority and Technical Authority must verify specification compliance and, as needed, share their comments with the Contractor within five business days. The Contractor must make all necessary amendments and return and return the revised version of the drawing, with revision dates and revision numbers, to the Technical Authority, in the following two working days.

G 9.4.2 Reviewed drawings must not be modified in any way without written authorization from the Technical Authority. In the event of subsequent revisions to drawings already reviewed the entire drawing (all sheets, revised or not) must be resubmitted for review.

G 9.4.3 Space must be provided on the working drawings for review dates and signatures of the Inspection Authority and the Technical Authority.

G 9.4.4 Drawings submitted for review, unless otherwise specified, must be in the form of original drawings. Printed manufacturer's data sheets for standard components are acceptable as long as the pertinent characteristics are identified and relate to specified items.

G 9.5 Working drawings – Submission for ABS approval

G 9.5.1 The Contractor must submit to ABS copies, as necessary, of working drawings, ship drawings and/or layout drawings, schedules and calculations required for approval by ABS.

G 9.5.2 The Contractor is responsible for ensuring that working drawings are approved by ABS before beginning work on any section of these specifications that must be approved by ABS.

G 9.5.3 Space must be provided on all working drawings for ABS approval stamps. This space must be clear of all technical information and must not be on the back of any sheets.

G 9.5.4 The Contractor must communicate with the respective ABS approval office to determine the quantities and types of materials required for approval purposes.

G 9.5.5 The Contractor must submit one copy of the original stamped drawing and three copies of all ABS approved drawings to the Technical Authority.

G 9.5.6 The Contractor must provide the Technical Authority with a DVD containing all ABS approved drawings compatible to PDF format.

G 9.6 "As Fitted" Drawings

G 9.6.1 Upon completion of work, the Contractor must transfer all mark-ups from the working drawings to a final revision of all vessel drawings affected by the project work. These drawings must become the "As fitted" drawings for the project work.

G 9.6.2 After acceptance of the ship, the Contractor must provide the following:

- a) four copies on standard ANSI paper of the latest revision of each of the "As Fitted" drawings;
- b) the latest revision of each "As Fitted" drawing, compatible to AutoCAD 2013 DWG format, containing a detailed, up-to-date, MS Excel-format list of the files for each DVD;
- c) All drawings must become the property of the Government of Canada.

G 9.6.3 If no AutoCAD drawing files are produced, then The Contractor must supply scanned files (raster format) to the Technical Authority compatible to PDF format.

G 9.6.4 The "As Fitted" drawings must be delivered within 15 days after completion of the sea trials.

G 9.7 Framed drawings

G 9.7.1 The following drawings, modified as "As Fitted" drawings, must be printed, framed and mounted on board the ship at the locations designated by the Technical Authority:

- a) General Arrangement Drawings including: plan view of all decks and profile view;
- b) Tank Capacity Plan;
- c) Fire Control Plan;
- d) Lifesaving Equipment Location.

G 10 MANUALS

G 10.1 General

G 10.1.1 Instruction Manuals and Registers must be bound in a hardcover three-ring, D-ring binder with positive locking mechanisms capable of holding 8 1/2" by 11" sheets. Larger drawings and documents must be concertina folded to suit. The following information must be printed on the cover:

- a) CCGS Pierre Radisson – Drydock;
- b) Specification identification number;
- c) Identification of equipment or systems;
- d) equipment manufacturer;
- e) Revision number and date.

G 10.1.2 All sections of the manuals must be equipped with plastic tabbed indices. Major equipment components must be subdivided into separate sections in the manuals.

G 10.1.3 A main index must be provided at the beginning of each binder indicating all items included in each section.

G 10.1.4 A list of names, addresses and telephone numbers of contacts associated with equipment manufacturers must accompany the document for consultation after the completion of the project for maintenance and information data purposes.

G 10.1.5 A copy of the final and approved "As Fitted" drawings must be included in the maintenance manual.

G 10.1.6 The Contractor must provide the Technical Authority with two paper copies of all manuals and data sheets in English and in French (1 copy each) for the equipment components supplied by the Contractor prior to the completion of the contract.

G 10.1.7 The Contractor must submit four copies of all manuals and data sheets to the Technical Authority on individual DVDs compatible to PDF format, prior to the completion of the contract.

G 10.2 Operation Manuals – “As-Fitted”

G 10.2.1 The operating manuals must include the following:

- a) A general description of the equipment's operating sequence in English and French;
- b) A detailed equipment start-up procedure in English and French;
- c) Schematic wiring diagram for the fitted equipment;
- d) All pertinent equipment performance criteria;
- e) When systems are accompanied by software or hardware, a user manual must include the following:
 - i) Full software documentation manual for the system, in CD-ROM format, such that Canada may revise the programs without recourse to the Contractor.
 - ii) The minimum software documentation must include:
 - System level diagrams describing the overall scheme of the software/hardware system;
- f) The functional specifications describing in detail the functional capabilities of the system and of each software component;
- g) The list of project-specific programs, including all comments describing the particularities of the code functions;
- h) All listings, files, manuals and associated documentation material must be delivered to and become property of Canada.

G 10.2.2 The Contractor must supply the number of paper copies and electronic copies of the operating manuals.

G 10.3 Maintenance Manuals – “As-Fitted”

G 10.3.1 These manuals must include the following:

- a) The manufacturer's maintenance instructions for each piece of equipment requiring maintenance;
- b) The instructions must include installation instructions, part numbers, parts lists, master drawings and exploded views with part identification for all mechanical, electrical, and electronic parts, name of suppliers;

- c) A list summarizing each piece of equipment requiring lubrication, indicating the name of equipment item, location of all points of lubrication, type of lubrication recommended, and the frequency of lubrication;
- d) Troubleshooting sections must be included for all equipment in the maintenance manual under a separate header.

G 10.3.2 The Contractor must supply the number of paper copies and electronic copies of the maintenance manuals as indicated in the section 6.2.1 above.

G 11 IDENTIFICATION

G 11.1 Nameplates

G 11.1.1 Nameplates must be affixed to all new equipment, compartments, doors and closures.

G 11.1.2 All nameplates must be written in both official languages.

G 11.1.3 Lettering must be clear and concise while minimizing the use of abbreviations. Primary information must be given in larger size lettering than secondary information.

G 11.1.4 The type of nameplate must correspond to the location on the vessel as specified below:

- a) Plastic must be used in accommodation and navigation spaces where the nameplate is not exposed to mechanical damage and does not risk being covered by ice, paint, oil, grease or dirt.
- b) Plastic nameplates must be laminated phenolic rigid type with machine engraved lettering and secured using stainless steel or brass screws. Unless otherwise indicated, nameplate must have white lettering on a black background for normal signs and white lettering on a red background for warning or emergency signs.
- c) Laminated plastic nameplates, black with white core engraved through to the center core, must be provided for all devices secured to the exterior surfaces the distribution panels/switchboard.
- d) Nameplates must be secured to the distribution panel/switchboard with machine screws. New nameplates to be fitted on the existing distribution panel/switchboard must be consistent in size and lettering with those already fitted. Nameplates for feeder circuits must identify each circuit by name and number and the fuse size and/or trip element rating.
- e) Warning or caution nameplates must be in laminated plastic; red with white core engraved through to the center core. They must indicate the circuit breakers provided with trip coils requiring completion of remote circuits prior to being operated, as well as those having a potential power source connected to both sides, or to any other potentially hazardous condition.

- f) Engraved metal, stainless steel or brass nameplates must be used in machinery spaces and where exposed to weather. Engraved metal nameplates must have lettering accentuated by means of black wax and secured with stainless steel or brass machine screws.
- g) Before ordering or manufacturing nameplates, a complete drawing list of nameplate must be submitted, specifying the size of the plates, the size of the lettering and their inscription, for review and acceptance by the Inspection Authority and the Technical Authority.

G 11.2 Key Tags

- G 11.2.1 Plastic labels must be provided for all new keys. Tags must be marked to identify the space or the item they lock. The description must be identical to that used for the identification nameplate for the space or the equipment. The complete list of new keys and labels must be submitted to the Inspection Authority and to the Technical Authority.
- G 11.2.2 All new keys and tags must be turned over to the Technical Authority as part of the acceptance of the vessel.

G 11.3 Safety Related Signs

- G 11.3.1 All new signs must be written in both official languages, French first.
- G 11.3.2 Painted signs for muster station directions, fire stations, emergency equipment, etc., must be provided and installed in accordance with ABS approval.
- G 11.3.3 The Contractor must prepare and present a drawing indicating the location, type and size of lettering for all signs. This drawing must be submitted to ABS for approval prior to fabrication or installation of the signs.

G 11.4 Nameplates for electrical equipment

- G 11.4.1 All new signs must be in both official languages, French first.
- G 11.4.2 All special precautions and maintenance or operating instructions must be written on the nameplate or on a separate plate attached to the equipment.
- G 11.4.3 All electrical equipment operating on hazardous voltages and the compartments in which they are located must be marked with a warning that a hazard exists and must specify the maximum system voltage.
- G 11.4.4 Distribution boards must be provided with nameplates indicating the following:
 - a) The name of the switchboard;

- b) The manufacturer;
- c) serial number (if applicable);
- d) The date of manufacture.

- G 11.4.5 Each circuit breaker must be provided with a nameplate indicating the name and function of the circuit and the circuit breaker configuration. The Contractor must correctly identify the functions and names of each instrument, switch, etc. on the distribution board and mark with a red line the value of full load or normal operation.
- G 11.4.6 Distribution panels must be provided with nameplates indicating:
- a) The space, service, device or circuits controlled and the designation of the power supply conductor.
- G 11.4.7 Inside, panels and switchboards and motor controls must have nameplates to identify bus bars and terminals. The phases of the busbars must be identified by means of a color code.
- G 11.4.8 Electrical boxes housing multiple electrical and electronic devices must have a unique identification code for each device, and each device must be labeled accordingly. Drawings must be mounted inside the enclosure and must clearly indicate the mounting and identification codes of the devices found in the enclosure.
- G 11.4.9 The terminal blocks and terminal wiring must be marked with the circuit designation and must be treated as devices within the enclosures. Terminal blocks must be labeled consecutively and in ascending order from left to right and from top to bottom.
- G 11.4.10 The size and other characteristics of nameplates must be in accordance with section G 11.

G 11.5 Labeling of cables

- G 11.5.1 All identifying marks of conductors and all cable labels must be shown on the drawings of the "As-Fitted" system and must comply with the following instructions:
- a) Cable tags must be printed with indelible ink and must not be handwritten;
 - b) Each cable must have an identifier unique to the installation;
 - c) Each cable tag must have the following information: unique cable designation and location of each end;
 - d) Conductor identification markings must be secured to the conductors to prevent them from becoming disassociated from the conductor when it is connected to a device.
- G 11.5.2 All permanently installed cables must be tagged with the circuit designation at all points of connection and on both sides of bulkheads, decks, etc. Tags must be of metal compatible with the armor or cable sheathing. Both ends of the tags must be strapped to the cable with compatible metal strap after all painting has been completed. Straps must pass through

holes in the tags so that tags are positively secured. Strap ends must be permanently folded and crimped. Adhesives of any kind will not be acceptable.

- G 11.5.3 All wiring in panels specified to be labelled must be labeled with the Cable Number and their conductor number unless otherwise specified in equipment installation drawings.

S SERVICES

S 1 GENERAL

- S 1.1 The Contractor must supply all labour, materials and facilities necessary for the maneuver, the dry docking and the refloating the ship identified in section G 2 as required to conduct the work described in this Specification package. Details of berthing and mooring facilities must be included in the bidder's proposal.
- S 1.2 The ship must be located at the Contractor's facilities for the duration of the work.
- S 1.3 The Contractor must supply all material and labour required to dock and undock the vessel including any vessel movements, provisions for tugs, and line handling personnel.
- S 1.4 The Contractor must supply and install a gangway fitted with a safety net in compliance with the Canada Labour Code for as long as the ship is docked at/in its facilities. The Contractor is responsible for the safety of the gangway.
- S 1.5 The following services for which unit prices must be submitted, must be provided to the ship while it is at the Contractor's facilities. These prices must cover the entire work period. When required, unit prices for each service must also be submitted for adjustment purposes based on variations in the duration of services. Services identified with an asterisk (*) will be required both in dry dock and at the Contractor's wharf.
- S 1.6 The Contractor must supply all equipment, tools and machinery required to perform the work as described in this Specification package. The Contractor cannot make execution of work conditional on provision of equipment or other machinery that is not already included in its firm price by the Government of Canada or by a sub-Contractor paid by the Government of Canada. Lifting equipment must be properly adapted and of sufficient capacity for its intended use. It must be accompanied by a valid certificate indicating its safe working load, or bare a permanent marking indicating its safe working load.
- S 1.7 All welded supports or other mountings required in this section must be installed by welders certified by the Canadian Welding Bureau. A testing by magnetic particle will need to be completed to confirm the quality of the weld and lifting capacity, prior to use. Upon completion of the work, all supports and mountings used for the work described in this Specification package must be removed from the ship.
- S 1.8 The overhaul and installation of all machinery and equipment specified herein must be in accordance with the applicable instructions, drawings and specifications of the manufacturer.

S 2 BERTHING

- S 2.1 The Contractor must be responsible for docking and mooring of the ship for the duration of the contract period. The Government of Canada must have free access to the ship at all times.
- S 2.2 A berthing plan is available upon request to the TA. The Contractor must make himself a copy and return the document to the TA.
- S 2.3 The depth of water must be sufficient to prevent the ship from touching bottom during any tidal or low water conditions. The Contractor must ensure that there is sufficient water under the keel to allow propulsion system testing during dock trials.

S 3 MOORING LINES

- S 3.1 The Contractor must supply all mooring lines and labour required for docking/undocking, mooring, dock trials, refloating of the ship and casting off of the vessel. The Contractor may use the ship's mooring lines to tie up the vessel upon arrival, but must be immediately replace these and remove the vessel's lines to storage.

S 4 DRY DOCKING

- S 4.1 The docking plan from the last dry dock (2019) will be provided to the shipyard by the Technical Authority during the first contractual meeting or before the ship arrives at the shipyard. The Contractor must make a copy and return the original to the TA. C17-66-026-11
- S 4.2 For planning purposes, the ship's displacement should not exceed 7620 metric tons with a mean draft of 6.63m in Sea water or 6.78m in Fresh water. As stated in paragraph 2.8 and 4.1.4 in Part 1 to 7 of the Call for Tender, the Contractor's bid package must include proof that the docking facility is certified to dry docking a ship with these particulars.
- S 4.3 The ship will be delivered to the entrance of the shipyard. The Contractor is responsible for docking the ship at the wharf adjacent to the dry dock, including the installation and removal of a gangway (Contractor supplied), regardless of the ship's arrival and departure times. This also applies to any docking/undocking as required for sea trials.
- S 4.4 The Contractor must supply all labor, materials, equipment and resources necessary for handling the ship's mooring lines and tug assistance as required to perform the docking and refloating of the vessel, as well as any other movements required throughout the duration of the contract period. The Contractor must be responsible for any associated fee.

- S 4.5 The Contractor must note that the ship will require a period of 24 hours, both before and after dry docking, to allow for ballasting and fuel transfer operations necessary to obtain the desired trim of the vessel for dry docking.
- S 4.6 The Contractor must supply a plan of the dry dock with its proposal. The plan must comply with the requirements of this specification of work. The plan must include the date and time of foreseen entry/exit from the dry dock, as well as the availability of the adjacent wharf.
- S 4.7 The stability books are included in the Technical Data Package provided to bidders see section G 3.2.
- S 4.8 The Contractor must supply all labour, materials and facilities necessary for dry docking and refloating the ship as required to conduct the work described in this Specification package.
- S 4.9 The Contractor must prepare a new blocking plan, offsetting the blocks relative to the measurements indicated on the 2019 docking plan in order to permit sandblasting of the hull and application of paint in those areas where the ship rested on keel blocks in 2019.
- S 4.10 The new blocking plan must indicate the location of all keel blocks in relation to the respective frames to serve as a reference for the next dry docking, permitting work to continue on the hull in the areas covered by blocks during this dry docking.
- S 4.11 The new blocking plan must be submitted to the TA and the IA for consultation before the Contractor prepares the dry dock.
- S 4.12 Before the dry docking of the ship, the Contractor must arrange an inspection with the IA to verify the blocks and their alignment. A report of the alignment readings must be submitted to the IA.
- S 4.13 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 dock and undock the ship and plan sufficient lay days to carry out the work described in this document, with a sufficient margin to perform unexpected work.
- S 4.14 The Contractor is responsible for recording all tank soundings, draft, trim and list of the ship, and must perform the stability calculations required to properly dock the ship. These calculations must be forwarded to the TA and IA two (2) business days prior to dry docking the vessel.
- S 4.15 The ship must be docked so that all docking plugs, transducers, anodes and sea inlet grids are clear and accessible. Blocks supporting the keel and hull that prevent removal of the drain plugs from tanks will have to be moved, as well as those preventing access to seawater intake and sea chest grates.

- S 4.16 The Contractor must not place blocks under the echo sounder transducer plates located between frames 138 and 140, port and starboard, nor under the Doppler sonar transducer plates located between frames 155 and 156. The Contractor must also consider the work on the multibeam see section 20.1.
- S 4.17 There must be a minimum clearance of 1.3 m (4 ft) under the keel.
- S 4.18 In the event that hull fittings are covered, the Contractor must be responsible for all labour and equipment required for making alternative arrangements to drain tanks and/or move blocks to gain access to areas of specified work.
- S 4.19 All misplaced blocks, not corresponding to the new blocking plan provided by the Contractor, must be moved at the Contractor's expense.
- S 4.20 If the CCG requires other blocks to be moved for other reasons, the Contractor must provide a unit price for 5 additional block displacement.
- S 4.21 The Contractor must supply and install gangways compliant with the Canada Labour Code as long as the ship is in dry dock. The ship must be equipped with two separate and independent accesses at all times. One gangway must be installed at the front of the ship on the port or starboard side and the other must be installed at the aft of the ship on the opposite side of the forward gangway. The gangways must be safe and structurally adapted for the passage of the ship's crew and workers, in accordance with Section 2 of the Maritime Occupational Health and Safety Regulations. The gangways must be well lit at night. The gangways must be placed at both ends of the ship, in accordance with the Technical Authority's directives. The Contractor is responsible for the safety of the gangways.
- S 4.22 Once the ship is properly resting on the blocks, the Contractor must immediately remove the ballast tank drain plugs and drain these tanks. The position of these plugs is indicated on the vessel's docking plan.
- S 4.23 The drain plugs must be clearly labelled as they are removed to insure they are reinstalled in their respective positions. Once the drain plugs have been removed, the Contractor must give them to the CCG Inspection Authority, who will be responsible for their storage.
- S 4.24 The Contractor must install drain fittings to the various deck scuppers overboard drains if they interfere with the work in any way. The Contractor must indicate a unit price for the installation of five (5) temporary drains for deck scuppers and overboard drains.
- S 4.25 The Contractor must be responsible for the safe transfer of the ship to the berth or mooring location where it will stay until the dry docking. During dry docking, radio contact must be maintained between the ship's Commanding Officer or IA and the Contractor's docking master. If necessary, the Contractor must include in its bid towing and/or pilotage and

icebreaking services. All costs for rope handling and for the certified docking master are the Contractor's responsibility. The Contractor must provide and install a ground cable between the vessel and the dock while it is docked, as per TCMS Ship Safety Bulletin 6/1989.

S 4.26 The Contractor must notify the CCG of all movement or refloating of the ship not required by this Specification package, seven days prior to the start of the operations. The Contractor must supply the IA, TA and CA with a plan of its intentions. The Contractor will be responsible for all costs associated with these decisions.

S 4.27 Within four hours of dry docking, the bottom of the ship's hull must be pressure washed (5000 psi minimum) with fresh water to remove any marine life/vegetation allowing for a preliminary hull inspection.

S 5 HULL CLEANING AND INSPECTION

S 5.1 Within 4 hours of dry docking, the Contractor must clean the entire hull, from the keel to the top of the bulwarks, propellers, rudder trunk, bow thruster, bow thruster tube and rudder using fresh water under pressure (5,000 lb/in² minimum) to remove fouling and any loose material.

S 5.2 The IA and ABS inspector will inspect the hull, keel, propellers and rudder as soon as possible after they have been cleaned.

S 5.3 The Contractor must supply a motorized platform (cherry picker), including a certified operator, for a period of six hours, to facilitate the inspection.

S 5.4 The Contractor must clearly identify the repairs required by ABS to the hull plate welding butts and seams in order to facilitate its execution.

S 5.5 Perform the inspection work for the ice belt.

S 6 NUMBERING

S 6.1 The shipyard must supply the necessary material and labour to temporarily number the hull frames and bulkheads to facilitate the external hull inspection. The shipyard will be responsible for keeping the frames numbered throughout the entire dry docking period until the ship is refloated.

S 6.2 Frames must be numbered on each side of the ship, at five-frame intervals, in conformity with the ship's construction drawings. Each number must be accompanied by a line 60 cm in height, on each side of the hull at bilge-level.

S 7 UNDOCKING

S 7.1 Before refloating the ship, the Contractor must obtain the drain plugs from the IA and install them in their respective locations using white lead and twine. The Contractor must verify the

water tight integrity all tank drain plugs, including those that were not removed, by means of a vacuum box test. If the seal of a previously removed drain plug does not pass the vacuum box test, the Contractor must remove it and add more white lead with twine and redo the test until proven watertight. The IA must witness the tests. All requirements regarding undocking apply whenever the Contractor floods the dry dock.

S 7.2 Before refloating the ship, the Contractor must verify all grate fasteners for all sea chests, seawater intakes and hull openings to ensure that they are locked in place by welding.

S 7.3 Before undocking the ship, the Contractor must ensure that any protective covers and connections are removed. The Contractor must supply, install and remove, upon completion of work, all fittings and lugs required to perform the work indicated in this Specification package. Where the lugs and/or fittings are installed and removed, the welds must be ground flush with the hull. Any damaged or disturbed paint work must be performed in accordance with the instructions found in the paint section of these Specifications and of those of the paint manufacturer. Paint must be applied in accordance with the ship's color and external marks diagram.

S 7.4 Before undocking the ship, the Contractor must ensure that all tanks are filled to obtain the same conditions as at docking. The Contractor is responsible for the safe refloating of the ship, taking into consideration any changes in stability resulting from the work carried out in these Specifications. The Contractor must perform the necessary stability calculations required to refloat the ship. These calculations must be submitted to the Inspection Authority and Technical Authority for review, 48 hours prior to flooding the dry dock.

S 7.5 Prior to refloating the ship, the Contractor must clean the transducers using a mild soapy fresh water solution to eliminate any contaminants or fouling. The transducers must then be rinsed with fresh water to ensure that there is no residual soap on their exterior surfaces.

S 7.6 The Contractor must ensure the safe undocking of the vessel and that no damage to the vessel will be incurred during the undocking process. The Contractor must have a sufficient number of personnel on board to respond in case of water ingress or other problems.

S 7.7 Prior to flooding the dry dock, the Contractor must ensure that all ship's side, including valves, are properly closed using a checklist.

S 7.8 Prior to the ship's departure, the Contractor must provide the CCG TA with the documentation required to obtain a certificate of seaworthiness from ABS.

S 8 **GANGWAYS**

- S 8.1 The Contractor must supply and install a gangway fitted with a safety net in compliance with the Canada Labour Code for as long as the ship is docked at/in its facilities. The Contractor is responsible for the safety of the gangway.

S 9 **PLATFORMS**

- S 9.1 The Contractor must supply the labour and material for the erection of access platforms required to execute the work specified in this Specification package and any additional agreed upon work. Upon completion of the work, the platforms will be disassembled and removed from the ship. The Contractor must include the cost of these preparations must in its bid.

S 10 **ACCESS AND CUMBERSOME ITEMS**

- S 10.1 The Contractor must remove any piping, inspection hole covers, components and equipment where necessary, in order to perform the work and access work spaces. Upon completion of the work, the Contractor must reinstall the removed items with new gaskets, collars, hardware and anti-seize compound to be supplied by the Contractor.

S 11 **(*) ELECTRICAL POWER**

- S 11.1 The Contractor must supply two electrical power connections (600 VAC, three-phase, 300 amps/connection) for the duration of the contract (docked or in dry dock).
- S 11.2 The Contractor must supply the material and labour to connect and disconnect as required, two electrical cables for shore power supply, each being 150 feet long with male plugs. These two cables must be connected in parallel onboard ship. Before powering the ship, the Contractor must ensure that power sources supplied have the same phase sequence at the source and on the ship. The nominal load of the ship is between 350 and 400 kilowatts. The ship will provide two, female plugs with two meter long extensions for connection to ship yard's electrical system. These cables must not be shortened. The cables and connections must be Megger-tested before connection.
- S 11.3 The Contractor must provide a unit price per kilowatt hour which the Contractor must use in its bid to determine a price for a block of 500 000 kilowatt hours. This unit price will also be used to adjust (up or down) the ship's total consumption at the end of the contract period via a PWGSC 1379 form.
- S 11.4 The Contractor must supply a kilowatt-hour meter and connect it to the ship's power source to track consumption. The Contractor must read the kilowatt-hour meter in the presence of the Technical Authority before connection and disconnection of the power supply to verify the

electrical consumption. The meter must be read in the presence of the TA before and after any movement of the ship. Power consumption readings must be reported to the TA weekly.

S 11.5 The power supply for which the price is indicated must only be used for the ship.

S 11.6 Upon completion of the work and disconnection of the shore power, the shore power adaptors/extensions must be disconnected from the cables and returned to the ship's Electrical Officer.

S 11.7 NOTE: If the Contractor powers the ship using a diesel generator installed on the deck, it must be responsible for watch keepers and generator fuel.

S 12 **(*) TEMPORARY PROTECTION OF DECKS AND BULKHEADS**

S 12.1 In order to avoid accumulation of dirt in corridors and to protect floor coverings, the Contractor must supply and install HDF (High Density Fibreboard) hardboard panels (1/8 inch thick) on all deck surfaces and of the Main deck, Upper deck, Boat deck, Officers deck, Navigation deck, Bridge and the Control Room. The Contractor must also supply and install HDF (High Density Fibreboard) hardboard panels in all entries, staircases, the Chief Engineer's, the Engineers offices, the two (2) offices for the Government of Canada representatives, the Crew's Dining Room, the laundry room deck and the rear main deck from the port propulsion room entrance to the steering gear compartment, inclusive. The total area to be covered is approximately 650 m². For adjustment purposes, the Contractor must provide a unit price per square metre (m²).

S 12.2 The Contractor must supply and install 48 in. x 1/8 in. thick cardboard on the lower bulkheads of all deck corridors mentioned above. The Contractor must ensure that the cardboard and HDF hardboard panels remain in good condition for the duration of the contract. If the cardboard and HDF hardboard panels become damaged, they must be replaced at the Contractor's expense.

S 12.3 Installation of the deck and bulkhead coverings must be done as soon as the ship arrives at the shipyard facilities. The Contractor is responsible upon taking charge of the ship. Upon completion of the work, the Contractor must remove all cardboard and HDF hardboard panels and must remove any remaining adhesive residue on decks and bulkheads. The use of polyethylene covers is prohibited.

S 13 **TEMPORARY LIGHTING AND VENTILATION**

S 13.1 The Contractor must supply, install and maintain any temporary lighting and ventilation as required to carry out the work in this Specification package. Upon completion of the work, the Contractor must remove these items.

S 14 **HEATING**

S 14.1 It is the Contractor's responsibility to ensure that heating and dehumidification are maintained for the duration of the contract. The Contractor is responsible for monitoring the environmental conditions onboard the ship to prevent damage from temperature variations. This must include protection from freezing of all piping systems containing liquids and protection against overheating in any spaces in which electronic equipment is susceptible to damage, such as the electronic equipment room, the wheelhouse and the engine control room. To prevent damage from temperature variations, the Contractor must keep the ambient temperature of the vessel between 18°C and 22°C.

S 14.2 The ship's steam systems will be made available to the shipyard for steam production. The monitoring and operation of this system will be under the shipyard responsibility. A CCG engineer will be available to provide advice to the shipyard for the monitoring and operation of this system.

S 15 **STORAGE SPACE (NOT USED)**

S 16 **FIRE PROTECTION**

S 16.1 The Contractor must supply the appropriate type and quantity of fire extinguishers including fire watches, required for all hot work until these surfaces and walls have cooled (see section G 5.10). The ship's fire extinguishers must not be used except in emergency situations. If the Contractor must use one of the ship's fire extinguishers, it must be refilled and verified by an authorized company. The Contractor must supply fire-retardant protection to protect cable trays, cables, equipment and structure against slag and any hot work by-products. In the event of the use of a fire extinguisher, vessel's or contractor's, an incident report must be filled out and given to the technical authority.

S 16.2 If the work affects the vessel's fire detection or extinguishing systems (sprinklers, CO₂), the Contractor shall ensure that the vessel and its occupants remain protected from any fire hazard. In order to do so, the Contractor may only remove or deactivate a portion of these systems at a time, by installing spare parts during the work or by any other means accepted by the IA.

S 17 **FRESH WATER AND FIREMAIN SEAWATER SERVICES**

S 17.1 The Contractor must supply all material and labour to install necessary connections and supply fresh water necessary to provide the services described hereunder throughout the entire dry docking period. The Contractor must disconnect connections upon completion of work.

S 17.2 The following connections are required to service the vessel:

- a The Contractor must supply and install a 1½ inch hose certified for potable water. The water must come from a source that is certified safe for human consumption by a health services authority from the local municipal or provincial government. The Contractor must supply a

valid potable water certificate to the Inspection Authority before making the connection. Potable water must be supplied through a pressure regulator, complete with pressure gauge and isolation valve. Potable water pressure will be held to fifty (50) psi gauge. Water consumption is approximately 8 tons/day when the crew of 32 are on board. Filling of two potable water tanks (135 m³).

- b The Contractor must supply a separate and continuous, uninterrupted non-potable water connection, which must pass through a pressure regulator and connected to the ship's fire main. The water supply must be connected immediately after the ship's entry into the dry dock. This water supply must be maintained at a pressure of 690 kPa (100 psi gauge) at all times and must be supplied by one 2.5 inch diameter hose. This installation must include an on-board pressure regulator equipped with a pressure gauge and isolating valve. The Contractor must communicate with the Inspection Authority to determine the exact locations for connecting to the ship. There must be no interruption of this supply while the ship is at the Contractor's facilities. It is the Contractor's responsibility to take all necessary precautions to ensure that lines do not freeze in cold weather. Water will be consumed as needed for firefighting and cleaning purposes. During the summer, air conditioning, refrigeration and air compressor cooling require 3,400 m³ of water per day. In other seasons, without air conditioning, 130 m³ are required per day.

S 17.3 The Contractor must supply separate fresh water for cleaning, testing and rinsing tanks, in accordance with these specifications. The cost of water consumption for these items of this specification package must be assumed by the Contractor.

S 18 **OVERBOARD DISCHARGE/DRAINAGE CONNECTIONS**

- S 18.1 The Contractor must supply all required materials and labour to attach temporary drainage hoses to the overboard discharges as listed below, such as to prevent water from running down the hull and disturbing uncured paint. The Contractor must also supply and install temporary drainage hoses to each of the overboard scuppers in such a manner as to prevent water from running down the hull. All drainage connections must be drained to suitable disposal facilities and/or drains. It is the Contractor's responsibility to take all necessary precautions to ensure that lines do not freeze in cold weather. The Contractor must disconnect and remove all temporary connections upon completion of work.

OUTLETS	DIMENSIONS	LOCATION
AIR CONDITIONING # 2 and 3	5"	STBD FR-94
AIR CONDITIONING # 4	4"	PORT FR-96
AIR CONDITIONING # 5	3"	PORT FR-36
DOMESTIC REFRIGERATION	3"	PORT FR-36
CARGO REFRIGERATION	3"	STBD FR-36
GREY WATER	4"	PORT FR-59

BLACK WATER	3"	STBD FR-96
BOILER PURGE (2 outlets)	3"	PORT FR-96
CONDENSATE DRAIN	5"	STBD FR-96
FORWARD COMPRESSOR	2"	PORT FR-96
AFT COMPRESSOR	3"	PORT FR-96

S 19 **BLACK WATER AND GRAY WATER**

- S 19.1 For black and grey water, the Contractor must supply portable tanks, or tanks that can be pumped out. The Contractor must be responsible for disposing of this water; all related costs must be included in this item.

S 20 **OILY BILGE WATER**

- S 20.1 The Contractor must indicate a price for the disposal of approximately 20,000 litres of oily bilge water from the ship's bilges. The price specified for this item must be adjusted upward/downward upon request of additional work using the 1379 form. The quantity stated in this item must only apply to the ship's needs and not to the Contractor's needs as required to complete any work described in this Specification package. The Contractor must provide the Inspection Authority with the name(s) of the company(ies) registered for pumping and disposal of waste oil, and receipts for the elimination of ship hydrocarbons for inclusion in the hydrocarbon service booklet.

S 21 **GARBAGE REMOVAL**

- S 21.1 The Contractor must supply suitably size garbage containers of 8 cubic yard placed on the flight deck beside the gangway for waste from the ship. These containers must be emptied daily.

S 22 **CRANES AND SCAFFOLDING**

- S 22.1 Provide the services of a crane of at least 5 tonnes from the shipyard for the ship's general needs, including an operator and all personnel needed to ensure that these operations are carried out safely. The Contractor must provide a price for this service for one (1) hour per working day, giving an average of five (5) hours per week, for 8 weeks. For adjustment (up or down) purposes, the Contractor must provide an hourly rate for this service. The Contractor must maintain a record of crane usage that must be signed weekly by the IA. A usage report must be submitted to the IA every 2 weeks.
- S 22.2 For the duration of the contract period, crane services must be provided by the shipyard for displacement of parts arising from the work described in this Specification package. This work

must be in addition to the specific needs of the ship, and the costs must be included with each item of this Specification package.

- S 22.3 The Contractor must supply all labour and materials needed to set up scaffolding, work platforms or shelters required to carry out the inspection of the ship's hull by the ABS inspector or by the IA, as well as all work performed on the ship's hull. This includes, but not limited to, scaffolding and equipment to access propellers, rudder, rudder trunk, bow thruster and cathodic anodes to be replaced.

S 23 CLEAN UP

- S 23.1 At the end of the work, the Contractor must rid the ship of all waste, debris and extraneous materials resulting from work carried out in this Specification package. The ship must be returned to its original state of cleanliness when it was handed over to the Contractor see section G 5.19.4.

- S 23.2 Upon completion of all work and final cleaning, the Contractor's Quality Assurance (QA) representative and the CCG Technical Authority must complete an inspection together of all compartments and spaces where work was performed by the Contractor. Any defect or damage noted during this visit must be recorded and compared with the digital images taken during the initial inspection G 5.19 Contractor Inspections – Initial condition and location of work areas.

- S 23.3 The Contractor must repair any damage or defects resulting from the work carried out, at its own expense.

- S 23.4 The Contractor must hire an external housekeeping service to perform a cleaning one week before the return of the crew onboard the ship in the following spaces: CCG representatives offices and washrooms, Chief Engineer, Electrical Officer and Senior Engineer's cabins (including living room/office, bathroom and bedroom), Engineers' office, the crew's dining room (cafeteria) and a shared washroom.

S 24 VESSEL SECURITY

- S 24.1 The Contractor must ensure security of the ship while under his care, custody and control.

- S 24.2 The Contractor must provide specialized security staff to carry out rounds all spaces, both interior and exterior, of the vessel. In addition to the requirements for hot work, the Contractor must conduct rounds every day at four-hour intervals even on holidays and holiday periods. These rounds must include a visual inspection of every compartment. The security patroller must be trained and informed of how to immediately take appropriate action upon discovery of any risky or urgent situations for the ship.

- S 24.3 When the ship is afloat, the Contractor must make arrangements to prevent damage to the ship due to wind, waves, tides, floods, fire and weather conditions. The Contractor must increase the frequency of security rounds in the event of bad weather conditions.
- S 24.4 The Contractor must provide a logbook, to be submitted to the IA, and must be initialed by the security patroller must upon the completion of each round. The register must be available at all times for verification and a copy must be sent to the TA an CA every week.
- S 24.5 The Contractor must implement an alert system to intervene in case of emergency, including personnel qualified to remedy these situations and prevent potential damage to the ship. Damage to the ship due to the Contractor's failure to meet these requirements must be repaired at the Contractor's expense.

S 25 MEETING ROOM AND PROJECT MEETINGS

- S 25.1 The Contractor must invite and inform CCG personnel of daily production meetings. The IA will usually participate in these meetings and will discuss production and inspection activities.
- S 25.2 The Contractor must provide a room for progress meetings. These meetings will be held every four weeks, but may be more frequent depending on the progress of work and potential issues to be addressed.

S 26 PROJECT FACILITIES

- S 26.1 The following must be provided on the Contractor's site:
- a) Washroom facilities must be located nearby;
 - b) Six parking spaces must be made available to Canada personnel. The spaces should be clearly marked to the ship's name. If necessary, passes must be provided to regular Canada project personnel;
 - c) All of the aforementioned equipment and facilities must be in good condition, to the satisfaction of Canada;
 - d) Canada must have access to the facilities listed above 7 days a week, including at night, from 7 days following the awarding of the contract and up to 7 days after the work is accepted.

10.0 SAFETY AND SECURITY

10.1 FIRE SYSTEMS

10.1.A IDENTIFICATION

- 10.1.A.1 The purpose of this specification item is to carry out the annual inspection and maintenance of the various firefighting systems and equipment aboard the vessel.

10.1.B REFERENCES

- 10.1.B.1 **Equipment Data – [Not Used]**

- 10.1.B.2 **Drawings and Documents**

Drawing Number	Drawing / Document Title	Number of Sheets
06418-20 shts 1,2,3	Plan de lutte contre les incendies	
F-3756-06M008.pdf DWG #3	Installation des systèmes d'extinctions CO ₂ (2008)	
F-3756-06M008-001-QCC.pdf	Système d'extinction au CO ₂	
	08-Système d'extinction fixe	
	11-extincteurs	

- 10.1.B.3 **Regulations and Standards**

- 10.1.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 government Regulation

	Title	Included Yes/No
FSM Procedures		
7.B.2	Fall Protection	Yes
7.B.3	Entry into Confined Spaces	Yes
Publications		
Standards		
IMO Circ. 1432	Revised guidelines for the maintenance and inspection of fire protection systems and appliances	No
IMO Circ 1318	Guidelines for maintenance and inspections of fixed Carbon Dioxide Fire-Extinguishing Systems	No

Regulations		
	Canada Shipping Act, 2001 and its regulations	No

10.1.C STATEMENT OF WORK

10.1.C.1 General

- 10.1.C.1.1 The Contractor must ensure that all inspections and maintenance are performed by a company certified to work on these types of systems/equipment. Before starting work, the Contractor must provide the IA with a valid copy of certificates.
- 10.1.C.1.2 After completion of the work, the Contractor must return all spaces to their original functional state and cleanliness.
- 10.1.C.1.3 The Contractor must provide the equipment, parts and labor required to re-certification fixed and portable firefighting systems of the ship and its boats. These fixed systems, described in the annex, the fixed system in the galley, the MINUTEMAN II, the Fire Combat of the flight deck, and portable fire extinguishers CO2.
- 10.1.C.1.4 The Technician will be accompanied at all times by a ship's deck officer. This work must be coordinated with the TA to ensure there is a deck officer onboard. The Contractor must provide a schedule to the TA as soon as possible. The Contractor must give the TA at least 4 weeks notice.
- 10.1.C.1.5 All work must be completed to the satisfaction the ABS inspector and the IA.
- 10.1.C.1.6 Following the examination and testing of the systems referred to below, the Contractor must submit three copies to the IA, of the following items.
- A hydrostatic tests certificate of all fixed cylinders and fire extinguishers tested;
 - A certificate of inspection of the fixed cylinders and portable fire extinguishers.
 - A certificate of inspection of the MINUTEMAN II 150 model system and the helicopter hangar FireCombat system.
 - A certificate of analysis from the foam of the MINUTEMAN II system, the FireCombat system and spare containers stored in the compartment adjacent to the lifeboat (3 different lots).
 - Inspection must be made by the manufacturer or by a qualified laboratory.
- 10.1.C.1.7 See attached lists of equipment designed for hydrostatic testing or maintenance included in the known work.
- 11- Extincteurs
 - 08- Systèmes d'Extinction Fixes

10.1.C.2 Fixed CO2 system:

- 10.1.C.2.1 Check system for proper operation of timers, visual indications, audible alarms and the ship's ventilation shut-downs. CO2 cylinders must be disconnected to avoid accidental discharge of CO2 gas. Piping must be blown-through and proven free, using compressed air, nitrogen or other inert gas.
- 10.1.C.2.2 While testing propulsion motors and propulsion alternators extinguishing systems, first remove the fusible nozzle cover before blowing through with inert gas. Reinstall the cover at the end of the testing.
- 10.1.C.2.3 At the start of each day, contractor must have sufficient reserves of compressed gas to perform all tests and inspections for that day, to avoid delays. Contractor must provide manpower to rearm system and perform trials at the same time. Contractor must coordinate trial and inspection period with the inspection authority.
- 10.1.C.2.4 Contractor must demonstrate that all nozzles and conduits are free from obstruction. This may require dismantling and blanking of certain sections of piping. Each system must be reassembled and restored to its original configuration at the end of each day.
- 10.1.C.2.5 Contractor must inspect all local and remote actuation devices, time delays and temperature rise actuators.
- 10.1.C.2.6 Contractor must ensure all hoses and flexible connections between bottles and distribution network are gas-tight.
- 10.1.C.2.7 All bottles must be checked for liquid level and marked accordingly.
- 10.1.C.2.8 It is understood that firefighting equipment must remain accessible and available in case of emergency. Adequate precautions must be taken when using hot work to perform inspection.
- 10.1.C.2.9 In every case, where a fixed firefighting cylinder is found defective, charged below its nominal capacity or requires hydrostatic testing, contractor is responsible for removal from vessel, perform necessary maintenance, return to its original position and re-connected. Parts to be replaced will be supplied by the contractor and dealt with using the PWGS 1379 form.
- 10.1.C.2.10 All systems must be identified with tags bearing the contractor's name, date and initials of person performing inspection.
- 10.1.C.2.11 The flexible hoses must be replaced according to the list 08-système d'extinction fixe.doc

10.1.C.3 Galley, Fixed Fire Extinguishing Pero-chem PCL 300

- 10.1.C.3.1 Contractor must perform annual inspection of Galley Fixed Fire Extinguishing system.
- 10.1.C.3.2 Contractor must check ventilation shut-downs, visual alarms and fusible links for correct operation.
- 10.1.C.3.3 Contractor must check local, remote and automatic triggering devices.
- 10.1.C.3.4 Contractor must check cylinder for level of extinguishing agent and date of most recent hydrostatic test.
- 10.1.C.3.5 If system cylinder needs to be removed for inspection, testing of refilling, it must be replaced with a cylinder compatible with the system in place, until original cylinder can be re-installed. Parts to be replaced will be supplied by the contractor and dealt with using the PWGS 1379 form.
- 10.1.C.3.6 Upon completion, new tags bearing the contractor's name, date and initials of person performing inspection must be affixed to the system.

10.1.C.4 Flight Deck Fire Extinguishing System

- 10.1.C.4.1 Contractor must perform annual inspection of Flight Deck fire extinguishing system: FireCombat & Minuteman
- 10.1.C.4.2 Contractor must provide containers and draw a sample of AFFF Foam from the Minuteman system, the FireCombat System and one from each lot of spare foam, as identified by the Chief Officer. Results from the analysis of these samples must be given to the CCG.
- 10.1.C.4.3 Contractor must ensure, powder from the Minuteman system has not been compacted due to the ship's vibrations. If compaction is noticed, contractor must advise Chief Officer.
- 10.1.C.4.4 Technical Information :
 - a) Fixed System MinuteMan : Foam (container below nozzle)
 - b) Fixed System FireCombat : Powder (aft container) and foam (forward container)
- 10.1.C.4.5 Inventory of spare extinguishing agent :
 - a) 2 containers Ansul-lite 3%, Helicopter Workshop.
 - b) 2 containers Angus Tridol 3% (AFFF) Motor Propulsion Room.
 - c) 12 containers Angus Tridol 3% (AFFF) Bosun's Store
 - i) 3 container Ansul-lite 3% (AFFF) Bosun's Store

- ii) 2 containers Angus Tridol 3% (AFFF), Fuel transfer compartment.

10.1.C.5 **Portable Fire Extinguishers**

- 10.1.C.5.1 Contractor must perform annual inspection of all portable fire extinguishers aboard the vessel according to list provided. Inspection must be performed aboard the vessel. Date and time must be coordinated with Chief Officer. Chief Officer must be advised if any extinguishers must leave the vessel.
- 10.1.C.5.2 Each fire extinguisher must be removed from its wall support and inspected for anomalies. Pressure gauge and date of most recent hydrostatic test must be checked.
- 10.1.C.5.3 All cartridges on powder extinguisher must be verified and weighted.
- 10.1.C.5.4 All extinguishers must be identified with tags bearing the contractor's name, date and initials of person performing inspection.
- 10.1.C.5.5 Contractor must repair and recharge all extinguishers found defective, below nominal charge and perform hydrostatic testing if required. The contractor must remove the extinguishers from the vessel, transport to his facility and transport back to be ship and install in the original location. Parts to be replaced will be supplied by the contractor and dealt with using the PWGS 1379 form.
- 10.1.C.5.6 Contractor must provide replacement CO2 extinguishers during hydrostatic testing, in absence of the ship's extinguishers.
- 10.1.C.5.7 Firefighting equipment must remain available in case of emergency. Adequate precautionary measures must be taken during hot work to complete inspection.
- 10.1.C.5.8 The list must be used to determine the extinguishers requiring maintenance.
- 10.1.C.5.9 Contractor must replace all extinguishers removed from the ship during all hydrostatic/maintenance/refilling by an extinguisher of the same type and capacity, so as to ensure the adequate compartment protection during the ships extinguishers absence.
- 10.1.C.5.10 When inspection is complete, (Date stamp), all extinguishers will have received necessary maintenance, and hydrostatic testing for them to be certified for 1 full year, until the next inspection, the following year.

10.1.D PROOF OF PERFORMANCE

10.1.D.1 **Inspection Points**

- 10.1.D.1.1 All work carried out must be to the satisfaction of the Chief Officer. Chief officer, or delegated officer must be present during inspections.

10.1.D.2 **Testing/Trials**

10.1.D.2.1 Equipment must be proven operational to the Chief Officer.

10.1.D.3 **Certification**

10.1.D.3.1 Contractor must provide two paper copies along with the original certificate, to the Chief Officer. Electronic copies in PDF format must be sent to the Vessel Maintenance Manager. All deficiencies noted must be resolved before the end of the contract. Corrective actions and parts to be replaced will be supplied by the contractor and dealt with using the PWGS 1379 form.

10.1.D.4 **Documentation**

10.1.D.4.1 The contractor must provide the Technical Authority with documentation relevant to the company's certification to conduct fire system inspection work.

10.1.D.4.2 Contractor must provide a written report describing in detail all work performed the causes of noted deficiencies, corrective actions taken and parts replaced.

10.1.D.4.3 Contractor must provide the report in electronic format (.pdf), to the TI and to the Vessel Maintenance Manager, before the end of the work period.

10.1.D.5 **Training[Not Used]**

10.2 **LIFEBOAT SYSTEM**

10.2.A IDENTIFICATION

10.2.A.1 The purpose of this item is to carry out the five-year inspection and maintenance of the lifeboat system.

10.2.A.2 The lifeboat will be onboard the vessel upon arrival at the Contractor's facilities. The Contractor must remove the lifeboat from its davit prior to carrying out any work and reinstall it once the work is completed. The Contractor must store lifeboat during the work period. The Contractor must ensure the lifeboat protected from all damage, weather and dirt. The Contractor must lift and handle the lifeboat by the two existing lifting points for the lifeboat's hooks. To avoid stressing the hull and structure of the lifeboat, the Contractor must use a lifting device with a lifting beam with lifting points positioned directly above the lifeboats lifting eyes. The Contractor must advise the Inspection Authority before lifting or moving the lifeboat. When removing the lifeboat the Contractor must that the lifting points are directly above the lifeboats lifting rings.

10.2.B REFERENCES**10.2.B.1 Equipment Data**

10.2.B.1.1 Davit :Schat-Davit Company Ltd, Type :SPG(L) 9500/4850

- a) Grease used: SKF LGWM2/04, White
- b) Gear box oil: Mobil SHC 629
- c) A break band will be provided by Canada

10.2.B.1.2 Characteristics of the lifeboat:

- a) Make: Watercraft International Ltd
- b) Serial Number : 9213262
- c) Dimensions : 8.5 x 2.75 x 2.35 m
- d) Capacity : 60 persons
- e) Net weight : 4275 kg

10.2.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
	DWG lifeboat	4
	Installation opération entretien crochets LHR6 M2.pdf	35

10.2.B.3 Regulations and Standards

10.2.B.3.1 IMO, msc.1 / circ. 1277

10.2.C STATEMENT OF WORK**10.2.C.1 General**

10.2.C.1.1 The Contractor must provide the equipment and labour to carry out the five-year inspection and maintenance of the vessel's lifeboat davit.

10.2.C.1.2 The Contractor must engage a service provider approved by TCMS to perform the inspection and certification of the lifeboat system. The accredited service provider must comply with the requirements of IMO, msc.1/circ. 1277. The Contractor must include a \$6,000 allowance in its bid to cover travel and living expenses for the designated representative. This allowance will be adjusted upwards or downwards via PWGSC form 1379 at the end of the contract. The Contractor must provide a copy of all supporting documentation attesting to the actual expenses. This allowance does not cover labour and materials required to perform the work. These costs must be included in the price of the work.

- 10.2.C.1.3 The Contractor must replace all worn or non-conforming parts with original equipment manufacturer.
- 10.2.C.1.4 The Contractor must provide the equipment and labour required to inspect and certify the release system and the lifeboat.
- 10.2.C.1.5 The Contractor must pay particular attention when removing and reassembling the 2 steel cables, the locks must be inspected and properly reinstalled. The forward and aft cables are of different lengths and cannot be interchanged. The Contractor must replace these cables. New cables will be provided by the CCG. ³~~The Contractor must give the old cables to the CCG.~~
- 10.2.C.1.6 The Contractor must dismantle and inspect all 19 sheaves for wear and deformation.
- 10.2.C.1.7 The Contractor must clean and inspect the shafts and grease passages. All sheave shafts and pivots must be subject to a magnetic particle inspection.
- 10.2.C.1.8 The Contractor must remove all 4 pivot pins, while the front and rear arms must be supported for inspection. The Contractor must remove and inspect all other pivots, e.g. gripping hooks, for wear and deformation.
- 10.2.C.1.9 The Contractor must sandblast SSPC-SP10 all pulleys and subject them to magnetic particle testing. The Contractor must degrease and mechanically brush their supports and adjacent surfaces on the davit arms, to remove flaking paint and rust. The Contractor must paint the pulleys and their supports, including the davit arms using the enclosed painting method: 2 coats of Interprime 539 primer (yellow), or equivalent, and 2 coats of Interlac 665 (or equivalent) topcoat white RAL 9003. The paint must be supplied by the Contractor. The condition of the rigging complementary to the steel cables; such as turnbuckles and shackles should also be inspected.
- 10.2.C.1.10 The Contractor must inspect the hooks for wear and tear.
- 10.2.C.1.11 The Contractor must disassemble, inspect, lubricate and reassemble the two stop springs (one front and one rear).
- 10.2.C.1.12 The Contractor must carry out the disassembly and inspection of the brakes, the disc brake and the centrifugal brake. Blow off dust and rust, clean, inspect, replace the brake pads on

³ REV 1 - 10.2.C.1.5 remove: ~~The Contractor must give the old cables to the CCG.~~ Insert : none.

both brakes and reassemble. These parts will be supplied by the CCG. The Contractor must return the old brake pads to the CCG.

10.2.C.1.13 The Contractor must drain the oil (about 15 litres) from the gearbox, open the gearbox, inspect the parts and replace the level indicator that will be supplied by the CCG. The Contractor must supply and fill the gearbox with oil. The oil currently used is Mobil SHC 629.

10.2.C.1.14 The Contractor must grease all dismantled equipment and put it back in place, the work must be to the satisfaction of the IA. The Contractor must supply the grease (SKF LGWM2/04, White, or equivalent).

10.2.C.2 **Lifeboat**

10.2.C.2.1 Provide equipment and labour to perform the following work on the rescue boat.

10.2.C.2.2 Check hull for water-tightness, repair as needed.

10.2.C.2.3 A repair must be made inline with the hooks. The contractor must redo the sealant and demonstrate the seal to the inspection authority.

10.2.C.2.4 Verify the SOLAS reflective tape on the whole hull and replace as necessary.

10.2.C.2.5 2 repairs of 3 inches long to the exterior plaster must be made with gel coat. The defects are 1/8 inch deep.

10.2.C.2.6 Hull must be cleaned, coated with UV filter, buffed and waxed.

10.2.C.2.7 Check weather-tightness of all doors, hatches penetrations and accessories. Repair as required.

10.2.C.2.8 Check and adjust doors and hatches

10.2.C.2.9 Check and adjust Shaft seal packing.

10.2.C.2.10 Check marine bearing.

10.2.C.2.11 Check entire system for oil, fuel, water, coolant and exhaust leaks. Repair will be negotiated by 1379 Form.

10.2.C.2.12 Track humidity levels of the entire lifeboat. Repair will be negotiated by 1379 Form.

10.2.C.2 Lifeboat will be delivered with the ship.

- 10.2.C.3 Hire an ABS approved service provider to inspect and certify the lifeboat. Provide material and labor to inspect and certify the release system. All replaced parts must be original parts. The parts and their installation will be negotiated by 1379.
- 10.2.C.4 Check covers.
- 10.2.C.5 Replace the diaphragm supplied by the contractor.
- 10.2.C.6 Five-year check on hooks. Opening, cleaning, inspection and replacement of wearing parts. Try. A new certificate must be issued by a company authorized by the manufacturer.
- 10.2.C.7 Visual inspection of hook release system and hanging off eye.
- 10.2.C.8 Check roller on hook tail.
- 10.2.C.9 Test on load function of hooks. While the ship is in the water.
- 10.2.C.10 Test hooks for simultaneous opening.
- 10.2.C.11 Check hydrostatic unit functions correctly when boat is afloat.
- 10.2.C.12 ⁴~~Check protective devices on the Davit.~~

10.2.D PROOF OF PERFORMANCE

10.2.D.1 Inspection Points

- 10.2.D.1.1 All work must be carried out according to the manufacturer's requirements and recommendations.
- 10.2.D.1.2 The inspection authority shall see the leak test demonstrating the repair of the sealant inline with the release hooks.
- 10.2.D.1.3 The chief engineer must see the boat safely stored during the dry dock. Covered if kept on the ship. ⁵~~A cradle is available for setting down the rowboat, but cannot be used for transport.~~

10.2.D.2 Testing and Trials

- 10.2.D.2.1 The Contractor must carry out the test under dynamic load (SWL + 10%) meeting ABS requirements. The Contractor must provide the necessary weights (e.g. sandbags) for the dynamic test.

10.2.D.3 Certification

⁴ Rev 1 – Remove 10.2.C.12

⁵ Rev 1 – Remove section 10.2.D.1.3 10.1.A.1.1A cradle is available for setting down the rowboat, but cannot be used for transport.

- 10.2.D.3.1 The Contractor must provide a copy of the proof of ABS inspection to the IA.
- 10.2.D.3.2 The qualifications of the technicians performing the non-destructive testing shall be demonstrated.

10.2.E DELIVERABLES

- 10.2.E.1 **Documentation**
 - 10.2.E.1.1 The Contractor must give to the IA and the TA with a comprehensive report detailing the work undertaken, defects, repairs made and measurements and readings taken on all axles, pivots and sheaves.
 - 10.2.E.1.2 The Contractor must provide the IA and the TA with all magnetic particle testing certificates.
 - 10.2.E.1.3 The condition of additional rigging on wire ropes; such as rigging screws and shackles.
 - 10.2.E.1.4 The Contractor must provide the T-8 inspection and test certificate approved by the ABS inspector.
 - 10.2.E.1.5 The contractor must provide a separate certificate for the lifeboat hooks.
 - 10.2.E.1.6 The contractor must provide certificates for the replacement cables used.
- 10.2.E.2 **Training – [Not Used]**

10.3 ASBESTOS REMOVAL OF THE AFT ENGINE ROOM

10.3.A IDENTIFICATION

10.3.A.1 Removing chrysotile asbestos containing insulation, from exhaust systems of the following equipment:

- a) Removing chrysotile asbestos containing insulation, piping of the steam system in the propulsion motor room.
- b) ⁶Exhaust piping lagging.

10.3.B REFERENCES

10.3.B.1 Equipment Data

10.3.B.1.1 Piping

Tableau 1: conduite Amiante

Référence 171-09529-52 page 104/114	Steam 5 po diamètre	75 mètres de long	Pastille 5
Reference	Exhaust 8 inch diameter	8 meters	

10.3.B.2 Drawings

10.3.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	Number of Sheets
171-09529-52	Gestion des matières dangereuses	114
141_19427_24_F1_F13	Devis désamiantage- NGCC Pierre Radisson WSP	13
141- _19427_24_information identification	Identification sommaire des calorifuges contenant de l'amiante NGCC Pierre Radisson	8

10.3.B.3 Regulations and Standards

⁶ Rev 1 – Insert 10.3.A.1.1 b) Exhaust piping lagging.

- 10.3.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:

Procédures MSF	Titre	Inclus – Oui/Non
Publications		
Système d'information sur les matières dangereuses utilisées au travail (SIMDUT)/Santé Canada	Fiches signalétiques (FS).	Sur demande
Normes		
Règlements		
Ministère de la Justice Canada	Loi canadienne sur la protection de l'environnement (1999) (LCPE)	
Ministère de la Justice Canada	Loi sur les normes du travail;	
Transports Canada (TC)	Loi de 1992 sur le transport des marchandises dangereuses (LTMD)	
Gouvernement du Québec	Code de sécurité pour les travaux de construction	
Gouvernement du Québec	Règlement sur la santé et la sécurité du travail.	

	Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST)	
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10.3.B.4 Definition

Amended Water:	water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
Contractor:	contractor in charge of asbestos work according to the requirements of this specification.
Asbestos Containing Materials (ACMs):	materials that contain 0.1 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.
Asbestos Work Area:	area where work takes place which will, or may disturb ACMs.
Authorized Visitors:	Canadian Coast Guard, or designated representative, and representative of regulatory agencies.
Competent worker in asbestos abatement:	in relation to specific work, means a worker who:
	Is qualified because of knowledge, training and experience to perform the work;
	Is familiar with the provincial laws and with the provisions of the regulations that apply to the work;
	Has knowledge of all potential or actual danger to health or safety in the work.
Friable Materials:	material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
Glove Bag:	prefabricated glove bag as follows:
	Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.
	Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.

	Equipped with reversible double pull double throw zipper on top and at approximately mid-section of the bag.
	Straps for sealing ends around pipe.
HEPA vacuum:	High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.
Non-Friable Material:	material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
Occupied Area:	any area of building or work site that is outside Asbestos Work Area.
Polyethylene:	polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
Sprayer:	garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.

10.3.C STATEMENT OF WORK

10.3.C.1 Waste management and disposal

- 10.3.C.1.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- 10.3.C.1.2 Collect and separate for disposal cardboard, papier plastic and polystyrene packaging material in separate on-site bins or bags to transport them off the ship for recycling in accordance with Waste Management Plan.
- 10.3.C.1.3 Place materials defined as hazardous or toxic in designated containers.
- 10.3.C.1.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- 10.3.C.1.5 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 0.15 mm (6 mils) bags or leak proof drums. Label containers with appropriate warning labels.
- 10.3.C.1.6 Provide manifests describing and listing waste created during work. Transport containers by approved means to licenced landfill for burial.

10.3.C.2 Existing conditions

- 10.3.C.2.1 Reports and information pertaining to ACMS to be removed and disposed of during this Project are appended to this specification.
- 10.3.C.2.2 Notify Canadian Coast Guard or designated representative of friable material discovered during Work and not apparent from drawings, specifications, or reports pertaining to Work. Do not disturb such material until instructed by the technical authority. This work will be negotiated by 1379.

10.3.C.3 Scheduling

- 10.3.C.3.1 At least ten (10) days before beginning work pertaining to this contract, notify the following persons and authorities in writing:
- i) Canadian Coast Guard.
 - ii) Authority having jurisdiction for ACMs disposal.
- 10.3.C.3.2 Submit to Canadian Coast Guard or designated representative a copy of all notices issued before beginning work.

10.3.C.4 Safety Requirements: worker protection:

- 10.3.C.4.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
- a) Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
 - b) Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head

covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.

- 10.3.C.4.2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- 10.3.C.4.3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
- 10.3.C.4.4 Ensure workers wash hands and face when leaving Asbestos Work Area. Facilities for washing designated by Canadian Coast Guard can be used.
- 10.3.C.4.5 Ensure that no worker required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- 10.3.C.4.6 Visitor Protection:
 - a) Provide protective clothing and approved respirators to Authorized Visitors to Asbestos Work Area.
 - b) Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - c) Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

10.3.C.5 Products

- 10.3.C.5.1 Materials
 - a) Drop and Enclosure Sheets
 - i) Polyethylene: 0.15 mm thick.
 - ii) Reinforced-polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
 - b) Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos containing material.
- 10.3.C.5.2 Waste Containers: contain waste in two separate containers
 - a) The inner container must be at least 0.25 mm (10 mils) thick sealable polyethylene bag.

- b) Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm (6 mils) thick sealable polyethylene bag.
- c) Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.

10.3.C.5.3 Glove bag

- a) Acceptable products: Safe-T-Strip brand products, model appropriate for the work to be performed, or equivalent products approved by the technical authority.
- b) The glove bag must be equipped with the following:
 - i) A tool pouch with a drain;
 - c) sleeves and gloves permanently sealed to the body of the bag so that the worker can access and manipulate the insulation;
 - i) Valves or openings allowing the introduction of a suction pipe and the nozzle of a water sprayer while maintaining the seal against the pipe, duct or other similar element;
 - ii) Tool holder with drain;
 - iii) Seamless bottom and means to seal the lower part of the bag;
 - iv) Removable straps if the bag has to be moved during operations.

10.3.C.5.4 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.

10.3.C.5.5 Encapsulant: type 2 surface film forming, Category A water base, approved by Canadian Coast Guard or designated representative.

10.3.C.6 Execution

10.3.C.6.1 Supervision

- a) Minimum of one Supervisor for every ten workers is required.
- b) Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

10.3.C.7 Procedures

10.3.C.7.1 Do construction occupational health and safety in accordance with applicable requirements.

10.3.C.7.2 Before beginning Work, at each access to Asbestos Work Area, install warning signs in both official languages in upper case 'Helvetica Medium' letters reading as follows, where number in parentheses indicates font size to be used: 'CAUTION ASBESTOS HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.

10.3.C.7.3 Pipe insulation removal using glove bag:

- a) A glove bag not to be used to remove insulation from a pipe, duct or similar structure if:
 - i) It may not be possible to maintain a proper seal for any reason including, without limitation:

- ii) The condition of the insulation;
- iii) The temperature of the pipe, duct or similar structure.
- b) The bag could become damaged for any reason including, without limitation:
 - i) The type of jacketing;
 - ii) The temperature of the pipe, duct or similar structure.
- c) Before beginning work, the steam supply system or appliances connected to exhaust pipes must be deactivated by the Canadian Coast Guard at least 24 hours before any work on the piping of a given sector.
- d) Prior to the work, the steam supply or the devices connected to the exhaust pipes must be deactivated by the Canadian Coast Guard at least 24 hours before any work on the pipes in a given sector.
- e) Upon installation of the glove bag, inspect bag for any damage or defects. If any damage or defects are found, the glove bag is to be repaired or replaced. The glove bag to be inspected at regular intervals, and repair or replaced, as appropriately. The asbestos containing contents of the damaged or defective glove bag found during removal are to be wetted, and the glove bag and its contents are to be removed and disposed of in an appropriate waste disposal container. Any damaged or defective glove bags are not be reused.
- f) Place tools necessary to remove insulation in tool pouch. Wrap bag around pipe and close zippers. Seal bag to pipe.
- g) Place hands in gloves and use necessary tools to remove insulation. Arrange insulation at the bottom of the bag.
- h) Insert nozzle of garden reservoir type sprayer into bag through valve and wash down pipe and interior of bag thoroughly. Wet surface of insulation in lower section of bag.
- i) To remove bag after completion of stripping, wash top section and tools thoroughly. Remove air from top section through elasticized valve using a HEPA vacuum. Pull polyethylene waste container over glove bag before removing from pipe. Release one strap and remove freshly washed tools. Place tools in a container filled with water. Fold over into waste container and seal.
- j) After removal of bag ensure that pipe is free of residue. Remove residue using HEPA vacuum or wet cloths. Ensure that surfaces are free of sludge which after drying could release asbestos dust into atmosphere. Seal exposed surfaces of pipe and ends of insulation with slow drying sealer to seal in any residual fibres.
- k) Upon completion of Work shift, cover exposed ends of remaining pipe insulation with polyethylene taped in place.

10.3.C.7.4 Work is subject to visual inspection. Contamination of surrounding areas indicated by visual inspection will require complete enclosure and clean-up of affected areas.

10.3.C.8 Cleanup

- 10.3.C.8.1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.
- 10.3.C.8.2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
- 10.3.C.8.3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
- 10.3.C.8.4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial and Federal authorities having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.
- 10.3.C.8.5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

10.3.C.9 Re-insulation of pipes.

- 10.3.C.9.1 The contractor must re-insulate the pipes upon completion of the inspection.
- 10.3.C.9.2 The contractor must insulate steam lines with 1.5" of insulation.

10.3.C.10 Re-insulation of exhaust section

- 10.3.C.10.1 The Contractor must install removable exhaust blanket with a mesh wire on the inside material to withstand exhaust temperatures.

10.3.D PROOF OF PERFORMANCE

10.3.D.1 Inspection Points

- 10.3.D.1.1 The Coast Guard reserves the right to have the asbestos removal work inspected by an Industrial Hygiene Technician, at the Coast Guard's expense. This technician will request to see the preventive measures taken by the contractor to ensure compliance with the Statement of Work.
- 10.3.D.1.2 Regulatory Agency Requirements: Comply with local, provincial and federal government requirements for asbestos protection. In the event of any discrepancy between these requirements and those contained in this specification, the more stringent requirements must prevail. Comply with the regulations in effect at the time the work is performed.
- 10.3.D.1.3 A visual inspection, reference **Error! Reference source not found.** by the Technical Authority before the start of pipe re-insulation.

10.3.D.2 Testing/Trials[– Not Used]**10.3.D.3 Certification****10.3.D.4 Documentation**

- 10.3.D.4.1 Before the start of work, the contractor must provide the Canadian Coast Guard with documents satisfactorily guaranteeing that all workers have received: adequate training concerning the risks of exposure to asbestos; personal hygiene measures; appropriate working methods; the use of glove bags and the rules to follow for use; cleaning and disposal of breathing apparatus; protective clothing.
- a) The contractor must provide documents demonstrating that the supervisory staff have completed an asbestos removal course of at least two (2) days. At least one supervisor must be appointed for each group of ten workers.
- 10.3.D.4.2 The contractor must submit to the technical authority before the end of the work period:
- a) Documents satisfactorily demonstrating that appropriate arrangements have been made for the receipt and proper disposal of asbestos waste. Ensure that the landfill operator is well informed of the risks associated with the materials brought to him and that he knows the appropriate methods for their disposal.
- b) Documents showing that the Contractor has liability insurance covering asbestos removal work.
- c) All the follow-up slips confirming that the asbestos waste has indeed been received and properly disposed of.
- d) Documents demonstrating that all workers have received adequate training and education regarding the risks associated with: exposure to asbestos; personal hygiene; the use of a breathing apparatus; the required protective clothing; the entry / exit procedures for asbestos removal areas; the techniques and protective measures to which they must comply when working in an asbestos removal area; the use, cleaning and disposal of breathing apparatus; protective clothing.
- e) Material Safety Data Sheets (MSDS) for the materials and chemicals used.
- f) Documents demonstrating that the operation and adjustment of the breathing apparatus given to each worker have been checked and tested.

10.3.D.5 Training[– Not Used]

11.0 HULL AND RELATED STRUCTURES

11.1 HULL WELDING INSPECTION AND REPAIRS

11.1.A IDENTIFICATION

- 11.1.A.1 The objective of this specification is to determine the amount of work/repairs required to the welded joints of the hull plating (butts and seams), as required by ABS. The extent of the work will be determined during the inspection of the vessel's hull, immediately after dry docking.

11.1.B REFERENCES

- 11.1.B.1 **Equipment Data – [Not Used]**

- 11.1.B.2 **Drawings and Documents**

Drawing Number	Drawing / Document Title	Number of Sheets
221-H-1	Shell Expansion	1

- 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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
Publications		
CT-043-EQ-EG-0001-E	CCG Welding Specification	Yes
Standards		
SSPC SP 1	Solvent Cleaning	No
SSPC SP10	Near White metal blast cleaning (sablage très soigné)	No
Regulations		

11.1.C STATEMENT OF WORK

- 11.1.C.1 ⁷An inspection of the hull welds shall be conducted with the contractor. The Coast Guard will make the decision as to which sections to rework.
- 11.1.C.1.1 The inspection shall include the sections identified in Plan 221-H-1.
- 11.1.C.1.2 For sections found with transverse cracks at the weld. Once the contractor has ground to remove the damaged weld, a magnetic particle inspection must be performed to ensure that all cracks have been removed.
- 11.1.C.1.3 The Contractor must supply all equipment, ventilation, scaffolding, shelters, chain hoists, cherry picker, slings and shackles required to perform the work.
- 11.1.C.1.4 After cleaning the hull, the Contractor must list the weld butts and seams to be repaired, as identified by the ABS inspector.
- 11.1.C.1.5 The welds to be repaired must be chamfered using compressed air arc gouging or grinding, and brought to their original levels using approved welding techniques and materials.
- 11.1.C.1.6 The Contractor must take into account that the following preparations must be implemented before welding the hull:
- a) Degassing of adjacent tanks.
 - b) Grit blasting of the hull side in accordance with SSPC-SP10 for a strip of about five (5) cm wide near all welds on the selected plating, until the metal is shiny and clean;
 - c) Cleaning to a SSPC-SP1 standard. Removal of all salt deposits, dirt, grease, etc., on the welds;
 - d) Removal of all grit from the welds using vacuuming or compressed air jet. The Contractor must install a shelter made of polyethylene or equivalent in the work areas to prevent rain, snow, ice, or their melted counterparts from rapid cooling the welds;
 - e) Plating welds must be preheated to the temperature according to the Contractor's welding procedure.
 - f) The filler metal must be made with at least 1% nickel. The contractor must have a welding procedure for this filler material in use with the hull of the ship.
- 11.1.C.1.7 The Contractor must provide a firm price to re-weld 500 linear feet of plating welds (beads) on the port or starboard plating (butts and seams) with 18 welding passes on average to form a bead, for a total of 9,000 feet (2743 m) of linear welding. Provide a unit price per foot of bead for adjustment purposes of the actual final cost using the PWGSC Form 1379. The Contractor must provide in its bid the cost of gouging all the fill material

⁷ Rev 1- insert 11.1.C.1 - An inspection of the hull welds shall be conducted with the contractor. The Coast Guard will make the decision as to which sections to rework.

that must be removed. A report of how many feet of completed welding is done on the ship must be sent to the TA every week.

- 11.1.C.1.8 The unit passes of a linear foot are defined as: butt or seam welding of the shell joints are made using the FCAW or GMAW technique in semi-automatic mode. Passes must be a minimum of ½" wide and 3/8" thick.
- 11.1.C.1.9 Welding must produce an excess of about 1 in. (2.54 cm) wide by ¼ in. (6.35 mm) high.
- 11.1.C.1.10 The Contractor must ensure before the work that all undercuts and the separation plates are ground smooth.
- 11.1.C.1.11 Using the development drawing for the ship's hull plating (~~68-H-3~~ 221-H-1 Shell expansion), the Contractor must indicate, using thick red marks on both port and starboard sides of the ship, the full extent of the new plating welds carried out during these repairs.
- 11.1.C.1.12 Any lugs or supports used for carry out these repairs must be removed and ground flat. All notches left by removal of the lugs must be ground in a V, re-welded and ground flat until the surface is smooth.
- 11.1.C.1.13 Upon completion of all welding, the Contractor must apply, on newly welded seams, bare and disturbed areas, the same preparation and paint schedule(s) as required for the area of the hull where the welding was done. (i.e. underwater hull, icebelt or topside).
- 11.1.C.1.14 ⁸The contractor must assist a research team that will come in and take a hull weld profile cast. This consists of taking an impression of some specific areas on the hull with material provided by the research team.

11.1.D PROOF OF PERFORMANCE

11.1.D.1 Inspection Points

11.1.D.1.1 Visual Inspection, The IA, TA and ABS inspector must do the following:

- a) Inspect all welds of the hull (port and starboard).
- b) Inspect the condition of welds on sea water overboard discharges, seawater intakes and any other hull appendages.

11.1.D.2 Radiographic Inspection

11.1.D.2.1 The Contractor must indicate a fixed price for 8 radiographic films of the welds and a firm price for ½ day of Ultrasound including the report and ½ day magnetic particle testing including a report. The ABS inspector must identify the areas to be filmed. In its bid, the

⁸ Rev 1- Insert 11.1.C.1.14

Contractor must indicate a unit price per film. The firm and unit price must include required scaffolding and cranes.

- 11.1.D.2.2 For radiographic inspection purposes, the surfaces of the welds and of the adjacent base metal must be thoroughly cleaned to allow a clear view of the area of interest (welding area). Visible discontinuities on the radiographic film identified later as surface discontinuities must be repaired and the location must be subject to a new radiographic inspection, the cost of the re-take will be cover by the Contractor

11.1.D.3 **Certification**

- 11.1.D.3.1 Certificates in accordance with the Documentation section of the General Notes.

11.1.E DELIVERABLES

11.1.E.1 **Documentation**

- 11.1.E.1.1 The Contractor must provide the TA with a hard copy and an emailed digital version of the report detailing the work done, defects, repairs performed, measurements and readings taken.
- 11.1.E.1.2 The Contractor must provide a report of the repaired weld joints using a copy of drawing 221-H-1 Shell expansion.
- 11.1.E.1.3 The Contractor must provide two copies of all radiographic films made.
- 11.1.E.1.4 The Contractor must provide a Quality Assurance (QA) report indicating that all areas as defined in this specification have been inspected by the Contractor's QA Department and all areas of defects established by this survey have been identified for remedial action. This report must be given to the TA no later than 3 weeks before floating the ship.
- 11.1.E.1.5 Once copy of the NDT Surveyor`s certification.
- 11.1.E.1.6 Copy of the welding procedures used, the certifications of the welders who performed the task.
- 11.1.E.2 **Training – [Not Used]**

11.2 HULL COATINGS

11.2.A IDENTIFICATION

- 11.2.A.1 The purpose of this specification is to identify the work required to prepare the ship's hull for painting. The hull must be coated with two component, abrasion resistant epoxy coating, designed for an ice-going vessel and compatible with the existing coating Inerta 160. This work also applies to the seawater intake grids.

11.2.B REFERENCES

- 11.2.B.1 **Equipment Data – [Not Used]**

- 11.2.B.2 **Drawings and Documents**

Drawing Number	Drawing / Document Title	Number of Sheets
06149S37	Hull Surface Calculation	1
	1200 Icebreaker Coating scheme	1

- 11.2.B.3 **Regulations and Standards**

- 11.2.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
Publications		
Standards		
ASTM D4060	Standard Test Method for Abrasion Resistance	No
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers	No
SP0287-2016-SG	Field measurement of surface profile of abrasive blast cleaned steel surfaces using replica tape	No
SSPC SP10	Near White Metal Blast Cleaning	No
SSPC SP6	Commercial Blast Cleaning	No
SSPC SP 1	Solvent Cleaning	No
Regulations		

11.2.B.4 The coating to be applied to the hull of a polar icebreaker must meet the following criteria:

- 11.2.B.4.1 If the Contractor selects a different coating from the existing one, an evaluation report of the selected paint must be provided to the TA before the paint is ordered.
- a) The product must have proven its worth for at least 3 years on a polar icebreaker hull;
 - b) Must be recognized by a classification society RO as a coating with a high resistance to abrasion;
 - c) Must be effective at temperatures as low as -50°C;
 - d) Anticorrosive epoxy coating with minimum 90% solids;
 - e) It must be possible to paint the hull in a single application, with a thickness of at least 30 mils dry;
 - f) Taber abrasion resistance (ASTM D4060, 1 kg, CS-17 wheel): maximum weight loss 50 mg;
 - g) Elcometer adhesion value (ASTM D4541): 1,000 psi min;
 - h) Kinetic coefficient of friction against ice of less than 0.03 at a velocity between 10 and 25 cm/s.
 - i) The coating must be compatible with the actual coating specified in the vessel coating scheme.

11.2.C STATEMENT OF WORK

11.2.C.1 General

- 11.2.C.1.1 The total surface area of the hull is 2,820 m². This includes all submerged parts from the keel to 0.9 m above the load line, including the rudder, rudder stock, the ship's bow covering the anchor pockets, the rudder trunk, seawater intake grids, bow thruster tunnel and its two grates. For the purposes of the tender, refer to the surfaces described and reference document 06418S21 Rev_C.
- 11.2.C.1.2 Part of the hull must be painted red (ERA174-CGuard Red), from 1.6 metres below the load line to 900 millimetres above the load line, while the remaining hull, including the hawseholes, the rudder and the rudder trunk, must be painted in black (ERA163-Black).
- 11.2.C.1.3 The Contractor accompanied by the IA must have an agreement on the degree of detachment and the areas to be prepared and the areas to be coated prior to commencing coating work. The Contractor must provide a report of the agreement reached before painting work begins no later than 5 days following the dry docking.

11.2.C.2 Preparation and coating procedures

- 11.2.C.2.1 During blasting and coating operations, the Contractor must provide protection for the following items and/or locations: Accommodations, Engine room intakes, bearings, screw threads, oil grooves, grease fittings, gearing, pins, universal joints, door screens, machined surfaces, nameplates, gaskets, electrical insulation, cable tray, electrical panels and fixtures, hinges, fair leads, hawseholes, windows and all working parts in general.
- 11.2.C.2.2 The Contractor must pay special attention to the propeller blades and associated shafts, seals, liners, pintles, bow thruster, echo sounding transducers, speed log, and anodes. The Contractor must cover these elements before grit blasting and coating operations begin and keep them covered until completion of the work.
- 11.2.C.2.3 The Contractor must shield the glass from the portholes, in way of areas that are to be grit blasted and coated, with rubber gasket in such a way as to both protect the glass and allow for grit blasting of the porthole ring.
- 11.2.C.2.4 The Contractor must fit all overboard discharges and deck scuppers with a drainage plug and/or spouts to ensure that any active over boards and water runoff is drained clear of the shipside before grit blasting and coating work starts.
- 11.2.C.2.5 In the case of vessels that have the spar deck flush with the ship sides, the Contractor must fit a temporary barrier to the deck so as to contain or redirect snow or water runoff and prevent it from coming in contact with grit blasted or freshly coated surfaces. This work must be included in the Contractor's pricing.
- 11.2.C.2.6 Water run-off, rain or snow that comes into contact with fresh epoxy coatings may produce an "amine blush". These areas must be cleaned with a suitable solvent and is the responsibility of the Contractor.
- 11.2.C.2.7 The Contractor must ensure that all surface preparation and coating application conforms to the manufactures recommended guidelines unless otherwise stated, including recommended surface profiles, temperature, relative humidity, drying times between coats and over coating intervals, drying time upon completion of coating, wet film thickness', dry film thickness', and curing time prior to immersion of coating during dock flooding operations. This applies to all coatings used during the Work.
- 11.2.C.2.8 The Contractor is responsible for timely ordering of all coating products and the proper disposal of used containers and solvents.
- 11.2.C.2.9 All coating products must be stored by the Contractor in a dry heated space according to manufacturer's specifications.

- 11.2.C.2.10 The Contractor must prepare all new steel to SSPC-SP10 and give one (1) coat of Interplate 937 (or equivalent) pre-weld construction primer on both sides as per coating manufacturer directions...
- 11.2.C.2.11 All areas of contamination subject to surface preparation will be solvent cleaned to SSPC SP1 by the Contractor.
- 11.2.C.2.12 The Contractor must perform grit blasting in order to achieve a surface profile, coarse angular, from 50 to 75 microns, unless stated otherwise in the Coating specification.
- 11.2.C.2.13 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 and is to the Contractors account.
- 11.2.C.2.14 The Contractor must monitor surface and ambient temperature and humidity, and painting can only take place when conditions are within the paint manufacturer's guidelines, or must provide suitable containment and environmental control to compensate.
- 11.2.C.2.15 On completion of blasting and before application of any paint or primer, the Contractor must blow the steel surfaces free of dust, using dry, oil free air. No paint is to be applied without the surface preparation being verified by the Owner's Representative NACE technician and agreement that the preparation meets the standard.
- 11.2.C.2.16 Prepared areas must be coated, by the Contractor, before flash rusting occurs or the blast will be considered unacceptable and will require re-blasting at the Contractor's expense.
- 11.2.C.2.17 The Contractor must feather all coating repairs back into sound existing coating and touch-up and recoat soiled, damaged or missed areas.
- 11.2.C.2.18 For items in the specification requiring spot application of coating, the Contractor must ensure that the topcoats cover undercoats completely.
- 11.2.C.2.19 The Contractor must apply all coatings with airless spray equipment using adequate ventilation and lighting. Areas not accessible by spray painting such as cut outs and brackets must be brushed or rolled to achieve the specified dry film thickness.
- 11.2.C.2.20 For coatings applied to any confined space, the Contractor must install an exterior supply / exhaust fan with adequate trunking to facilitate air circulation and the removal of solvents from the lowest areas possible to aid in the curing of the coating.
- 11.2.C.2.21 The dry film thicknesses specified are the minimum required and must be verified by the Contractor. The Contractor must monitor humidity, surface and ambient temperatures and record, at all times, during coating operations. All this data must be made available for the TA for review upon request.

- 11.2.C.2.22 The Contractor must take care in the application of final coats to ensure that all vessel equipment is protected from excess paint spray and, in particular, electronic or other equipment liable to more serious damage due to excess spray.
- 11.2.C.2.23 Excessive runs, curtains and sags in the coating must be brushed out by the Contractor while the coating is wet. If the coating dries, the Contractor must remove these defects, sand and re-coat the area at its own account.
- 11.2.C.2.24 The contractor shall take measures to prevent bridging of the coating. Bridging in the coating will need to be corrected.
- 11.2.C.2.25 Regardless of the number of coats required, lines of graphics, points of color change, names, logos and all cosmetic top coatings that are to be cut in by brush or masked, are to be cut sharp by the Contractor, square and be esthetically pleasing.
- 11.2.C.2.26 Where names and lines of graphics are to be painted over and are not clearly etched or outline welded into the substrate, the Contractor must drill or punch into the steel the outlines before over coating.
- 11.2.C.2.27 Note that when the Coating Specification calls for epoxy coating over Intershield 163/Inerta 160, the over coating windows are very short and finite and the Contractor must apply the epoxy coat while the coat beneath is **“thumbprint”** soft.
- 11.2.C.2.28 Any new and/or existing paint coatings that are disturbed during the performance of the Work must be touched-up to the same specification as the existing coating system and is to the Contractor account.
- 11.2.C.2.29 On completion of the repairs and prior to flooding the dock, any and/or all of the above mentioned protective coverings or containments must be removed from the equipment, by the Contractor. Sand ingress, coated and/or damaged items as listed above will be cleaned, repaired or replaced by the Contractor at no cost to the Owners. The installation and removal of any protective devices should form part of the Contractor’s quoted price.
- 11.2.C.2.30 Contractor’s quoted prices must include all material, ice removal from dock, specialized equipment, water, chemicals, staging, containment, environmental controls, services, high pressure hosing machines (i.e.: pumps, hoses, nozzles, etc.), fresh water supply, stain/grease removers, special scrapers, staging, lighting, cherry pickers, sandblasting and paint spraying machine, etc. as necessary to effect the blasting and coating task in its entirety and must include removal and disposal of sandblast grit and debris from the vessel and dock as per the applicable environmental regulations.

- 11.2.C.2.31 Estimated area measurements supplied by the Owner are for reference only at it is the Contractors responsibility to verify actual areas referred to in this specification prior to commencement of the Work.
- 11.2.C.2.32 **Optional** - The Contractor must supply and install a temporary shelter covering the ship's hull from the keel until above the main deck bulwark. This shelter is to be ventilated and heated. No combustion gasses exhausted from the heaters are allowed in the shelter. The shelter must be dismantled only after the paint work is completed, and only after the recommended drying time is reached. The shelter must withstand all possible bad weather and be waterproof with the vessel's hull. This work is optional and the bidder; the Contractor must include a price for this work in its bid.

11.2.C.3 Coating Inspection Procedures

- 11.2.C.3.1 All blasting and coating operations will be inspected by the Contractor as per an agreed Quality Assurance plan, a copy of which is to be submitted to the TA, and will be subject to periodic inspection by the TA.
- 11.2.C.3.2 The Contractor must measure the surface profile in accordance to NACE RP0287-95.
- 11.2.C.3.3 The following references must be used for coating application inspection procedures:
- SSPC SP10 - Near White metal blast cleaning
 - SSPC SP6 - Commercial blast cleaning
 - SSPC-SP1 Solvent cleaning
 - NACE RP0287-95 Field measurement of surface profile of abrasive blast cleaned steel surfaces using replica tape
- 11.2.C.3.4 The Contractor must have a NACE inspector to see the hull coating process. Costs for this are to be included in the quotes for these areas. The technician must be able to produce a report regarding the surface preparation, each day of paint application, and the final product. The Canadian Coast Guard reserves the option to hire a third party Nace Inspector audit the work documentation.
- ### 11.2.C.4 Surface Areas
- 11.2.C.4.1 For the purpose of this tender, the surface areas of the vessel hull will be denoted in three distinct parts; Underwater Hull, Ice Belt and Topsides. Additional areas such as sea chests/bay, lettering, draft marks and trim etc. will be addressed as separate individual items

- 11.2.C.4.2 The maximum load line (waterline) is denoted by weld marks placed at regular intervals around the periphery of the vessel. This will be abbreviated for the purpose of this document as W/L. This will be considered the base line for all hull surface area determination.
- 11.2.C.4.3 The Underwater Hull will be the total shell plate area denoted from the keel upwards to a point 2.0m below the W/L, and will include the stern tubes and supports, the rudder and stock up to the W/L, the exterior of any sea chest grates, interior are grates of the bowthruster tunnel and grates, and the exterior of the cover plate of any extending device.
- 11.2.C.4.4 For the purpose of this document, the calculated surface area of the Underwater Hull is ~~1885~~⁹1822.2 m².
- 11.2.C.4.5 The Ice Belt will be considered the total shell plate area denoted from 2.0m below the W/L and 0.9m above, for a total Ice Belt height of 2.9m. In addition, this area will include the anchor pockets and surrounding protection, the area of the stem between the anchor pockets and the area immediately aft of either anchor pocket beginning at the upper aft edge of the pocket and angling downward at 45° until meeting the upper delineation of the Ice Belt at 0.9m above W/L.
- 11.2.C.4.6 For the purpose of this document, the calculated surface area of the Ice Belt is ~~657~~¹⁰629m².
- 11.2.C.4.7 The Topsides of the vessel will be considered the total shell plate area denoted from upper demarcation of the Ice belt upwards to the rail of the vessel, including fore and aft bulwarks, and any removable bulwark plates in profile line with the shell plating.
- 11.2.C.4.8 For the purpose of this document, the calculated surface area of the Topsides is 825¹¹ m².
- 11.2.C.5 **Hull Cleaning**
- 11.2.C.5.1 The Contractor must clean the ship's hull with high pressure (5000 psi minimum) fresh water before any sandblast / paintwork preparation. Work is to proceed from the vessel rail downwards to the keel to remove any and all salt residue from hull shell plating. Upon inspection of vessel, after dry-docking, it is determined that there exists sufficient reason to include a higher pressure fresh water wash to remove excessive residue from the hull, variance will be determined as per the provisions of NACE RP0287-95.

⁹ Rev 1 – 11.2.C.4.4 – remove 1885 insert 1822.2

¹⁰ Rev1 – 11.2.C.4.6 – remove 657 insert 629

¹¹ Rev 1 – 11.2.C.4.8 – remove 825 insert 912.7

- 11.2.C.5.2 Additional cleaning variances by way of contaminant removal such as oils, greases, soils etc., if determined to be necessary will be considered according to NACE RP0287-95.
- 11.2.C.6 **Underwater Hull**
- 11.2.C.6.1 The Contractor must spot grit blast all rust spots, lifting or peeling coating, and mechanical coating damage on the Underwater Hull to ¹²SSPC-SP10 with a coarse angular profile of 75 – 100 micron. The Contractor must feather onto sound coating by 7 – 8cm. The Contractor must clean surface by dry air blast to remove residues and grit dust.
- 11.2.C.6.2 During sandblasting, the Contractor must completely clean remaining aluminous cement from rudder plug welds. The Contractor must supply and re-fill holes using Speed Crete Blue Line 3700-132 (W.R. Meadows of Canada). The Contractor must plan to fill 96 plugs (20 mm x 5mm x 5mm x 2.5 mm deep)
- 11.2.C.6.3 The Contractor must hold further work once completed for inspection and release of surface preparation by the IA, TA or CA. Coating manufacturer technical service representative must be consulted by Contractor to obtain directives on the surface preparation.
- 11.2.C.6.4 Upon authorized release and following coating manufacturer directions, the Contractor must apply one or two coats of Black (ERA163) to obtain a minimum dry film thickness of 500 micron to prepared spots of bare metal and overlapping onto feathering.
- 11.2.C.6.5 It is a requirement that the coating manufacturer technical service representative be present during the set-up, mixing and application of the material to advise the Contractor and confirm conformity to specification.
- 11.2.C.6.6 The Contractor must paint by brush the draft marks below waterline using a compatible white product (EGA010) during the time interval recommended by the manufacturer of the finishing coat. If the overcoating window for the finishing coat is missed for any reason, the Contractor must abrade the areas before the coating can be applied.
- 11.2.C.6.7 Total estimated grit blasting and coating surface area of the Underwater Hull for the purpose of this tender is 40% ¹³of 1822 or 730m². Contractor is required to independently verify given surface areas.
- 11.2.C.6.8 An area of 60m² non continuous square meters has heavy pitting. The contractor must adapt the spray method to ensure coverage.

¹² Rev 1- 11.2.C.6.3 French only reference to SSPC – SP10.

¹³ Rev 1 – 11.2.C.6.7 French only insert of 1822

11.2.C.7 Ice Belt

- 11.2.C.7.1 The Contractor must spot grit blast all rust spots, lifting or peeling coating, and mechanical coating damage on the Ice Belt to SSPC-SP10 with a coarse angular profile of 75 – 100 micron. The Contractor must feather onto sound coatings by 7 – 8cm. The Contractor must sweep blast remaining areas to create 50 – 75 micron profile for full overcoat. The Contractor must clean surface by dry air blast to remove residues and grit dust.
- 11.2.C.7.2 The Contractor must hold further work once completed for inspection and release of surface preparation by the IA, TA or CA. Coating manufacturer technical service representative must be consulted by Contractor to obtain directives on the surface preparation.
- 11.2.C.7.3 Upon authorized release and following coating manufacturer directions, the Contractor must apply one or two coats of Coast Guard Red (ERA174) to achieve a minimum of 500 micron dry film thickness to prepared spots of bare metal and feathered overlap.
- 11.2.C.7.4 An NACE technician hired by the Canadian Coast Guard shall be present during the preparation, mixing and application of the product to advise the contractor and to confirm compliance with the statement of work and paint manufacturer's specifications.
- 11.2.C.7.5 The Contractor must paint by brush the draft marks below waterline using a compatible White (EGA010) while during the time interval recommended by the paint coats' manufacturer. If the overcoating window for the product is missed for any reason, the Contractor must abrade the areas before the coating can be applied.
- 11.2.C.7.6 The Contractor must pay an important consideration to the sub-area above the W/L where Topsides coatings overlap onto the Ice Belt to provide a cosmetic finish.
- 11.2.C.7.7 Total estimated grit blasting and coating surface area of the Ice Belt for the purpose of this tender is 50% ¹⁴fo 629m² or 315 m².
- 11.2.C.8 Hull painting above the waterline**
- 11.2.C.8.1 The Contractor must spot grit blast all rust spots, lifting or peeling coating, and mechanical coating damage on the Topsides to SSPC-SP10 with a coarse angular profile of 50 – 75 micron. The Contractor must feather onto sound coating by 7 – 8cm. The Contractor must clean the surface by dry air blast to remove residues and grit dust.
- 11.2.C.8.2 Total estimated grit blasting and coating surface area of the Topsides for the purpose of this tender is 20% of 913 or 183 m².

¹⁴ Rev 1 – 11.2.C.7.7 – French only insert 629 m²

- 11.2.C.8.3 Following coating manufacturer directions, the Contractor must apply ^two^ touch-up coat of Intergard 264¹⁵ (or equivalent) ^of contrasting^ colors Red Oxide (FPL274) at 125 micron dry film thickness to prepared spots of bare metal and overlapping onto feathering.
- 11.2.C.8.4 The Contractor must supply and apply ~~two base coats of red oxide, self priming, epoxy coating, 0.005" to 0.006" (0.13 mm to 0.15 mm) thick, red in colour, on all bare metal surfaces, and then~~ two ^50 microns^ ~~0.0015" (0.04 mm)~~ thick coats of a acrylic polyurethane coating red Coast Guard (RAL 3000) over the entire surface. The paint must be compatible with the existing paint.
- a) The current paint system on the topside is: Intergard 264 Light grey 125 microns; Intergard 264 red 125 microns; Interthane 990 50 microns; Interthane 990 50 microns.
- 11.2.C.8.5 Total estimated coating on bare metal surface area of the Topsides for the purpose of this tender is 25% of 913 or 229 m².
- 11.2.C.8.6 In addition, the Contractor must apply the topsides finishing coatings onto the Ice Belt down to the W/L, cutting in with a defined demarcation line detailed The Contractor must follow the recommendations of the representative (s) in order to obtain adequate adhesion between the finish coats of the topside and the ice belt. This may include a rolled undercoat application to the ice belt within very short time frame.
- 11.2.C.8.7 The Contractor must apply two coats of Interthane 990 (or equivalent) RAL3000 Red at 50 micron dry film thickness over the entire Topsides area and down to the W/L demarcation. The Contractor must allow to dry to minimum overcoating window.
- 11.2.C.8.8 The Contractor must allow drying until the recommended 'hard' dry time before applying lettering and signage.
- 11.2.C.8.9 The total topcoats is equal to the total to the topside and ¹⁶1/3 of the calculated^icebelt 1123 m² of surface to be prepared for adherence and top coat applied.

11.2.D PROOF OF PERFORMANCE

11.2.D.1 Inspection Points

- 11.2.D.1.1 The following inspections must be carried out in the presence of the IA:
- a) Visual inspection of the hull after cleaning;
- b) Transducer surfaces washed;
- c) Adequate protection of the parts described in this specification;

¹⁵ Rev 1 – 11.2.C.8.3 french change intershied 264 for intergard

¹⁶ Rev 1- 11.2.C.8.9 insert text: 1/3 of the calculated

- d) Degree of cleanliness after painting;
 - e) Removal of protective materials after painting.
- 11.2.D.1.2 The TA or IA can hire and be accompanied by a certified inspector in NACE International standards to ensure that these equivalencies are met. The Contractor must allow site access to this inspector.
- 11.2.D.1.3 All stripping and coating work must be inspected by the Contractor in accordance with the agreed-upon quality assurance plan, of which a copy must be submitted to the TA, and will be subject to periodic inspection by the IA.
- 11.2.D.1.4 The surface profile must be measured in accordance with NACE International SP0287-2016-SG.
- 11.2.D.1.5 The references below must be used for the coating application inspection procedures:
- a) SSPC SP10 – Near White Blast Cleaning of metal;
 - b) SSPC SP6 – Commercial Blast Cleaning;
 - c) SSPC-SP1 – Solvent Cleaning;
 - d) NACE International SP0287-2016-SG – Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape.
- 11.2.D.1.6 The Contractor must supply assistance and equipment (cherry picker with operator) required to the CCG representatives and the FSR for inspection of work.
- 11.2.D.2 ¹⁷**Additional recommendations and requirements:**
- 11.2.D.2.1 During painting, the Contractor must keep all deck scuppers plugged using perforated wooden plugs.
- 11.2.D.2.2 All portholes and windows on the upper deck must be protected during sandblasting and painting work, and uncovered upon completion of the work.
- 11.2.D.2.3 The edges of the portholes must be cleaned by sandblasting or mechanically, and painted. The portholes must be protected from any damage that could occur during sandblasting.
- 11.2.D.2.4 For the duration of the sandblasting work, all the vessel's vents and ventilation openings must be covered with a watertight polyethylene film to prevent sand from entering the vessel's accommodation and the engine room spaces. All equipment located on the upper deck and boat deck (anchor windlass, mooring winch, crane, davits, etc.) must be covered

¹⁷ Rev 1- French only – add 11.2.D.2 including 11.2.D.1.1 to 11.2.D.2.4

in the same way. Upon completion of the work the Contractor must remove and dispose of all protective coverings.

11.2.D.3 **Testing and Trials – [Not Used]**

11.2.D.4 **Certification – [Not Used]**

11.2.E DELIVERABLES

11.2.E.1 **Documentation**

11.2.E.1.1 Before the end of the contract, the Contractor must give to the TA a comprehensive report detailing the work undertaken, defects, repairs made and measurements and readings taken.

11.2.E.1.2 The Contractor must submit an inspection report from the coating manufacturer's technical service representative.

11.2.E.1.3 The Contractor must provide the IA a detailed quality assurance report once the work is completed. This report must include, but not limited to, the inspection reports, dry film thickness (DFT) measurements and condition monitoring data during the coating application.

11.2.E.1.4 The Contractor must provide a new docking plan in a CAD format indicating the position of each block for the next dry docking. This plan must be given before the undocking of the ship.

11.2.E.1.5 The Contractor must provide the technical and data sheet of the paint products used.

11.2.E.2 **Training – [Not Used]**

11.3 FREEBOARD, DRAFT AND SYMBOLIZATION MARKINGS

11.3.A IDENTIFICATION

11.3.A.1 The purpose of this item is to repaint the hull and freeboard markings once the vessel's hull has been painted.

11.3.B REFERENCES

11.3.B.1 **Equipment Data [– Not Used]**

11.3.B.2 **Drawings and Documents**

Drawing Number	Drawing / Document Title	Number of Sheets
06149_SF	Federal Symbolization	2

	Paint scheme – CCGS Pierre Radisson	
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11.3.B.3 Regulations and Standards

- 11.3.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
Publications		
GCC/6016	CCG Fleet - Federal Identity Program Guide	Yes
Standards		
Regulations		

11.3.C STATEMENT OF WORK

11.3.C.1 General

- 11.3.C.1.1 The Contractor must supply all the paint to be applied, according to the manufacturer's specifications, for all black and white markings. All paint must be compatible with the various hull coatings.
- 11.3.C.1.2 Colours and type of paint to be used:
- White: RAL9003
 - Black: RAL9004
 - Red: RAL3000
- 11.3.C.1.3 The Contractor must paint the load line, draught marks, forward and aft, port and starboard, letters, with two (2) coats of white paint compatible with the hull coating.
- 11.3.C.1.4 The Contractor must ensure that all paint used for the markings is applied in two (2) coats and is compatible with INERTA and INTERTHANE coatings.
- 11.3.C.2 **List of hull markings to be painted:**
- 11.3.C.2.1 The name of the vessel on port and starboard sides, fore and aft, as well as the port of registry;
- 11.3.C.2.2 On both sides of the vessel, the inscriptions "COAST GUARD" AND "GARDE CÔTIÈRE", as well as diagonal white stripes, delineated by black stripes;

- 11.3.C.2.3 The inscription “DANGER” with the symbols for “PROPELLERS” and “BOW THRUSTER” on both sides;
- 11.3.C.2.4 The inscriptions/lettering of the Canadian flags, CANADA, PÊCHES ET OCÉANS, FISHERIES AND OCEANS, on both sides of the vessel.
- 11.3.C.2.5 Referring to the plans, mark off the limits of the white diagonal and black stripes on the hull, just above the ice belt.

11.3.D PROOF OF PERFORMANCE

11.3.D.1 Inspection Points

- 11.3.D.1.1 Inspection of the surface preparation must be performed by referring to the following standards:
 - a) Sa 2½ or SSPC SP10 – Near White Blast Cleaning of metal;
 - b) Sa 2 or SSPC SP6 – Commercial Blast Cleaning;
 - c) SSPC-SP1 – Solvent Cleaning;
 - d) NACE International SP0287-2016-SG – Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape.
- 11.3.D.1.2 Freeboard marking must be inspected by the IA, referring to the drawings.
- 11.3.D.2 **Testing and Trials – [Not Used]**
- 11.3.D.3 **Certification – [Not Used]**

11.3.E DELIVERABLES

11.3.E.1 Documentation

- 11.3.E.1.1 The Contractor must provide the owner a detailed quality assurance report once the work is completed. This report must include, but is not limited to, the inspection reports, dry film thickness (DFT) measurements and condition monitoring data during the coating application.
- 11.3.E.1.2 The Contractor must provide the technical data sheet for the paint products used before the start of the application.

11.3.E.2 **Training – [Not Used]**

11.4 HULL SURVEY

11.4.A IDENTIFICATION

- 11.4.A.1 The purpose of this item is to conduct a structural inspection of the hull via thickness measurement following the requirements of the classification society ABS in accordance with Special Survey #4 for general dry cargo vessels 15 years of age or older.

11.4.B REFERENCES

- 11.4.B.1 **Equipment Data – [Not Used]**

- 11.4.B.2 **Drawings and Documents**

Drawing number	Drawing/Document	Number of sheets
221-H-138	Construction Sections	1
221-H-139	Profile and Decks	2
221-H-139 Sht 2	Profile and Decks page 2	1
221-H-1	Shell Expansion	1
221-H-12	Framing Expansion	1
221-H-24 Sht 1	Fore end framing inc w.t.b. fr-176	1
221-H-24 Sht 2	Fore end framing inc w.t.b.	1
221-H-101	General Arrangement	5
221-670-7_02A	Arrgt. Shipline valves – Forw'd eng. room	2
221-670-7_02B	Arrgt. Shipline valves – aft eng. room	2
221-670-7_02C	Arrgt. Shipline valves – Motor room	2

- 11.4.B.3 **Regulations and Standards**

- 11.4.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
Publications		
Standards		
Regulations		
PART 7-3-2	Rules for Survey After Construction	No

11.4.C STATEMENT OF WORK

11.4.C.1 General

- 11.4.C.1.1 The Contractor must retain the services of a certified technician to take the ultrasonic measurements. The technician and the measuring devices used must have valid certification from ABS or another classification society recognized under Transport Canada's Delegated Statutory Inspection Program.
- 11.4.C.1.2 The Contractor must indicate a lump sum amount for all work set out in the specifications. The Contractor must take thickness measurements in accordance with the provisions of the ABS rules. The requirements governing thickness measurement are defined in *Part 7: Rules for survey after construction* under section 7-3-2, *Hull surveys / Vessels for unrestricted service*. Thickness measurements must be taken in compliance with special survey #4 for general dry cargo vessels 15 years of age or over. To avoid repeating surveys unnecessarily, measurements must be taken at the same time as conducting any other special surveys.
- 11.4.C.1.3 OPTIONAL - The Contractor must indicate an hourly rate for taking additional measurements including report writing. For bidding purposes, the Contractor must indicate a price for an additional 40 hours of work.
- 11.4.C.1.4 In addition to the requirements of the special survey, the Contractor must take representative readings of the condition of all ice belt strakes.
- 11.4.C.1.5 The Contractor must also take thickness measurements at four points on each hull penetration for overboard discharge and on the surround of the water discharge.
- 11.4.C.1.6 The Contractor must supply all equipment and labour required to assist the inspector, non destructive testing technician and IA in gaining access to the exterior and interior portions of the vessel's hull and structure that need to be surveyed, including clearing away interference items. Gas freeing and certification of tanks as safe to enter must be included where necessary.
- 11.4.C.1.7 The Contractor must provide an approved work platform or man lifts so that the classification society can thoroughly inspect the hull and internal structure, and so that it is possible to conduct an ultrasonic thickness inspection. The Contractor must quote a price for use of an approved mechanical lift, including operator, for a 30-hour period.
- 11.4.C.1.8 The Contractor must do paint touch-ups at all locations where the steel has been exposed for thickness measurement. Paint touch-ups must be compatible with the existing system and comply with paint manufacturer requirements. Paint for touch-ups will be provided by the CCG.

11.4.C.2 Additional Inspection Points

- 11.4.C.2.1 Thickness measurement and steel replacement plan shall be made for the following areas :
References can be taken from the documents additional inspection and hull evaluation.
- a) RSE2 - Flight Deck & Boat Deck, FR 51 - FR 72, Hanger Side-15'-10" OCL, Port, page 4-7.
 - b) RSE3 - Flight Deck & Boat Deck, FR 63 - FR 68, CL -Hanger Side, Port, page 4-8.
 - c) RSE4 - Transverse BHD FR 0, Main Deck - Bottom Shell, Side Shell Port-Side Shell Stbd, page 4-9.
- 11.4.C.2.2 Recommended Inspections at Areas of noted corrosion (RSE) and High Fatigue (SFA). The following areas should be visually inspected to identify any observable defects including cracked welds or base material, plate buckling or cracked or peeling coatings. Records of findings including photographs should be collected. Repair as necessary will be negotiated with a 1379 form.
- a) RSE1- Tank Top Plating, Fr 138 – 140, 9'0" OCL Port – 16'-0" OCL Port, page 4-6.
 - b) SFA3 - Bulwark Connection to Side Shell at FR 54, Above Upper Deck, Port, page 3-55.
 - c) SFA4 - Bulwark Connection to Side Shell at FR 54, Above Upper Deck, Stbd, page 3-56.
 - d) SFA7 - Flight & Boat Deck Plating, FR 51 to FR 55, Obrd Stairway Opening, 24' OCL, Stbd, page 3-59.
 - e) SFA9 - Longitudinal BHD Plating, Above Upper Deck, FR 146, 6.5' OCL, Stbd, page 3-61.
 - f) SFA10 - Longitudinal BHD Plating, Below Flight & Boat Deck and Above Door, FR 133, 11.5' OCL, Stbd, page 3-62.
 - g) SFA11 - Longitudinal BHD Plating, Below Flight & Boat Deck and Above Door, FR 67, 10' OCL, Stbd, page 3-63.
 - h) SFA12 - Longitudinal BHD Plating, Below Flight & Boat Deck and Above Door, FR 59, 20' OCL, Stbd, page 3-64.
 - i) SFA15 - Longitudinal Girder Connection to BHD at FR 13, Below Flight & Boat Deck, 10' OCL, Stbd, page 3-67.
- 11.4.C.2.3 ¹⁸Recommended Inspections at Areas of high stress (DLA). The following areas should be visually inspected to identify any observable defects including cracked welds or base material, plate buckling or cracked or peeling coatings. Repair as necessary. Records of findings including photographs should be collected.

¹⁸ Rev 1- French only insert 11.4.C.2.3

- 1- DLA1 -Longitudinal BHD Plating, Above Upper Deck, FR 146,6.5' OCL, Stbd, page 4-41.
- 2- DLA6 - Longitudinal Girder Connection to BHD at FR 13, Below Flight & Boat Deck, 10' OCL, Port, page 4-46.
- 3- DLA11 - Tank Top Plating, FR 128 to FR 133, 2' OCL to 9' OCL,Port, page 4-51.
- 4- DLA12 - Tank Top Plating, FR 130 to FR 134, 2' OCL Port to 2'OCL, Stbd, page 4-52.
- 5- DLA13 - Tank Top Plating, FR 130 to FR 134, 2' OCL to 9' OCL,Stbd, page 4-53.

11.4.D PROOF OF PERFORMANCE

11.4.D.1 Inspection points

- 11.4.D.1.1 Prior to commencing work, the contractor must supply a drawing indicating thickness measurement locations to the ABS inspector and the IA for approval.

11.4.D.2 Tests and trials

- 11.4.D.2.1 The Contractor must provide the IA with proof of calibration of its ultrasonic measuring device.

11.4.E DELIVERABLES

11.4.E.1 Documentation

- 11.4.E.1.1 The Contractor must supply the IA and TA with a typed copy of a structural thickness report. For each thickness measurement, the report must indicate the following at minimum: thickness measurement location, current steel thickness, percentage steel loss and original steel thickness. Each ultrasonic shot must be identified on a structural drawing of the vessel.

11.4.E.2 Training - [Not Used]

11.5 CATHODIC PROTECTION SYSTEMS

11.5.A IDENTIFICATION

- 11.5.A.1 Inspection of the anodes for the cathodic corrosion protection system and the hull anodes.
- 11.5.A.2 Renewal of the damaged anodes.
- 11.5.A.3 Calibration of the cathodic protection system according to the manufacturer's specifications.

11.5.B REFERENCES

11.5.B.1 Equipment Data

- 11.5.B.1.1 ¹⁹The following table indicates the location of the cathodic protection system anodes in the sea bays.

Description	Location	Frame	Anode	Qty	Panel
Starboard low seabox	Sprinkler pump	30-31	KE -28	2	D
Seabay (Port and Stbd)	Propulsion motor room (7T)	55-61	KE 28-35	10	D
Port and Stbd Low seabox	Propulsion motor room	60-61	KE 28-35	4	D
Starboard High seabox	Propulsion motor room	58-61	KE 23-28	3	D
Seabay	Aft engine room (14T)	93-95	KE 28-35	10	C
Port and Stbd. low seabox	Aft engine room	92-95	KE 4-28-35	6	C
Port high seabox	Aft engine room	92-95	KE 4-23-28	3	C
Seabay	Forward engine room (14T)	95-97	KE 28-35	10	B
Starboard high seabox	Forward engine room	95-97	KE 4-23-28	2	B
Port and Stbd low seabox	Forward engine room (<i>Note: #20 Neck 6" offset</i>)	95-97	KE 4-28-35	4	B

11.5.B.2 Drawings and Documentation

Drawing Number	DRAWING TITLE	Number of Sheets
221-670-5_01	FWD. & AFT Engine Room Sea Bay Piping Details	
221-670-5_02	Propulsion Motor Room Sea Bay piping Details	
	Instruction Manual for « CATHELCO » Electrolytic Protection System	
3163-1	Caisse d'eau de mer et Caisse de prises d'eau- salle des moteurs de propulsion, coque 221/2	

¹⁹ Rev 1- 11.5.B.1.1 French version only table replaced

3163-2	Caisse d'eau de mer et prise eau salle moteurs prop, coque 221/2	
3163-3	Caisse d'eau de mer salle de propulseur étrave	
	C.C.G.S. Radisson - Anodes – 1	
	C.C.G.S. Radisson - Anodes – 2	
	C.C.G.S. Radisson - Anodes – 3	
	C.C.G.S. Radisson - Anodes – 4	
68-2730-1	Cathodic Protection in Seabays	
Drawing number	Drawing/Document	Number of sheets
	EMCS Pierre Radisson Anodes	4
68-2730-1	Cathodic Protection in Sea bays	1
ESK-26	Detail of Cathodic Protection Anode Installation	1
311381	Rolls Royce anode location	1

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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
7.B.5	Lockout and Tagout	Yes
Publications		
Standards		
Regulations		

11.5.C STATEMENT OF WORK

11.5.C.1 General

- 11.5.C.1.1 The work described herein must be coordinated with the work in sections 11.2 and 11.6 of this specification package.
- 11.5.C.1.2 Prior to the commencement of any and all work, the Contractor must lock out the power supply for the cathodic protection system as per the Coast Guard ISM Safety Lockout Procedure 7.C.1.M S36-01 safety code.
- 11.5.C.1.3 The Contractor must install/remove locks and tags accordingly during the scope of work.
- 11.5.C.1.4 The Contractor must consult the IA to determine the equipment that must be locked out.

- 11.5.C.1.5 It must be the Contractor's responsibility to perform the actual lock out and the Contractor must supply and install its own locking devices and retain all keys during the scope of this work.
- 11.5.C.1.6 The Contractor must perform all work as per manufacturer's specifications and recommendations in the manufacturer's instruction manual.
- 11.5.C.2 **Anode Inspection (Marelco System)**
- 11.5.C.2.1 The Contractor must remove the covers on all anode connection boxes which are to be opened for inspection only. Any defect found must be brought to the attention of the IA or TA for remedial action if necessary. On completion of all work, the Contractor must close the connection boxes using new gaskets.
- 11.5.C.2.2 To gain access to the Marelco system anodes, the Contractor must remove 23 suction pipe extensions from the sea bays. After work has been carried out, the Contractor must reinstall the same extensions using new corrosion-resistant bolts and nuts, as well as new gaskets.
- 11.5.C.2.3 The Contractor must disconnect the electrical connections and remove all Marelco anodes identified in drawings 68-2730-1 and ESK-26 and present them to the IA. The Contractor must dispose of all anodes not being conserved by the CCG.
- 11.5.C.2.4 The Contractor must install the new anodes supplied by the CCG and verify ground resistance of each anode. The Contractor must verify ground resistance of the electrical wiring linking each anode to the control panel before connecting it to the anodes. The Contractor must supply a report of the readings of the ground resistances to the IA.
- 11.5.C.3 **Calibration**
- 11.5.C.3.1 The Contractor must calibrate the cathodic protection system to the manufacturer's recommended levels and test its performance once all work has been completed and the ship has been re-floated.
- 11.5.C.3.2 The crew will perform the adjustment of the system in salt water, to a current between 1 and 2 amps.

11.5.D PROOF OF PERFORMANCE

11.5.D.1 Inspection

- 11.5.D.1.1 The following inspections are required to be verified by the IA or/and TA:
- a) Visual inspection of connection boxes,
 - b) Visual inspection of reference anodes,

- c) Visual inspection of protection anodes,
- d) Witnessing installation and connection of new anodes - if required,
- e) Witnessing the calibration of the system.

11.5.D.2 **Testing and Trials**

- 11.5.D.2.1 The Contractor must demonstrate that they system is fully function upon completion of the work.

11.5.D.3 **Certification - [Not Used]**

11.5.E DELIVERABLES

11.5.E.1 **Documents**

- 11.5.E.1.1 The Contractor must supply the IA with an electronic copy, on a USB stick not protected by a password, in Microsoft Office Word 2003 or more recent format, a report detailing all undertaken works, defects, repairs performed, measurements and readings taken.
- 11.5.E.1.2 The Contractor must provide a Quality Assurance (QA) report indicating that all parts of the cathodic protection system has been inspected by the Contractor's QA Department for correct installation and fit.

11.5.E.2 **Training - [Not Used]**

11.6 GRIDS, SEA CHEST AND SEA BAYS

11.6.A IDENTIFICATION

- 11.6.A.1 The objective of this specification item is to carry out the maintenance, inspection and certification of the sea chests and sea bays. The work includes the cleaning, painting, anode replacement and hydro static testing.

11.6.B REFERENCES

11.6.B.1 Equipment Data

- 11.6.B.1.1 The following table indicates the location of the ship's sea chests and sea bays that must be opened for cleaning and inspection by the IA and the ABS Inspector.

Description	Location	Surface (pi ²)
Starboard high suction, Forward engine room	95-97	218
Starboard low suction, Forward engine room	95-97	195
Port lower suction, Forward engine room	95-97	195
Port high suction, Aft engine room	92-95	219
Port low suction, Aft engine room	92-95	195
Starboard low suction, Aft engine room	92-95	195
Port low suction, Propulsion motor room	60-61	173
Starboard low suction, Propulsion motor room	60-61	173
Starboard high suction, Propulsion motor room	59-61	194
Starboard high suction, Submersible pump	58-59	95
Starboard sea chest, Sprinkler pump	30-31	80
Port sea chest, Evaporators	120-123	82
Starboard sea chest, bow thruster compt.	165-166	100
Port & Stbd sea bay, forward engine room (14 T)	95-97	²⁰ ^1107^
Port & Stbd sea bay, aft engine room (14 T)	93-95	^1107^
Port & Stbd sea bay, propulsion motor room (7 T)	55-61	^748^

11.6.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
NT-2531-13^14^-CA001A	Tank and compartment surface calculation	98
C17-66-620-11 R1	Capacity Plan	1
221-670-5_01	FWD. & AFT Engine Room Sea Bay Piping Details	
221-670-5_02	Propulsion Motor Room Sea Bay piping Details	

²⁰ Rev 1- 11.6.B.1.1 information added to tableau

221-H-101	Arrangement Général	
221-H-45	Tank Testing Plan	

11.6.B.3 Regulations and Standards

- 11.6.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
7.B.3	Entry into Confined Spaces	Yes
Publications		
Standards		
Regulations		

11.6.C STATEMENT OF WORK

11.6.C.1 Sea Strainers

- 11.6.C.1.1 The Contractor must open the port and starboard sea strainers of each of the three engine rooms (total of 6). This will involve disconnecting the sea strainer vents & drains.
- 11.6.C.1.2 The Contractor must remove and clean, by hand wire brushing, the sea strainer grates to remove any marine growth and/or corrosion.
- 11.6.C.1.3 The Contractor must mechanically clean to bare clean surfaces the strainer boxes and, when dry, submit them to the IA for inspection. Any defects found must be brought to the IA's attention for remedial action.
- 11.6.C.1.4 The Contractor must apply two coats asphalt base coating to the interior surfaces (approximately 4.5 m²) of each strainer box as well as to the underside of each strainer cover.
- 11.6.C.1.5 The Contractor must, after the painting is completed, submit the strainer to the IA for inspection
- 11.6.C.1.6 After inspection, the Contractor must reinstall the strainers and the covers, using new gaskets, and secure the assembly into place. The Contractor must apply anti-seize compound on all fasteners.
- 11.6.C.1.7 The Contractor must reconnect the vents and drain piping and verify that they are working properly.

- 11.6.C.1.8 ~~²¹The Contractor must provide a quote for the additional costs to have the strainers hot galvanised after cleaning.~~
- 11.6.C.1.9 The Contractor must open all access grids and manholes for sea chests and sea bays. To gain access to the sea bays, the Contractor must remove any piping blocking the manholes. The contractor must remove the drain plugs to drain the boxes and reinstall them at the end of the work. The drain plugs should be tested with a vacuum box following reinstallation.
- 11.6.C.2 **Sea Chests**
- 11.6.C.2.1 The Contractor must remove the manhole covers and the access grates (on the hull) to the sea chests, as described in 11.6.B.1.1 above.
- 11.6.C.2.2 The Contractor must clean the internal surfaces, including the access grates, using high-pressure water jets with a minimum pressure of 5,000 psig, or a sand blasting process.
- 11.6.C.2.3 The Contractor must inform the IA and the attending ABS Surveyor when the sea chests are opened up, so they can inspect them.
- 11.6.C.2.4 The Contractor must mechanically ream all access grates' holes to their original diameter.
- 11.6.C.2.5 The Contractor must quote for the surface preparation, supply, and the installation of 28 Z-22 zinc anodes, in the seaboxes, at specific locations, as stated by the IA. The anodes must be bolted down, and the Contractor must supply 5/8" stainless steel bolts that must be welded for the anodes installation. The Contractor must not install any anodes in the evaporator sea chest.
- 11.6.C.2.6 The Contractor must wire brush clean any bared areas in preparation for painting.
- 11.6.C.2.7 The Seaboxes must be inspected by the IA, before any painting starts.
- 11.6.C.2.8 After inspection, the Contractor must paint each sea chest with 2 separate coats of asphalt for each coat, on all internal surfaces of the seaboxes, including sprinkler pump seabox.
- a) ²²The current coating is Apexior 3[^]
- 11.6.C.2.9 The Contractor must advise the IA so he (she) can witness each coat application.
- 11.6.C.2.10 For bidding purposes, The Contractor must provide a price for the surface preparation and painting of 100% of each sea chest (see section 11.6.B.1.1), except the evaporator sea

²¹ Rev 1- Remove 11.6.C.1.8

²² Rev 1- insert 11.6.C.2.8 a) The current coating is Apexior 3

chest. The Contractor must provide a unit cost per square metre for each coat of paint application on bared areas and the surfaces described in 11.6.C.2.8.

- 11.6.C.2.11 The Contractor must sandblast the evaporator sea chest to remove the existing coating and to obtain a surface preparation of SSPC-SP-10. The Contractor must supply and apply a new coating in the evaporator sea chest. The new coating must be an asphalt based coating (for example: Zeco AA 4108), suited for this application and must be NSF 61 approved for use with potable water. See table above for estimated surface area.
- 11.6.C.2.12 The Contractor must close the sea chest access grates, with corrosion proof new bolts, tack welded. There are 120 countersunk head bolts, $\frac{3}{4}$ " (d) by 5 in. (L). The Contractor must remove the nuts (3/4" UNC) welded inside the plates and replace them with new ones, welded in the same locations. Bolts and nuts must be supplied by the Contractor. The Contractor must also paint the bolts and nuts with INERTA; this painting must be coordinated with the hull painting in section 11.2.
- 11.6.C.2.13 The Contractor must close all manhole covers, supply and install new gaskets (0,6 mm thick), bolts nuts and washers
- 11.6.C.2.14 For bidding purposes the Contractor must quote on renewing 10 manhole studs, with a unit cost per stud for any addition replacement required. This quote must also cover manhole studs under item 11.6.C.3.

11.6.C.3 Sea Bays

- 11.6.C.3.1 The Contractor must remove all docking plugs to drain the sea bays and give them to the IA.
- 11.6.C.3.2 The Contractor must remove the manhole covers and thoroughly clean the sea bays, using high-pressure water jets with a minimum pressure of 5,000 psig.
- 11.6.C.3.3 On completion of cleaning, the Contractor must notify the IA and the ABS Surveyor, so they can inspect the sea bays.
- 11.6.C.3.4 The Contractor must wire brush clean any bared areas in preparation for painting, estimated at 100% for each sea bay (see section 11.6.B.1.1).
- 11.6.C.3.5 The Seabays must be inspected by the IA, before any painting starts.
- 11.6.C.3.6 After the inspection, the Contractor must paint all internal surfaces of the sea bays with two separate coats of grey colored INTERGARD 264 (ou equivalent) paint de 150 microns (.006" DFT each).

- 11.6.C.3.7 The Contractor must advise the IA so they can witness each coat application and perform a final inspection once the painting is completed.
- 11.6.C.3.8 For adjustment purposes, the Contractor must provide a unit cost per square metre for each additional coat of paint application on bared areas and the surfaces.
- 11.6.C.3.9 Upon completion of all repair work, inspections and paint work, the Contractor must recuperate the docking plugs from the IA. The Contractor must install the docking plugs and all manhole covers. The Contractor must supply new rubber gaskets and new galvanized fasteners. All fasteners must receive an application of ant-seize compound by the Contractor.
- 11.6.C.3.10 A waterproof test must be performed by the Contractor on each docking plug, using the vacuum box system, in presence of the IA and the attending ABS Surveyor.
- 11.6.C.3.11 The Contractor must hydrostatically test, to the equivalent pressure of not more than three (3) psig, all Seabays. The IA and the attending ABS surveyor must be present for these tests.
- 11.6.C.3.12 If a hydrostatic test fails and the failure is related to the Contractor's work, the Contractor must perform the necessary repairs and repeat the items until a satisfactory hydrostatic test is performed before the IA and the attending ABS Surveyor.
- 11.6.C.3.13 If a hydrostatic test fails and the failure is not related to the Contractor's work or if it is necessary to perform additional work, required by the IA: the additional cost must be negotiated using PWGSC 1379 form.

11.6.D PROOF OF PERFORMANCE

11.6.D.1 Inspection Points

11.6.D.1.1 The following inspections must be verified by the IA and the ABS Surveyor:

- a) Sea strainer grids and strainer boxes,
- b) Inspection of internal surfaces of sea chests,
- c) Inspection of main sea bays after cleaning.

11.6.D.1.2 The following inspections must be verified by IA:

- a) Closing up strainer covers and manhole covers.
- b) Paint application on internal surfaces of sea chest and main sea bay.
- c) Visual inspection of protection anodes.

11.6.D.2 Testing and Trials

- 11.6.D.2.1 Hydrostatic testing must be carried out on all sea bays to the satisfaction of the AI and the ABS surveyor.
- 11.6.D.3 **Certification – [Not Used]**
- 11.6.D.4 **Documentation**
 - 11.6.D.4.1 The Contractor must supply the IA and the AT with a typewritten copy of a report detailing the work undertaken, defects, repairs made and measurements and readings taken.
 - 11.6.D.4.2 The Contractor must also provide a copy of the ABS survey credit to the IA.
 - 11.6.D.4.3 The Contractor must provide a Quality Assurance Report indicating the replaced anodes.

11.7 BALLAST TANKS AND COFFERDAMS

11.7.A IDENTIFICATION

- 11.7.A.1 The objective of this section is to carry out the 5 year inspection, maintenance, and certification of the ship's ballast tanks and cofferdams. This also includes hydrostatic testing of the tanks and cofferdams.

11.7.B REFERENCES

11.7.B.1 Equipment Data

- 11.7.B.1.1 The following table identifies the tanks and cofferdams where work is to be carried out:

Tank/Cofferdam	Frame	Capacity (Metric tons)	Surface Area ft ²	% Loose paint
Forepeak	Fore frame 183	103.4	8422	5
Aft peak	Aft frame R to 0	90.3	5996	5
Fore trim	176-183	181.4	9475	5
Aft trim tank	0-18	113.7	8667	5
Port heeling tank	138 to 165	214.58	5831	5
Starboard heeling tank	138 to 165	214.58	5831	5
Helicopter cofferdam	0-14		7837	20
Pipe tunnel (Duct Keel)	122-166		2780	20
Echo sounder cofferdams	138-140		60	5
Bow Thruster Sea suction	165-176		1827	50

11.7.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
NT-2531-13-CA001A	Tank and compartment surface calculation	98
221-H-131	Docking Plan	1
C17-66-620-11 R1	Capacity Plan	1
221-H-45	Tank Testing Plan	1

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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
7.B.3	Entry into Confined Spaces	yes
Publications		
Standards		
Regulations		

11.7.C STATEMENT OF WORK

11.7.C.1 Preparation, cleaning and inspection

- 11.7.C.1.1 The Contractor must note that the tanks are used as water ballast tanks. The ship's crew, prior to docking the vessel, must empty these tanks to the minimal required level in order to achieve the desired trim.
- 11.7.C.1.2 The Contractor must bid on draining and disposing of approximately 20 metric tons of water and debris from each of six the ballast tank noted for a total of 120 metric tonnes.
- 11.7.C.1.3 Once the vessel has been safely docked, the Contractor must remove the docking plugs for the designated tanks in order to drain them, except the heeling tanks which are not fitted with docking plugs. The Contractor must pump them dry using a portable pump to complete the work. The Contractor must also drain the suction piping between the tanks and the pumps, as well as the 2 tank bottoms.
- 11.7.C.1.4 The Contractor must give the docking plugs to the IA for safekeeping.
- 11.7.C.1.5 The Contractor must open all manhole covers and ventilate the tanks and void spaces. The Contractor must post a certificate, prepared by a certified chemist, near the entrance of each tank specifying a safe entry and permission to perform all required work during the whole duration of the work period.
- 11.7.C.1.6 The Contractor must descale, mechanically clean, to remove all rust and loose paint that is not in contact with the plate, then clean each of the tanks and void spaces noted in this specification. The Contractor must hydro-blast the ballast and cofferdams, using high-pressure water (5000 psi minimum), hand clean them, remove all traces of rust and dirt, and dry them prior to inspection.
- 11.7.C.1.7 The evaluation of the expected surfaces to be treated is indicated in the table above (11.7.B.1.1).

- 11.7.C.1.8 Once cleaned, each of the tanks and void spaces must be surveyed by the ABS Surveyor and the IA. The Contractor must coordinate the presence of the ABS Surveyor and the IA when the work is ready for inspection.
- 11.7.C.1.9 The cost associated with all remedial work, required by the ABS Surveyor and the AI, after their inspections, will be negotiated using PWGSC 1379 form.
- 11.7.C.1.10 On completion of the survey and any remedial action required, any coating damage found must be prepared and painted using a paint that is compatible with the existing paint schedule. The estimated surface areas to be touched up are indicated in 11.7.B.1 above. All surface preparation and paint application must be done in accordance with the paint manufacturer's recommendations and specifications. The Contractor must apply two coats of paint, each being a different color, to the recommended thickness. The AI must inspect each coat.
- 11.7.C.1.11 ²³~~Optional—Recoat the tanks~~
- 11.7.C.2 **Closing, testing and certification**
- 11.7.C.2.1 The IA must inspect the tanks and in order to validate the quality of the paint application between each coat of paint and prior to the final closing of the manhole covers.
- 11.7.C.2.2 On completion of all work, the Contractor must:
- a) Recuperate the docking plugs from the IA and install them.
 - b) Install the manhole covers using new gaskets, washers and nuts that he must supply. The new gaskets must be of the same material and thickness as those replaced.
 - c) Apply an Anti-seize compound to all threaded components.
- 11.7.C.2.3 The Contractor must perform a pressure test (hydrostatic or air pressure), on each tank and cofferdam, in presence of a ABS surveyor and the IA.
- 11.7.C.2.4 Once the hydrostatic or air pressure test are completed, if necessary, the Contractor must remove the docking plugs in order to drain the tanks. The heeling tanks must be emptied using portable pumps, as indicated above.
- 11.7.C.2.5 The Contractor must re-install the docking plugs, again supplying and installing new joints, and perform a vacuum test in the presence of the IA.

11.7.D PROOF OF PERFORMANCE

11.7.D.1 Inspection Points

²³ Rev 1 – remove 11.7.C.1.11

- 11.7.D.1.1 Inspections by ABS and the IA must show that all surfaces from each tank and cofferdam are in good condition and completely and uniformly coated as demanded in the current specification.
- 11.7.D.2 **Tests and Trials**
- 11.7.D.2.1 Hydrostatic or air pressure tests must prove that all tanks and cofferdams are watertight and be certified according to the requirements of ABS to obtain certification.
- 11.7.D.3 **Certification**
- 11.7.D.3.1 The Contractor must also provide a copy of the ABS survey credit to the IA.

11.7.E DELIVERABLES

- 11.7.E.1 **Documentation**
- 11.7.E.1.1 The Contractor must supply the IA and the TA with an electronic copy, on a USB stick not protected by a password, in Microsoft Office Word 2013 or more recent format, a report detailing all undertaken works, defects, repairs performed and detailed results of all performed tests.
- 11.7.E.1.2 The Contractor must supply the IA and the TA with a detailed QA report at the completion of the Work. This must include, but not limited to, inspection records, DFT readings, and condition monitoring data during coating application, etc.
- 11.7.E.2 **Training – [Not Used]**

11.8 FUEL OIL AND OILY WATER TANKS

11.8.A IDENTIFICATION

11.8.A.1.1 The objective of this section is to carry out the 5 year inspection, maintenance, and certification of the ship's fuel oil and oily water tanks. This also includes hydrostatic testing of the tanks.

11.8.B REFERENCES

11.8.B.1 Equipment Data

11.8.B.1.1 The following table identifies the tanks where work is to be carried out:

Tank	Frame	Volume m ³	Surface ft ²
Double Bottom No.1, port	123 to 165	95.4	7248
Double Bottom No.1, stbd	123 to 165	95.3	7248
Double Bottom No.2, port	97 to 123	106.7	8021
Double Bottom No.2, stbd	97 to 123	115.5	8345
Double Bottom No.3, port	61 to 93	148.7	10593
Double Bottom No.3, stbd	61 to 93	148.7	10593
Double Bottom No.4, port	30 to 61 (oily water)	65.6	5673
Double Bottom No.4, stbd	30 to 61 (oily water)	64	5559
Fore deep tank, port	146 to 165 (no drain plugs)	147.4	3753
Fore deep tank, stbd	146 to 165 (no drain plugs)	147.4	3394
Aft deep tank, port	18 to 30	106.2	5197
Aft deep tank, stbd	18 to 30	106.2	5433
Wing tank, port	138 to 158 (no drain plugs)	60.7	3670
Wing tank, stbd	138 to 158 (no drain plugs)	60.7	3670
Settling tank, port	123 to 127 (no drain plugs)	73.8	1796
Stabilization tank, upper	127 to 138 (no drain plugs)	267.9	6693
Stabilization tank, lower	127 to 138 (no drain plugs)	275.5	7050
Settling tank, stbd	123 to 127 (no drain plugs)	73.8	2738
Day tank, center	123 to 127 (no drain plugs)	44.8	1796
Wing tank fore engine room, port	95 to 123 (no drain plugs)	115.9	6915
Wing tank fore engine room, stbd	95 to 123 (no drain plugs)	115.9	6915
Wing tank aft engine room, stbd	61 to 95 (no drain plugs)	140.3	8247
Wing tank aft engine room, port	61 to 95 (no drain plugs)	140.3	8247
Helicopter fuel tank, centre	4 to 11 (kerosene type aviation fuel) (no drain plugs)	28.2	622
Boiler Fuel Oil tank	84-86	3	189

Bilge retention tank	116 to 120	4.2	357
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11.8.B.1.2 The fuel oil tanks contained:

- a) Arctic type diesel; and/or
- b) Marine type 3GP 11D; and/or
- c) Arctic type 3GP 11C; and/or
- d) Marine diesel;

11.8.B.1.3 The helicopter fuel tank contained Jet A1 fuel.

11.8.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
NT-2531-13-CA001A	Tank and compartment surface calculation	98
68-H-105	Docking Plan	1
C17-66-620-11 R1	Capacity Plan	1
68-H-107_2	Keyplan and List of Manholes	1
221-H-45	Tank Testing Plan	1
	1200 Icebreaker Coating scheme	1
	NO29_2009_Framo_Portable_Cargo_Pump	

11.8.B.3 Regulations and Standards

11.8.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
7.B.3	Entry into Confined Spaces	yes
Publications		
Standards		
Regulations		

11.8.C STATEMENT OF WORK

11.8.C.1 Emptying and draining the tanks :

- 11.8.C.1.1 The Contractor must pump and store ashore and then pump back approximately 100 (this amount is to be confirmed) metric tons of diesel fuel. Storage facilities (Contractor supplied) must be clean, uncontaminated, and prior to transferring of any fuel oil to these facilities, inspected by the IA. This fuel transfer operation must be the responsibility of the Contractor.
- 11.8.C.1.2 During the course of this transfer, the Contractor must empty all tanks to the bottom of their suctions. Contractor must consult with the IA as to the sequence of transferring of fuel off the vessel whilst the vessel is sitting on the blocks.
- 11.8.C.1.3 The Contractor must remove the docking plugs and drain remaining fuel and residues from the tanks. The Contractor must bid on the removal and disposal of approximately 40 metric tonnes of fuel residue and dirt which can be expected to be found in the tanks indicated in 11.8.B.1.1. For tanks not fitted with docking plugs, the Contractor must use a portable pump to complete the draining procedure. The Contractor must dispose of this remaining residue ashore in accordance with the provincial environmental regulations.
- 11.8.C.1.4 There will still be some fuel in the day tank and possibly in the settling tanks. The Contractor must plan, in its specification, a fuel transfer by the ship's crew. Details must be discussed with the IA.
- 11.8.C.2 **Opening and cleaning of tanks**
- 11.8.C.2.1 The Contractor must dismantle any equipment restraining access to the manholes and reassemble them once work is completed.
- 11.8.C.2.2 The Contractor must open the manhole covers of the tanks according to the schedule specified by the IA.
- 11.8.C.2.3 The Contractor must empty, clean of all deposits, and ventilate the helicopter fuel tank, fuel tanks and oily water tanks for a sufficient period of time to ensure that tanks are free of noxious and explosive gases.
- 11.8.C.2.4 Before any work or inspection can be performed in the tanks, the Contractor must obtain a certificate from a chemist to certify that tanks are gas free, safe to work inside and that hot work can be performed inside. Copies of the certificates must be posted in a visible location, near the manholes, and another copy for each tank must be given to the IA. The Contractor must keep those certificates valid for the entire period where a tank is open.

- 11.8.C.2.5 ²⁴~~The Contractor must clean and degrease, using high pressure water jet, the following tanks:~~
- ~~a) Port and starboard , #4 double bottom tanks, frames 30 to 61;~~
 - ~~b) For bidding purposes, the Contractor must estimate a paint looseness of 10% after cleaning the tanks. After thoroughly cleaning and degreasing both #4, double bottom tanks (port and starboard), the Contractor must supply and apply, on all bare steel surfaces, a primer, compatible with the existing paint schedule, and 2 coats of International Interline 624 (or equivalent) paint on all other surfaces. The first coat must be 0.004" thick when dry and the second coat must be 0.010" thick when dry.~~
 - ~~c) Bilge Retention tank, frames 116 to 120.~~
- 11.8.C.2.6 ~~The Contractor must steam clean all the other tanks and dispose of all dirt and debris.~~
- 11.8.C.2.7 ~~Upon completion of steam cleaning, the Contractor must ensure that each tank is gas freed, suitable for entry and for further inspection and required works.~~
- 11.8.C.2.8 The Contractor must ensure that all limber holes in each tank are free and clear and the Contractor must also inspect the bottom of all sounding pipes and tanks suction to ensure they are not obstructed.
- 11.8.C.3 **Tanks inspection**
- 11.8.C.3.1 All the tanks must be inspected by an ABS and the IA surveyor for certification. The Contractor must inform the ABS surveyor and the IA when the above mentioned tanks are ready for inspection.
- 11.8.C.3.2 Following the inspections, all defects noted by the surveyors or the Contractor must be repaired by the Contractor. If any repairs are required for the Contractor, their cost must be negotiated using PWGSC 1379 form.
- 11.8.C.4 **Replacement of threaded insert plugs**
- 11.8.C.4.1 The contractor shall replace 3 tank sounding sockets. 2 off deck and one at deck level with the doublers removed and replaced, replacement pipe used must be scheduled 80 seamless or a collar plus is to be used. Plugs and sockets must be provided.
- 11.8.C.5 **Tank Testing**
- 11.8.C.5.1 Once the inspections completed, the Contractor must install the docking plugs.

²⁴ Rev 1- Remove 11.8.C.2.5 and 11.8.C.2.6 and 11.2.C.2.7

- 11.8.C.5.2 The Contractor must close the manhole covers, supplying and using new gaskets, nuts and washers. The required gasket material for the manhole cover's gaskets is BUNA-N (NITRILE) or an equivalent suitable for petroleum products. The Contractor must check all manhole cover studs and renew any defective studs.
- 11.8.C.5.3 The Contractor must perform hydrostatic or compressed air tests on all tanks, in presence and to the satisfaction of an ABS surveyor.
- 11.8.C.5.4 If hydrostatic tests are performed, once they are completed, the Contractor must:
- a) remove the docking plugs,
 - b) drain the tanks,
 - c) open the manhole covers,
 - d) obtain a chemist certification allowing for safe entrance,
 - e) wipe dry the tanks,
 - f) close the manhole covers,
 - g) install the docking plugs
 - h) perform vacuum box tests in the presence of the IA.
- 11.8.C.5.5 The Contractor must plug all air vents and overflow piping before performing the hydrostatic or compressed air tests on the tanks and free the air vents and overflow piping after testing. There is overflow piping in the following tanks:
- a) Forward Engine Room wing tank, port and starboard;
 - b) Settling tanks, port and starboard;
 - c) Emergency Generator Fuel Oil tank;
 - d) Boiler Fuel Oil tank;
 - e) Fuel oil Day tank;
- 11.8.C.5.6 If compressed air tests are performed on the tanks, the Contractor must plug all piping, supply, vents, overflow, etc.
- 11.8.C.5.7 All the tanks must be inspected by the IA before the Contractor closes them.

11.8.D PROOF OF PERFORMANCE

11.8.D.1 Inspection Points

- 11.8.D.1.1 The following inspections are required to be verified by the IA and the ABS surveyor (as required):
- a) Inspection of each fuel oil tank after cleaning,
 - b) Final inspection of all tanks prior to their being "closed-up".

11.8.D.2 Tests and Trials

11.8.D.2.1 The Contractor must perform the following test on each fuel oil tank:

- a) Hydrostatic or air pressure test.
- b) Vacuum box tests on each docking plug.

11.8.D.3 Certification

11.8.D.3.1 The Contractor must also provide a copy of the ABS survey credit to the IA.

11.8.E DELIVERABLES**11.8.E.1 Documentation**

11.8.E.1.1 The Contractor must supply the IA and the TA with a report, detailing the work undertaken, defects, repairs made and measurements and readings taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.

11.8.E.1.2 The Contractor must provide a report from the hydraulic firm detailing the work carried out on the Framo pump.

11.8.E.1.3 The Contractor must provide a Quality Assurance report indicating that all areas, as defined in this specification, have been inspected by the Contractor's QA Department and all areas of defects established by this survey have been identified for remedial action.

11.8.E.2 Training – [Not Used]

11.9 BILGE WELL DAY TANK AND SETTLING TANKS

11.9.A SCOPE

- 11.9.A.1.1 The Contractor must create three settling wells in the tanks: daily and port and starboard settling tanks.
- 11.9.A.1.2 The Contractor must modify the water withdrawal plumbing to draw water from the settling well.
- 11.9.A.1.3 When the ship arrives at the contractors facilities the settlings and day tank will be full.

11.9.B REFERENCES

11.9.B.1 Equipment Data

- 11.9.B.2 The day tank is located between frames 123 and 127.
- 11.9.B.3 The settling tanks are located between frames 123 and 127.

11.9.B.1 Drawings

- 11.9.B.1.1 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
Puits de drainage réservoir journalier_jB	CCGS Pierre Radisson bilge well daily F.O. Tank (port side) strip out, location and fabrication details rev 01	1
C17-66-620-11 R1	Capacity plan rev 1	

11.9.B.2 Regulations and Standards

- 11.9.B.2.1 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	Included CCG/5737
7.B.4	Hotwork	Included CCG/5737
Standards		

CT-043-EQ-EG-001-E	Welding specification	Welding Specification
Regulations		

11.9.C STATEMENT OF WORK

11.9.C.1 Confined Space Entry

- 11.9.C.1.1 The contractor must empty and gasfree the tanks involved. The contractor must make the tanks safe for hot work.
- 11.9.C.1.2 The Contractor must keep the tanks safe for entry until final closure.
- 11.9.C.1.3 The crew must assist with the internal fuel transfer. A quantity of 200 litres in each tank will remain once the tank is completely pumped out. And a quantity of 20 Litre of sludge will have to be cleaned and disposed of.
- 11.9.C.1.4 The contractor must have his crew for the entry into the confined space. During the along side work period the contractor must follow the Coast Guard standards for confined space entry. A discussion between the chief engineer and the contractor must take place before the tank cover is opened.

11.9.C.2 Settling wells

- 11.9.C.2.1 The Contractor must fabricate a well in the bottom of the day tank and settling tanks. According to the diagram: CCGS Pierre Radisson bilge well daily F.O. Tank (port side) strip out, location and fabrication details rev 01.
- 11.9.C.2.2 The piping to drain water from the bottom of the tank must be extended to reach the bottom of the three new wells.

11.9.C.3 Welding

- 11.9.C.3.1 The contractor must provide a visual and magnetic particle inspection report by a level 2 technician.

11.9.C.4 Tank Closure

- 11.9.C.4.1 The contractor must supply and install a new nitrile gasket on each tank.

11.9.D PROOF OF PERFORMANCE

11.9.D.1 Inspection Points

- 11.9.D.1.1 The work must be inspected by the ship's chief engineer or his representative.

11.9.D.2 Testing/Trials

- 11.9.D.2.1 A pressure test of the container must be carried out to demonstrate that the well is leakproof.

11.9.D.3 Certification

- 11.9.D.3.1 The Contractor must provide certification of welders and NDT technician(s) for visual, magnetic particle and thickness testing.
- 11.9.D.3.2 Certification of the equipment used must be provided.

11.9.D.4 Documentation

- 11.9.D.4.1 The Contractor must provide a detailed report explaining the work performed.
- 11.9.D.4.2 A certificate of the equipment used to fabricate the settling wells.
- 11.9.D.4.3 A report of the weld inspection must be submitted to the technical authority before the tank is closed.
- 11.9.D.4.4 A draft as-built drawing must be approved by the technical authority before the tank is closed. The as-built drawing must be submitted prior to contract closure. The drawing must be produced in accordance with section drawings.
- 11.9.D.4.5 A steel thickness report must be provided no later than 4 days after the closure of the tank.

11.9.D.5 Training[– Not Used]**11.10 HULL VALVES AND SCUPPERS****11.10.A IDENTIFICATION**

- 11.10.A.1 The objective of this task is to inspect all seawater intake, discharge and de-icing valves listed in the attached document "Soupapes Vannes dalots.pdf". They must be opened and dismantled for repair, and then submitted for inspection by ABS in order to maintain the "Load Line" certificate.

11.10.B REFERENCES**11.10.B.1 Equipment Data**

- 11.10.B.1.1 See document entitled "Valve List 2019"

11.10.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
221-670-5 sh 1 and 2	Fwd/aft engine room sea bay piping details	2
221-670-7_02 sht A – B - C	Arrangement of Shiplside valves	1
3163-2	Caisse eau mer et prise eau mer-salle mach avant c 221/2	1
221-H-80 (2 sheets)	Insulation Plan	2
	Soupape Vannes et dalot	
	Décharge par-dessus bord.pdf	4

11.10.B.3 Regulations and Standards – [Not Used]

11.10.C STATEMENT OF WORK

11.10.C.1 General

- 11.10.C.1.1 The Contractor must supply all equipment, ventilation, staging, chain falls, slings and shackles necessary to perform the work.
- 11.10.C.1.2 The Contractor must remove interference items necessary to access the valves noted in this specification. These will include but not be limited to grids, floor plating, sections of piping, insulation and mesh. Upon completion of work, all removed interference items must be returned to "as found" condition. All sections of piping that were removed to carry out the work must be reinstalled using new gaskets (Contractor supply).
- 11.10.C.1.3 The Contractor must perform the following work on each of the valves listed in the document "Soupape Vannes Dalots":
- Remove all valve bonnets;
 - Dismantle valves, clean and lap disks with a lapping compound to ensure a good seat.
 - Clean and inspect all valve stems for wastage and then strike them for material failure. Any valve discs, seats and/or valve stems that require machining or replacement must be brought to the attention of the IA for remedial action. All contiguous piping and studs are to be examined for wastage.
 - Visually inspect, both external and internal, all spool pieces for all valves. The Contractor must provide a written report showing the status of each spool piece in conjunction with its associated valve and copies of this report are to be given to the CCG Technical Authority. Any defects found must be brought to the attention of the Technical Authority for remedial action.
 - On completion of all cleaning and overall, all parts are to be laid out for inspection and survey by the ABS surveyor and the AI.

- f) After a completion of successful survey and/or repairs, all valves must be reassembled to a working order, using new gaskets and valve stem packing.
- g) All moving parts and fasteners must be coated with anti-seizing compound ("Never Seize" or equivalent), supplied by the Contractor.

- 11.10.C.1.4 The final closing up of all valves is to be witnessed by the IA. Following inspection, all valves must be reassembled in the closed position and checked for water tightness.
- 11.10.C.1.5 If a valve needs to be replaced, the replacement will be processed through Form 1379. The contractor must replace a valve with an equivalent certified valve.
- 11.10.C.1.6 The Contractor must clean and wire brush to bare metal all valves and scuppers equal to or greater in size than 4 inches in diameter, then paint them internally with 2 separate coats of different colors of a paint system suitable for this application. Application must be made according to the manufacturer's recommendations.
- 11.10.C.1.7 The contractor must provide all gaskets, gland packing, liquid cleaners, pads, anti-rust paint, etc. required to perform the work. New gaskets and gland packing must be the same as removed, unless replacement by another type has been accepted by the IA.
- 11.10.C.1.8 The Contractor must visually inspect overboard penetrations for any form of defect and report them to the IA. The Contractor must coordinate this inspection with requirement of the hull inspection in 11.4.C.1.5 of this specification package.
- 11.10.C.1.9 The Contractor must remove the scupper valves from their axles and check the wear. The Contractor must then be reassemble them with new seals and coat the moving parts with an anti-seize compound, supplied by the Contractor.
- 11.10.C.1.10 Any insulation removed to access the valves must be replaced by new insulation, new mesh and secured in the same manner in accordance with "221-H-80".
- 11.10.C.2 **Removal of valve sampling for inspection**
- 11.10.C.2.1 The valves noted in red in the document "valves par dessus bord" must be removed along with their associated steam valve. The valves must be brought to the ship, sandblasted, repainted, interior exterior. A pressure test done in the workshop witnessed by the inspection authority. Hull penetrations should be cleaned for corrosion to allow inspection by the inspection authority.
- 11.10.C.2.2 The Contractor must re-install the steam line on One of the generator outlet valve 5". The line is currently leaking at the threads.
- 11.10.C.3 **Replacing the evaporator valve penetration pipe**

11.10.C.3.1 Replace the 3-foot 4-inch diameter penetration pipe section with flange between the valve and the plating. Plan to adapt the hose to the shape of the hull.

11.10.C.4 Overhaul of scupper valves

11.10.C.4.1 The contractor shall disassemble the actuator from the scupper valves and the stems must be sent out to be chrome plated and the gaskets must be changed. These are 8 scupper valves.

11.10.C.4.2 The valve seats must be changed.

11.10.D PROOF OF PERFORMANCE

11.10.D.1 Inspection Points

11.10.D.1.1 Each stage of the work must be inspected by the IA. After inspection, the valves will be reassembled and checked for function and tightness. IA must be present during the tests.

11.10.D.1.2 Demonstrate to the IA the proper functioning and water tightness of valves and scuppers.

11.10.D.2 Testing and Trials

11.10.D.2.1 The Contractor must perform NDT testing on all new welds on the on the overboard discharge piping of the two new scupper valves.

11.10.D.2.2 Hydrostatic test on all valves.

11.10.D.3 Certification

11.10.D.3.1 The Contractor must also provide a copy of the ABS survey credit to the IA.

11.10.E DELIVERABLES

11.10.E.1 Documentation

11.10.E.1.1 The Contractor must provide a report for each valve. The report should include the following information:

- a) Clear identification of the valve;
- b) Work performed, parts replaced and materials used;
- c) The results of the measurements taken on the components.

11.10.E.1.2 The Contractor must provide a copy of the NDT results for the new scupper valves to the IA and the TA.

11.10.E.1.3 The Contractor must provide the welding procedures for the new piping prior to welding. These procedures must be certified and in accordance with section G 5.31.

11.10.E.2 **Training – [Not Used]**

11.11 CHAIN LOCKERS

11.11.A IDENTIFICATION

- 11.11.A.1 The purpose of this specification item is to carry out the cleaning, inspection, maintenance and certification of both chain lockers.

11.11.B REFERENCES

11.11.B.1 Equipment Data

COMPARTMENT	FRAMES	CAPACITY	SURFACE
		(m ³)	(m ²)
CHAIN LOCKER	183 -191		130

11.11.B.1.1 Chain lengths :

- a) Port – 9 shots, 2 "
- b) Starboard - 10 shots, 2 "

11.11.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
68-H-52	Anchor Chain End Brackets	1

11.11.B.3 Regulations and Standards

- 11.11.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 government Regulation or Standard:s

	Title	Included Yes/No
FSM Procedures		
7.B.3	Entry into Confined Spaces	yes
Publications		
Standards		
Regulations		

11.11.C STATEMENT OF WORK

11.11.C.1 General

- 11.11.C.1.1 The work described herein must be coordinated with the work on the anchor chains.
- 11.11.C.1.2 Once the chains have been removed from the chain lockers, the Contractor must remove the perforated floor plates from both chain lockers.
- 11.11.C.1.3 Access to the chain lockers is from two horizontal hatches located in the Boatswain store.
- 11.11.C.1.4 The Contractor must hydro-blast clean (5000 psi), scrape and brush with a steel brush to purge the lockers of all loose scale, paint, dirt and rust both chain lockers, including portable perforated deck plates, manhole covers and strum boxes. The Contractor must remove and dispose of all the mud and dirt in accordance with Federal, Provincial and Municipal environmental regulations. The contractor must tender for the ²⁵~~mechanical~~ ^SSPC-SP 10^ cleaning (scraping, wire brush) of 50% of the total surface (130 m2) of the chain locker.
- 11.11.C.1.5 Prior to the start of all work in this specification, the Contractor must send a sample of the chain locker mud to be analyzed for contaminants at a provincially recognized environmental laboratory. Lab results exceeding acceptable handling and disposal limits must be reported to the TA immediately for remedial action. Copies of the lab report are to be submitted to the TA by email in PDF format.²⁶
- 11.11.C.1.6 The Contractor must dispose of two 2 cubic meters of mud and associated debris in accordance with Federal, Provincial and Municipal environmental regulations. The Contractor must provide a unit price per cubic meter to adjust upward or downward according to the total usage of the vessel at the end of the work period using PWGSC Form 1379.
- 11.11.C.1.7 The Contractor must open the manhole at the bottom of the starboard locker, which provides access to the suction valve of the fore peak. This valve must be opened for inspection and for lapping the valve to its seat. The valve must be closed with new gaskets and packing in the packing gland. The control mechanism must be inspected, lubricated, and tested.
- 11.11.C.1.8 The Contractor must clean the mud boxes. The drains and drain pipes must be cleaned and their operation must be checked. The Contractor must demonstrate the full operation of the drains, piping and bilge system.

²⁵ Rev 1- 11.11.C.1.4 Change regarding the paint preparation.

²⁶ Rev 1 : Insert : Quantify the presence of the following contaminants: AS, Cd, Cr, Cu, Hg, Pb, Ni, Zn.

11.11.C.1.9 The Contractor must paint all bare interior surfaces, including the centre line division plate, portable deck plates and manhole covers and spurling pipe with one coat of INTERGARD 143 (FP Series), or equivalent, primer. Once primer has been applied to the bare areas, the Contractor must apply, on all interior surfaces of each chain locker, including the manhole cover(s), two (2) separate coats of ^Intertuf 203^ ~~INTERGARD 264 (FP Series)~~, or equivalent, white epoxy paint. Each coat is to achieve a DFT of 0.005".

11.11.C.1.10 The total area of both chain lockers is 130 m², which means 65 m² for each locker.

11.11.C.1.11 Upon completion of painting, the Contractor must install, in their respective location, the portable deck plates and manhole cover(s) using new neoprene gaskets, studs and nuts.²⁷

11.11.C.1.12 The spurling pipe must be part of the inspection and coating work.

11.11.D PROOF OF PERFORMANCE

11.11.D.1 Inspection Points

11.11.D.1.1 The following inspections must be verified by the IA and the ABS surveyor.

- a) Inspection of the chain locker after cleaning,
- b) Inspection of bitter end connection,
- c) Inspection of drains and strum boxes.

11.11.D.1.2 Coating inspection

- a) The Contractor must examine the coating for blisters, runs, sags, dry spray and foreign material after the last coat has dried and before it has cured. No coating containing blisters, runs, sags, dry spray or foreign material will be accepted.

11.11.D.2 Testing and Trials

11.11.D.2.1 The following tests are to be performed by the Contractor before the IA and the ABS surveyor:

- a) Prove functionality of drain pipes and strum box suction,
- b) Measurement of paint thickness. Holiday test.

11.11.D.3 Certification

11.11.D.3.1 The Contractor must also provide a copy of the ABS survey credit to the IA.

11.11.D.4 Documentation

²⁷ Rev -1 – 11.11.C.1.12 Insert – The spurling pipe must be part of the inspection and coating work.

11.11.D.4.1 The Contractor must supply the IA and the AT with a typewritten copy of a report detailing the work undertaken, defects, repairs made and measurements and readings taken.

11.11.D.5 **Training - [Not Used]**

11.12 BATHROOM ENGINE ROOM RATINGS #651

11.12.A IDENTIFICATION

- 11.12.A.1 The engine room rating's washroom must be redesigned to allow for a larger shower and better use of space.

11.12.B REFERENCES

11.12.B.1 Equipment data

- 11.12.B.1.1 The bathroom for the assistant mechanics is on the main deck in room # 651.

- 11.12.B.1.2 Equipment provided by the Canadian Coast Guard:

- a) A stacked washer-dryer unit
- b) A hand washing basin, basin only without fittings.
- c) A thermostatic mixing valve for the shower.

11.12.B.2 Drawings

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

Numéro de dessin	TITRE DU DESSIN	Nombre de feuilles
221-H-80_1	Insulation Plan at superstructure Decks Rev D	1
221-H-80_2	Insulation Plan at Upper Deck & Main Deck & 17.0' flat. Rev D	1
DCC 2019-3427	Proposition W.C. #651 Assistants mécaniciens rev 3	1

11.12.B.3 Regulations and standards

- 11.12.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 the regulations and standards, as well as the regulations and standards of the federal, provincial, provincial and territorial governments.

Procédures MSF	Titre	Inclus – Oui/Non
	Hot work	
Publications		

Normes	NSF 61 Normes eau potable.	
Règlements		

11.12.C STATEMENT OF WORK

11.12.C.1 Dismantling

11.12.C.1.1 The contractor must empty the bathroom elements in order to make the modifications.

11.12.C.1.2 The Contractor must arrange ventilation to an outside deck for dust and smells to exhaust the work zone.

11.12.C.1.3 For reinstallation, if the contractor sees any defects with the equipment before removal, he must notify the technical authority.

a) The toilet and its mechanisms will be reused.

b) The suspended ceiling (4 screws per tile) must be removed and the suspension system.

11.12.C.1.4 To dispose of

a) The washer and dryer must be arranged by the contractor.

b) The toilet and shower partitions. The sinks.

c) Floor tiles.

11.12.C.2 Floor covering

11.12.C.2.1 The contractor must remove the tiles covering from the floor.

11.12.C.2.2 ²⁸~~The contractor must include marine cement repairs following tile removal. The contractor must install an epoxy type coating with coloured flakes throughout the room including a 4-inch border on the walls. A stainless adaptor ring must be installed for the 2 shower drains. The floor covering must be continuous under the sink cabinet and under the washer-dryer unit.~~

11.12.C.2.3 ~~Option: Contractor must The contractor shall destroy and dispose of marine cement preparing the surface and redo the approved marine cement system for the entire bathroom surface. The thickness is 2 inches 110" x 116".~~

11.12.C.3 Wall cladding

²⁸ Rev 1- remove sections 11.12.C.2.2 and 11.12.C.2.3

- 11.12.C.3.1 The contractor must remove the desk panels that are in place to join the steel partitions. The inspection authority or its representative must be given an opportunity to see the steel partition before it is covered.
- 11.12.C.3.2 The Contractor must supply and install wall panels for the entire room. The wall panels used must be approved by a classification society. The panels must be designed for high moisture content areas. Color white.

11.12.C.4Piping

- 11.12.C.4.1 A new deck penetration must be made to allow for a washer drain. The contractor must connect this drain in the engine room to a grey water drain. The connection must allow the drain to be opened for cleaning. The piping must be hot-dip galvanized steel. Threaded piping with an accessible connection is acceptable.
- 11.12.C.4.2 The grey water piping is accessible from the engine room. Insulation with aluminum cladding is on the ceiling and must be reinstalled once the piping is installed.

11.12.C.5Hand wash sink

- 11.12.C.5.1 The contractor must install the hand washing sink unit. The sink and faucet is provided by the Coast Guard.
- 11.12.C.5.2 The contractor must bring the piping to the wall of the sink at the height behind the cabinet.
- 11.12.C.5.3 The contractor must supply and install a automatic faucet. Connect water inlet and outlet plumbing.

11.12.C.6Shower cubicle

- 11.12.C.6.1 The contractor must supply and install a 42"x42" shower enclosure with stainless steel cladding on the walls up to the height of the suspended ceiling. The contractor must do the installation and reinforcement at the back of the retaining bar that must be installed in the shower.
- 11.12.C.6.2 The contractor must supply and install the faucet. The shower must have a thermostatic valve.
- 11.12.C.6.3 The piping must come from the ceiling and not be under the wall of the shower. Protection must surround the pipes.
- 11.12.C.6.4 The dry shower enclosure must have a full-height door. A retractable bench, 300 lbs capacity, must be installed.

- 11.12.C.6.5 All connections to the ship's drinking water must be made with silver solder. All materials used must be shown to the Chief Engineer and NSF 61 Material Safety Data Sheets and approvals must be submitted to the Technical Authority before the solder takes place.

11.12.C.7Lavatory

- 11.12.C.7.1 The contractor must supply and install toilet stall partitions. The style must be with a stainless steel finish and with a height that optimizes the ^{^29}privacy over sized.^.

11.12.C.8Electricity

- 11.12.C.8.1 The electric hand dryer must be relocated near the new sink for hand washing.
- 11.12.C.8.2 The existing wall-mounted heating unit must be removed.
- 11.12.C.8.3 The contractor must move the electrical connections for the washer and dryer to bring them to be able to plug in the unit. The contractor must report to the technical authority or its representative if electrical problems are present. These will be negotiated by Form 1379.
- 11.12.C.8.4 The contractor must supply and install a heating unit on the ceiling of the room. In the centre. The contractor must connect the unit and adapt the ceiling tiles for this change.

11.12.C.9 ³⁰Asbestos removal

- 11.12.C.9.1 The sub-floor contains asbestos. The sampling report is attached. The project must be tendered as a high-risk asbestos removal.
- 11.12.C.9.2 The contractor must submit his asbestos removal plan that is specific to the project. before the start of asbestos work.
- 11.12.C.9.3 The Coast Guard will send an industrial hygiene technician to verify that the contractor adheres to the methods he has agreed to follow in his plan.
- 11.12.C.9.4 The Contractor shall take an air sample outside his asbestos work area during demolition and after the work.
- 11.12.C.9.5 The Contractor shall take corrective action if asbestos is found outside the protected area.
- 11.12.C.9.6 The Contractor shall provide evidence of training of employees and supervisors of asbestos removal tasks prior to the commencement of asbestos removal work.

²⁹ Rev 1 – 11.12.C.7.1 word added for clarity.

³⁰ Rev1- insert 11.12.C.9

11.12.D PROOF OF PERFORMANCE

11.12.D.1 Inspection Points

All work must be inspected by the IA or delegate.

11.12.D.2 Testing/Trials

11.12.D.2.1 A magnetic particle test and visual inspection must be carried out for deck penetration between the washroom and engine room.

11.12.D.3 Certification

11.12.D.3.1 All products used for potable water supply must be certified to NSF 61.

11.12.D.3.2 All products used for floor covering must be approved by a classification society.

11.12.D.3.3 The non destructive technician must be certified level 2.

11.12.D.4 Documentation

11.12.D.4.1 Data sheets for certified products must be submitted to the Technical Authority prior to commencement of use on board.

11.12.D.4.2 ³¹A report of non destructive testing must be given to the Technical Authority prior to the flooring installation. ~~The Contractor must provide within 3 days of the inspection a certificate for each equipment attesting its compliance with the standard, and any inspections specified in standard CAN/CSA B44 M90, sec. 12.~~

11.12.D.4.3 The Contractor must provide a detail report of the work done. The report must be provided before the end of the work period. ~~The Contractor must provide the IA and the TA with an electronic copy of the report in PDF format.~~

11.12.D.5 Training[– Not Used]

11.12.D.5.1 [– Not Used]

³¹ Rev 1- 11.12.D.4.2. Insert non destructive testing report and 11.12.D.4.3. report on work

11.13 DECKHAND'S WASHROOM #604

11.13.A SCOPE

11.13.A.1.1 Deckhands' washrooms must be refreshed to allow for the replacement of floor coverings and shower stalls.

11.13.B REFERENCES

11.13.B.1 Equipment Data

11.13.B.1.1 The washroom is on the main deck in Room #604

11.13.B.2 Drawings

11.13.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
221-H-80_1	Insulation Plan at superstructure Decks Rev D	1
221-H-80_2	Insulation Plan at Upper Deck & Main Deck & 17.0' flat. Rev D	1
Space 604.pdf	Space 604	1

11.13.B.3 Regulations and Standards

11.13.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
Publications		

Standards		
	NSF61 potable water	
Regulations		

11.13.C STATEMENT OF WORK

11.13.C.1 Dismantling

11.13.C.1.1 The contractor must empty the bathroom elements in order to make the modifications. Forced ventilation to the outside must be present to evacuate dust and smells outside.

11.13.C.1.2 For re-installation by the Contractor, if the contractor sees any deficiencies with the equipment before removal, he must notify the technical authority.

- a) The toilets and their mechanisms will be reused.
- b) The contractor must remove the suspended ceiling and suspension system.
- c) Electric hand dryer

11.13.C.1.3 To dispose of

- a) The washer and dryer must be removed from the location.
- b) Toilet and shower partitions. Sinks.
- c) Floor tiles.

11.13.C.2 ³²Asbestos removal

11.13.C.2.1 ~~The sub-floor contains asbestos. The sampling report is attached. The project must be tendered as a high-risk asbestos removal.~~

11.13.C.2.2 ~~The contractor must submit his asbestos removal plan that is specific to the project, before the start of asbestos work.~~

11.13.C.2.3 ~~The Coast Guard will send an industrial hygiene technician to verify that the contractor adheres to the methods he has agreed to follow in his plan.~~

11.13.C.2.4 ~~The Contractor shall take an air sample outside his asbestos work area during demolition and after the work.~~

11.13.C.2.5 ~~The Contractor shall take corrective action if asbestos is found outside the protected area.~~

³² Rev 1- remove 11.13.C.2

11.13.C.2.6 ~~The Contractor shall provide evidence of training of employees and supervisors of asbestos removal tasks prior to the commencement of asbestos removal work.~~

11.13.C.3Floor covering

11.13.C.3.1 The contractor must remove the tile covering and dispose of it.

11.13.C.3.2 The contractor must include marine cement rebuild following tile and cement removal. The contractor must install an epoxy type finish with colored flake in the entire room including a 4-inch border on the walls. The flooring must be continuous under the sink cabinet and under the washer-dryer unit.

11.13.C.3.3 The Contractor must include a spacer to bring the floor drains up to floor level. An incline must be created for the water to flow toward drains.

11.13.C.3.4 ³³^The contractor must include marine cement repairs following tile removal. The contractor must install an epoxy type coating with coloured flakes throughout the room including a 4-inch border on the walls. A stainless adaptor ring must be installed for the 2 shower and one floor drains. The floor covering must be continuous under the sink cabinet and under the washer-dryer unit.^

11.13.C.3.5 Option: Contractor must The contractor shall destroy and dispose of marine cement preparing the surface and redo the approved marine cement system for the entire bathroom surface. The thickness is 2 inches 110" x 116".

11.13.C.4Toilet Stall partition

11.13.C.4.1 Partitions must have a brushed stainless steel finish.

11.13.C.4.2 Doors in partitions must be full height.

11.13.C.4.3 Locking and hinge mechanisms must match.

11.13.C.5Wall panneling

11.13.C.5.1 The contractor must remove the desk panels that are in place to join the steel partitions. The inspection authority or its representative must be given an opportunity to see the steel partition before it is covered.

11.13.C.5.2 An inspection of the steel must be done by the contractor and the chief engineer.

³³ Rev 1- insert 11.13.C.3.4 and 11.13.C.3.5

- 11.13.C.5.3 The contractor must supply and install wet room wall panels. For the entire bathroom. The chosen pannels must be approved by a classification society and must be designed for a bathroom with the transition to the higher deck.

11.13.C.6Opening to Air Conditioning compartment 4

- 11.13.C.6.1 The Contractor must create a resealable opening between the deckhand washroom and the air conditioning compartment 4.
- 11.13.C.6.2 The size must allow for cleaning of the refrigeration unit condenser.
- 11.13.C.6.3 The contractor must provide as-built drawings of this removable panel.

11.13.C.7Piping

- 11.13.C.7.1 Piping from ceiling collectors must be replaced with copper piping. All joints must be made using an NSF 61 approved process.

11.13.C.8Hand wash sink

- 11.13.C.8.1 The contractor must install the hand washing sink unit.³⁴ The sink is provided by the Coast Guard.
- 11.13.C.8.2 The contractor must bring the piping to the wall of the sink at the height behind the cabinet.
- 11.13.C.8.3 The contractor must supply and install a faucet. Connect water inlet and outlet plumbing.

11.13.C.9Shower cubicle

- 11.13.C.9.1 The Contractor must supply and install 2 stainless steel shower enclosures 36" x 36". The shower surround must go higher than the ceiling.
- 11.13.C.9.2 The contractor must do the installation and reinforcement at the back of the retaining bar that must be installed in the shower.

11.13.C.10washer-dryer unit

- 11.13.C.10.1 A washer-dryer unit will be provided by the Canadian Coast Guard. It must be installed by the contractor. Including a base and a retaining mechanism. The unit will be in the same location as the old one. The contractor must make the electrical, water supply, drain and ventilation dryer connections.

11.13.D PROOF OF PERFORMANCE

11.13.D.1Inspection Points

³⁴ Rev 1- French only add mention of sink being supplied.

All work must be inspected by the IA or delegate.

11.13.D.2 Testing/Trials

11.13.D.2.1 Bathroom systems must be turned on in the presence of the contractor.

11.13.D.3 Certification

11.13.D.3.1 All products used for potable water supply must be certified to NSF 61.

11.13.D.3.2 All products used for floor covering must be approved by a classification society.

11.13.D.4 Documentation

11.13.D.4.1 At the end of the work, the contractor must provide a complete report detailing the work performed.

11.13.D.4.2 Certificat for all the certified material used.

11.13.D.5 Training[– Not Used]

11.13.D.5.1 ³⁵[– Not Used]

11.13.D.6

11.13.D.6.1 ~~116 "~~Installation of 3 inside doors

11.13.D.7 Wall-covering

11.13.D.7.1 The contractor must remove the wall panels that are in place to join the steel partitions. The inspection authority or its representative should be given the opportunity to view the steel partition before it is covered.

11.13.D.7.2 The contractor must supply and install wall panels for the entire room. The wall panels used must be approved by a classification society. Panels should be designed for locations with high moisture content. White colour.

11.13.D.8 Piping

11.13.D.8.1 A new deck penetration must be made to include a washer drain. The contractor must connect this drain in the engine room to a gray water drain. The connection must allow it to be opened to clean the drain. The piping must be hot-dip galvanized steel. Threaded piping with an accessible connection is acceptable.

11.13.D.8.2 The gray water piping is accessible from the engine room. Insulation with a perforated aluminum cover is on the ceiling and must be reinstalled after the piping is installed. The re-insulation will be done with new material. Calculate 10 square feet of rock wool marine insulation.

11.13.D.9 Hand-washing sink

11.13.D.9.1 The installation of the sink will be carried out by the manufacturer. Contact details will be provided to the contractor. The contractor must assist by allowing the cabinet to be secured to the partition.

11.13.D.9.2 The contractor must bring the piping to the wall of the sink to the height that will be behind the cabinet.

³⁵ Rev 1-11.13.D.5.1 to 11.13.F Delete

11.13.D.9.3 The contractor must supply and install two automatic valves. He must also connect the water inlet and outlet plumbing.

11.13.D.10 Shower cabin

11.13.D.10.1 The contractor shall supply and install a 42 "x 42" size shower enclosure with stainless steel cladding on the walls up to the height of the suspended ceiling.

11.13.D.10.2 The contractor shall install and reinforce the rear of the retaining bar which is to be installed in the shower.

11.13.D.10.3 The contractor must install the valves. The piping must be changed up to the header in the ceiling.

11.13.D.10.4 The piping must come from the ceiling and not be under the shower wall. Protection must surround the pipes.

11.13.D.10.5 The dry shower enclosure must have a full height door. A retractable bench must be installed there with a capacity of at least 300 lbs.

11.13.D.10.6 All connections to the vessel's potable water must be made using an NSF 61 approved process. All materials used must be shown to the Chief Engineer. Material Safety Data Sheets and NSF 61 approval must be submitted to the Technical Authority before welding takes place.

11.13.D.11 Washroom

11.13.D.11.1 The contractor shall supply and install partitions for the toilet cubicle. The door must have a stainless steel finish and over dimensioned height.

11.13.D.12 Electricity

11.13.D.12.1 The electric hand dryer must be relocated near the new sink for hand washing.

11.13.D.12.2 The existing wall heater unit should be removed.

11.13.D.12.3 The contractor must move the electrical connections of the washer and dryer to bring them to be able to plug in the unit. The contractor must report to the Technical Authority or its representative if electrical problems are present. These will be negotiated by PWGSC 1379 form.

11.13.D.12.4 The contractor must supply and install a heating unit in the center of the ceiling of the room. The contractor must hook up the unit and adapt the ceiling tiles for this change.

11.13.E PROOF OF PERFORMANCE

11.13.E.1 Inspection points

11.13.E.1.1 All work must be inspected by the IA.

11.13.E.2 Tests and trials

11.13.E.2.1 A magnetic particle test and visual inspection shall be done for bridge penetration between the bathroom and the engine room.

11.13.E.3 Certification

11.13.E.3.1 All products used for the potable water connection must be NSF 61 certified.

11.13.E.3.2 All products used for flooring must be approved by a classification society.

11.13.E.3.3 The non-destructive testing technician must be certified level 2.

11.13.E.4 Documentation

11.13.E.4.1 Technical data sheets for certified products must be submitted to the technical authority before they start to be used on board.

- 11.13.E.4.2 ~~The non-destructive test report must be submitted to the technical authority before the start of the installation of the floor.~~
- 11.13.E.4.3 ~~The contractor must provide a detailed report that explains the work performed. This report must be submitted before the end of the work period.~~

11.13.F ~~TRAINING [NOT APPLICABLE]~~

11.13.G TRAINING [- NOT APPLICABLE]**11.14 FLIGHT DECK DRAIN****11.14.A IDENTIFICATION**

11.14.A.1 Modify flight deck drains to direct water directly overboard through the bulwark.

11.14.B REFERENCES**11.14.B.1 Equipment Data**

11.14.B.1.1A total of 4 drains with a diameter of 3" and 4 ½" inches between the flight deck and the upper deck.

11.14.B.2 Drawings

11.14.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
Référence drain d'envol	Référence drain d'envol.pdf	
Pont d'envol-flight deck	Pont d'envol-flight deck.pdf	
221-730-1_04	Arrgt of sprinkler & deck scuppers (flight&boat deck)	
201-10553-06	Pierre Radisson peinture Plomb	

11.14.B.3 Regulations and Standards

11.14.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
Publications		
Standards		

Regulations		

11.14.C STATEMENT OF WORK

11.14.C.1.1 The contractor must extend the 4 drains of the flight deck to direct them directly overboard through the bulwark. Reference flight deck drain.pdf

11.14.C.1.2 The new section must be welded to the pipe and the bulwark.

11.14.C.1.3 All the new steel must be painted inside and out.

11.14.D PROOF OF PERFORMANCE**11.14.D.1 Inspection Points**

11.14.D.1.1 Welds must be inspected by the inspection authority or its representative prior to coating.

11.14.D.2 Testing/Trials[– Not Used]**11.14.D.3 Certification[– Not Used]****11.14.D.4 Documentation**

11.14.D.4.1 A service report must be submitted to the IA prior to the end of the work period.

11.14.D.5 Training[– Not Used]

11.14.E**11.15 INSTALLATION OF 3 INSIDE DOORS****11.15.A IDENTIFICATION**

11.15.A.1 Two new type A-60 doors must be installed at the main deck for the laundry room at the main deck for the deckhand shop and one A-60 door must be installed for the incinerator room.

11.15.B REFERENCES**11.15.B.1 Equipment Data**

Localisation	Numéro de porte	Dimensions de la porte
Atelier des matelots pont principal du côté bâbord	Porte 114	L 760 mm x H 1860 31'' x 73 ¼''
La buanderie est au pont principal du coté tribord du navire	Porte 120	L 760 mm x H 1860 31'' x 73 ¼''
La salle de l'incinérateur porte vers le corridor	Porte 176	L 787.7 mm x H 1842 31'' x 72 1/2''

11.15.B.1.1 ³⁶~~Les portes existantes sont des portes d'acier avec cadres soudés.~~^The current door frames are welded. ^

11.15.B.2 Drawings

11.15.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
222-H-101	Arrangement général	3
74-1004_03	Firedoor class « A-60 » with (3) point latch bolt	
221-H-78_02	Door Schedule at upper & main dks @ 17'-0'	
	Local 600 porte Door.pdf	1

11.15.B.3 Regulations and Standards

11.15.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
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³⁶ Rev 1- Sentence translated

Publications		
TP14612	Procedures for approval of life-saving appliances and fire safety systems, equipment and products—	
Standards		
CT-043-EQ-EG-001-E	Spécifications de soudage	
Regulations		

11.15.C STATEMENT OF WORK

11.15.C.1Dismantling

- 11.15.C.1.1 The contractor must remove the cable to pull the CO2 for the duration of the steel work. Two CO2 cable lines run through the door frame. These CO2 devices must be reset at the end of the work.
- 11.15.C.1.2 In the deckhand workshop, two electrical outlets are also located near the door frame of the deckhouse. Photo, Local 600 Door porte.pdf, attached showing the passage of the CO2 device and electrical connections.
- 11.15.C.1.3 The paint on the bulkheads contains lead.
- 11.15.C.1.4 Finishes; Contractor must remove ceiling tiles and tile tracks that are necessary to clear the work space. Tiles and hangers must be stored for re-installation.
- 11.15.C.1.5 The current doors are welded in place. The contractor must remove and dispose of them.
- 11.15.C.1.6 The contractor must install a magnetic restraint system.
- 11.15.C.1.7 ³⁷~~The door must have a key locking mechanism. Keys must be turned in to the Technical Authority before the end of the work period.~~
- 11.15.C.1.8 ~~The door must be factory painted.~~

11.15.C.2Magnetic Retention

³⁷ REV 1 – Remove 11.15.C.1.7, 11.15.C.1.8– Not needed in text

11.15.C.2.1 Deckhand Shop Door

11.15.C.2.2 ~~The Contractor must interface the magnetic restraint system with the rest of the vessel's system. Currently the doors do not have a magnetic restraint system and no wire is run to the door position.~~³⁸ The Contractor must install the magnetic restraint from the old door.

11.15.C.3 Painting

11.15.C.3.1 The Contractor must touch up paint in areas that have been disturbed during the work.

11.15.D PROOF OF PERFORMANCE

11.15.D.1 Inspection Points

- 11.15.D.1.1 The chief engineer must agree to the installation of the gasket with a light directed towards the door. This light must not be visible from the other side.
- 11.15.D.1.2 Door gaps must be measured and recorded. Door gaps must be within the manufacturer's acceptable limits.
- 11.15.D.1.3 The closing system must be demonstrated to the Chief Engineer. The closing mechanism must engage to secure the door during closing. For all 3 doors
- 11.15.D.1.4 The remote door locking system must be demonstrated to the chief engineer.
- 11.15.D.1.5 The weld must be seen ^by the IA^ before painting.
- 11.15.D.1.6 All work must be inspected by the IA.

11.15.D.2 Testing/Trials

- 11.15.D.2.1 All welds must be non-destructively tested. One 100% visual test by a level 2 technician.

11.15.D.3 Certification

- 11.15.D.3.1 The doors must be certified by a classification society A0 and A60 with a Canadian approbation.
- 11.15.D.3.2 The non-destructive testing technician must be certified level 2.

11.15.D.4 Documentation

- 11.15.D.4.1 The contractor must provide a detailed report explaining the work performed.

³⁸ Rev 1-Remove 11.15.C.2.2. Insert – The Contractor must install the magnetic restraint from the old door.

11.15.D.4.2 Door certificates must be delivered to the Technical Authority before the end of the work period.

11.15.D.4.3 The Contractor must provide documentation for the doors.

11.15.D.4.4 The contractor must provide the door frame weld inspection certificate.

11.15.D.5 Training[– Not Used]

11.16 PIPING RENEWAL

11.16.A IDENTIFICATION

11.16.A.1 The purpose of this specification is to perform the replacement of thinned or corroded galvanized steel pipes in the machine area.

11.16.B REFERENCES

11.16.B.1 Equipment Data

Table 1: Piping replacement

item	référence du tuyau	Fluide	approx OD	approx LOA	Fittings	Brides	Notes de dessin
1	Tuyau bouchain		6"	17'	2 x 45 degree	4	

11.16.B.2 Drawings

11.16.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
Bilge pipe tuyau bouchain	Bilge pipe tuyau bouchain.pdf	

11.16.B.3 Regulations and Standards

11.16.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
Publications		

Standards		
ASME IX		
ASTM A53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	Non
ASTM A139-16	Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)	Non
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products	Non
ASTM A530	Standard Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe	Non
ASME B31.3	Code for pressure Piping – Chemical Plant and Petroleum Refinery Piping.	Non
ASTM F708-92 (reapproved 2018)	Design and installation of rigid pipe hangers	Non
Regulations		

11.16.C STATEMENT OF WORK

11.16.C.1 Replacement

- 11.16.C.1.1 During the manufacture of the replacement pipes, the flanges of the pipe remaining on the vessel must be blocked with blind flanges and gaskets so that there is no possibility of liquid flow.
- 11.16.C.1.2 The contractor must reproduce the pipe sections as described in Table 2: Pipe to be replaced.
- 11.16.C.1.3 The replacement pipe has obstructions of pipes and floor plate supports that must be removed and re-installed.

11.16.C.2 Galvanising

11.16.C.2.1 The Contractor must hot dip galvanise the pipe.

11.16.C.3 Seawater Piping Fabrication

11.16.C.3.1 The contractor must provide seamless ASTM A53-73T Grade A piping, Schedule 40 Double galvanised. For piping identified in Table 2: Pipe to be replaced. Type Std #150 flanges.

11.16.C.4 Pipe Replacement

11.16.C.4.1 The piping must be painted outside only with a paint system adapted to the material. Two coats of marine paint in addition to one coat of primer must be applied.

11.16.D PROOF OF PERFORMANCE

11.16.D.1 Inspection Points

- 11.16.D.1.1 The contractor must provide a visual inspection report of the interior and exterior of all pipe. The inspection must be performed by a level 2 or 3 welding inspector. Acceptability criteria are those of ASME Section IX. The welding inspector is hired by the contractor.
- 11.16.D.1.2 The contractor must present the galvanized piping to the Technical Authority prior to installation.
- 11.16.D.1.3 Hold Point: An inspection of the root weld must be made by the weld inspector. A 48 hour notice must be given to the technical authority to see the first weld pass.

11.16.D.2 Testing/Trials

- 11.16.D.2.1 A hydrostatic test at a pressure of 80 psi for 30 minutes must be done for each section of pipe. This test must be performed in the presence of the technical authority prior to galvanizing. 48 hours notice must be given to the technical authority.
- 11.16.D.2.2 The contractor must test all systems where piping has been disturbed. The crew will perform the operation and start-up of the equipment.

11.16.D.3 Certification[– Not Used]

11.16.D.4 Documentation

- 11.16.D.4.1 The visual weld inspection report must be submitted to the Technical Authority prior to the galvanizing of the pipes.
- 11.16.D.4.2 The certificates of qualification of the welding inspection personnel must be submitted to the technical authority before the galvanizing of the pipes.

11.16.D.5 Training[– Not Used]

11.17 ³⁹RENEW ANTI-SWEAT PAINT AROUND 20 PORTHOLES

11.17.A IDENTIFICATION

11.17.A.1 The paint around 20 portholes needs to be renewed. The paint contains lead

11.17.B REFERENCES

11.17.B.1 Equipment Data

Localisation	Quantity
Pont principal	20 portholes

11.17.B.2 Drawings

11.17.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
222-H-101	Arrangement général	3
	Porthole 1.pdf	2

11.17.B.3 Regulations and Standards

11.17.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
Publications		
Standards		
Regulations		

11.17.C STATEMENT OF WORK

³⁹ Rev 1- 11.17 joined section that was published separately.

11.17.C.1 Removal of existing paint

- 11.17.C.1.1 The Contractor must use a non-lead dusting method to remove the anti-stress paint that is around the windows of 20 cabins on the main deck of the vessel. The entire lead paint shall be removed.
- 11.17.C.1.2 The contractor shall keep the premises clean. The work areas are cabins.
- 11.17.C.1.3 The contractor shall protect the portholes and porthole seals during paint removal and application.

11.17.C.2 Painting

11.17.D The Contractor shall perform surface preparation to the level of preparation requested by the paint manufacturer. SSPC-SP1.

11.17.E Contractor shall apply one coat of marine primer followed by two coats of insulating paint, each 20 mils thick.

11.17.F The contractor shall make the necessary preparations on the steel to apply a marine insulating paint; approved by a classification society.

11.17.G The dimensions are 21.75" x 33" with a 16 inch window in the center. The porthole has a 2 inch protruding strip.

11.17.H PROOF OF PERFORMANCE**11.17.H.1 Inspection Points**

- 11.17.H.1.1 The inspection authority shall view the protection of the cabins prior to the start of paint removal.
- 11.17.H.1.2 The Inspection Authority shall view the surface preparation as in accordance with the Contractor's selected paint application guide.

11.17.H.2 Testing/Trials**11.17.H.3 Certification**

- 11.17.H.3.1 The paint must be approved for use in a habitable area.

11.17.H.4 Documentation

- 11.17.H.4.1 Data sheets for the product used for paint removal
- 11.17.H.4.2 Data sheets for the insulating paint used
- 11.17.H.4.3 A contractor's paint application report.

11.17.H.5 Training[– Not Used]

12.0 PROPULSION AND MANEUVERING

12.1 RUDDER AND RUDDER STOCK

12.1.A IDENTIFICATION

- 12.1.A.1 The objective for the work described in this section is to evaluate the condition of the rudder, rudder stock and their components and to overhaul them if necessary.

12.1.B REFERENCES

12.1.B.1 Equipment Data

- 12.1.B.1.1 Steering gear - Wagner Engineering Ltd. - Model LA2 93-37-EB2

12.1.B.2 Drawings and Documents

- a) 221-H-46, Rudder & Stern frame
- b) 221-H-47, Rudder Stock & Pintle
- c) 221-H-48, Rudder casting & Stern frame casting
- d) 221-H-50 Steering gear arrangement
- e) 221-H-51 Steering gear details
- f) C-2145, Split housing rudder carrier bearing
- g) C-2146, Split radial bearing and packing gland ring
- h) C-2148, Gland stud ring and lantern ring 'r' class icebreaker
- i) D_688, Frame hub's and thrust bearing for 'R' class icebreaker
- j) D_689, Frame hub bearings for 'R' class icebreaker
- k) C-690.tif, Tiller hub for r class icebreaker (20.5" rudder stock cap).
- l) 221-630-4, Steam to rudder-trunk added

12.1.B.3 Regulations and Standards – [Not Used]

12.1.C STATEMENT OF WORK

12.1.C.1 General

- 12.1.C.1.1 Beforehand, the Contractor must lockout the electrical circuits supplying the main hydraulic pumps and those of the telemotor.
- 12.1.C.1.2 The Contractor must isolate the main oil tank from the system.

- 12.1.C.1.3 All lifting equipment provided by the CCG that will be used by the Contractor must be clearly identified by means of photographs that both parties will have in their possession. All equipment must be returned to the CCG in the “as found” condition.
- 12.1.C.1.4 At the end of the work, The Contractor must check the oil level in the main tank and add oil if necessary, supplied by the vessel (CCG).
- 12.1.C.1.5 The contractor shall carry out the inspection of the welds of the plugs of the rudder side plates. The contractor shall prepare the surface in way of the plug welds and apply a fairing compound in accordance with the compound manufacturer's recommendations. The Contractor shall submit the description of the proposed compound product and the data sheet to the TA for approval prior to application.
- 12.1.C.2 **Preliminary Measurements**
- 12.1.C.2.1 The Contractor must remove the fairwater plates. These plates must be reinstalled upon completion of work.
- 12.1.C.2.2 The Contractor must measure the three rudder pintles and gudgeons clearance/gap. Record all measurements.
- 12.1.C.2.3 The Contractor must measure the clearance/gap between the three buffer bearings. The chief engineer must be present. Record all measurements.
- 12.1.C.2.4 The Contractor must measure the distance between the front of the rudder structure and the pintle housing structure. Record all measurements.
- 12.1.C.2.5 The Contractor must measure the steady bearing and jumping collar clearance/gap. Record all measurements
- 12.1.C.2.6 The Contractor must measure the clearance/gap between the lower pintle and the thrust washer installed in the bottom of the lower gudgeon housing. This measurement must be taken using a dial indicator. Record all measurements.
- 12.1.C.2.7 Open and vent the helicopter fuel tank to gain access to the bolt for the jailer ring. A certificate of entry shall be issued and posted prior to entry. Only the charges in relation to the steering gear shall be captured in this item.
- 12.1.C.2.8 All measurements of the present section must be witnessed by IA and must be recorded in the measurement logbook.
- 12.1.C.3 **Optionel - Removal of Rudder and Rudder Stock**

- 12.1.C.3.1 The Contractor must mark all items on the rudder and associated equipment prior to disassembly. The Contractor must record all identifying marks and re-assemble all marked items to the same position from which they were disassembled.
- 12.1.C.3.2 The Contractor must disassemble the linkage attached to the tiller and rudder stock as well as the limit switch.
- 12.1.C.3.3 The Contractor must ensure that the rudder stock locking pin cylinder is disengaged.
- 12.1.C.3.4 The Contractor must screw the lifting eyebolt into the end of the stock. The Contractor must grab hold of the stock using a crane, through the hatches designed for that purpose (flight deck and upper deck). The Contractor must open and close the hatches.
- 12.1.C.3.5 The Contractor must remove and dispose of all packing from the rudder stock glands.
- 12.1.C.3.6 The Contractor must support both hydraulic rams and remove the 4 pins to check wear pins and their bushings.
- 12.1.C.3.7 The Contractor must support both parts of the tiller, then unbolt and remove the tiller coupling on the stock. The Contractor must transfer the tiller and its coupling outside of the working area.
- 12.1.C.3.8 The Contractor must dismantle and remove the split rings and bearings from the steering gear mounting frame.
- 12.1.C.3.9 The Contractor must dismantle and remove the locking pintle.
- 12.1.C.3.10 The Contractor must remove the cement from around the 6 bolts on the rudder palm.
- 12.1.C.3.11 The Contractor must remove the nuts and bolts from the rudder palm. The Contractor must identify the location of each of the bolts with their respective holes. The Contractor must remove the safety plate held in place by two ½ NC bolts. The Contractor must completely remove the transverse key from the keyway.
- 12.1.C.3.12 The Contractor must rotate the stock 37.5 degrees, and the rudder as far as possible in the opposite direction.
- 12.1.C.3.13 The Contractor must secure the lifting eyebolts to the hull and 2 support rods to the rudder. The eyebolts will be supplied by the CCG.
- 12.1.C.3.14 The Contractor must lift and manoeuvre the rudder to remove the pintles from the gudgeons and lower the rudder to the bottom of the dry dock. The Contractor must place the rudder upright on wooden blocks at the bottom of the dry dock.
- 12.1.C.3.15 The Contractor must remove the rudder stocks which includes:

- a) Removal of the jumping collars,
- b) Removal of the rudder position indicators and follow up assemblies,
- c) Removal of the course limit switch,
- d) Disconnection of the hydraulic actuating rams from the tiller heads,
- e) Removal of the the rudder stock nuts,
- f) Removal of the locking bars and the tiller heads.

12.1.C.3.16 The Contractor must lower the stock to gudgeon-level and then release the rope.

12.1.C.3.17 The Contractor must remove the carrier bearing from the stock and its mount. The Contractor must check its general condition and conduct crack tests.

12.1.C.3.18 The Contractor must dismantle and remove the radial bearing as well as the gland and packing. The Contractor must check its general condition and conduct crack tests.

12.1.C.3.19 The Contractor must unbolt and remove the steady bearing cap. The lubrication lines must be disconnected. The Contractor must check its general condition and conduct crack tests.

12.1.C.3.20 The Contractor must lower the stock to the bottom of the dry dock and place it on wooden blocks.

12.1.C.4 **Maintenance of Rudder Grease Lines and Rudder Trunk De-Icing Line**

12.1.C.4.1 The Contractor must check the lubrication lines of the carrier bearing.

12.1.C.4.2 The integrity of the lubrication lines for the steady bearing must be checked. The Contractor must block the lines and pressurize them by injecting them with grease (supplied by the CCG).

12.1.C.4.3 The integrity of the lubrication lines for the carrier bearing must be checked. The Contractor must ensure that grease flows freely through the lines and internal piping of the bearing. Grease (supplied by the CCG) must be injected into the lines.

12.1.C.4.4 The Contractor must check the condition of the rudder trunk de-icing system.

12.1.C.5 **Rudder Condition Check**

12.1.C.5.1 The Contractor must remove the vent plug and docking plug from the rudder in the presence of the IA and ASB surveyor. This action is often sufficient to prove the watertightness of the rudder. If there is any doubt, the Contractor must perform a complete hydrostatic test with an 8' water column on the rudder.

12.1.C.5.2 Optional - Following the hydrostatic test, the Contractor must drain and dry the rudder. When the bottom plug will be removed, the coating already present in the rudder will

escape. The Contractor must ensure the containment of the product and its disposal. The existing coating is Magnacoat Plus.

- 12.1.C.5.3 The Contractor must supply the materials and apply a solvent-dispersed corrosion preventive compounds that deposit thin, easily removable films after evaporation of solvent on the inner walls of the rudder. The product must be applied according to the product manufacturer's recommendations. The Contractor must propose a product and must request approval by the TA prior to its purchase by the Contractor.
- 12.1.C.5.4 Following the application, the Contractor must pick up and dispose the remaining product of it in environmentally approved manner.
- 12.1.C.5.5 The Contractor must reinstall the plugs and perform a vacuum test on each plug in the presence of the IA and the ABS surveyor.
- 12.1.C.6 **Optional – Remove 3 Pintles**
 - 12.1.C.6.1 The Contractor must mark the exact place where the pintles are located in their housings on the rudder, and then remove them. The locking plates must be removed. Pintles and gudgeons must be measured precisely, and those values must be recorded. The Contractor must check whether the pintles are ovalized and rectify the problem, if necessary. The surfaces of the pintles must be polished on a metal lathe.
 - 12.1.C.6.2 The Contractor must check the alignment of the housing holes where the pintles are inserted using a piano wire or laser. The data must be recorded.
 - 12.1.C.6.3 The Contractor must apply an anti-seize paste to the conical surfaces of the pintles and put them back in their original, respective positions. A tightening torque must be applied on the 3 bolts, and they must be locked in place by welding them to 1/2 inch by 2 inch 316 stainless steel locking plates.
- 12.1.C.7 **Optional - Stock and Tiller Measurements and Crack Detection**
 - 12.1.C.7.1 The Contractor must measure and record the fitted clearance between the fitted keys and keyways of the rudderstock and tiller heads for the rudder. This must be done in the presence of the IA.
 - 12.1.C.7.2 The Contractor must conduct a liquid penetrant dye test on the keys and two (2) keyways (tiller and rudder stock).
 - 12.1.C.7.3 A liquid penetrant dye test must also be conducted on the key and keyway between the rudder palm and the reflective side of the rudder stock.
- 12.1.C.8 **Optional - Rudder Stock Reinstallation**

- 12.1.C.8.1 The Contractor must reinstall the rudder stock by following the disassembly procedure in reverse.
- 12.1.C.8.2 The Contractor must replenish the stock gland and supply the seals. For bidding purposes the Contractor is to bid on supplying and installing 9.144 metres of one inch (1" or 2,5 cm) new Teflon impregnated flax type packing for each rudder stock gland.
- 12.1.C.8.3 The Contractor must verify the fit of the taper connection between the rudderstock and the tiller head. Verification of fits must be by the machinist bluing process. The minimum surface contact area allowable must be 80% surface contact area between the flanges and tapers. Final fit of the flanges and tapers must be witnessed by the ABS Surveyor, and the IA.
- 12.1.C.9 **Rudder Reinstallation**
- 12.1.C.9.1 The Contractor must reinstall the rudder once work on the stock is complete by reversing the disassembly procedure.
- 12.1.C.9.2 The Contractor must insert the rudder palm key and the rudder palm bolts after polishing and cleaning the threads of the palm bolts and nuts.
- 12.1.C.9.3 The Contractor must secure all rudder palm bolts and nuts with 2 locking bars welded along the flats of each nut and bolt head, covered with cement on top of the palm. The Contractor must reinstall the fairwater plates.
- 12.1.C.9.4 The Contractor must ensure that rudder coupling bolts and jumper collar screws are locked in the same manner as prior to disassembly. Only stainless steel locking wire must be used where applicable.
- 12.1.C.9.5 The Contractor must touch up any damaged paint as a result of this work. This must include all interior and exterior surfaces.

12.1.D **PROOF OF PERFORMANCE**

12.1.D.1 **Inspection Points**

- 12.1.D.1.1 The IA must witness the condition of all the components at all dismantling and reassembly stages.

12.1.D.2 **Testing and Trials**

- 12.1.D.2.1 A hydrostatic test of the rudder must be performed in the presence of IA and ABS surveyor.

- 12.1.D.2.2 Conduct non-destructive (dye penetrant) tests on keys and keyways to detect cracks in at the rudder palm level and tiller and stock level.
- 12.1.D.2.3 Perform non-destructive testing (dye penetrant) on gudgeons / pintle sets.
- 12.1.D.2.4 Conduct non-destructive testing (dye penetrant) on assembly bolts and the rudder palm flange holes.
- 12.1.D.2.5 Conduct non-destructive testing (dye penetrant) on all axes of the reaction bench and both hydraulic cylinders at both ends.
- 12.1.D.2.6 Check the clearance/gap between the support disc located in the bottom gudgeons and the end of the lower pintle. The Contractor must record this information in a logbook, which must be submitted with the report.
- 12.1.D.2.7 Upon completion of work the Contractor must verify the following:
- a) The proper operation and indication of each rudder's angle indicator system. The Contractor must verify that all local and remote rudder angle indicators indicate the true deflection of the rudder as witnessed in the steering gear compartment. Where necessary, the Contractor must adjust the system to provide correct indication.
 - b) The Contractor must verify the hydraulic operation of each steering gear pump and that each rudder's hydraulic system operates in a smooth manner. Where air is entrapped in the system, the Contractor must bleed the hydraulic system until all entrapped air has been removed.
 - c) Verify that each rudder has full travel from hard over to hard over when being steered by the hydraulic systems. The hydraulic systems must be so adjusted to prevent the rudder from contacting the mechanical stops on either side.
 - d) The Contractor must verify that the rudder operates and responds to all local and remote steering station inputs.
- 12.1.D.2.8 After the floating of the ship, at the dock, carry out the following tests:
- a) Performance test at 1 pump and 2 pumps, to measure the hard over turn from port to starboard travel time and hard over turn from starboard to port, from -37 to 37 degrees.
 - b) Emergency steering system tests.
- 12.1.D.2.9 Sea trials: special attention must be paid to the performance of the steering gear. Ensure that the system performs as indicated on the performance specification sheet.
- 12.1.D.3 **Certification**
- 12.1.D.3.1 The Contractor must provide proof of rudder and rudder stock condition approval by the ABS Inspector.

12.1.E DELIVERABLES**12.1.E.1 Documentation**

12.1.E.1.1 The Contractor must supply the IA and the TA with a report detailing the work undertaken, defects, repairs made and all measurements and readings taken.

12.1.E.2 Training - [Not Used]

12.2 THRUST BEARINGS

12.2.A IDENTIFICATION

- 12.2.A.1 The purpose of this item is to The objective of this item is to remove the covers of the 2 KINGSBURY thrust bearings from the propeller shafts, with a view to taking measurements for acceptance of the thrust bearing inspection.
- 12.2.A.2 The last complete inspection was conducted in 2017.

12.2.B REFERENCES

- 12.2.B.1 **Equipment Data – [Not Used]**
- 12.2.B.2 **Drawings and Documents**

Drawing Number	Drawing / Document Title	Number of Sheets
68-H-3	Shell Expansion	1

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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
Publications		
Standards		
.	Solvent Cleaning	No
Regulations		

12.2.C STATEMENT OF WORK

- 12.2.C.1.1 The two (2) propeller shaft thrust bearings, located in the propulsion engine room, must be dismantled so that their internal parts can be inspected. Before beginning the work, the Contractor must measure and record the bearing and thrust clearance.
- 12.2.C.2 **Sump Cleaning**

- 12.2.C.2.1 The Contractor must drain the lubricating oil from each of the bearings as well as the oil from the tanks. The Contractor must dispose of the oil in accordance with environmental standards in force. The bottom of the bearings and tanks must be cleaned with a waste rag.
- 12.2.C.2.2 Clean the interior of the thrust bearings base. The other access panels must be removed so the bases can be cleaned more effectively.
- 12.2.C.3 **Heat Exchanger**
- 12.2.C.3.1 There is a tube heat exchanger to cool down the lubricating oil in each thrust bearing. The Contractor must:
- a) Dismantle the water cooling connections for each of the bearings;
 - b) Clean the interior of the tubes and conduct a hydrostatic test (45 psi) under the supervision of the Chief Engineer;
 - c) Reinstall the coolers with new bolts, nuts and seals. Prior to that, the Chief Engineer must check the interior of the bases before they are closed.
- 12.2.C.3.2 Once the reassembly work has been completed, the Contractor must fill the bearings with oil (Teresso 100), which must be provided by the CCG.

12.2.D **PROOF OF PERFORMANCE**

12.2.D.1 **Inspection Points**

- 12.2.D.1.1 During sea trials, temperature readings must be taken on the thrust bearings at positions pre-determined by the CCG. The readings must be taken at regular intervals, until temperatures have stabilized. Reverse propulsion tests must be carried out at the discretion of the IA.

12.2.D.2 **Certification**

12.2.E DELIVERABLES

12.2.E.1 **Documentation**

- 12.2.E.1.1 The Contractor must provide CCG authorities with a report on the work carried out by the Kingsbury service technician as well as the technician's recommendations. The report must include the number of hours worked.
- 12.2.E.1.2 The Contractor must submit a thrust bearing test report.
- 12.2.E.1.3 The Contractor must provide proof that the TCMS inspector has approved the condition of the thrust bearings.

12.2.E.2 **Training – [Not Used]**

12.3 CHANGE PORT PROPELLER

12.3.A IDENTIFICATION

- 12.3.A.1 The Contractor must install a new propeller on the Port shaft
- 12.3.A.2 The Contractor must measure the wear down of the two propeller shafts and record the measurements before removing the propellers.

12.3.B REFERENCES

12.3.B.1 Equipment Data

12.3.B.2 Material provided by the Coast Guard

- 12.3.B.2.1 All tools and special equipment supplied to the Contractor by the CCG must be returned in good condition once the works are completed. The Contractor must sign a logbook prepared by the IA for each tool or equipment loaned. Photos of the tools must be taken in the presence of a CCG representative and a shipyard manager. Copies of the photos must be given to both parties.
- 12.3.B.2.2 The Contractor must include in its bid, the handling of these tools, including returning them to their respective storage locations. These tools must be returned in the same working condition and cleanliness as before the work.
- 12.3.B.2.3 One left and propeller

12.3.B.3 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
26801M	Propeller	1
AW201941	Shafting Arrangement	1
AW201945	Tailshaft with liner	1
221-620-1	Propeller shafting “arrangement and details”	1
	Pilgrim Nut Instruction Manual	18
	Mopress Hydraulic Pump Manual	19

12.3.B.4 Regulations and Standards [Not Used]

12.3.C STATEMENT OF WORK

12.3.C.1 Inspection of Propellers:

- 12.3.C.1.1 The Contractor must remove the rope guards to measure and record port and starboard tailshafts wear down. Measurements are to be taken with a feeler gauge in the presence of the IA, recorded and provided to the ABS surveyor. A measure must be taken with a depth gauge provided by the vessel. This work must be conducted on both propeller shafts.
- 12.3.C.1.2 The Contractor must check for clearance at the forward end of the propeller. Any other abnormality must be noted in the report.
- 12.3.C.1.3 The propellers must be inspected by the IA, as well as a qualified service provider recognized by the propeller manufacturer, and by ABS.
- 12.3.C.1.4 The Contractor must perform a dye penetrant on each blade edge (minimum width of 6 in) and at the root of the blade. The test must be done by a technician approved by Classification Society.
- 12.3.C.1.5 The Contractor must perform a dye penetrant crack test on the keyway of the propeller.
- 12.3.C.1.6 If one or both propellers are damaged and if the repairs can be performed without removing them, the Contractor must perform the repairs accordingly with the TA requirements. The cost of the repair work must be negotiated using PWGSC 1379 form.
- 12.3.C.1.7 If the propellers are damaged and, upon advice from an expert, cannot be repaired in place, they must be loaded on a truck and shipped to a specialized firm facility to be repaired. The firm chosen must be certified by a classification society. The specialized sub-Contractor must provide a welding procedure approved by an engineer and the propeller manufacturer prior to beginning the work. The cost of the repair work must be negotiated using PWGSC 1379 form according to the invoice of the specialized firm performing the propeller repairs. A written report of the propeller repairs must be prepared by the Contractor and submitted to the TA and to ABS.

12.3.C.2 Propeller Removal

- 12.3.C.2.1 The IA must be present for the duration of the propeller removal operation.
- 12.3.C.2.2 To gain access to the propeller cone nuts, the Contractor must remove the cement encasing them. After having removed the cement, the Contractor must unscrew and remove propeller cones and place them at the bottom of the dry dock. These cones are filled with Tallow.
- 12.3.C.2.3 The Contractor must unbolt and remove the locking plates of the two Pilgrim nuts.

- 12.3.C.2.4 The Contractor must slack off the propeller shaft nuts and reinstall them taking care to turn them around so that the moving parts of the nuts are directed towards the exterior and not towards the propeller hub. The Contractor must carefully clean the tailshaft threads to prevent contaminants from seizing the pilgrim nut.
- 12.3.C.2.5 After removing the Pilgrim nut and before turning around and installing the propeller shaft nut, the Contractor must take measurements of the longitudinal position of the propellers on the conical section of the tailshaft. The Contractor must record these measurements as guidance for installing the propellers.
- 12.3.C.2.6 The Contractor must position the air bleed valve vertically towards the highest point in order to completely remove the air. The Contractor must also remove the rings and rubber seal of the internal face (sterntube side).
- 12.3.C.2.7 The Contractor must install 8 special studs (CCG supplied) on the propeller hub.
- 12.3.C.2.8 The Contractor must slide a 6" thick by 4' in diameter plate (CCG supplied) onto the studs and harden them up against the Pilgrim nut with 8 special nuts (CCG supplied).
- 12.3.C.2.9 The Contractor must apply pressure using the Morpress hydraulic pump (supplied by the ship) to force the propeller off of the shaft taper. The inflatable nitrile rubber ring (Nitrile Tyre) must be purged of air using the Morpress pump. During this operation, the propellers must be supported by chain blocks. Special eye bolts that screw into the ship's hull will be supplied by the CCG.
- 12.3.C.2.10 Before applying any pressure, the Contractor must purge all air remaining in the nitrile rubber ring using the MORPRESS pump, supplied by the CCG. The IA must be present during the complete removal operation of the propellers. The pump pressure can easily exceed 10 000 psi, in the early stage of the withdrawal process.
- 12.3.C.2.11 Before commencing propeller clearance, the Contractor must restrain the propellers with hoists and special eye bolts, which are screwed onto the hull of the ship, and provided by the IA. The eight 8 nuts will hold the special plate against the Pilgrim nut and the pressure applied by the Contractor, with the hydraulic pump, the propeller will drop from the tapered end of the tailshaft. During propeller withdrawal, chain blocks must be rigged to support the weight of the propellers. The pressure necessary to remove the propellers must be logged by the Contractor.
- 12.3.C.2.12 The Contractor must install the Pilgrim nut on the tailshaft once the propeller has been removed. The Contractor must protect the Pilgrim nuts from any damage to their internal mating surfaces.

12.3.C.2.13 The Contractor must lay the propellers down on adequate structures. The Contractor must clearly identify the propellers as “Port” propeller and “Starboard” propeller.

12.3.C.2.14 Propellers and cone studs must then be inspected. Any defects are must be brought to the immediate attention of the IA and the TA for remedial action.

12.3.C.2.15 Handling of the propellers must be included in the item pricing.

12.3.C.2.16 If applicable, the Contractor must take the necessary measures to organize the transportation of propellers to a qualified sub-Contractor.

12.3.C.3 **3D modeling**

12.3.C.3.1 The contractor must make a 3D model of the propellers currently in place on the propeller shafts. Port and starboard. Data ownership and supporting documentation will be provided to the Canadian Coast Guard. The deliverable will be in STEP format. The contractor must produce a report including a dimensional comparative of the propellers.

12.3.C.4 **Propeller Fitting (on propeller)**

12.3.C.4.1 Upon completion of repairs and other associated work, each propeller must be fitted to its respective propeller shaft.

12.3.C.4.2 The Contractor must make the necessary adjustments (fits) using Prussian blue to obtain 80% contact area on each propeller. Propeller adjustments must be made in place. The Contractor must provide a firm price for all the required adjustment. An adjustment of at least 80% is required. The Contractor must demonstrate the final adjustment obtained to IA and ABS.

12.3.C.4.3 Final propeller adjustments must be made in the presence of the IA.

12.3.C.4.4 The Contractor must check the key between the shaft and the propeller, the shaft key and the key locking bolts for cracks by means of a dye penetrant crack test. These tests must be performed in the presence of the IA and the ABS inspector.

12.3.C.5 **Propeller Installation**

12.3.C.5.1 Prior to the final installation, the Contractor must install new rubber seals (o-ring) on the inner groove of each propeller hub. The seals must be supplied by the Contractor.

12.3.C.5.2 Before tightening the propellers in place, the Contractor must purge all air remaining in the nitrile rubber ring, making sure that the air bleeding valve is located on top of the ring. The IA must be present during the complete propellers installation process.

- 12.3.C.5.3 The Contractor must tighten the propellers, complete with the PILGRIM nuts, onto the tapered end of the tailshaft with the hydraulic pump. The ‘PILGRIM’ nuts must be installed to allow the rubber ring to push the propellers onto the tailshaft taper.
- 12.3.C.5.4 The Contractor must not exceed the propeller positioning marks made on the propeller shaft during removal. The hydraulic pressure exerted by the pump can easily exceed 10,000 psi.
- 12.3.C.5.5 Once the propellers are in place, the nuts must be tightened and locked into place. The Contractor must drill new holes for the locking devices.
- 12.3.C.5.6 The Contractor must clean the propeller cones. The Contractor must reinstall them and fill them with tallow.
- 12.3.C.5.7 The Contractor must secure in place each cone using its associated securing nuts, 16 per cone and each nut must be locked into place using a welded " U " shaped 1/4 inch stainless steel rod. The Contractor must, after the final bolt tightening; fill the cone nut recesses with high-density cement. Once installed a runout must be taken on the propeller cone. The data must be noted in the work report.
- 12.3.C.6 **Installation of Rope Guards**
- 12.3.C.6.1 Prior to re-installing the rope guard and on each stern tubes, the Contractor must remove the existing welded sacrificial anodes and replace them with 4 new five pound anodes, Contractor supplied, for a total of eight (8) anodes. Dimensions of the new anodes are 3 inches by 15 by 1½ inches thick. The disturbed steel must be recoated as described in section 11.2.
- 12.3.C.6.2 The Contractor must weld in place the new rope guards. The Contractor must weld the steel plates over their overall circumference as well as the joints between their half-sections.
- 12.3.C.6.3 After welding the rope guard in place, the Contractor must paint the welded parts and their surroundings with the same coating system as the hull.

12.3.D **PROOF OF PERFORMANCE**

12.3.D.1 **Inspection Points**

- 12.3.D.1.1 The IA must inspect the following items:
- a) The measuring of propeller shaft wear down in the stern tubes;
 - b) The measuring of propeller shaft concentricity;
 - c) The measuring of propeller shaft run-out;

- d) The mating surfaces between the propellers and the propeller shaft tapers;
- e) The bluing of surfaces and the quality of the fit of the propellers on the shaft tapers (ABS inspector must attend);
- f) The final tightening of all retaining nuts and propellers;
- g) The final installation of the Pilgrim nuts and lock devices;
- h) The measuring of the propeller cone runout.
- i) The Installation and welding of rope guards.

12.3.D.2 **Testing and Trials - [Not Used]**

12.3.D.3 **Certification**

- 12.3.D.3.1 Provide proof of acceptance of propeller condition by the ABS inspector.

12.3.D.4 **Documentation**

- 12.3.D.4.1 Preliminary propeller repair report. One week after receipt of the propellers from the sub-Contractor.
- 12.3.D.4.2 Final propeller repair report. One week after receipt of the propellers for reinstallation.
- 12.3.D.4.3 The Contractor must provide a quality assurance report demonstrating acceptance of the condition of the propellers and their installations by ABS. This report must be submitted before the vessel is released.

12.3.D.5 **Training - [Not Used]**

12.4 MECHANICAL SEAL

12.4.A IDENTIFICATION

- 12.4.A.1 The purpose of this specification item to carry out an inspection and overhaul of the port⁴⁰ and starboard propeller shaft mechanical seals.
- 12.4.A.2 ~~⁴¹The work described below must be coordinated with section Error! Reference source not found. of this specification package.~~

12.4.B REFERENCES

12.4.B.1 Equipment Data

- 12.4.B.2 ~~Wartsila 710 MOD 671.825 Type MA Seal~~⁴²SeaThigor

12.4.B.3 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
221-620-1	Propeller shafting “arrangement and details”	1
NT-2776-19-DE100A	Installation de palier Thordon arbre porte-hélice Sterntube Thordon Bearing Assembly tail shaft	1
	SeaThigor Seal - Product Manual - Rev5Final 20180907	
TG-ST-D-15B-00-MOD1	TBI seathigor seal srtp size #D-15d assembly	
VP-200806-01	SeaThigor Verification Plan	

12.4.B.4 Regulations and Standards [Not Used]

12.4.C STATEMENT OF WORK

12.4.C.1 General

- 12.4.C.1.1 The Contractor must obtain the services of a Thordon FSR to inspect, assemble and put back into service. The Thordon representative must supervise the installation in the sterntube bushings. The Contractor must include a firm price in its bid for the FSR. This price must include all travel expenses, labor and materials required to carry out the work. The contractor must include a \$5,000 allowance in their bid to cover travel and living expenses for the seconded representative. This allowance will be adjusted upwards or downwards through the PWGSC 1379 form at the end of the contract. The Contractor must

⁴⁰ Rev 1- 12.4.A.1 remove reference to stbd shaft

⁴¹ Rev 1- 12.4.A.2 remove

⁴² Rev 1- 12.4.B.2 reference to Wartsila seal replace with SeaThigor seal

provide a copy of all supporting documentation attesting to the actual expenses. This allowance does not cover labour and materials required to perform the work. These costs must be included in the price for the work.

- 12.4.C.1.2 All work must be performed according to the manufacturer's instructions and recommendations.
- 12.4.C.2 **Disassembly of both mechanical seals**
 - 12.4.C.2.1 Before dismantling the seals, the Contractor must uncouple the 1" diameter cooling water connections and the 1/2" diameter air connections.
 - 12.4.C.2.2 The Contractor must completely dismantle the 2 tailshaft mechanical seals, port and under the supervision of the IA.
 - 12.4.C.2.3 Once the seals are completely removed, the Contractor must measure the diameter of the bronze liner, on each shaft, to the nearest thousandth of an accuracy.
 - 12.4.C.2.4 The Contractor must inspect the parts and replace any defective parts as per the manufacturer's recommendations. New parts will be supplied by the CCG.
 - 12.4.C.2.5 The Contractor must cover and protect, at all times and until their reassembly, the friction faces to preserve them from any scratch, scuff mark or bumps.
- 12.4.C.3 **Installation**
 - 12.4.C.3.1 The Contractor under the FSR supervision must assemble the mechanical seal.

12.4.D PROOF OF PERFORMANCE

- 12.4.D.1 **Inspection Points**
 - 12.4.D.1.1 All parts must be inspected by the IA prior to reinstallation.
- 12.4.D.2 **Testing and Trials**
 - 12.4.D.2.1 The Contractor must perform the following trials in dry dock under the supervision of Wartsila ^Thordon technician^ :
 - a) The Contractor must perform a pressure test on both inflatable seals to the initial pressure of 5 bars. A pressure drop of approximately 0.7 bar over 30 minutes is allowed (ex. tailshaft diameter of 727 mm).
 - b) If the bellows are removed during trials, it is possible to see the inflatable seals and to make sure that they touch the tailshaft evenly and on the entire circumference.

- 12.4.D.2.2 Sea trials: Once the ship is afloat, seal performance and water tightness is to be tested during 4 consecutive hours of sea trials (without interruption), at cruise speed. The Contractor's qualified personnel will be required to readjust the seals during trials.
- 12.4.D.2.3 The Contractor must verify the following in the presence of the AI and the Thordon FSR:
- a) The Contractor must test the inflatable seal with the sea water pressure.
 - b) The Contractor must test the water tightness of both sealing surfaces, , statically, and later, during the sea trials. ~~The allowable leaking for such a system is 1.5 litre/100 mm (shaft diameter) per hour, which is about 9 litres per hour for the vessel.~~
 - c) The Contractor must assure the whole system alignment.
 - d) The Contractor must check the system alignment to make sure that there is no hot spots during the whole sea trial period.
- 12.4.D.3 **Certification - [Not Used]**

12.4.E DELIVERABLES

12.4.E.1 Documentation

- 12.4.E.1.1 The Contractor must provide a report detailing all work carried out, all parts replaced, all measurements taken, and any corrective actions taken.
- 12.4.E.1.2 The Contractor must submit a report to the IA and the TA of the dimensions recorded before and after the work, including the bronze liner size, temperature dock trial, temperature seal trial. This report must be given no later than a week after sea trial.
- 12.4.E.1.3 ⁴³The Contractor must provide a copy of the Thordon FSR's service report.

⁴³ Rev 1- 12.4.D.4.3 French added text.

12.5 FLANGE COUPLING (MUFF COUPLING)

12.5.A IDENTIFICATION

- 12.5.A.1 The intent of this specification item is to remove the two Muff couplings from their respective tailshaft in order to remove the tailshafts from the vessel.
- 12.5.A.2 The work described below must be coordinated with the work described in sections 12.1 through **Error! Reference source not found.** of this specification package.

12.5.B REFERENCES

12.5.B.1 Equipment Data

12.5.B.1.1 Muff Couplings

12.5.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
AW-302302	Coupling for tailshaft	1
AW-302317	Arrgt for Flange Coupling Removal	1

12.5.B.3 Regulations and Standards – [Not used]

12.5.C STATEMENT OF WORK

- 12.5.C.1 The Contractor must supply all the following equipment, not limited to, ventilation, staging, chain falls, slings and shackles or other necessary to perform the work. All lifting equipment must be appropriate for the expected duties, and be accompanied by valid certification indicating, or be permanently marked as to being, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this item are to meet the welding requirement of this specification. On completion of work, all of the Contractor's work related tools and equipment must be removed from the vessel and repair according to the respective requirements of this estimate the surfaces damaged by the welding of fasteners.
- 12.5.C.2 In order to gain access to each Muff, the Contractor must move various interference items. These are, but not limited to, walkways, railings above pedestal bearings and the turning gear covers for each tailshaft. Upon completion of all work, the Contractor must return and reinstall these items to "as found" condition.
- 12.5.C.3 The Contractor must remove the sixteen (16) 3" diameter studs and nuts from each Muff coupling using a special tool supplied by the ship. The Contractor must note that it is important that the last nut to be removed is the one facing the eyebolt. Before removing the 16th nut, the Contractor must install the chain block and connect it to the eyebolt.

- 12.5.C.4 The entrepreneur must remove the 1 1/2 x 1/2 inch flat steel water thrower, built in two sections and forming a 2 feet 8 inches in diameter circle made of gauge 14 sheet metal. Both sections are secured with two 1/2 inch diameter bolts.
- 12.5.C.5 The Contractor must remove the top of the Cooper bearing see section 12.6 inspection port tailshaft.
- 12.5.C.6 The Contractor must partially withdraw each tailshaft aft in order to expose the end of each Muff coupling and its associated PILGRIM nut.
- 12.5.C.7 CCG supplied special removal tools will be supplied to the Contractor to permit the removal of the PILGRIM nut and the Muff couplings. These will include but not be limited to:
- a) one hydraulic pump c/w hydraulic hoses and fittings,
 - b) one 805 mm (31.69") long x 72 mm or 2.83" diameter stud,
 - c) special steel plate 640 mm (25") diameter x 120 mm thick,
 - d) eight (8) special studs,
 - e) two (2) special sleeves,
 - f) special steel plate 1,020 mm (41") diameter x 160 mm (6.3") thick,
 - g) One copy of service manual for the removal and re-installation of the PILGRIM nuts.
- 12.5.C.1.2 The Contractor must only use these special tools during the removal process of the PILGRIM Nuts and Muff couplings, and any damage resulting from the misuse of these tools or the use of inappropriate tools during the course of this removal must be to the Contractor's account. Upon completion of all work, these specialized removal tools must be cleaned and returned to the IA in the same condition as received.
- 12.5.C.8 Using the supplied hydraulic pump, the Contractor must remove each Pilgrim nut and carefully place it aside. The Contractor must protect the Pilgrim nuts to prevent any damage to their internal mating surfaces.
- 12.5.C.9 The Contractor must perform the following procedure to remove one muff coupling. The same procedure is to be applied to both couplings.
- a) The 805 mm long x 72 mm diameter stud is to be screwed into the end of each tailshaft.
 - b) Once complete, the Contractor is then to install the special 640 mm steel plate and then the 8 special studs are to be inserted in the Muff coupling.
 - c) Once installed, the 8 special studs will serve as a base for the second 1,020 mm diameter steel plate.
 - d) The secondary steel plate is to be rigged and installed in such a way that the Pilgrim nut is between the two plates and mounted on top of the two sleeves fitted on the two lower Muff coupling studs.
 - e) The Muff coupling is then to be jacked off its associated shaft using the Pilgrim nut and the hydraulic pump as defined in the Service Manual.

- 12.5.C.10 Once each coupling has been removed the Contractor must protect the mating surfaces to prevent any damage from occurring during the tailshaft withdrawal process. Any damage incurred as a result of not adequately protecting these machined surfaces must be to the Contractor's responsibility.
- 12.5.C.11 Upon completion of associated work and after the reinstallation of the tailshafts, the Contractor must reinstall on its respective shaft each muff coupling in the reverse order of procedure above. The mechanical seals previously removed must be reinstalled in their respective locations following satisfactory blueing on the cone surfaces. The IA must witness final hardening up of each Muff coupling and its associated Pilgrim nut.
- 12.5.C.12 The Contractor must perform a dye check (liquid penetrant) on keyways by ABS classification society approved technician.
- 12.5.C.13 The Contractor must proceed to the adjustments (fits) with Prussian Blue. MUFF adjustments must be made in place. The Contractor must provide a fixed price for all necessary adjustments. An adjustment (fit) of at least 80% is required. The Contractor must demonstrate the final adjustment IA obtained.

12.5.D **PROOF OF PERFORMANCE**

12.5.D.1 **Inspection Points**

12.5.D.1.1 The following inspections are required to be witnessed by the IA:

- a) Inspection of the machined mating surfaces between the shafts and the couplings,
- b) Hardening up of all retaining nuts.

12.5.D.2 **Testing and Trials**

12.5.D.2.1 Fits using Prussian blue to obtain an adjustment of at least 80% of the contact surface.

12.5.D.3 **Certification – [Not Used]**

12.5.D.4 **Documentation**

12.5.D.4.1 The Contractor must supply a report detailing the work undertaken, defects, repairs made and measurements and readings taken.

12.5.D.4.2 The Contractor must provide a Quality Assurance (QA) report indicating that all parts of the Muff coupling and inboard tailshaft ends have been inspected by the Contractor's QA Department for correct installation and fit.

12.5.D.5 **Training – [Not Used]**

12.6 INSPECTION PORT TAILSHAFT

12.6.A IDENTIFICATION

- 12.6.A.1 The CCG wants to inspect and certify by ABS for 5 years the tailshafts and sterntube bearing of the ship for the port side.
- 12.6.A.2 The Contractor must present this survey credit to the IA and the TA prior to the flooding of the dock to re-float the vessel.

12.6.B REFERENCES

12.6.B.1 Equipment Data

12.6.B.1.1 Dimensions of tailshafts:

- a) Weight :37 tons
- b) Length :46 pieds 1 13/16 inches
- c) Diametre :26 inches

12.6.B.1.2 The shafts must not be supported on the rubber coating between the two bronze sleeves.

12.6.B.1.3 Stern Tube Bearings

- a) Forward bearing 3 sections of Thordon Compac
- b) Aft bearing 4 sections of Thordon Compac

12.6.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
221-620-1	Propeller shafting arrangement and details	1
221-620-2	Sterntube arrangement & details	1
221-H-52	Spectacle shaft brackets	1
AW201804	Tailshaft with liner	1
AW302302	Coupling for tailshaft	1
NT-2776-19-DE100A	Installation de palier Thordon arbre porte-hélice Sterntube Thordon Bearing Assembly tail shaft	1

12.6.B.3 Regulations and Standards - [Not Used]

12.6.C STATEMENT OF WORK

12.6.C.1 Preparation

- 12.6.C.1.1 The Contractor must be responsible for preparing the equipment and arranging for all inspections required. The Contractor must consult with ABS prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor must advise the IA and the TA, 24 hours in advance, to allow their attendance.
- 12.6.C.1.2 The Contractor must supply all equipment, chain falls, 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. Any brackets or other welded attachments required in the performance of this item must be welded into place by CWB-certified welders only. All items must be removed before floating of the vessel.
- 12.6.C.1.3 Whilst the vessel is still afloat, and not yet on the blocks, the Contractor must:
- Refer to section 12.7 shaft alignment verification to coordinate both tests.
 - Uncouple ~~both~~ ^{the port} ~~starboard~~ after tailshaft couplings;
 - Take an record alignment readings;
 - Measure and record the axial clearance, height and parallelism between the coupling flanges when their spigot is freed.
 - Supply and install four (4) bolts, not fitted, on the couplings when measuring clearances.
 - Take and record a second series of measures taken at 180° from the first readings.
- 12.6.C.1.4 These readings must be witnessed by both the IA.
- 12.6.C.1.5 Once the vessel is docked, the Contractor must remove the rope guards, measure and record the clearances between the tailshafts and the sterntube bearings. The Contractor can find additional information on rope guards on the drawing "Shafting Arrangement 221-601-1". The removal of the guards must be done for the 2 propeller shafts. The cost must be entered in the propeller section. See section 12.3 Propellers Change Port Propeller.
- 12.6.C.2 **Propeller Removal**
- 12.6.C.2.1 The Contractor must remove ~~both~~ ^{the port} propellers, and place ~~them~~ ^{it} in the bottom of the dry dock as specified in section 12.1.
- 12.6.C.3 **Tailshaft Removal and Inspection**
- 12.6.C.3.1 Using the turning gears, the Contractor must check and record the tailshafts wear down and concentricity at each stern tube end and on the propeller tapers.
- 12.6.C.3.2 The contractor shall remove the shaft bearing cover. Lift the shaft and slide the bearings for removal. Details of the procedure can be found in Assembly Manual 9500189ST_Rev 1.

The contractor is responsible for cleaning the bearings for inspection and protecting them until re-installation. Pictures must be taken upon removal.

- 12.6.C.3.3 The Contractor must completely remove, the shafts from the stern tubes. The Contractor must protect, support and manoeuver the shafts, making sure not to damage the bearings, the threads, the tapers and the vulcanised rubber coating between both shaft bearings.
- 12.6.C.3.4 The Contractor must support the tail shaft at all times, to avoid any warping.
- 12.6.C.3.5 The Contractor must transport the tail shafts into its shop, where it must always be adequately supported along its whole length (except in the way of rubber coatings).
- 12.6.C.3.6 The Contractor must thoroughly clean the tailshafts and inspect ~~them~~ ^{it} for wear and defects. The AI and ABS inspector will perform a thorough examination of the tailshafts. The Contractor must pay particular attention to the following areas;
- a) Forward and aft keyways on shaft tapers;
 - b) Forward and aft shaft tapers;
 - c) Forward and aft ends of each of the two liners where they meet the tail shaft;
 - d) Forward and aft pilgrim nuts and threads on shafting;
 - e) Liner wear and condition of bushing;
 - f) Forward end of forward liner in way of "MD Seal" seal;
 - g) Galvanised rubber coating between liners.
- 12.6.C.3.7 The Contractor must inspect the keyways, the tail shafts threads and tapers, the propeller nuts and the couplings with non-destructive crack detection (dye penetrant) performed by a minimum Level II NRCan certified technician. All materials for testing must be supplied by the Contractor and a report, detailing the results of this testing, must be provided to the ABS inspector and TA/IA within three days of completion.
- 12.6.C.3.8 The Contractor must set ~~each~~ ^{the port} shaft on a lathe and take a short cut on both bronze bearings of ~~each~~ ^{the} shaft. The finish must be 32 RMS. Note: The shafts must not be machined near the mechanical seals areas. The machining thickness will be decided following a dimensional analysis of the shafts, an approval must be given by the Coast Guard before taking a cut.
- 12.6.C.3.9 While ~~each~~ ^{the} shaft is set on a lathe, the Contractor must check for shaft run-out. The Contractor must provide run-out readings of the shaft and a drawing showing the extent of grooving on ~~each~~ ^{the} shaft. While in the lathe, the lathe steady rest must not interfere with the shaft surface in way of the mechanical seal. Contractor must ensure that lathe's steady rest does not groove the shaft.

- 12.6.C.3.10 With the shafts set on a lathe or laid on appropriate rollers, Contractor supplied, and not in the stern tubes, the Contractor must check the concentricity of ~~both~~ ^{the} tail shafts and the presence of the IA.
- a) A special verification must be ^{done}~~not~~ on the cone to ensure the angle of the cone compare to the shaft axis.
- 12.6.C.3.11 The Contractor must perform, in presence of the ABS inspector and the IA, a Spark test on the vulcanised rubber coating of the tail shafts in order to check the adhesion of the rubber product and provide a report.
- 12.6.C.3.12 If the Spark test confirms the integrity of the rubber coating or after completion of required repair works, the Contractor must carefully handle the shafts and set ~~them~~ ^{it} on a temporary cradles, Contractor supplied, particularly if ~~they~~ ^{it} cannot be reinserted immediately because of required works on the stern tubes or sterntubes bearings. If the vulcanised rubber coating is damaged and requires repairs, the repairs must be completed by an accredited firm specialized in this type of coating. The entrepreneur must consult the TA before choosing the firm. The cost will be adjusted using PWGSC 1379 form if necessary.
- 12.6.C.4 **Inspection Sterntube bearings**
- 12.6.C.4.1 The Contractor must verify the stern tube bearings.
- 12.6.C.5 **OPTIONAL- Sterntube Bearings**
- 12.6.C.5.1 The Contractor must obtain the services of a Thordon FSR to inspect the Thordon bushings and for the installation of new THORDON bearings if needed. The Thordon representative must supervise the installation in the sterntube bushings. The sterntube bushings will be CCG supplied materials. The Contractor must include a firm price in its bid for the FSR. This price must include all travel expenses, labor and materials required to carry out the work. The contractor must include a \$3,000 allowance in their bid to cover travel and living expenses for the seconded representative. This allowance will be adjusted upwards or downwards through the PWGSC 1379 form at the end of the contract. The Contractor must provide a copy of all supporting documentation attesting to the actual expenses. This allowance does not cover labour and materials required to perform the work. These costs must be included in the price for the work.
- 12.6.C.5.2 The Contractor must check the bronze locking bars installed to prevent rotation of the bearings and replace them if required by the TA. The machining of the inner diameter of the bearings must be determined after the tail shafts measurements are completed and performed according to the THORDON representative requirements.

- 12.6.C.5.3 The Contractor will install Bronze key locks, supplied by the CCG. The bearings will be installed using the “freeze fit method”, under the manufacturer’s representative supervision.
- 12.6.C.5.4 The order of all steps regarding this sub section will be the following;
- a) Removal of old stern tube bearings
 - b) Sandblast cleaning, cavity filling of the stern tubes with Belzona Ceramic R Metal.
 - c) Retaining ring inspection
 - d) Stern tube painting glass flake coating
 - e) Key lock system installation
 - f) Machined tail shaft and stern tube measuring
 - g) Machining of the new stern tube bearings
 - h) Stern tube bearing installation
- 12.6.C.5.5 The existing forward and aft retaining rings will be removed, followed by the stern tube bearings. The rings and the Thordon bushing are to be conserved by the Contractor.
- 12.6.C.5.6 The Contractor must clean and repair ~~both~~ ^{each} the stern tubes in the mid-section, between the two bearings housings using sand blast complying with the SSPC-SP10 standard. Before doing so, the bearings areas will be properly protected against sandblast.
- 12.6.C.5.7 Once the tubes is blasted and cleaned, the cavities and porosities will be filled with Belzona Ceramic R Metal product by the Contractor.
- 12.6.C.5.8 The Contractor will include in their price 5 kg of this product per tube.. Application of Belzona Ceramic R Metal will be done following manufacturer’s recommendations and under the IA’s supervision. The date of manufacture of each package is to be given to the IA to ensure the product is not expired.
- 12.6.C.5.9 Once the product fully cured, a mechanical preparation will be done by the Contractor on the repaired spots to roughen the surface. Clean the tubes in order to remove all fine particles and prepare for painting. Apply two coats of a coating adapted for this purpose with glass flake , beige color, 0.005” thick each coat in ~~each~~ ^{each} the stern tube.
- 12.6.C.5.10 The Contractor must inspect all stern tube bearings retaining rings, located at the end of the bearing housings, and check each bolt tightness and locking devices. The Contractor must carry out a NDT (dye check) on every retaining ring. The retaining rings at ~~each~~ ^{each} the tube end will be reinstalled after the stern tube bearing replacement, using Loctite 263 threadlocker by the Contractor.
- 12.6.C.5.11 Inspection and measuring of the tail shaft bronze liners and bearing housings must be executed by the bushing manufacturer’s representative once the tail shaft is machined and

the key slot system installed. The IA or its representative must be present to note all readings and measurements obtained. Final machining of the stern tube bearings will be completed must be done by a specialized and accredited firm. The Contractor must consult the TA before choosing the firm. The Contractor must foresee a delay in his calendar between the measuring and the return of the machined bearing's delivery to the shipyard.

- 12.6.C.5.12 The machining of the stern tube bearings will be determined by the housing and tail shaft diameters. The manufacturer's representative and the ABS inspector will be advised when ready to take measurements, in order to cover the shafts and housings on the same visit.
- 12.6.C.5.13 Once the key slot system and measurements accepted by the manufacturer's representative, the new bearings must be frozen using liquid nitrogen, in a specific container for this particular application. The bushings will be installed in the sterntube under the supervision and directives of the representative.
- 12.6.C.5.14 The Contractor must supply material, man power, all necessary tooling and machinery to install the stern tube bearings using this method. That includes the container(s) that will be needed to freeze the bearings.
- 12.6.C.5.15 Once the bearings installation is completed and their temperature is stabilized, the Contractor must measure all bearings' inside diameter at eight (8) points on each bearing section. Note all readings in the measurement book.

12.6.C.6 **Reinstallation**

- 12.6.C.6.1 Upon completion of inspection and repairs, the Contractor must re-assemble ~~all~~ ^{the} shafting, turning gears, brakes, propellers, rope guards, mechanical seals and couplings. All equipment must be assembled to a fully operable condition and as per manufacturer's recommendations where applicable.
- 12.6.C.6.2 The Contractor must coat the stern tubes bearing staves end the bronze sleeve with non-polluting water soluble grease.
- 12.6.C.6.3 The Contractor must verify the fit of the taper between ~~each~~ ^{the} propeller and it's associated ~~the~~ tail shaft taper. Verification of fits must be by machinist bluing process with a minimum surface contact area between the flanges and tapers of 80%. Final fit and hardening up of the propellers must be witnessed by the ABS Surveyor and the IA. Copies of all readings must be provided to the IA and the TA. The Contractor must install the MUFF couplings on the tail shafts and screw the PILGRIM nuts inside.
- 12.6.C.6.4 The Contractor must use chain blocks to match the coupling of the propeller shaft with the thrust bearing shaft in order to install the sixteen 3 inches diameter bolts with their nuts and

locking plates. The Contractor must take care to insert the bolts in their specific holes (#1 bolt in # 1 hole, etc.). The Contractor must fit these bolts in the coupling's face.

- 12.6.C.6.5 Before tightening the couplings, the Contractor must check their parallelism, before the shaft coupling is on the motor coupling spigot. This verification must be done twice at a 180° angle. The Contractor might use non fitted bolts, Contractor supplied, when the measurements are taken. The Contractor must register the readings.
- 12.6.C.6.6 The Contractor must complete the coupling tightening on the tail shaft taper using the hydraulic pump and the Pilgrim nut. The Contractor must drill new holes in the locking plates and install them at their specified location.
- 12.6.C.6.7 The Contractor must install the intermediate bearings covers and adjust them with the tail shafts then connect the oil piping (3/8 in. dia.), using Contractor supplied, new gaskets. The Contractor must supply new gaskets, connect the cooling system and fill up the bearing with ship supplied new oil.
- 12.6.C.6.8 The Contractor must remove the brackets installed for the purpose of establishing rigging points, grind flush the affected areas, and apply a paint treatment to match the existing paint in the surrounding area.
- 12.6.C.7 **Roller bearing installation**
- 12.6.C.7.1 ⁴⁴The Contractor must obtain the services of a Cooper FSR to inspect the ~~Thordon-bushing~~ ^{^^Cooper Bearing^^} and for the re-installation of ~~new THORDON~~ ^{^^COOPER^^} bearings if needed. The Cooper representative must supervise ~~the installation in the stern tube bushings~~ ^{^^reassembly of the roller bearing^^}. ~~The stern tube bushings will be CCG supplied materials.~~ The Contractor must include a firm price in its bid for the FSR. This price must include all travel expenses, labor and materials required to carry out the work. The contractor must include a \$3,000 allowance in their bid to cover travel and living expenses for the seconded representative. This allowance will be adjusted upwards or downwards through the PWGSC 1379 form at the end of the contract. The Contractor must provide a copy of all supporting documentation attesting to the actual expenses. This allowance does not cover labour and materials required to perform the work. These costs must be included in the price for the work.
- 12.6.C.7.2 The Contractor shall provide materials to reinstall the rolling bearing. Including grease recommended by the installation manual and copper slip.

12.6.D PROOF OF PERFORMANCE

⁴⁴ Rev 1- 12.6.C.7.1 – text change to only cooper bearing FSR under this article. 12.6.C.7.2 added

12.6.D.1 Inspection Points

12.6.D.1.1 The following inspections are required to be verified by the IA and the ABS inspector:

- a) Witnessing of readings taken of tailshaft alignment and clearances prior to and after docking of the vessel;
- b) Witnessing of readings taken of tailshaft/bearing clearances prior to removal and after re-assembly;
- c) Witnessing of NDT testing;
- d) Witnessing of shaft run-out verification;
- e) Witnessing of stern tube bearing clearances;
- f) Blueing of surfaces of tapers;
- g) Hardening up of all retaining nuts and propellers.

12.6.D.2 Testing and Trials

12.6.D.2.1 Dry dock trial

- a) Prior to refloating, the Contractor must take an additional set of clearance readings between the tail shaft and stern tube bearing. The Contractor must record these readings and provide copies to the TA/IA.

12.6.D.2.2 Sea trials

- a) After the vessel has been afloat for a minimum 24 hours, the Contractor must take shaft alignments readings and compare them to those taken previously. Any correction required due to miss-alignment must be the Contractors responsibility and to his account. These alignment readings must be witnessed by the IA.
- b) Upon completion of all refit work, but prior to Acceptance; a 4 hour sea trial must be conducted. A series of evolutions, involving a gradual increase of speed and reversals must be undertaken to test the ship's equipment. The Contractor must submit the trials program to the TA and the IA 48 hours prior to start of the trials for approval.
- c) The vessel must be gradually worked up to full speed; the Contractor must have shipyard personnel in attendance to monitor the shafting system on a continual basis for both this trial and the dockside trial noted above. Any overheating or vibration must be remedied at no expense to Canada.

12.6.D.3 Certification - [Not Used]

12.6.E DELIVERABLES

12.6.E.1 Documentation

- 12.6.E.1.1 The Contractor must supply the IA and the TA, on an USB stick, not protected by a password, in a Microsoft Office Word 2013 or more recent format, a report detailing the work undertaken, defects, repairs made and measurements and readings taken.
- 12.6.E.1.2 The Contractor must also provide a copy of ABS inspection survey credit to the TA/IA
- 12.6.E.1.3 The Contractor must provide a Quality Assurance (QA) report indicating that all parts of the tailshafts and sterntubes shafts bearings have been inspected by the Contractor's QA Department for correct installation and fit.

12.6.E.2 ^^Formation – [Not Used]^^

12.7 ALIGNMENT VERIFICATION STERNTUBE

12.7.A IDENTIFICATION

- 12.7.A.1 The Coast Guard wants to check the alignment of the stern tube and the straightness of the tube bore.
- 12.7.A.2 Prior to dry-docking, the contractor must verify the loads on each bearing in the shaft line.
- 12.7.A.3 The removal of Thordon Compac bearings will be determined upon receipt of the reports in this section.

12.7.B REFERENCES

- 12.7.B.1 **Equipment data**
- 12.7.B.2 **Drawings and documents - [not applicable]**
- 12.7.B.3 **Regulations and standards - [not applicable]**

12.7.C 15.1.C STATEMENT OF WORK

- 12.7.C.1 **General**
 - 12.7.C.1.1 Checking shaft alignment and bearing load
 - 12.7.C.1.2 The Contractor must verify the bearing load in the condition at the arrival of the vessel in dry dock, in the water.
 - 12.7.C.1.3 A second verification must be made when the vessel is in dry dock.
 - 12.7.C.1.4 When the Contractor's work is completed, the verification must be made prior to launching and after the vessel has been returned to the water for at least 24 hours.
 - 12.7.C.1.5 Strain gauges are currently installed on each propeller shaft and had previously been installed for this purpose.

- 12.7.C.1.6 The Contractor must use a method that includes a shaft jack-up. A preliminary report shall be submitted to the Technical Authority at each measurement.
- 12.7.C.1.7 Checking the condition of the stern bearings
- 12.7.C.1.8 The contractor shall report the physical condition of the stern tube bearings. Point of Contact
- 12.7.C.1.9 The contractor shall use a company having the capability to measure the position of the stern tube alignment relative to the projected centerline of the electric motor shaft.
- 12.7.C.1.10 Measurements shall be taken with the bearings in place. The positioning of the stern bearing in each of its sections, as well as the roller bearing, must be on the bore sighting positioning report.

12.7.D PROOF OF PERFORMANCE

12.7.D.1 Inspection points

- 12.7.D.1.1 The inspection authority must be witness of each measurement.

12.7.D.2 Tests and trials

12.7.D.3 Certification

12.7.E DELIVERABLES

12.7.E.1 Documentation

- 12.7.E.1.1 The contractor must provide a complete report detailing the work performed, the cause of the failures, the necessary modifications and the parts replaced.
- 12.7.E.1.2 The contractor must submit the original, signed copies to the inspection authority and an electronic copy in PDF format of the report to the inspection authority and the technical authority.

12.7.E.2 Training - [not applicable]

14.1 RECONDITIONING OF DSL CIRCUIT BREAKER

14.1.A IDENTIFICATION

14.1.A.1 The purpose of this specification item is clean the bilges of debris, oil and grease.

14.1.B REFERENCES

14.1.B.1 Equipment Data

a) Westinghouse DSL-416

14.1.B.2 Drawings and Documents

Drawing no.	Drawing/document title	Number of sheets
68-2000-1	Bilge & Ballast Pumping Diagram	1

14.1.B.3 Regulations and Standards

14.1.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 complies with regulations and standards, as well as with other applicable federal, provincial and territorial regulations and standards.

	Title	Included – Yes/No
FSM procedures		
Publications		
Standards		
Regulations		
	Canada Shipping Act, 2001, and its regulations	No

14.1.C STATEMENT OF WORK

14.1.C.1 General

14.1.C.1.1 The work consists of performing a complete upgrade and reconditioning of one (1) circuit breaker, Westinghouse DSL-416, currently spare on the vessel Pierre Radisson CCGS.

14.1.C.1.2 The work shall be done in shops belonging to the contractor.

14.1.C.1.3 The breaker is not currently installed and will be on the vessel

14.1.C.2 The work shall include at least the following items for the circuit breaker :

14.1.C.2.1 Replacement of the protection unit

14.1.C.2.2 Replace the existing protection unit (LS) with a new model WESTRIP RMS-2012AF, that provides the same level of protection;

14.1.C.2.3 Program and adjust the new protection module based on the settings found on the existing LS modules and to be operational as per required values. Note : This breaker is a spare one and not usually in operation. As reference, CCG will provide adjustment settings data from a previous report on DSL-416 actually in operation.

14.1.C.3 Maintenance of the mechanism and frame

14.1.C.3.1 Completely disassemble the mechanism;

14.1.C.3.2 Inspect and clean each part;

14.1.C.3.3 Replate all of the mechanism's parts with zinc;

14.1.C.3.4 Clean the frame using glass beads;

14.1.C.3.5 Repaint the front plate;

14.1.C.3.6 Replace damaged bolts;

14.1.C.3.7 Lubricate the mechanism in accordance with the manufacturer's recommendations;

14.1.C.3.8 Reassemble and test the mechanism assembly.

14.1.C.4 Maintenance of electrical components

14.1.C.4.1 Clean the main and arc-chute contacts;

14.1.C.4.2 Replate all conductive parts with silver (Main contacts);

14.1.C.4.3 Check the pressure of the main contacts and make adjustments if required;

14.1.C.4.4 Add blue Loctite on the adjustment nuts of each pole (Main contacts) to avoid release caused by the vibration on this type of vessel;

14.1.C.4.5 Clean and reinsulate the moulded plastic parts around the main contacts;

14.1.C.4.6 Clean and reinsulate the arcing chambers;

14.1.C.4.7 Clean and reinsulate all insulators;

- 14.1.C.4.8 Test and clean all auxiliary contacts, replacing them if required;
- 14.1.C.4.9 Clean and lubricate the electrical connection points at the rear of the circuit breaker;
- 14.1.C.4.10 Check and replace the spring loading motor brushes if necessary;
- 14.1.C.4.11 Check the general condition of internal wiring and replace attachments if necessary;
- 14.1.C.5 **Replacement of parts**
 - 14.1.C.5.1 If any parts are defective or damaged and must be replaced, the contractor must provide a list of such parts with an assessment of replacement cost and associated delivery times. No parts can be replaced by the contractor before receiving written authorization from the Contracting Authority (CA) involved in the project.
 - 14.1.C.5.2 The Coast Guard already has several spare parts for this type of circuit breaker and can use them if needed for repairs.

14.1.D PROOF OF PERFORMANCE

- 14.1.D.1 **Inspection points**
 - 14.1.D.1.1 The IA must have the opportunity to verify that all materials and equipment have been removed from the vessel in accordance with the specifications.
- 14.1.D.2 **Tests and trials**
 - 14.1.D.2.1 Check the operation of the new protection unit;
 - 14.1.D.2.2 Check the operation and adjustment of the SHUNT trip;
 - 14.1.D.2.3 Measure the resistance of the main contacts;
 - 14.1.D.2.4 Measure the insulation level of the electrical circuits;
 - 14.1.D.2.5 Check the operation of the spring loading motor;
 - 14.1.D.2.6 Check the operation of the low voltage trip relay (if applicable);
 - 14.1.D.2.7 Check operation of the anti-hunting relay (If applicable).
 - 14.1.D.2.8 Carry out a primary injection trip test, in the contractor's workshop, in the presence of the ABS classification society inspector, according to his availability.
- 14.1.D.3 **Certification**

14.1.E DELIVERABLES

14.1.E.1 Documentation

14.1.E.1.1 The contractor must produce a complete report of all the work and tests that will be carried out on the circuit breaker.

14.1.E.1.2 The contractor must submit the original, signed copies to the inspection authority and an electronic copy in PDF format of the report to the inspection authority and the technical authority.

14.1.E.2 Training - [Not Used]**14.2 ⁴⁵INSPECTION GENERATOR DSL CIRCUIT BREAKER****14.2.A IDENTIFICATION**

14.2.A.1 The work consists of carrying out the complete verification, testing, certification, delivery and commissioning of the 4 circuit breakers.

14.2.B REFERENCES**14.2.B.1 Equipment Data**

a) Westinghouse DSL-416

14.2.B.2 Drawings and Documents

Drawing no.	Drawing/document title	Number of sheets
		1

14.2.B.3 Regulations and Standards - [Not Used]**14.2.C STATEMENT OF WORK****14.2.C.1 General**

14.2.C.1.1 The work consists of carrying out a 5 year inspection on the generator circuit breakers of the ship. Including primary injection.

14.2.C.1.2 The work must be carried out in workshops belonging to the contractor or his subcontractor.

⁴⁵ Rev 1- French text – numbering corrected to indicate 14.2

- 14.2.C.1.3 The circuit breakers are presently installed; the contractor is responsible for removing them, handling them and bringing them back once the work is completed.
- 14.2.C.2 **The work must include at least the following elements:**
- 14.2.C.2.1 Each circuit breaker must be dismantled by the Contractor to carry out a complete inspection of all internal mechanisms, cleaned, lubricated, and replaced parts if necessary;
- 14.2.C.2.2 Checking, adjusting and cleaning the auxiliary and main contacts;
- 14.2.C.2.3 Checking the resistance of the main contact of each circuit breaker;
- 14.2.C.2.4 Lubrication of all lubrication points must be carried out;
- 14.2.C.2.5 A thorough check of the spring tension;
- 14.2.C.2.6 Particular attention must be paid to the condition of the spring charging motor brushes. The engine switch must be very well cleaned, free of carbon traces;
- 14.2.C.2.7 All circuit breaker linkage sets must meet the manufacturer's tolerances;
- 14.2.C.2.8 A measurement of resistance in relation to mass must be compiled in the final report;
- 14.2.C.2.9 All overcurrent trip tests must be performed by primary injection in the presence of the ABS inspector.
- 14.2.C.2.10 These circuit breakers trip only in instantaneous mode;
- 14.2.C.2.11 The insulating plates inside the arc blower should be checked and cleaned. In the event that these are too damaged, these plates may be replaced by a material having the same properties, characteristics and same thicknesses.
- 14.2.C.3 **Replacement of parts**
- 14.2.C.3.1 If some parts are defective or damaged and need to be replaced, the contractor must provide a list of those parts with an estimate of the cost of replacement and associated delivery times. No part replacement can be made by the contractor before receiving written permission from the technical authority involved in the project.
- 14.2.C.3.2 The Canadian Coast Guard already has several spare parts for this type of circuit breaker and can use them as needed to carry out repairs.

14.2.D PROOF OF PERFORMANCE

- 14.2.D.1 **Inspection points**

14.2.D.1.1 An ABS inspector must be present for the circuit breaker inspection. The cost of the inspector will be charged directly to the Coast Guard.

14.2.D.2 **Tests and trials**

14.2.D.2.1 Check the operation of the new protection unit;

14.2.D.2.2 Check the operation and adjustment of the SHUNT release;

14.2.D.2.3 Measure the resistance of the main contacts;

14.2.D.2.4 Measure the level of insulation of electrical circuits;

14.2.D.2.5 Check the operation of the spring loading motor;

14.2.D.2.6 Check the operation of the low voltage trip relay (if applicable);

14.2.D.2.7 Check the operation of the anti-pumping relay (If applicable);

14.2.D.2.8 Perform a primary injection trigger test, which will be carried out in the presence of an inspector from the ABS classification society.

14.2.D.3 **Certification - [Not Used]**

14.2.E DELIVERABLES

14.2.E.1 **Documentation**

14.2.E.1.1 The contractor must produce a complete report of all the work and tests that will be carried out on the circuit breaker.

14.2.E.1.2 The contractor must submit the original, signed copies to the inspection authority and an electronic copy in PDF format of the report to the inspection authority and the technical authority.

14.2.E.2 **Training - [Not Used]** **AUXILIARY SYSTEMS**

15.1 FRAMO PUMP OVERHAUL

15.1.A IDENTIFICATION

15.1.A.1 Inspect the Framo pump. Currently the pump is not working.

15.1.B REFERENCES

15.1.B.1 Equipment data

15.1.B.1.1 Framo TK150 pump.

15.1.B.1.2 Vickers PUH 131CRF13SC

15.1.B.1.3 Engine: Hydromatik model A2F M56 / 6TL-XBBSS GPDd 150

15.1.B.2 **Drawings and documents - [not applicable]**

15.1.B.3 **Regulations and standards - [not applicable]**

15.1.C 15.1.C STATEMENT OF WORK

15.1.C.1 **General**

15.1.C.1.1 Perform maintenance on the FRAMO brand submersible pump, model TK150, located in the lower stabilization tank, used to transfer fuel to land installations. The contractor must perform the following work:

15.1.C.1.2 Remove the pump located in the lower stabilization tank and send it to a hydraulic specialist and authorized FRAMO representative for a complete overhaul and tests on a test bench (hydraulic part);

15.1.C.1.3 Test the pumping capacity of the fuel side pump;

15.1.C.1.4 Remove the pump mounted on the hydraulic unit and send it for testing on a test bench;

15.1.C.1.5 All damaged parts must be replaced. All parts replacement work resulting from the inspection must be negotiated by the PWGSC representative using form PWGSC 1379;

15.1.C.1.6 Reinstall the pump in the tank with new sealing gaskets, once the work is completed;

15.1.C.1.7 Reinstall the pump on the hydraulic pumping unit with new sealing gaskets, once the work is completed;

15.1.C.1.8 A certificate must be provided by the subcontractor, specifying the work and tests carried out.

15.1.C.2 **Hydraulic oil line prove free of obstruction**

- 15.1.C.2.1 In the local bowthruster power pack.
- 15.1.C.2.2 The contractor connect the closed loop pump in order to prove the hydraulic flow. Repairs by 1379.
- 15.1.C.2.3 The power pack reserve must be emptied. Cleaned up. Seen by 1
 - a) The interior strainer must be cleaned, the filter must be changed and will be supplied by the Canadian Coast Guard. The cover gasket must be changed and supplied by the contractor. The tank should be filled through an oil filler filter to be supplied by the Coast Guard. Estimated quantity 210 liters.

15.1.D PROOF OF PERFORMANCE

- 15.1.D.1 **Inspection points**
 - 15.1.D.1.1 The Inspection authority must see the leak test
 - 15.1.D.1.2 The Inspection authority must see the hydraulic power pack before it is closed.
- 15.1.D.2 **Tests and trials**
 - 15.1.D.2.1 A test bench trial of the pump
- 15.1.D.3 **Certification**

15.1.E DELIVERABLES

- 15.1.E.1 **Documentation**
 - 15.1.E.1.1 The contractor must provide a complete report detailing the work performed, the cause of the failures, the necessary modifications and the parts replaced.
 - 15.1.E.1.2 The contractor must submit the original, signed copies to the inspection authority and an electronic copy in PDF format of the report to the inspection authority and the technical authority.
- 15.1.E.2 **Training - [not applicable]**

15.2 DUMP VALVES

- 15.2.A.1 Two (2) butterfly-type drain valves to drain any fuel or other liquid (ballast water) from the upper to the lower stabilization tank. The Contractor must perform the following work :
- 15.2.A.2 The contractor must take the valves to the shop and overhaul them. And reinstall them on the vessel. The contractor must prove local and remote operation

- 15.2.A.1.1 ⁴⁶~~The visual weld inspection report must be submitted to the Technical Authority prior to the galvanizing of the pipes. Ref: 15.1.D.1.1~~
- 15.2.A.1.2 ~~The certificates of qualification of the welding inspection personnel must be submitted to the technical authority before the galvanizing of the pipes.~~

15.2.A.2 Training[– Not Used]

⁴⁶ Rev 1- Remove 15.2.A.1.1 and 15.2.A.1.2

15.3 ANNUAL INSPECTION - FUEL TRANSFER HOSES

15.3.A IDENTIFICATION

15.3.A.1 The purpose of this specification is to carry out the annual inspection and certification of various fuel transfer hoses.

15.3.B REFERENCES

15.3.B.1 Equipment Data

15.3.B.1.1 Details of the fuel transfer hoses that must be inspected and certified⁴⁷:

Item	Description	longeur et embouts	qté	Test pressure
Aeropal aviation fueling hose PLT1.50X100MXM	Low Temp Aviation Hose	1-1/2" x 100' c/w Male NPT Ends adapted with camlocks	1	450 psi
Aeropal aviation fueling hose PLT2.00X50MXM	Low Temp Aviation Hose	2" x 50' c/w Male NPT	1	450 psi
NH tank truck hoses 150 psi WP	Diesel fuel transfer hoses	4" x 50 ft Male and Female locking camlock	4	225 psi
Futura SBQ4369 150 psi	Diesel fuel transfer hoses	2" x 51' Male and Female camlock	1	225 psi
Hose Q2271 150 psi	Fuel transfer	1" x 98' male pipe to male pipe swivel	1	225 psi
Hose Q2270 150 psi	Fuel transfer	1" x 98' male pipe to male pipe swivel	1	225 psi
hose ref 88910 300 psi	petroleum transfer hose	3/4" x 150' male pipe male pipe swivel	1	450 psi

15.3.B.2 Drawings and Documents – [Not Used]

15.3.B.3 Regulations and Standards – [Not Used]

15.3.C STATEMENT OF WORK

15.3.C.1 General

15.3.C.1.1 In order to respect the annual certification dates of the fuel transfer hoses, the above mentioned hoses must be tested and certified.

⁴⁷ Rev 1- 15.3.B.1.1 Added column for test pressure of the hoses

- 15.3.C.1.2 The Contractor must provide all materials and labor required to perform the inspection and hydrostatic testing of fuel transfer hoses (diesel and Jet A-1) in accordance with RMA IP-11-4, based on the operating pressure. The contractor is responsible for transporting the hoses to a workshop for testing, if necessary.
- 15.3.C.1.3 The Contractor must ensure that the hoses are capped. The Contractor must drain and dispose of any presence of fuel in the hoses according to all applicable regulations.
- 15.3.C.1.4 The hoses that fail the above tests must be repaired by the Contractor or a qualified company. The repairs and replacement parts will be processed through Form PWGSC 1379.

15.3.D PROOF OF PERFORMANCE

15.3.D.1 Inspection Points

- 15.3.D.1.1 All work must be completed to the satisfaction of the IA.

15.3.D.2 Tests and Trials

- 15.3.D.2.1 All hoses must be hydrostatically tested.

15.3.D.3 Certification

- 15.3.D.3.1 The Contractor must provide a certificate for each hose identifying the company that completed the inspection, the certificate number, the name and signature of the responsible technician.
- 15.3.D.3.2 The Contractor must ensure that a metal tag bearing the same information is attached to each hose with metal fasteners.

15.3.E DELIVERABLES

15.3.E.1 Documentation

- 15.3.E.1.1 The Contractor must provide a detailed report that explains the work carried out, the cause of any defects, corrective actions taken and any parts that were replaced.
- 15.3.E.1.2 The Contractor must provide the original signed copies of the report and certificates to the IA and an electronic copy in PDF format to both the IA and TA.

15.3.E.2 Training – [Not Used]

15.4 ACCOMMODATION DUCT CLEANING

15.4.A SCOPE

- 15.4.A.1 The intent of this specification item is to clean all supply and return ducting associated with different HVAC systems onboard. These include the HVAC units 2, 3, 4, 5 the bridge heating and ventilation system and the toilet exhaust systems. The ducting for the HVAC units 2, 3, 4 and 5 was last cleaned in 2011.

15.4.B REFERENCES

- 15.4.B.1 Reference Drawings

C1129: HVAC Ducting Layout

221-H-101: General Arrangement

221-H-86 87: Superstructure Deck Accommodation A/C

221-H-88_01: Upper Deck Accommodation A/C

221-H-88_02: Main Deck Accommodation A/C

Drawing number	Title	Sheets
C1129	HVAC Ducting Layout	1
221-H-101	Arrangement général	1
221-H-86 87	Superstructure Deck Accommodation A/C	1

- 15.4.B.1 **Standards**

- 15.4.B.1.1 ACR 2013: National Air Duct Cleaning Association (NADCA) Standard for Assessing, Cleaning, and Restoring HVAC systems.

15.4.C TECHNICAL DESCRIPTION

- 15.4.C.1 **General**

- 15.4.C.1.1 The Contractor must provide the labor and materials to internally clean the ducting associated with the HVAC units 2, 3, 4, 5, the bridge heating and ventilation system and the toilet exhaust system, to a visibly clean state. Visibly clean means the surface is free of non-adhered substances and debris. After cleaning, all ducting must be disinfected. This

cleaning must be carried out by NADCA certified personnel, who must provide proof of their certification.

- 15.4.C.1.2 The cleaning of the bridge and toilet exhaust systems must also include the cleaning of all interior surfaces of the Air Handling Units and their components.
- 15.4.C.1.3 The Contractor must coordinate the work in such a manner that will ensure minimal disruptions to the ship's personnel. The work schedule must be agreed upon by both the Contractor and the Inspection Authority. The duct cleaning for the HVAC units 2, 3 and 5 must be coordinated with the replacement of each of these systems and their associated reheat units.
- 15.4.C.1.4 Prior to working on a system, the Contractor, with the collaboration of the ship's Electrical Officer, must ensure that all necessary equipment has been properly locked out.
- 15.4.C.1.5 Any spaces or compartments entered for HVAC system cleaning must be protected from soiling or any other damage as a result of the cleaning process. The Contractor must remove all protective coverings upon completion of work.
- 15.4.C.1.6 The Contractor must remove all air distribution devices (registers, grilles, and diffusers), clean them so that they are free of all visible contaminants, and then reinstall them in their original location.
- 15.4.C.1.7 The Contractor must use existing access points to gain access for cleaning. Upon completion of the work the Contractor must re-install all access covers and insulation. Any sections of ducting removed to facilitate cleaning, must be reinstalled and sealed upon completion of the work.
- 15.4.C.1.8 All dampers in the ducting, including fire dampers must be proven functional and must be returned to their as found position on completion of duct work cleaning.
- 15.4.C.1.9 Any debris removed from the ducting must be collected and precautions must be taken to prevent the ingress of dirt, dust or debris into connecting spaces. Any vacuum equipment used during the cleaning process, exhausting inside the ship, must be fitted with HEPA filtration having 99.97% collection efficiency for 0.3 micron size particles.
- 15.4.C.1.10 The Contractor must not use any cleaning methods that will damage the ducting or system components.
- 15.4.C.1.11 The Contractor must restore spaces and compartments affected by the work must be restored to their original functional state and cleanliness. The Contractor must dispose of all waste and residues in accordance with all applicable provincial and federal regulations.

15.4.A PROOF OF PERFORMANCE**15.4.A.1 Inspection Points**

- 15.4.A.1.1 Upon completion of the work, all HVAC units must be run up and ductwork proven free and clear.
- 15.4.A.1.2 The contractor shall demonstrate to the inspection authority or his delegate the cleanliness of the pipes before the closure of a section.

15.4.A.2 Testing and Trials

- 15.4.A.2.1 With the ABS inspector present, the tank must be subjected to a hydrostatic test.

15.4.A.3 Certification

- 15.4.A.3.1 Personnel must be certified by NADCA (National Air Duct Cleaners Association)

15.4.B DELIVERABLES**15.4.B.1 Documentation**

- 15.4.B.1.1 The Contractor must provide the Inspection Authority with a copy of the MSDS sheets for all products used in the cleaning and disinfection of these systems.
- 15.4.B.1.2 The Contractor must provide a certificate of cleaning to the Inspection Authority.
- 15.4.B.1.3 The Contractor must submit a detailed report of all work carried out, any defects found, any corrective measures taken (if any) and any recommendations for future maintenance to the Inspection Authority. The Contractor must also supply an electronic version of the report in PDF to both the Inspection and Technical authorities.

16.0 DOMESTIC SYSTEMS

16.1 POTABLE WATER TANKS

16.1.A IDENTIFICATION

- 16.1.A.1 The purpose of the work is to perform the 5 year inspection, certification and maintenance of both potable water tanks.

16.1.B REFERENCES

16.1.B.1 Equipment Data

TANK	FRAME	CAPACITY (m ³)	AREA (m ²)
Fresh Water Tank Port	13 - 27	67.45	218
Fresh Water Tank Starboard	13 - 27	67.45	218

16.1.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
NT-2531-14-CA001A	Tank and compartment surface calculation	98
C17-66-620-11 R1	Capacity Plan	1
221-H-45	Tank Testing Plan	1
Bulletin 2015.pdf	Technical Bulletin Potable water tank epoxy based surface coating...	7
OSB 2020-02.pdf	Operations Safety Bulletin- Updates to test parameters for potable water in Fleet Safety Manual 7.A.12	8

16.1.B.3 Regulations and Standards

- 16.1.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
7.A.12	Potable Water Quality	Yes
Publications		
Bulletin 2015-01	Bulletin technique de la GCC	Yes

Standards		
NSF 61/ANSI 61 -2016	Drinking water system components	No
NACE 6G186-2010-SG	Surface Preparation of Soluble Salt Contaminated Steel Substrates Prior to Coating	No
SSPC SP10	Near White metal blast cleaning	No
SSPC-SP-1	Solvent Cleaning	No
SSPC Guide 15	Methods for Extraction and Analysis of Soluble Salts on Steel and other Nonporous Substrates	No
Regulations		

16.1.C STATEMENT OF WORK

16.1.C.1 General

- 16.1.C.1.1 The preparation and coating work of the potable water tanks must start as early in the work period to allow sufficient curing time. Once the vessel has been safely docked, the Contractor must be responsible for the immediate draining of their contents.
- 16.1.C.1.2 The Contractor must provide all materials, equipment, parts and tools required to carry out the work.
- 16.1.C.1.3 During the work, workers must wear disposable coveralls and shoe covers over their work clothing to avoid contaminating the tank. New protective clothing must be worn each time the tank is entered.
- 16.1.C.1.4 All products or materials (e.g.: lubricant, anti-seize products, gaskets, caulking, o-rings etc.) used when working must be certified for use in a potable water system according to the ANSI 61 standard. The Contractor must provide the technical authority with justifying documents.
- 16.1.C.1.5 The Canadian Coast Guard will hire a NACE technician. The Contractor must coordinate with the technician to let him see all the process.
- 16.1.C.1.6 The coating currently used in the tank is Interline 925. The Contractor must note that the paint manufacturer has replaced Interline 925 with Interline 975P.
- 16.1.C.1.7 All work must be in accordance with the paint manufacturer's guidelines for preparing and applying their product to potable water tanks.
- 16.1.C.1.8 Important: No solvent or thinner must be used in the work.
- 16.1.C.1.9 The Contractor must use all new equipment for the application of the coating including pumps, hoses, spray guns, brushes, etc. This is important to ensure that thinners or solvents

are not inadvertently introduced by equipment previously used and then cleaned and contaminated with thinners or solvents. The re-use of pumps but not hoses may be permitted provided that the Contractor demonstrates draining plus sufficient flushing of the equipment with a product NSF 61 certified for use in potable water tanks and absent of any solvents. The Contractor must not use the product used for flushing on potable water tanks.

16.1.C.2 **Initial Preparation and Cleaning**

- 16.1.C.2.1 The Contractor must remove the manhole covers, finish emptying the tanks with portable pumps then ventilate the tanks. A certified chemist must post a certificate attesting that each tank is gas free and safe to work inside.
- 16.1.C.2.2 The tanks must be washed and cleaned of any contaminant or debris and then wiped dry. For bidding purposes, the Contractor must remove and dispose two hundred (200) litres of water and debris. Once the tanks have been pumped out.
- 16.1.C.2.3 The Contractor must carry out an initial inspection with the inspection authority and a cursory report must be produce to determine the quantity of coating work that needs to be done.

16.1.C.3 **Overhaul of tanks' Suction and Discharge Valves**

- 16.1.C.3.1 The Contractor must remove all suction and discharge valves on each tank and transport them to its shop for overhaul.
- 16.1.C.3.2 The Contractor must perform the following tasks:
 - a) Remove all valve bonnets;
 - b) Dismantle valves, clean and lap disks in with compound to ensure a good seat;
 - c) Clean all valve stems, examine them for wastage and then ring out;
 - d) Report to the IA any valve discs, seats and/or valve stems that require machining or replacement so remedial actions can be performed;
 - e) Inspect all contiguous piping and studs for wastage.
- 16.1.C.3.3 On completion of all cleaning and overhaul, the Contractor must lay out all parts for inspection and survey by the ABS surveyor.
- 16.1.C.3.4 After successful completion of survey and/or repairs, the Contractor must reassemble all valves to a working order, using new gaskets and valve stem packing and then reinstall them in their respective positions on the tanks using new gaskets. All valves are to be installed in a VALVE CLOSED position.
- 16.1.C.3.5 The Contractor must supply and coat all moving parts and fasteners with an anti-seizing compound that is NSF 61 certified for potable water use.

16.1.C.4 Initial Tank Preparation and Cleaning Prior to Painting

- 16.1.C.4.1 The Contractor must bid on the preparation of 40% of the total tank surface area for each of the potable water tanks. This surface must be prepared to obtain a surface profile of the SSPC-10 standard.
- 16.1.C.4.2 Important: The Contractor must strictly follow CCG Technical Bulletin 2015-01 as well as all the parameters identified in paragraph 3.9 and section 7.A.12 of the Fleet Safety Manual.
- 16.1.C.4.3 As the manholes for these tanks are located within the vessel's machinery space the Contractor must take every precaution to prevent ingress of sand into the machinery areas, ventilation systems and accommodations. The Contractor must erect an enclosure around the access of each tank. These enclosures must be under negative pressure to eliminate the possibility of blasting media entering into the machinery spaces. (i.e. the air pressure on the outside of the enclosure must be higher than the air pressure on the inside (tank side) of the enclosure). All ventilation exhaust must be exhausted outside, overboard and away from any of the vessel's ventilation intake fans.
- 16.1.C.4.4 Prior to commencing sandblasting, all above water hull mounted equipment and openings are to be fully protected and all ship openings and ventilation ducts are to be covered with a polyethylene material to prevent sand/grit from entering the ship accommodations and the engine room. All protective coverings must be removed upon completion of work. Any damage resulting from inadequate protection must be repaired by the Contractor at his expense.
- 16.1.C.4.5 After the surface preparation work, the Contractor must thoroughly clean each tank of all residues (accordance with SSPC-SP-1) and other foreign materials. This cleaning must also remove the chloride ions from the tank surfaces. The Contractor must carry out chloride ion testing as described below. If the Chloride ion tests are above the maximum acceptable value, remedial work will have to be carried out by the Contractor to reduce the chloride ion to an acceptable level. This remedial work will be at the Contractor's expense. The Contractor must dispose of these residues respecting federal, provincial and municipal codes in effect. The Contractor must provide the TA with a disposal certificate.
- 16.1.C.4.6 After the tanks are cleaned of all residue, they must be inspected by the IA, the NACE inspector and the ABS surveyor. This inspection is to ensure that the suction valves and sounding pipes are free of obstruction and that limber holes in the floors, stringers and web frames are free. The Contractor is required to advise the NACE inspector when the tanks in question are ready for inspection.

- 16.1.C.4.7 Any structural defects discovered during these inspections will be dealt with using form 1379.
- 16.1.C.4.8 Once the tanks have been cleaned from all blasting residue and contaminants, and prior to painting, the Contractor must conduct chloride ion testing on the bare metal surfaces to be coated. This test must be conducted in the presence of the IA, the NACE inspector and must be in accordance with SSPC Guide 15, Methods for Extraction and Analysis of Soluble Salts on Steel and other Nonporous Substrates. The Contractor must supply and use Chloride ion tests (ex: CHLOR*TEST “CSN SALTS” Test kit) conforming to NACE 6G186, SSPC Guide 15 or SSPC-TU-4. The maximum amount of chloride ion on the surfaces must be 5 µg/cm² or less. The Contractor must record the results of the testing and provide them to the TA and the IA prior to commencing any coating work. If the Chloride ion tests show results above the maximum permissible, additional remedial work must be conducted by the Contractor to reduce the chloride ion count to below the maximum permissible.
- 16.1.C.4.9 To determine the number of tests required, the Contractor must refer to the table below:

(A) Total Recoated Area	(B) Recoated Area per Test
Less Than 50 m ² (539 ft ²)	10 m ² (107 ft ²)
50 m ² (539 ft ²) to 200 m ² (2153 ft ²)	20 m ² (215 ft ²)
200 m ² (2153 ft ²) to 500 m ² (5382 ft ²)	40 m ² (431 ft ²)
500 m ² (5382 ft ²) to 1000 m ² (10764 ft ²)	60 m ² (646 ft ²)

- i) Locate the entry in column (A) for the approximate tank area to be recoated and divide that value by the value in column (B) of the same row.
 - ii) When only portions of the tank are to be recoated, the total area that is to be recoated per location (and not the total recoat area of the tank) is used in the calculation listed above.
- 16.1.C.4.10 Chloride ion tests must be uniformly distributed over the tank area to be recoated.
- 16.1.C.4.11 The Contractor must provide a price for carrying out testing of 100% of the surface area of each tank.
- 16.1.C.4.12 The Contractor must also provide a price per lot of 10 tests.
- 16.1.C.5 **Application of Coating (paint)**
- 16.1.C.5.1 The Contractor must provide a complete schedule of painting work, including the application. The Contractor must ensure that the paint used meets the following criteria :
- a) 100% solid epoxy coating that is volatile organic compound (VOC) free.

- b) Certified "protective barrier material" for use on potable water tanks, as stipulated in the National Sanitation Foundation's "Drinking Water System Components Program – Standard 61."
 - c) Compatible with the existing coating allowing for NSF 61 certification.
- 16.1.C.5.2 The Contractor must indicate a price for recoating approximately 40% of 218 m² of the tank area for each tank.
- 16.1.C.5.3 OPTIONAL - The Contractor must provide a price for the complete blasting and recoating of each of the tanks..
- 16.1.C.5.4 The Contractor must apply a strip coat (as recommended by the paint manufacturer) to all edges and corners at right angles before the first coat of paint is applied.
- 16.1.C.5.5 Ten days after the contract is awarded, the Contractor must provide the Contracting Authority with the following:
 - a) The paint coating that has been bid and that will be applied;
 - b) The manufacturer of the coating;
 - c) Proof that the paint meets the NSF 61 Standard and that it is compatible with Interline 925 (current tank coating). The Contractor must also demonstrate that the two products, when applied one over the other, are NSF 61 approved;
 - d) Manufacturer's application procedures;
 - e) WHMIS Material Safety Data Sheets and product data sheets.
- 16.1.C.5.6 The Contractor must ensure that the paint manufacturer's application procedures for the paint are strictly adhered to, in particular, with respect to:
 - a) Preparation of surfaces
 - b) Drying and curing conditions (including temperature, humidity, dew-point, ventilation, cure time)
 - c) Shelf life of paint
 - d) Compatibility with tank materials
- 16.1.C.5.7 On completion of the surface preparation and prior to the first application of the paint schedule, the Contractor's Quality Assurance representative must provide a written statement certifying that the surface preparation has been completed in accordance with the manufacturer's instructions. Any deviations from those instructions must be noted in the certified statement.
- 16.1.C.5.8 The Contractor must monitor the following parameters during paint application and curing:

- a) The temperature of the ambient air in each tank must be constantly monitored during the application and curing period of the paint schedule, using an electronic data recorder. Temperatures must be recorded hourly and printouts submitted as contract deliverables;
- b) Space temperature and relative humidity level in the tank - before work is started and then then during the curing process;
- c) Wet-bulb temperatures of the tank and temperatures of the surfaces being painted - this is to be taken and recorded every four hours during the coating process as well as during the paint curing process.

16.1.C.5.9 The Contractor must note that the paint application must not take place when the surface temperature of the tanks is less than three (3) degrees Celsius above the dew point.

16.1.C.5.10 The Contractor must dismantle and dispose of the temporary enclosure ashore

16.1.C.6 **Commissioning of the Potable Water Tanks**

16.1.C.6.1 The Contractor must leave the potable water tanks open and ventilated until the paint coating is fully cured. The curing period must be determined based on the ambient air temperature in the tanks as well as the substrate temperature. The Contractor must afford the IA and the 3rd party NACE inspector the opportunity to inspect the cured paint coating before the tanks are closed for commissioning.

16.1.C.6.2 The Contractor must close the manhole covers with new contractor supplied fibre reinforced neoprene gaskets (certified NSF 61) for the manhole covers.

16.1.C.6.3 The Contractor must disinfect each tank in accordance with the CCG Fleet Safety Manual (FSM) Potable Water Quality Guidelines contained in section 7.A.12 prior to filling for testing. The water used for disinfection must be disposed of in accordance with regulations in effect and the Contractor must supply the TA with a disposal certificate. The disinfection of the tanks must be coordinated with the work in Sections 16.2 and 16.3 of this statement of work.

16.1.C.6.4 The Contractor must measure and record the chlorine levels during super chlorination of the tanks. These reading must be provided to the TA.

16.1.C.6.5 The Contractor must hydrostatically test each potable water tank to a head of 2.44m. This hydrostatic test must be witnessed by the IA and the ABS surveyor. This test may be carried out concurrently with the chlorination treatment specified in the FSM.

16.1.C.6.6 The Contractor must supply all required chemicals and equipment for the superchlorination, de-chlorination and disposal of all water used to treat the fresh water

tanks in accordance with paragraphs 3.5 of the CCG Fleet Safety manual (FSM) “Potable Water Quality”, contained in section 7.A.12.

- 16.1.C.6.7 On completion of flushing of the water tanks the Contractor must arrange for water samples to be provided to an accredited laboratory for analysis and to obtain a potable water inspection certificate.
- 16.1.C.6.8 The Contractor must perform the following to obtain these samples:
- a) Each tank must be filled with potable water to half its normal capacity;
 - b) Each tank must then sit undisturbed forty-eight (48) hours before samples are taken;
 - c) One (1) water sample must be taken from the fresh water supply line used to fill the tanks;
 - d) Two (2) samples must be taken from the water inside each tank;
 - e) The samples must be taken in the presence of the IA and the TA;
- 16.1.C.6.9 The Contractor must ship the water samples listed above to an independent, accredited laboratory for water quality testing. The Contractor must ensure that the water samples are kept at the correct temperature and shipped in such a way that the laboratory can perform the water quality analysis. Failure to meet this requirement will require re-sampling of the potable water tanks. The Contractor must have the water samples tested using the 29 parameters described in the Fleet Safety Manual, paragraph 3.6F of the section 7.A.12 – POTABLE WATER QUALITY and the Operational Safety Bulletin 02-2020, as well as other identified chemicals of concern based on the Coating manufacturer MSDS sheets.
- 16.1.C.6.10 The Contractor must take an additional 2 water samples after 72 hours from the time the first samples were taken from the tanks and ship them for analysis and testing as specified in 16.1.C.6.9 and 16.1.C.10.
- 16.1.C.6.11 All potable water test results must meet the parameters specified. Where potable water results are higher than those specified will require the Contractor to perform remedial work at his expense to rectify the situation.

16.1.D PROOF OF PERFORMANCE

16.1.D.1 Inspection Points

- 16.1.D.1.1 The Contractor's quality assurance representative, the IA, TA and the NACE inspector must perform the following tasks:
- a) Inspect each water tank after the surfaces have been cleaned and prepared;
 - b) Monitor ambient temperatures and dew points;
 - c) Monitor surface temperatures;

- d) Monitor the relative humidity;
- e) Final inspection of all tanks prior to being "closed-up".

16.1.D.1.2 The Contractor must provide the results of the Chloride ion testing prior to commencing any coating work.

16.1.D.1.3 Holiday Test

- a) The contractor must perform a holiday test of the entire tank. Repairs must be performed on missing paint areas. All areas missing paint must be repaired with a method approved by the paint manufacturer.

16.1.D.1.4 Water quality test.

16.1.D.2 **Testing and Trials**

16.1.D.2.1 With the ABS inspector present, the tank must be subjected to a hydrostatic test.

16.1.D.3 **Certification**

16.1.D.3.1 The Contractor must provide a copy of the laboratory water analysis results certifying each tank is suitable for potable water use.

16.1.D.3.2 The qualification of the NACE inspector.

16.1.E DELIVERABLES

16.1.E.1 **Documentation**

16.1.E.1.1 The Contractor must provide the TA with the report detailing the work done, defects, repairs performed, measurements and readings taken.

16.1.E.1.2 The Contractor must provide the yard paint report to the IA and the TA. The report must indicate any non-compliance with the manufacturer's instruction in performing the work. This must also include the results of the Chloride ion testing.

16.1.E.1.3 The Contractor must provide the reports from the independent, accredited laboratory for water quality testing to the TA and the vessel as soon as they are available but no longer than 1 week after the samples were taken.

16.1.E.2 **Training - [Not Used]**

17.0 DECK EQUIPMENT

17.1 OPTIONAL⁴⁸ ~~PORT~~ ^^STARBOARD^^ BARGE DAVITS

17.1.A IDENTIFICATION

- 17.1.A.1 The purpose this section is to perform the 5 year inspection, maintenance and certification of the ~~port~~ ^Stbd^ barge davits.

17.1.B REFERENCES

17.1.B.1 Equipment Data

Welin Lambie Davit ^^Modèle 17485A – SWL 11 000 Kg^^

17.1.B.2 Drawings and Documents

- 17.1.B.2.1 The following drawings are to be considered as guidance drawings, as defined in the Drawings section of the General Notes.

Document Number	Drawing / Document Title	Number of Sheets
17.1 Liste bossoir.pdf	List of Sheaves and Pins for Barge Davits	5
Welin Davit.pdf	Installation, Operating & Maintenance Instructions for Special Lum Davits & M 9.4 Winches	26
17485A_01	General Arrangement of Davit Starboard	1
17485A_02	General Arrangement of Davit Port	1
17578	Bolting Plan of Davits	1
1102-0911	General Arrangement of Winch	1
5508-0202	Sectional Arrangement of Winch	1
1151-0101	General Arrangement of FT Winch	1
5506-0801	Sectional Arrangement of FT Winch	1
5505-0901	Sectional Arrangement of Luffing Screw Gear	1
5660-0302	Sectional Arrangement of Shock Absorber	1
5655-0002	Swivel Sheave Block Assembly	1
5655-0102	Boat Block Assembly	1

17.1.B.3 Regulations and Standards

- 17.1.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

⁴⁸ Rev 1- 17.1 Text adjusted to singular for only the Stbd barge davit.

Regulations as well as any other pertinent Federal/Territorial government Regulation or Standard.

	Title	Included Yes/No
FSM Procedures		
7.B.2	Fall Protection	Yes
7.B.4	Hot Work	Yes
7.B.5	Lock Out/Tag out	Yes
Publications		
Standards		
ISO 12944 Paints and varnishes – corrosion protection of steel structure by protective paint systems		
Regulations		
SORS/2007-128	Cargo, Fumigation and Tackle Regulations, Part 3	Non

17.1.C STATEMENT OF WORK

17.1.C.1 General

- 17.1.C.1.1 The Contractor must provide all materials, labor, tools, crane and scaffolding required to carry out the work on ~~each of~~ the barge davits.
- 17.1.C.1.2 The Contract can start work as soon as the barge removed from the ship. The ship's crew will disembark ~~both~~ ^{the} barges.
- 17.1.C.1.3 The Contractor must lock out both barge davits prior to working on ~~them~~ ^{it}. This must be done in the presence of the ship's electrical officer.
- 17.1.C.1.4 The Contractor must support and securely fasten the davit arms for the duration of work.
- 17.1.C.1.5 The Contractor must remove the fore and aft cables before starting the work. The Contractor must install new cables, Contractor supplied, upon completion of the work. The Contractor must dispose of the old cables CABLE 6X36 CAG 7/8" EIPS,IWRC,RHRL 230 feet et 262 feet fac 5/1;. With certificate.
- 17.1.C.1.6 The Contractor must identify all sheaves and pins as to their location while dismantling and removing them, in such a way as to ensure all components are reinstalled in their original location. The Contractor must identify the parts in accordance with the sketches provided. See document « List of Sheaves and Pins for Barge Davits».
- 17.1.C.1.7 The Contractor must provide the services of a specialized firm (level 2 technician) to carry out a magnetic particle inspection of all welds of the davit seating. The Contractor must

provide the report for this inspection. Surface preparation and testing must be included in the price. All seating of gearboxes, shock absorbers, pulleys and davit arms, welded to the deck must be sandblasted. The Contractor must provide shelters to prevent contamination and soiling of the vessel and remove them upon completion of the work. If any welds require repairs, these will be addressed with a 1379. Following the work, the Contractor must coat all exposed metal with a marine paint system, which is compatible with the existing paint system, of at least two coats in addition to the primer. The existing system is 1 coats of International Interbond 201 reddish-brown (RAL 3011) paint with 2 coats of International Interthane 990 reddish-brown (RAL 3011).

- 17.1.C.1.8 The Contractor must dismantle, clean and inspect the lifting hooks, using the same procedure as for the pins. They must not be tested unless repairs are required. Any repairs will be negotiated using a 1379 form.
- 17.1.C.1.9 The Contractor must sandblast each pulley and sheave for visual inspection. The Contractor must clean all grease and prove all grease channels (bearings, pulleys, sheaves, etc). The Contractor must repaint each pulley and sheave with a paint system to comply with ISO 12944 category C5 Very High. The different coats must be of different colors with a final coat of white RAL 9003. The pulleys located on the deck must have a reddish-brown final coat (RAL3011).
- 17.1.C.1.10 The Contractor must inspect and measure all pulleys. Special attention must be taken when inspecting the groove where the cable passes through. All pulley measurements must be taken in the presence of the IA and must be included in the final report.
- 17.1.C.1.11 The Contractor must clean and inspect brass bushings, pins and grease paths. The Contractor must take measurements of the pins and bushings in the presence of the IA and they must be included in the final report. Based on the results of this inspection, replacement of components found to be damaged will be performed by the Contractor. The parts to be replaced will be negotiated using a 1379 form.
- 17.1.C.1.12 The Contractor must carry out a dye penetrant inspection of the mechanical components (sheaves, pins, shackles) to detect any cracks or anomalies. The Contractor must provide a copy of this report to the IA and TA.
- 17.1.C.1.13 The Contractor must also support the transverse boom in order to disassemble and inspect the two shackles. The weight of the boom is approximately 2 tons. The Contractor must carry out a magnetic particles test of two shackles to detect any cracks or defects. The Contractor must provide a report for this inspection.
- 17.1.C.1.14 The Contractor must perform the following works on the five (5) gearboxes:

- a) Drain the oil;
- b) Clean the interior completely;
- c) Check the gears for cracks;
- d) Renew the bearings with high quality;
- e) Renew the gaskets;
- f) Check shafts and their straightness;
- g) Assemble and fill with new oil provided by the ship (Mobil SHC 629).
- h) Replacement parts will be supplied by the contractor and processed via a 1379 form.

17.1.C.1.15 The Contractor must send the electric motors of the gearboxes to a specialized firm to be cleaned and overhauled. The following work must be carried out on each of the electric motors identified below:

- a) Disassemble, inspect, and clean all components
- b) Rewind the stator, dip stator in class H varnish and bake (3 times)
- c) Dynamic balancing of rotor
- d) Conduct a thermographic test
- e) Paint wiring and outer motor casing with epoxy paint
- f) Replace all ball bearings with new bearings (SKF)
- g) Replace anti condensation heating elements
- h) Conduct insulation testing (megger) before and after work.
- i) Provide a detailed report of the work performed, testing and parts replaced.

Electric Motor to be overhauled	Starboard Davit
Luffing Screw - Aft	X
Fall Tensioning Winch – Aft	X
Fall Tensioning Winch - Foreward	X
Main Winch	X

- **Luffing Screw Motors:**

Howells-Starway

Type : TEFC

3 Kw, 460Vac, 3ph, 1100 rpm, Fr. METRIC.

Anti-condensation elements (internal) 120V.

- **Fall Tensioning Winch Motors :**

Howells-Starway

Type : TEFC

2.2 Kw, 460Vac, 3ph, 1740 rpm, 5A, fr. METRIC.

Anti-condensation elements (internal) 120V

- **Main Winch Motor :**

Howells-Starway

Type :TEFC

25 hp,, 460Vac, 3ph, 1700 rpm, 33A, isulation cl.B, Fr. METRIC.

Anti-condensation elements (internal) 120V

Engine manufacturer : Laurence Scott & Electromotors Ltd
Serial number : 21417A7 et 21417A8
RPM :1160
Volt : 440/3/60
Insulation : B
Bearings : D.E. 6208/C3
N.D.E. 6206/C3

- 17.1.C.1.16 The Contractor must overhaul the clutch of the main winch motor and replace the gaskets. Parts to be replaced will be supplied by the Contractor and negotiated using a 1379 form.
- 17.1.C.1.17 The Contractor must dismantle, clean, inspect by magnetic particles, reassemble, with new bearings and gaskets, the worm gear mechanisms. Spare parts will be supplied by the Contractor and the cost must be negotiated via a 1379 form. Prior to reassembly, the Contractor must present the parts to the IA.
- 17.1.C.1.18 The Contractor must overhaul brake and ratchet mechanism. The Contractor must supply replacement parts and the cost must be negotiated using a 1379 form. Prior to assembly, the Contractor must present the parts to the IA for inspection.
- 17.1.C.1.19 The Contractor must unbolt both (2) spring force systems (fall tensioning), clean and inspect, close them with a new seals and grease. The Contractor must clean all these parts by sand blasting the interior and exterior and paint them according to the paint schedule mentioned in this specification. The Contractor must apply grease on the springs to protect them from corrosion.
- 17.1.C.1.20 The Contractor must reassemble and connect all davit components and elements according to the manufacturer`s instructions.
- 17.1.C.1.21 The Contractor must supply and replace all fasteners, bolts, nuts, washers for the bases of the different equipment with new ones of the same size, grade 5.
- 17.1.C.1.22 The Contractor must replace all damaged grease nipples with a stainless steel 316L “button head” model.

- 17.1.C.1.23 During reassembly, the Contractor must check that all grease points are clear. The Contractor must supply and lubricate all components with the grease. The grease used must be compatible with the grease system used onboard the vessel (SKF LGWM-2/0.4).
- 17.1.C.1.24 The Contractor must perform a second greasing, while putting all components into motion during the greasing. This must be done in the presence of the IA.
- 17.1.C.1.25 Upon reinstallation of all davit components, the Contractor must carry out the necessary adjustments of the davits, including their fall tensioning system, to ensure proper operation. The Contractor must also carry out a load test on each of the davits, in the presence of the IA.
- 17.1.C.1.26 The Contractor must provide a detailed report, ~~per davit~~, of all work, measurements and inspections carried out. Precise measurements of all mechanical components must be taken and recorded in this report.

17.1.D PROOF OF PERFORMANCE

17.1.D.1 Inspection Points

- 17.1.D.1.1 The Contractor must provide an inspection plan to the IA. The IA must inspect all mechanical components prior to reassembly. ^^The inspection authority should verify component measurement reports.^^

17.1.D.2 Testing and Trials

- 17.1.D.2.1 The Contractor demonstrate the proper operation of ^^the^^ ~~each~~ davit and ~~all their~~ ^^related^^ systems to the IA, including all safety protections.
- 17.1.D.2.2 The Contractor must carry out a dynamic and static load test of ^^the^^ ~~each~~ davit at 125% of the SWL. The Contractor must carry out a visual inspection of the davit components after each test. The Contractor must provide the weights for these tests.
- 17.1.D.2.3 The Contractor must coordinate with the Canadian Coast Guard a 10-hour sea trial for davit adjustments wave compensation unit. The date of these trials will be determined at a later date. The Contractor must provide the labour and materials for the adjustments.

17.1.D.3 Certification

- 17.1.D.3.1 The Contractor must provide a T2 Certificate of Inspection to the IA.
- 17.1.D.3.2 The Contractor must provide the original copy of the Magnetic Particle Inspection Certificate.
- 17.1.D.3.3 The Contractor must also send an electronic copy of the certificates to the TA

17.1.E DELIVERABLES**17.1.E.1 Documentation**

- 17.1.E.1.1 The Contractor must provide the original copy of the T2 Certificate to the IA and an electronic copy to the TA.
- 17.1.E.1.2 Certificate for ^{^^both^^} the davit cables.
- 17.1.E.1.3 Inspection report non destructive testing.
- 17.1.E.1.4 The Contractor must provide a detailed report of all the work carried out on ~~each~~ of the davits. This report must include all measurements taken, all defects found, all corrective measures taken, all parts replaced, the results of all non-destructive testing and any reports from specialized firms. This report must be provided in PDF format to both the IA and the TA.

17.1.E.2 Training - [Not Used]**17.2 ANCHORS AND CHAINS****17.2.A IDENTIFICATION**

- 17.2.A.1 The purpose of this item is to carry out the 5 year inspection, maintenance and certification of the vessel's anchors and chains.

17.2.B REFERENCES**17.2.B.1 Equipment Data**

- 17.2.B.1.1 The vessel has 2 anchors. The anchor chains are of the forged stud link type (2") with the starboard chain length measuring 10 shots and the port chain measuring at nine 9 shots in length.

17.2.B.2 Drawings and Documents [not used]**17.2.B.3 Regulations and Standards**

- 17.2.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 government Regulation or Standard:

	Title	Included Yes/No
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FSM Procedures		
Publications		
Standards		
SA 2 / SSPC SP6	Commercial blast	non
Regulations		

17.2.C STATEMENT OF WORK

17.2.C.1 General

- 17.2.C.1.1 The Contractor must remove both port and starboard anchors and their associated chains from the vessel and lower them to the dock floor where they are to fully layed out for inspection and survey by the AI and the ABS Inspector.
- 17.2.C.1.2 The Contractor must clean the anchors and anchor chains with a high pressure water jet for inspection by the IA and the ABS Inspector.
- 17.2.C.1.3 The Contractor must dismantle all the shackle joints, including the ones in the chain lockers for inspection, heat them up to facilitate their dismantling and reassemble them correctly. The Contractor must seal the joints with melted lead.⁴⁹
- 17.2.C.1.4 The Contractor must inspect each link and shackle as well as measuring and recording the dimensions of 10 links, taken at random, per each shot of cable for a total of 100 links for the starboard chain and a total of eighty 90 links for the port chain. The Contractor must contact the AI to establish which links are to be measured. Any defects found are to be brought to the attention of the AI and the TA for remedial action. For bidding, the Contractor must quote a unit price for the renewal welding of 100 chain links.
- 17.2.C.1.5 Before reassembly of the shackle joints of each chain, the Contractor must, switch two shackles from the anchor side and connect them to the bitter ends/chain locker.
- 17.2.C.1.6 The Contractor must reconnect the remaining shackles in order to rebuild the anchor chains. All changes of chain links or shackle joints required are to be included in carrying out this work.
- 17.2.C.1.7 The Contractor must clean all surfaces of both anchors and their chains using sand blasting to SSPC-SP-6 standard, making sure the turn them for a complete cleaning.

⁴⁹ Rev 1- 17.2.C.1.3a – French text- mentions of renewing kenter Shackles removed. 17.2.C.1.3 remains untouched.

- 17.2.C.1.8 On completion of survey and/or repairs, the Contractor must supply and apply, on each chain surface, 2 separate coats of ⁵⁰"INTERPRIME 234" red primer (or equivalent). Each coat is to be 0.0035" (0,08 mm) to achieve a DFT of 0.003" (0,07 mm).
- a) The Contractor must supply and apply two coats of anti-corrosive black INTERGARD FP (or INTERGARD 264), or equivalent, paint on the chains. Each coat must be 0.0035" (0,08 mm) to achieve 0.003" (0,07 mm).
 - b) joining shackles, same as the chain, but with a red enamel.
 - c) The appropriate number of links corresponding to the "shot number" (from the anchor) on either side of the joining shackle must be painted white enamel. The stay of the last painted white link on either side of the joining link must be wrapped with a galvanized steel wire with the number of winds equaling the number of shots.
- 17.2.C.1.9 The Contractor must sweep-blast, supply the paint and prime both anchors with two coats of ⁵¹"INTERPRIME 234" red primer (or equivalent). Each coat is to be 0.0035" (0,08 mm) to achieve a DFT of 0.003" (0,07 mm). Then each anchor is to receive two (2) coats of "Intergard 264 black" (or equivalent). Each coat is to be 0.0035" (0,08 mm) to achieve a DFT of 0.003" (0,07 mm).
- 17.2.C.1.10 On completion of all work, the Contractor must reconnect both the port and starboard anchors and chains to their respective "Bitter-ends" and correctly re-stow and secure on board the vessel to the satisfaction of the AI, once work in section chain locker is completed.
- 17.2.C.1.11 One shot of chain must be replaced, 90 feet. The Canadian coast guard will provide the chain.

17.2.D PROOF OF PERFORMANCE

17.2.D.1 Inspection Points

- 17.2.D.1.1 The Contractor must afford the attending ABS Surveyor and the IA the opportunity to visually inspect the following items;
- a) Spread out anchor and anchor chain.
 - b) Joining shackles and swivels,
 - c) Bitter end connection

17.2.D.2 Testing and Trials

⁵⁰ Rev 1- French only added reference to interprime 234

⁵¹ Rev 1- French only added reference to interpreime 234 and intergard 264.

17.2.D.2.1 The Contractor must afford the attending ABS Surveyor and the IA the opportunity to witness:

- a) Ringing out of all chain links and shackles.
- b) The successful operation of anchor and anchor chain.

17.2.E DELIVERABLES

17.2.E.1 Documentation

17.2.E.1.1 The Contractor must supply the IA and the AT with a typewritten copy of a report detailing the work undertaken, defects, repairs made and measurements and readings taken.

17.2.E.1.2 The Contractor must also provide a copy of the ABS survey credit to the IA.

17.2.E.1.3 The Contractor must provide a Quality Assurance (QA) report indicating that all parts of the anchors and chains have been inspected by the Contractor's QA Department for correct installation and fit.

17.2.E.2 Training – [Not Used]

17.3 ANNUAL INSPECTION – ELEVATOR AND DUMBWAITER

17.3.A IDENTIFICATION

17.3.A.1.1 The objective of this item is to carry out the annual inspection, maintenance and certification of the ship's elevator and dumbwaiter.

17.3.B REFERENCES

17.3.B.1 Equipment Data

17.3.B.1.1 The equipment that must be inspected:

- Elevator
Manufacturer: Montgomery Elevator Co. Ltd
Capacity: 1200 lbs
Speed: 100 pi/min
- Dumbwaiter
Manufacturer: Montgomery Elevator Co. Ltd
Capacity: 300 lbs
Speed: 50 pi/min

17.3.B.2 Drawings and Documents – [Not Used]

17.3.B.3 Regulations and Standards

17.3.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 government Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
Publications		
Standards		
16.2.2CAN/CSA-B44-M90	Safety Code for Elevators, section 12	No
Regulations		

17.3.C STATEMENT OF WORK

17.3.C.1 General

- 17.3.C.1.1 The Contractor must hire a certified firm to carry out the maintenance, inspection and certification of the elevator and dumbwaiter in accordance with CAN / CSA-B44-M90, section 12.
- 17.3.C.1.2 The Contractor must update the maintenance register for each piece of equipment once the work is completed.
- 17.3.C.1.3 The Contractor must clean and adjust the brake for the dumbwaiter. The Contractor must clean the floor and compartment containing the electric motor.
- 17.3.C.1.4 This inspection includes a test of the Montgomery elevator's speed limiter.
- 17.3.C.1.5 Upon completion of the work, the Contractor must return all spaces to their original functional state and cleanliness.
- 17.3.C.1.6 Any additional work must be billed at the regular hourly rate using a 1379 form.

17.3.D PROOF OF PERFORMANCE

- 17.3.D.1 **Inspection Points – [Not Used]**
- 17.3.D.2 **Tests and Trials**
 - 17.3.D.2.1 The Contractor must perform operation tests, in the presence of the IA, demonstrating the proper operation of each piece of equipment prior to being put back in service.
- 17.3.D.3 **Certification – [Not Used]**

17.3.E DELIVERABLES

- 17.3.E.1 **Documentation**
 - 17.3.E.1.1 The Contractor must provide the original copy of the inspection certificates to the IA before the end of the work period (one certificate per piece of equipment). The Contractor must also provide an electronic copy in PDF format to the TA.
 - 17.3.E.1.2 Upon completion of the work, the Contractor must provide a detailed report explaining the work carried out, the cause of any defects (if any), any corrective measures taken and any parts replaced. The Contractor must also submit an electronic copy of the report in PDF format to the IA and to the TA.
- 17.3.E.2 **Training – [Not Used]**

18.0 COMMUNICATIONS AND NAVIGATION

18.1 SATELITTE TV ANTENNA

18.1.A IDENTIFICATION

- 18.1.A.1 ⁵²The intent of this specification is to install an owner supplied Satellite TV antenna on^^ the chimney^ ~~an existing structure on top of the wheelhouse.~~^This is a one for one replacement. The Contractor doesn't have to run cables, only replace the antenna.^
- 18.1.A.2 ⁵³This work must be carried out in conjunction with the other essential electronic equipment requirements detailed in main specification.
- 18.1.A.3 CCG Technicians must have access to the Contractor's facilities, at all times, to proceed with wiring terminations and commissioning.
- 18.1.A.4 CCG Technicians must be allowed to run short cables, install equipment inside consoles or racks if required during commissioning and troubleshooting.

18.1.B REFERENCES

18.1.B.1 **Equipment Data**

- 18.1.B.1.1 The contractor must supply all materials, equipments and parts necessary for the specified work unless stated.
- 18.1.B.1.2 Cables will be reused
- 18.1.B.1.3 The following specific equipment will be supplied by the CCG:
- a) Satellite TV Antenna Radome (Seatel TV-120). ^6012^

⁵² Rev 1- 18.1.A.1 details added.

⁵³ Rev 1- 18.1.A.2 French text remove section to fit English text.



Photo 1 - Antenne Satellite (Seatel 612)

18.1.B.2 Drawings and Documents

Document Number	Document Title	File Name
99-141160-Rev A	Seatel 120 TV Manual	99-141160-a_dealer technical- manual_sea-tel-tvtvhd-ecen- ear 99.pdf
99-138223-A	Seatel 6012 Installation Manual	SeaTel 6012 Installation Manual (99-138223-A).pdf

18.1.B.3 Regulations and Standards

- 18.1.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:

FSSM Procedures	Title	Included Yes/No
7.B.4	Hot work	Yes
7.B.5	Lock out and Tag Out	Yes
Publications		
Standards		
TP127E	Ships Electrical Standards	No

IEEE 45:2002	Recommended Practice for Electrical Installations on Ships	No
70- 000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment	No
Regulations		
	Canada Shipping Act, 2001	No

18.1.C STATEMENT OF WORK

18.1.C.1 General

- 18.1.C.1.1 The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Contractor must supply all equipment, enclosures, ventilation, staging, chain falls, craneage, slings and shackles necessary to perform the work. All lifting equipment must be 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. 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 and 2.
- 18.1.C.1.2 Prior to any hot work taking place, the Contractor must ensure that the area of work and all equipment, wiring, transits, etc. have been sufficiently protected from any sparks or metal filings. The Contractor must also ensure that the area of work, the system, and the adjacent space is certified as gas free and suitable for hot work as per the Fleet Safety and Security Manual.
- 18.1.C.1.3 The Contractor must be responsible to ensure that all areas have been thoroughly cleaned and free of any debris resulting from the performance of this specification item.
- 18.1.C.1.4 The Contractor must follow existing cable trays throughout the vessel where fitted. Once installed, all cabling must be secured as per TP127.
- 18.1.C.1.5 Prior to the commencement of any electrical work, the Contractor must ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tag out procedure, and as per ISM fleet safety manual.
- 18.1.C.1.6 Upon final installation, testing must be carried out as per Section 18.1.D.2 of this document.

18.1.C.2 Equipment

- 18.1.C.2.1 The Contractor must dismantle the antenna on the stack.

- a) Canadian coast guard technician will disconnect the antenna.

18.1.C.2.2 The Contractor must install the television satellite antenna:

- a) Satellite antenna (Seatel 6012)
 - i) The Contractor must clean the rust on the existing base
 - ii) The Contractor must apply primer and paint compatible with the ship's paint system.
 - iii) The Contractor must install the antenna (SeaTel 6012 Installation Manual (99-138223-A).pdf).
 - iv) The Contractor must install a grounding point, (welded bolt) under the antenna.

18.1.C.3 **Location**

18.1.C.3.1 Chimney

18.1.C.4 ⁵⁴**Interferences**

18.1.C.4.1 The Contractor is responsible to identify interference items, temporary removal storage and reinstallation.

18.1.D PROOF OF PERFORMANCE

18.1.D.1 **Inspection Points**

18.1.D.1.1 The ABS class surveyor and the IA must be present at the inspection of the work

18.1.D.2 **Tests and Trials**

18.1.D.2.1 Electronic equipment which has been removed for the performance of this specification must be returned in operational condition. They must be packaged properly and stored in a location determined with the IA at the time of installation

18.1.D.2.2 Terminations

- a) CCG Technicians will complete the wiring terminations on the system. They must be granted access to the Contractor's job site at all times.

18.1.D.2.3 Commissioning

- a) CCG Technicians will complete the commissioning on the system. They must be granted access to the Contractor's job site in all times.

18.1.D.3 **Certification**

⁵⁴ Rev 1- 18.1.C.4 insert- interferences

- 18.1.D.3.1 The IA will complete the certification on this system after the system has been installed and commissioned.

18.1.E DELIVERABLES

18.1.E.1 **Documentation**

18.1.E.2 **Training – [Not Used]**

20.0 SCIENCE, OCEANOGRAPHIC, AND HYDROGRAPHIC EQUIPMENT

20.1 MULTIBEAM SYSTEM MODIFICATIONS

20.1.A IDENTIFICATION

20.1.A.1 The purpose of this specification item is to install a back-up SVS Sound and Velocity sensor.

20.1.B REFERENCES

20.1.B.1 Equipment Data

Drawing Number	Document Title	Number of Sheets
	Micro X User Manual	28

20.1.B.2 Drawings and Documents

Drawing Number	Drawing / Document Title	Number of Sheets
424444	Hull Unit HL2900 EM712	1
424511	Transducer Pod Assembly EM712	1
424455	General Arrangement HL2900 EM	1

20.1.B.3 Regulations and Standards

	Title	Included Yes/No
FSM Procedures		
7.B.4	Hotwork	Yes
Publications		
Standards		
Regulations		
TP 127	Ships Electrical Standards	No

20.1.C STATEMENT OF WORK

20.1.C.1 primary SVS

20.1.C.1.1 ⁵⁵ ~~The primary SVS installed on the multibeam system is currently not functioning and must be removed along with its associated cabling.~~ The SVS is mounted on the transducer

⁵⁵ Rev 1- 20.1.C.1.1 delete text.

pod assembly which is attached to a ram and deployed through the hull of the ship. Details of this system can be seen in the reference drawings 424444, 424511 and 424455. The actual mounting configuration is also shown in *Figure 1: SVS mounting configuration on transducer pod assembly*:



Figure 1: SVS mounting configuration on transducer pod assembly

- 20.1.C.1.2 To access the SVS the transducer pod assembly must be deployed below the hull of the ship. The Contractor must consult the IA prior to deployment or retraction of the system.
- 20.1.C.1.3 To access the SVS cable from below the Contractor must remove the lower cover of the transducer pod assembly. To remove the cover the Contractor must remove a number of screws in the bottom panel. These screws must be retained as the bottom cover will be reinstalled after the two new SVS are installed. The Contractor must not remove the screws holding the transducers in place. The transducers are shown in *Figure 2: Bottom view of transducer pod assembly*. **The Contractor must take extreme caution to not damage the transducers when working around the pod assembly.** Upon removal of the lower cover both transducers must be fully enclosed and protected to prevent scratches, dents or other forms of damage while completing the remaining work.

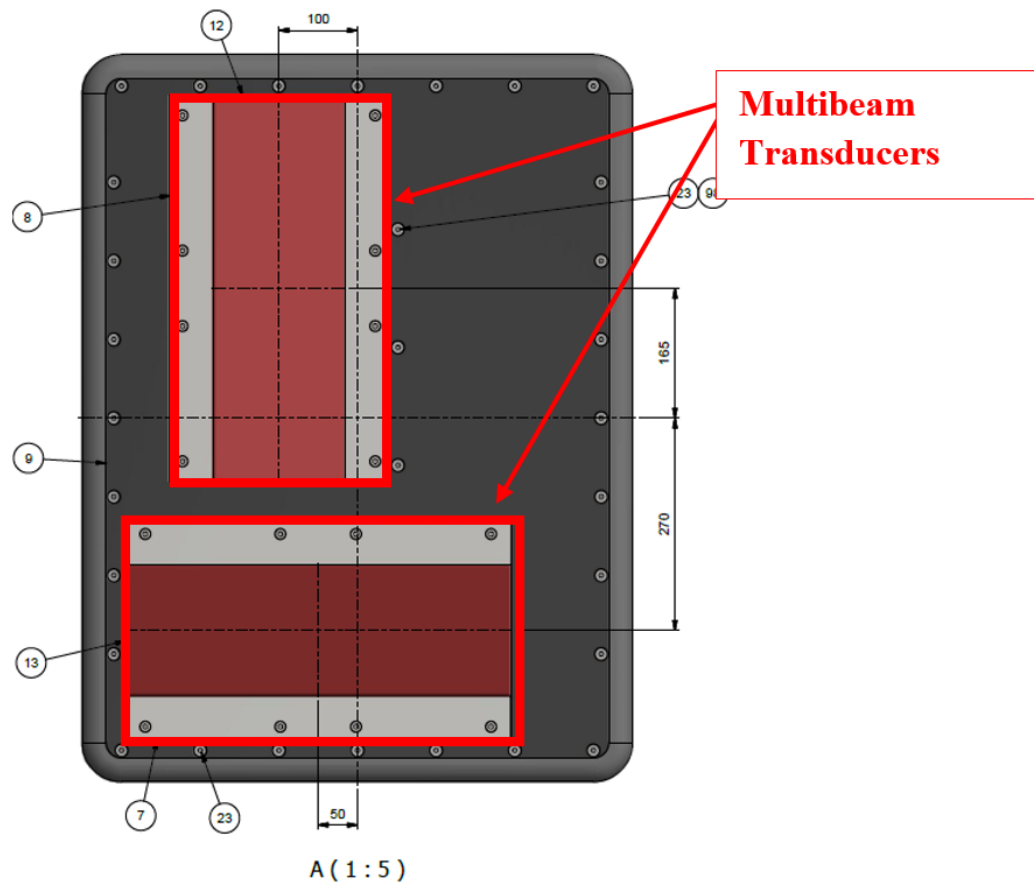


Figure 2: Bottom view of transducer pod assembly

- 20.1.C.1.4 To access the SVS cable from the top, the Contractor must remove the transit block which is installed at the top of the ram. The Contractor must take care when removing the transit block as any pieces which fall into the ram will be extremely difficult to remove. This transit block must be retained for reinstallation of the two new SVS. The transit block is shown in *Figure 3: Transit block on top of multibeam ram*:

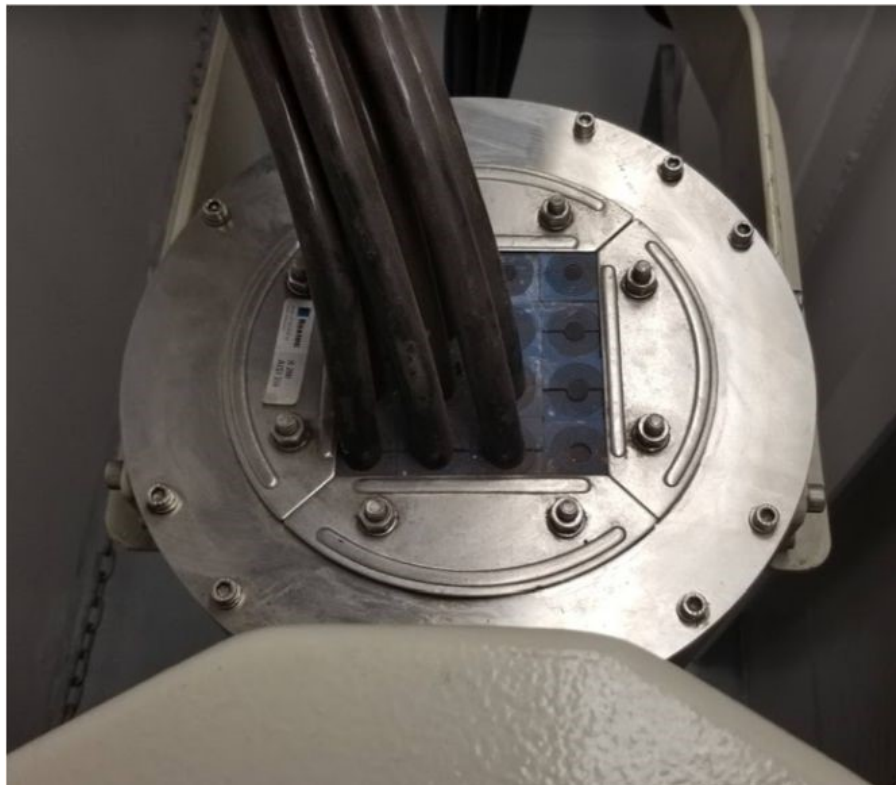


Figure 3: Transit block on top of multibeam ram

- 20.1.C.1.5 After opening the accesses for the SVS cable from above and below the ram the Contractor must remove this cable. The cable passes from the transducer pod assembly, up through the ram, through the transit block at the top of the ram, through a second transit block supporting the cable and then through the transit in the centreline bulkhead separating the multibeam and heeling compartments. The cable terminates on the aft bulkhead of the heeling compartment, near the centreline. The total cable run is approximately 25m.
- 20.1.C.2 **Installation of a new SVS**
- 20.1.C.2.1 The SVS and its associated cables, described in this section, will be provided by CCG.
- 20.1.C.2.2 The Contractor must fabricate a second mounting base for the new SVS. This base must be fabricated from high-density polyethylene and secured to the transducer pod assembly with cap screws. The new mounting base must match the existing base both in terms of dimensions and mounting arrangement. The Contractor must also install two stainless steel hose clamps on the new mounting base to secure the SVS. The configuration of the mounting base can be seen in *Figure 1: SVS mounting configuration on transducer pod assembly*. The exact location of the new mounting base on the transducer pod assembly will be confirmed by CCG onsite.

- 20.1.C.2.3 The Contractor must run the SVS cable from the mounting bases on the transducer pod array, in through the available opening on top of the transducer pod assembly, and up through the hollow deployment ram. The cables will then travel through the support transit, inboard through the transit at the forward edge of the centreline bulkhead and then aft to the SVS junction box in the heeling compartment. The Contractor must connect one of the SVS sensors within the junction box. This connection must match the previous connection recorded ⁵⁶as part of ~~Error! Reference source not found.~~ for the existing SVS sensor[^]. The second cable must be capped and secured near the SVS junction box. The approximate cable run is 25m.
- 20.1.C.2.4 The Contractor must mount the two SVS on the mounting brackets and connect each with its associated cable.
- 20.1.C.2.5 Upon installation of the new SVS and associated cabling the Contractor must remove the protection installed on the transducers and reinstall the covering plate with all screws.
- 20.1.C.2.6 The Contractor must reinstall the three transits affected by the installation. The transit at the top of the deployment ram, the cable support transit and the centreline bulkhead transit between the multibeam and heeling compartments.

20.1.D PROOF OF PERFORMANCE

20.1.D.1 Inspection Points

- 20.1.D.1.1 The Contractor must provide CCG with 24 hour notice for all inspection requirements.
- 20.1.D.1.2 The IA will inspect the protection installed as part of 20.1.C.1.3 prior to continuing work around the transducer pod assembly.

20.1.D.1.3 ⁵⁷The IA will inspect the fit-up of the piping system in ~~Error! Reference source not found.~~ prior to final connection.

- 20.1.D.1.4 The IA will inspect the proposed location of the new SVS mount in 20.1.C.2.2 prior to final installation.

20.1.D.2 Testing and Trials

- 20.1.D.2.1 The CCG will confirm the functionality of the two SVS prior to the Contractor closing the transits and bottom cover of the transducer pod assembly.

20.1.E DELIVERABLES

⁵⁶ Rev 1- 20.1.C.2.4 and 20.1.D.1.3 – error reference removed.

⁵⁷ Rev 1- 20.1.D.1.3 Delete. Insert None

20.1.E.1 Documentation

20.1.E.1.1 The Contractor must provide the technical data sheet for the paint products used before the start of the application.

20.1.E.1.2 The Contractor must provide material/specification data for all pipes, valves and fittings installed as part of this specification.

20.1.E.2 Training – [Not Used]