

CCG VESSEL F.G.CREED
F3065 – 190368
Winterizing Dry-Dock 2019-20
DATES : 27/11/2019 to 31/03/2020

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G 1.0 **GENERAL NOTES**

G 1.1 **Vessel Particulars**

G 1.1.1 **Details**

Name :	CCGS F.G.Creed
Official Number:	813676
Class:	Hydrographic Sounding Vessel
Year Built:	1988
Principle Dimensions:	19.2 m
Length:	19.2 m
Breadth, molded:	9.91 m
Loaded Draft:	2.74 m
Tonnage, displ:	75 t
Type :	Swath
Propulsion	Diesel Reduction Gear

G 1.1.2 **Equipment**

Equipment	Make	Model	Serial No.
Jib Crane 272 Kg	Unknown	Unknown	N/A
Gantry 454 Kg	N/A	Unknown	N/A
Winch	Meridien	Customized	N/A

G 1.2 **References**

G 1.2.1 **Regulations**

- G 1.2.1.1 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 specification are done to all pertinent federal and territorial regulations and standards to latest edition at time of

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contract.. CCG procedures are to be used as a guide if no other regulation takes precedence.

CCG Procedures	Title	Included Yes/No
FSSM	Fleet Safety and Security Manual (Latest Edition)	Yes
Ship Specific	Vessel Specific - Asbestos Risk Assessment Report and Management Plan	Yes
Ship Specific	Vessel Specific – Lead Paint Test Report	Yes
Publications		
TP 127	Ships Electrical Standards	No
NFPA 306 2014	Standard for the control of gas hazards in vessels to be repaired or altered	No
TP 3669	Standards for Navigating Appliances and Equipment	No
TP 11469	Guide to Structural Fire Protection	No
TP 14231	Marine Occupational Health and Safety Program	No
TP 14612	Procedures for approval of Life-saving appliances and fire safety systems, Equipment and Products	No
TP 4414 E	Guidelines Respecting Helicopter Facilities on Ships.	No
IEEE45	Institute of Electrical and Electronics Engineers, Recommended Practice for Electrical Installations on Shipboard	No
70-000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment	No
IEC 60533	Electrical and Electronic installations in ships – Electromagnetic Compatibility	No
IEC 60945	Maritime Navigation and Radio communication equipment and systems – methods of testing and required test results.	No
EPS Report 1/RA/2	Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from	No

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	Refrigeration and Air Conditioning Systems - Environment Canada	
NFPA 10	Standard for portable fire extinguishers	No
18-080-000-SG-003 (formerly DFO/5884 - TP 12445E)	PAINTS AND COATINGS STANDARD	

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Standards	Title	Included
CCG	CCG CAD using AutoCAD http://intra.coast-guard.ca/folios/00922/docs/ccgststden.zip	No
CCG	CCG Standards for Electronic Data	No
CCG	CCG Trim and Stability Book Production MECTS# 3350860	No
CCG	Colour Coding Standard for Piping Systems 30-000-000-ES-TE-001	No
CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures Division 2 Certification	No
CSA W47.2	Certification of Companies for Fusion Welding of Aluminum	No
CSA W59	Welded Steel Construction – Metal Arc Welding	No
CSA W59.2	Welded Aluminum Construction	No
ISO 9712:2005	International Standards for NDT	No
CT-043-EQ-EG-001-E	Welding Specification http://intra.coast-guard.ca/folios/00922/docs/WeldingSpecification-eng.pdf	Yes
SSPC	The Society for Protective Coatings	No
ISO 8501-1:2007	Preparation of steel substrates before application of paints and related products	No
ISO 10816-1:1995	Mechanical vibration -- Evaluation of machine vibration by measurements on non-rotating parts -- Part 1: General guidelines	No
Regulations	Title	Included
MOHS	Maritime Occupational Health and Safety	No
CSA	Canada Shipping Act	No
Machinery Regs.	Marine Machinery Regulations (SOR/90-264)	No
Fire Safety	Vessel Fire Safety Regulations (SOR/2017-14)	No
Hull Regs.	HULL INSPECTION REGULATIONS (C.R.C., C. 1432)	No
Canada Labour Code	Canada Labour Code (R.S.C., 1985, c. L-2)	No
Workers' Safety & Compensation Commission work-safe regulation of the province or territory	http://www.ccohs.ca/oshanswers/inTraining/wcb_canada.html	No

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where the work is performed		
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G 1.2.2 Reference Drawings

G 1.2.2.1 The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Numéro de dessin	TITRE DU DESSIN	Nombre de feuilles
176-DCK_2	Shell Expansion	
65-B1	Construction profile	
65-C8	Shaft Line	
65-D1_1	Ligthing and switch plan	
176-100-1	Accomodation	
176-B	Docking plan Port	
176-T	Docking plan Starboard version 2013	
65-A5	Rudder Plate	
02604-20	Fire	
02604-10	Lifesaving Equipment	
02604-SF	Symbolization (2)	
65-A4	Stabilizer fin Detail	
8265-200	Rudder construction	
65-A3	Canard fin Detail	
SOS65-B1	Construction profile	
FR-98-2	Stabilizer Wing	
65-B4	Deck Framing Plan	
	Extinguishers List	
176-360	Gantry 1000 lbs	
2434-0002	15x24 Hingeless	

G 1.2.3 Tanks

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G 1.2.3.1 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.

Tank Name	Location	Capacity in m³
Port Forward Fuel Tank	Frames 8-11	4.324
Port After Fuel Tank	Frames 14-16	3.49
Stbd Forward Fuel Tank	Frames 8-11	4.324
Stbd After Fuel Tank	Frames 14-16	3.49
Port Fuel Oil Day Tank	Frames 11	.262
Stbd Fuel Oil Day Tank	Frames 11	.262
Port Potable Water Tank	Frames 5-7	1.440
Stbd Potable Water Tank	Frames 5-7	1.440

G 1.2.3.2

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

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

G 1.3 Conditions and definitions

G 1.3.1 The following conditions and definitions are applicable to all work contained in the Specifications and are intended to outline the quality of workmanship and practice that is the minimum acceptable level:

G 1.3.2 Introduction

G 1.3.3 The purpose of the following project is initially to determine the structural condition of the vessel and its ability to navigate safely. Second is to assess the safety and effectiveness of its systems in the event of fire, bad weather or water intrusion. Third, assessing whether the vessel is repairable has reasonable costs for Canada for a minimum of 10 years. Fourth, if the ship is declared unfit for navigation and therefore has resale, it will be dismantled in this contract by the yard. The Contractor's role will be dry-docking, wintering of the vessel, and assisting the CCG and its subcontractors in the evaluation of the vessel, as well as the non-optional inspections under the contract.

G 1.3.4 It is the responsibility of the contractor to ensure that:

(a) that the performance of the work specified herein meets all stated and regulatory requirements;

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(b) that all materials and equipment provided are considered necessary to ensure the vessel's seaworthiness and safe operation in accordance with all requirements for a ship of this class;

G 1.4 Miscellaneous provisions

G 1.4.1 Workplace Health and Safety

G 1.4.1.1 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 1.4.1.2 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 meet or exceed the safety management system defined in the FSMM, unless the contractor has proposed a comprehensive safety management system that has been reviewed and accepted by the technical authority.

G 1.4.1.3 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 the Contractor's employees, including all subcontractors, 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 and Security Manual.

b) The Contractor must comply with the Fleet Safety and Security Manual, DFO/5737, as well as with the Instructions for working on board the vessel,

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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 Tag out;
- v) Pre-work safety assessments.

c) The contractor and his representatives shall participate in a ship safety orientation session prior to the commencement of any work to familiarize the contractor's employees with the hazards specific to the ship and its permit systems related to work protocols. During this session, CCG will review procedures for safety, risk prevention, hazard response and pre-work safety assessments. The contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.

d) For the purpose of the Lockout and identification procedure, the Contractor must provide the padlocks and locking devices for the Contractor's employees as well as those provided by the Chief Engineer for the vessel's crew.

e) The Contractor must adhere to local facilities shore based safety instructions and safety procedures if they are provided to the Contractor.

G 1.4.1.4 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 1.4.1.5 Areas that pose a hazard as a result of the specification 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 1.4.2 Lead Paint and Paint Coatings

G 1.4.2.1 The Contractor must not use lead based paints.

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G 1.4.2.2 CG ships have been painted with lead based paints in the past and as a result some of the Contractor's processes such as grinding, welding and burning may release this lead from the coatings. Coast Guard will provide copies of all available lead testing results, however; responsibility lies with the contractor to ensure all environmental considerations and use of od Personal Protective Equipment are employed.

G 1.4.3 Touch-up / Disturbed Paint

G 1.4.3.1 The Contractor shall, as a minimum, repair paint systems altered by the specified work. Paint systems shall correspond to that of the ship and shall be applied in accordance with the procedures recommended by the paint manufacturer.

G 1.4.4 Asbestos Containing Materials (ACM)

G 1.4.4.1 The Contractor must use insulation that contains 0% ACM.

G 1.4.4.2 The Contractor will be supplied the most recent Asbestos Risk Assessment Report and Asbestos Management Plan by CCG prior to Assumption of Custody.

G 1.4.4.3 Handling of any asbestos containing materials must be performed by trained personnel and/or a company certified in the removal of asbestos in accordance with Federal, Provincial/Territorial and Municipal regulations.

G 1.4.4.4 The Contractor must provide the TA with disposal certificates for all asbestos containing material removed from the vessel indicating that the disposal was in accordance with Federal, Provincial and Municipal regulations in effect.

G 1.4.4.5 The Contractor must provide an "Observation Report (OR)" with reference to any concerns or intentions in regards to asbestos containing materials not already specified. The Contractor is to identify any materials that are suspected to contain asbestos prior to any work being completed. Any approved work resulting from the OR will follow the Additional Work Procedures.

G 1.4.5 Confined Spaces

G 1.4.5.1 Prior to commencing work in any confined space, the Contractor must ensure that a qualified person issues a "Gas Free Certificate" for that space. Certificates must specify, "Safe for persons" or "safe for hot work" as appropriate. Contractor must adhere to the safety management system requirements as determined in the Pre-Work Meeting.

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- a) Any entry into confined spaces onboard the vessel during the contract period must be conducted in accordance with the safety management system as determined in the Pre-Work Meeting.
- b) All copies of certificates generated are to be provided to the TA in accordance with the Documentation section of the General Notes.

G 1.4.6 Hot Work

G 1.4.6.1 The Contractor must, as a minimum, ensure the following items are followed when conducting hot work while in their care and custody:

- a) The compartment(s) affected must be certified gas free by a qualified person. The Contractor must provide all certificates to the TA in accordance with the Documentation section of the General Notes. Certificates must specify, "Safe for persons" or "safe for hot work" as appropriate. The Contractor must post a copy of all certificates at the entrance to the affected spaces;
- b) All portable combustible materials within 2m of hot work must be removed from the vicinity;
- c) Protective material must be used to prevent the spread of sparks, protecting electrical cables and other services;
- d) Fire sentries must be provided in each space and in the adjacent space where welding, grinding, or burning is being carried out on bulkheads, deckheads or decks.
- e) Fire sentries must be provided with an appropriate fire extinguisher (Contractor supplied) and must be trained in its use. The fire sentry must maintain a watch in his designated area for at least thirty (30) minutes after any hot work has been completed.
- f) Any hot work carried out onboard the vessel during the contract period must be conducted in accordance with the safety management system. A copy of the site generated hot work permits must be provided to the TA in accordance

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with the Documentation section of the General Notes named in accordance with the specification item generating the required work.

G 1.4.7 Work Aloft

- G 1.4.7.1 Any work aloft onboard the vessel during the maintenance/refit 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 1.4.8 Electrical Equipment

- G 1.4.8.1 When working on electrically operated equipment, the following precautions must be taken at a minimum:

- a) All electrical equipment undergoing work must be isolated at the main power and alternate distribution panel;
- b) Electrical lock-outs must be used to isolate the equipment and electrical caution tags posted at the main power and distribution panel on those switches supplying equipment under maintenance and verification made at the terminals to ensure power is not present.
- c) Only after completion of the work must the lock-outs and electrical caution tags be removed and the switches engaged.
- d) Any lock-out requirements onboard the vessel during the contract period must be conducted in accordance with the safety management system.

- G 1.4.8.2 The TA must be notified of all such ongoing work.

- G 1.4.8.3 All electrical installations and repairs must be done in accordance with the latest revisions of TP127E - Electrical Standards of Transport Canada Marine Safety and of standard 45- Recommended Practice for electrical installation on ships – of the IEEE. Standard TP127 takes precedence over the IEEE standard.

G 1.4.9 Workplace Hazardous Materials InTraining System (WHIMS)

- G 1.4.9.1 The Contractor must provide the TA with Material Safety Data Sheets (MSDS) for all Contractor and sub-contractor supplied WHIMS controlled products. MSDS

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sheets are to be the formats requested in the Documentation section of the General Notes.

G 1.4.9.2 All MSDS sheets must be maintained in accordance with OHS procedures.

G 1.4.9.3 The TA will provide the Contractor with access to MSD sheets for all controlled products on the ship for all specified work items on request.

G 1.4.10 Smoking in the Work Space

G 1.4.10.1 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 1.4.11 Contractor Furnished Materials (CFM) and Tools

G 1.4.11.1 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 1.4.11.2 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 inTraining about materials used, certificate of grade and quality of various materials to the TA prior to use.

G 1.4.11.3 The Contractor must provide all equipment, devices, tools and machinery such as crange, staging, scaffolding, hoarding, and rigging necessary for the completion of the work in this specification.

G 1.4.11.4 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 1.4.11.5 Equipment and equipment components with the same fit and function must have the same form throughout the contract and warrantee period. That is to say the Contractor must ensure the implementation form (eg. hardware and software) is identical for items with the same fit and function regardless of when installed.

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G 1.4.12 Government Supplied Materials (GSM) & Tools

- G 1.4.12.1 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 1.4.12.2 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 1.4.13 Storage

- G 1.4.13.1 Equipment (i.e. covers, cowling and other items that may need to be removed and stored) must be stored and maintained 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 1.4.13.2 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 1.4.14 Regulatory Inspections and/or Class Surveys

- G 1.4.14.1 The Contractor must contact, coordinate, schedule, and be completely prepared for all regulatory inspections and surveys by the applicable authority: i.e. TCMS, HC, Environment Canada or others as indicated by individual specifications.
- G 1.4.14.2 Documentation generated by the above inspections and/or surveys indicating that the inspections and/or surveys were conducted (i.e. original signed and dated certificates) must be provided to the TA in accordance with the "Documentation" Section of these General Notes.
- G 1.4.14.3 The Contractor must not substitute inspection by the TA for the required regulatory inspections.
- G 1.4.14.4 The Contractor must provide timely advance notification (minimum of 2 working days) of scheduled regulatory inspections to the TA so they may witness the inspection.
- G 1.4.14.5 The Contractor must pay all costs and fees associated with TCMS, HC, Environment Canada, or any other Inspection required by the specification unless

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otherwise indicated. Copies of invoices of said fees shall form part of the documentation package to be provided to CCG.

G 1.4.15 Contractor Inspections

- G 1.4.15.1 The Contractor must afford the opportunity for the TA to conduct an inspection with the contractor on the condition and location of items to be removed prior to either carrying out the specified work or gaining access to a location to carry out the work.
- G 1.4.15.2 The Contractor must take a before picture of conditions prior to removing any items. These photos are to be in accordance with the Documentation section of the General note, named according to the specification section that resulted in removing those items.
- G 1.4.15.3 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 photo's, documents, reports, and trials in relation to the item being closed out as completed.

G 1.4.16 Recording of Work in Progress

- G 1.4.16.1 The TA may record any work in progress using various means including, but not limited to photography and video, digital or film.

G 1.4.17 Access for Maintenance, Installation, and Removal.

- G 1.4.17.1 The Contractor shall ensure that the technical authority and CCG personnel have unimpeded access to the work site at all times throughout the duration of the contract.

G 1.4.18 Assembly of Components

- G 1.4.18.1 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

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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 1.4.18.2 Covers, cowlings and components damaged by the Contractor must be replaced with a new CFM cover, cowling, or component.
- G 1.4.18.3 Where torque specifications are not provided by the manufacturer, standard SAE, ANSI, and/or BS1083 nut and bolt torques must be used.
- G 1.4.18.4 Unless otherwise specified, the Contractor shall provide all materials or equipment necessary to perform the work in this specification.
- G 1.4.18.5 Machinery and equipment must be approved by a classification society and must meet current TCMS regulations. The contractor shall provide the inspection authority and the technical authority with copies of the classification society's certificates. Certificates must be current and correspond to the type and model of equipment installed by the contractor. The contractor should refer to Section 6 for complete documentation requirements.
- G 1.4.18.6 Replacement machinery, equipment and fittings must be new OEM unless otherwise stated.
- G 1.4.18.7 Machinery shall be installed in accordance with the manufacturer's recommendations. Particular attention must be paid to the attenuation of noise and vibration transmission and to the location in order to allow accessibility for maintenance. Rotary machinery must be installed along a longitudinal or vertical axis, unless otherwise approved by TCMS. The contractor must submit an installation diagram to the IA before starting the work.

G 1.4.19 General Piping Installation

Before starting the work, the contractor must submit drawings or installation plans to the IA and TA for approval. These must be sufficient detail to obtain regulatory approval. The piping must be installed in such a way that it does not interfere with the following:

- (a) passage through doors;
- (b) hatches;

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- (c) openings covered by removable sheets or work areas;
- (d) in areas of frequent traffic, the minimum height clearance shall be 2 metres;
- (e) the operation of machinery, equipment, controls and periodic maintenance;
- (f) the structure of the vessel;
- (g) designated equipment removal routes or removable structural parts of the vessel designed to access the equipment, removal or maintenance of the equipment

- G 1.4.19.1 The piping must be installed in a location where it cannot be damaged, otherwise the contractor must provide a protective measure satisfactory to the IA. Pipeline layouts should be as direct as possible and use the minimum number of fittings to minimize flow resistance.
- G 1.4.19.2 The piping shall be removable near mechanical, electrical or hydraulic systems that require periodic maintenance or repair. Isolation valves must be provided and installed to facilitate the movement of the pipes, so as to minimize the effects on operation.
- G 1.4.19.3 Where high or low points are unavoidable in the alignment, ventilation, purge or other means acceptable to the IA must be installed to ensure proper operation of the system.
- G 1.4.19.4 The suction pipes of the pumps shall be as short as possible, of sufficient diameter and installed in such a way that they do not form bends in order to avoid air pockets. The rear pipe connections must be 0.5 times the inside diameter of the suction pipe above the bottom of the tank at the deepest point.
- G 1.4.19.5 Bulkhead and deck penetrations must be located near the compartment boundaries. Unless otherwise stated structural framing must not be disturbed. All penetrations must pre-approved by TCMS.
- G 1.4.19.6 Pipes shall not pass through tanks and void spaces, except where necessary to supply the tanks themselves, or to avoid penetrations through fuel, potable water and ballast tanks by less desirable pipes. Pressure piping must not pass through void spaces, cofferdams and other spaces that are generally not ventilated.

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- G 1.4.19.7 Piping shall not pass through the following areas unless required as part of the equipment or system:
- cable trays and housings
- G 1.4.19.8 In the case where the passage of piping through oil or diesel fuel tanks is authorized by TCMS for different fluids, unless otherwise specified, the thickness of the piping shall be of Schedule 80 and the joints shall be welded;
- G 1.4.19.9 Brackets shall be designed and located to support the weight of the pipe and its operating or test fluid (whichever is heavier), pipe insulation (if any), and to withstand all expansion and contraction stresses and loads resulting from vessel operations.
- G 1.4.19.10 The number of brackets installed, their type and location must be installed such as to avoid chafing with any other components or excessive vibration of the piping under any operating conditions. They must not apply stress or load transfer to the pipes.
- G 1.4.19.11 Rigid anchors shall be designed so that noise and vibration of pipe components and excessive heat from high temperature circuits are not transferred to the surrounding areas through the anchor piece.
- G 1.4.19.12 Changes in pipe direction shall be made by means of elbows and pipe bends where space does not permit straight sections.
- G 1.4.19.13 Direct reading thermometers, pressure gauges or manometers shall be installed in locations where they can be easily read and protected from damage. All pressure gauges and manometers must be supplied and installed with a shut-off valve.
- G 1.4.19.14 Metal fittings that may cause galvanic corrosion are not permitted unless otherwise specified by the IA or TCMS. In this case, the contractor must provide for galvanic corrosion protection by coupling a relatively small portion of cathodic material to a large portion of anodic material, or by separating different metals by means of a short length of very heavy galvanized steel pipe (sacrificial). The permissible potential difference must not exceed 0.4 volts. This device should only be installed when indicated.
- G 1.4.19.15 Raised-face flanges shall not be used with valves, fittings or flanges made of bronze or other relatively weak alloys.

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G 1.4.19.16 Where pipes penetrate through non-watertight structures, provisions shall be made to prevent them from contacting the structure.

G 1.4.20 Choice of materials

G 1.4.20.1 Figure 3-1 shows the recommended materials for the piping according to its use. Figures 3-2 to 3-8 show the type of materials for piping and various components.

G 1.4.20.2 Piping and components shall conform to this specification unless the material indicated is incompatible with the materials remaining in the system. The use of other materials not listed is permitted only if they are approved or recommended by the original equipment manufacturer or supplier of that equipment or component. In such situations, the technical authority must give instructions before continuing the work.

G 1.4.20.3 Steel pipes used for raw water shall be hot-dip galvanized. The contractor shall provide for hot immersion after manufacture, on-site adjustments, any welding of connection parts or other components, and pressure tests. If this is not possible, the contractor must obtain the authorization of the IA if he intends to use cold galvanizing and state the product to be used, the application procedure and the corresponding standard. Before passing the steel parts to hot-dip galvanizing, they must be free of the slag produced during welding. To do this, hammering with a welder's hammer and acid cleaning must be used.

G 1.4.20.4 Reference Table

Figure 3-1: Acceptable products in each piping system

Component or system	Figure corresponding to the material
Raw water systems	References
Fire Main, Sewage (Black Water), Ballast, AFFF, Bilge Suction (oil/water separation)	4t, 6b, 1a, 2a, 3a, 6a, 7a, 3fl, 4fl, 5fl, 11fl, 12fl, 1f, 2f, 3f, 4f, 19f, 20f, 21f, 1v, 2v, 3v, 5v, 6v, 7v, 8v, 22v, 5g (AFFF 11g only) (4b non-bilge areas)
Main and Auxiliary Circulating Systems	4t, 9v, 10v, 11v, 12v, 8f, 9f, 10f, 11f, 12f, 20f, 21f, 4fl, 5fl, 5g, 6g, 7g, 1b, 2b, 6b, 1a, 2a, 4a

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Component or system	Figure corresponding to the material
Oil Fuel, Marine Diesel and Distillate	References
Filling and Transfer	4t, 1b, 6b, 6g, 7g, 1a, 5a, 6a, 4fl, 5fl, 8f, 9f, 10f, 9v, 10v, 19v
Inside Tanks	1b, 6b, 6g, 4fl, 8f, 9f
Fresh Water	References
Potable (including vents, overflows, sounding pipes, inside tank suctions), Sanitary (Grey water)	3t, 5g, 4b, 1a, 2a, 3a, 6a, 1fl, 2fl, 1f, 3f, 4f, 5f, 3fl, 1v, 2v, 3v, 5v, 6v, 7v, 8v (valve bodies can be used in accordance with standard ASTM B62, seals in accordance with standard ASTM B61)
Circulation (Engines)	5t, 5g, 2b, 6b, 1a, 2a, 3a, 6a, 3fl, 4fl, 5fl, 11fl, 12fl, 8f, 9f, 10f, 11f, 12f, 19f, 20f, 21f, 9v, 10v, 11v, 12v, 13v, 14v, 18v 19v, 20v
Lubricating Oil	References
General Service (150 PSIG side)	4t, 6g, 7g, 1b, 6b, 1a, 5a, 4fl, 12fl, 8f, 9f, 10f, 21f, 9v, 10v, 11v
Hydraulic Oil	8t, 9t, 1b, 1g, 1a, 6fl, 12fl, 13f, 14f, 15f, 21f, 22f, 14v
Steam (150 psig)	References
Feed water, Condensate	3t, 4t, 3g, 1b, 6b, 1a, 1fl, 2fl, 12fl, 1f, 2f, 4f, 5f, 21f, 1v, 2v, 3v, 4v, 6v (valve bodies may comply with standard ASTM B62, seals to standard ASTM B61)
Compressed Air	References
3,000 PSIG 150° F	1t, 2g, 1a, 17f, 16f, 21v
250 PSIG 150° F	5t, 3g, 1b, 6b, 1a, 4fl, 5fl, 8fl, 12fl, 8f, 9f, 10f, 11f, 12f, 21f, 4v, 6v, 9v, 11v, 12v, 13v

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Component or system	Figure corresponding to the material
Deck Drains and Scuppers	References
All “As Fitted”	5t, 4b, 6b, 5g, 6g, 4fl, 8f, 9f

Figure 3-2: Material for Pipes and Tubes

	Description	Important	
1t	Tube – seamless (tube for pressures greater than 150 PSI)	ASTM B466-79	70-30 CU-NI
2t	Tube, seamless	ASTM B466-79, Alloy 706	90-10 CU-NI
3t	Tube, seamless	ANSI/ASTM B88-78	Copper
4t	Pipe, seamless	ANSI/ASTM A 53 GR A or B Sch 40	Steel
5t	Pipe, seamless	ANSI/ASTM A 53 GR A or B Sch 40	Carbon Steel
6t	Tube	ANSI/ASTM A376-79B	Stainless Steel, 316L
7t	Tube	ASTM B59-78	Low Carbon Steel
8t	Tube, seamless	ASTM A179	Hydraulic Quality carbon steel
9t	Pipe, seamless	ANSI/AASTM A376-79B AISI 316	Stainless Steel

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Figure 3-3: Material for Valves

	Description	Important
1v	Globe, angled	ANSI/ASTM B 61-76
2v	Pressure Regulating	ANSI/ASTM B 61-76
3v	Pressure Relief	ANSI/ASTM B 61-76
4v	Y Type Filters	ANSI/ASTM B 61-76
5v	Diaphragm	ANSI/ASTM B 61-76
6v	SDNR and Lift Check	ANSI/ASTM B 61-76
7v	Butterfly	ANSI/ASTM B 61-76
8v	Gate Valve, flanged	ANSI/ASTM B 61-76
9v	Globe, angle and check valve	Steel
10v	Gate valve	Steel
11v	Relief	Steel
12v	Pressure Regulating	Steel
13v	Globe, angle, check, control bleeder, ball valve	Carbon steel
14v	Globe, gate, ball valve (fire resistant)	316 stainless steel
18v	Angled, relief	316 stainless steel
19v	Butterfly	Ductile cast iron or cast steel
20v	Assorted	AISI 304, 316/A51M, A 182 Teflon packing
21v	Assorted	Alloy 642
22v	Sprinkler Control Valves	ASTM B61

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Figure 3-4: Material for fittings

	Description	Material
1f	Brazing	ANSI/ASTM B61 only (do not use standard ASTM B 150)
2f	Flange	ANSI/ASTM B61 only
3f	Threaded	ANSI/ASTM B61 (125 psi nominal)
4f	Unions	ANSI/ASTM B61 only
5f	Solder joint	Wrought copper ANSI B16.22
6f	Brazing bosses	ANSI/ASTM B61 only
7f	Refrigeration	Wrought copper ANSI B16.22
8f	Butt welding	ANSI/ASTM A234-WPB
9f	Socket welding	ANSI/ASTM A 105
10f	Welding bosses	ANSI/ASTM A 105
11f	Threaded	ANSI/ASTM A 105
12f	Union	ANSI/ASTM A 105
13f	Socket Weld	AISI 316L
14f	Butt welding	AISI 316L
15f	Flanges	AISI 316L
16f	Brazing	Bronze
17f	Union	Bronze
18f	Butt welding	90-10 CU-NI
19f	Flexible coupling for shouldered steel pipe	ductile iron for grooved end pipe
20f	Tube fittings	Stainless Steel (Swagelok)
21f	All compression fittings	316L or carbon steel

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Figure 3-5: Material for flanges

	Description	Material
1fl	Brazing	ANSI/ASTM B61 only
2fl	Threaded	ANSI/ASTM B61 only
3fl	Composite	ANSI/ASTM B61 – brazing ring, with slip-on flange complying with ANSI/ASTM A181-77 GR1 and ANSI/ASTM A181-GR1
4fl	Welding neck, socket weld, slip-on	ANSI/ASTM A181-GR1
5fl	Extended welding neck	ANSI/ASTM A181-GR1
6fl	Welded	AISI 304L, 316L
8fl	Welding neck socket	ANSI/ASTM A105-GR-2
9fl	SAE 4 Bolt split, solid	Carbon steel
10fl	Composite	Inner flange 90-10 CU-NI Outer flange carbon steel
11fl	Flexible coupling for shouldered steel pipe	ductile iron for grooved end pipe
12fl	Swagelok flanges	316L or carbon steel

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Figure 3-6: Material for Gaskets

Figure 3-6:	Description	Material
1g	O-Ring	Buna N
2g	O-Ring	Buna N
3g	Full Face	CAF Non Graphite
4g	Full Face	CAF with graphite
5g	Full Face	Synthetic rubber, max. temp. 180° F
6g	Full Face	Buna N
7g	Flat Ring	Teflon
8g	Spiral Wound	Teflon impregnated
11g	Sheet	Ethylene propylene terpolymer (EPT)

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Figure 3-7: Material for nuts and bolts

	Description	Material
1b	Bolts	ANSI/ASTM A193-79A
	Continuous Thread	GR B16
	Stud or Hex Head	ANSI/ASTM A193-79A
	Tap End	GR B16
	Nuts: Hex, HSF	ANSI/ASTM A194-79A GR4
2b	Bolts	Phosphor Bronze ASTM
	Continuous thread	ANSI/ASTM B139-79
	Stud or Hex Head	Alloy B1 or B2
	Tap End	
	Nuts: Hex, HSF	
4b	Bolts	Mild steel
	Stud or Hex Head	Hot dipped galvanized
	Nuts, Hex	
5b	Stud Bolts	
	Continuous Thread	
	Tap End	
	Nuts: Hex, HSF	
6b	Bolts: Hex Head	ASTM A-307 Cadmium plated
	Nuts: Hex Head	
7b	Bolts: Hex Head	ASTM A-320 Stainless Steel
	Nuts: Hex Head	

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Figure 3-8: Material for miscellaneous components

	Description	Material
1a	Pipe Clips	Steel
2a	Orifice Plates	Monel
3a	Strainers	
	Plate type	ANSI/ASTM B 61-76
	Flat plate	ANSI/ASTM B 61-76
	Y-type	ANSI/ASTM B 61-76
	Basket type	ANSI/ASTM B 61-76
4a	Strainers	Steel
	Y-type	
	Basket type	
5a	Strainers	304 stainless steel
	Y-type	
6a	Closures for Sounding Pipes	Bronze
7a	Fire hose – supply manifold	Bronze

G 1.4.21 Exhaust Piping

- G 1.4.21.1 Exhaust piping must be fabricated from materials as indicated on the guidance drawings. Flanges must be forged steel 1,035 kPa, “Light Pattern”, in accordance with standard ASTM A181-59T. Expansion pieces must be free flexing with flange joints, one fixed and one free floating flange, internal stainless steel sleeves suitable for exhaust duty at the system's operating temperature).

G 1.4.22 Piping Fabrication

- G 1.4.22.1 Flange faces must be perpendicular to the longitudinal axis of the pipe, tube or fitting to which they are attached. All components and assemblies of components must be thoroughly cleaned after fabrication and before installation on the vessel. Foreign matter such as dirt, grit and shavings, must be removed by methods and materials that are compatible with the fluids employed in the service aboard the vessel.

G 1.4.23 Bulkhead and Deck Fittings

- G 1.4.23.1 Bulkhead and deck fittings must be steel marine standard three-flange, galvanized for seawater, black for hydrocarbons. Penetrations must be schedule 80 pipe. Penetrations for copper piping must be in bronze, with a nut on each side of the bulkhead or deck.

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G 1.4.24 Pipe Connections

- G 1.4.24.1 Brazed connections must be used in non-ferrous systems and welded connections in carbon steel or alloy systems. The number of connections must be minimized through the use of pipe bending.
- G 1.4.24.2 For bend radii three times the diameter or less, only prefabricated bends must be used. For bends with larger radii, the Contractor must also use prefabricated piping, unless otherwise authorized by the Inspection Authority.
- G 1.4.24.3 If the Contractor wishes to fabricate connections on board the vessel, it must obtain authorization from the Inspection Authority and the Technical Authority. It must comply with all pertinent CCG safety requirements.
- G 1.4.24.4 Disassembly joints must be located so as to permit sufficient clearance to ensure proper assembly and maintenance. Joints located in locations inaccessible for maintenance must be welded or brazed. All flanged pipe connections must be connected using joint sealant appropriate for the intended service and approved by TCMS.
- G 1.4.24.5 Throttle valves and valves which operate automatically or semi-automatically such as safety valves, relief valves and regulating valves must be flanged. If their nominal bore is less than 20mm (3/4"), they may have threaded connections.

G 1.4.25 Contact strips

- G 1.4.25.1 All copper connections isolated by joining to other materials must be provided with contact strips securely fitted from flange to flange, in order to have a continuous circuit in pipelines.

G 1.4.26 Hydraulic Piping

- G 1.4.26.1 Hydraulic piping must be phosphate etched, neutralized, flushed with oil and blown dry prior to installation.

G 1.4.27 Cables

- G 1.4.27.1 All cables must comply with TP127E, be manufactured, tested and installed in accordance with the latest TCMS publication, IEEE and the Classification Society requirements.

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- G 1.4.27.2 The Contractor must produce a schematic or update the single line schematic showing all new electrical cables which must be installed and all existing cables which must be reused. For each cable, the following elements must be shown:
- Conductor size;
 - Current rating;
 - Estimated length;
 - Identification number and name of manufacturer;
 - Approximate weight;
 - Voltage drop;
 - Insulation level (voltage);
 - Insulation type designation and maximum allowable temperature.
- G 1.4.27.3 This schematic must be submitted to the Technical Authority for review and approval 2 working days before installing or removing any cables. The schematic may be submitted in sections as the detailed design develops.
- G 1.4.27.4 New cables must not be spliced. Splicing in existing cables of 600 VAC or less, may be permitted with prior permission from TMCS providing splices are performed in accordance with TP 127E.
- G 1.4.27.5 Coaxial cables for radio frequencies must not be spliced. In-line connectors must not be used in such cables, except to terminate the cable. All cable and wire terminations must be in accordance with TP 127E.
- G 1.4.27.6 Where cables penetrate drip proof or watertight compartments, motors or other sheltered or sealed equipment, TCMS approved glands and/or strain relief devices must be used. Cables entering into sheltered compartments must be from the bottom or the side. Where cables penetrate the side of an enclosure, they must be routed downward of the compartment before running in an upward direction.
- G 1.4.27.7 Cables must be concealed, except in machinery spaces, workshops and store rooms. The location of the cable runs, connection boxes, hangars/supports, concealed by paneling or linings, must be clearly indicated on the “As Fitted” drawings. Concealed connection boxes must indicate the circuit designation, stamped or painted on a part of the box that cannot be dismantled.
- G 1.4.27.8 Adhesive or permanently printed plastic identification labels for individual cables and conductors can be used inside equipment cubicles and equipment racks.

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- G 1.4.27.9 All conductor identification markings and cable labels must be reflected in the “As Fitted” system drawings and must be as follows:
- 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 1.4.27.10 Spare conductors within a cable must not be stripped back or shortened and must be tied back, and appropriately labelled as spare. Control cables and cables used for the alarm and monitoring system must contain a minimum of 10% spare conductors. Shielded control cables must have the shield bonded to ground at one end of the cable run only, preferably at the input signal end. The cable must not be grounded at both ends.
- G 1.4.27.11 Low-loss coaxial cables of appropriate impedance must be used for coaxial antenna feeders.

G 1.4.28 Cable Separation

- G 1.4.28.1 The Contractor must refer to Figure 4-1, indicating the physical separation which must be maintained between the various categories of cables. The separations do not apply to cables crossing at, or close to, right angles. Cables of all types must be kept well separated from antennas, antenna couplers and feed wires. Deviations must be approved by TCMS and the Technical Authority and all related documentation of approved deviations must be forwarded to the Inspection Authority.
- G 1.4.28.2 Cables must be grouped according to their categories indicated in Figure 4-1 and must comply with the following instructions:
- Cables of groups A to E inclusive may be grouped with cables from the same group and share a common cable tray with the remaining groups;
 - Grouping of cables of groups F to K inclusively is not authorized unless otherwise advised by the Inspection Authority. In this case, additional separation material must be provided and installed to the Inspection Authority’s satisfaction;
 - Cables of groups F to K must use separate cable trays wherever possible, unless otherwise advised by the Inspection Authority.

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Figure 4-1: Recommended cable separation (in inches)

Cable group	Cable group classification	Recommended separation (in inches) between cable groups									
		A	B	C	D	E	F	G	H	J	K
A	Ship lighting and electrical power supply	–	4	2	2	4	12	18	18	18	18
B	Receiving antenna cables	4	–	4	2	2	12	18	18	18	18
C	Electrical control cables	2	4	–	2	4	12	18	18	18	18
D	TV and VHF antenna distribution cables	2	2	2	–	2	12	18	18	18	18
E	Telephone and audio distribution cables	4	2	4	2	–	12	18	18	18	18
F	Echo sounder transducer	12	12	12	12	12	–	18	18	18	18
G	Antenna/transmitter coupler feed cables	18	18	18	18	18	18	–	18	18	18
H	Coupler and antenna cables	18	18	18	18	18	18	18	–	18	18
J	VHF/UHF transceiver antenna cables	18	18	18	18	18	18	18	18	–	18
K	Radar transceiver co-axial/wave guide	18	18	18	18	18	18	18	18	18	–

G 1.4.29 Circuit breakers

- G 1.4.29.1 Circuit breakers must be equipped with individually insulated, braced and protected connectors. Tripped indication must be clearly shown by the handle at a position between ON and OFF and/or a visual trip indicator.
- G 1.4.29.2 All circuit breakers must be rated for their application taking into account voltage, current, trip value, and the number of poles.
- G 1.4.29.3 Circuit breakers must be calibrated at 50°C.
- G 1.4.29.4 Circuit breakers must be suitable for marine use, meeting the following criteria:

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- They must be provided with a moulded enclosure;
- They must be designed for a nominal voltage of 600 VAC, 240 VAC or 120 VAC;
- They must be quick closing and opening;
- They must have overcurrent inverse-time characteristics;
- They must have an overload device for each phase.

G 1.4.30 Bulkhead/Tabletop Mounting

- G 1.4.30.1 Equipment mounted on bulkheads must be attached directly or indirectly to the ship's structure. Under no circumstances must any equipment be supported on lining panels or ceiling panels.
- G 1.4.30.2 Mounting equipment on tables is acceptable, but the use of window sills must be avoided, unless approved by the TA. Standard manufacturers' mounting accessories must be used wherever possible. All mounted equipment must be oriented to best serve the operator.
- G 1.4.30.3 Enclosures of all equipment mounted on bulkheads or tables must be grounded to the ship's metal structure.

G 1.4.31 Protection of Equipment

- G 1.4.31.1 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 1.4.31.2 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.

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- G 1.4.31.3 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, grinding and painting.
- G 1.4.31.4 Any damage to surfaces, equipment, furnishings or decor incurred prior to acceptance must be returned to As-Delivered condition by the Contractor.
- G 1.4.31.5 All openings in machinery and/or systems prior to connections being made must be kept covered by suitable inserts or covers at all times.
- G 1.4.31.6 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 1.4.31.7 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 1.4.31.8 The Contractor must protect the vessel from the possibility of vermin infestation (insect/mammal/bird). If an infestation does occur during the contract period the Contractor must bear all costs to ensure the vessel is made vermin free before the vessel's departure and contract completion.

G 1.4.32 Refrigeration systems

- G 1.4.32.1 All work on refrigeration and air conditioning systems must be performed in accordance with of the Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

G 1.4.33 Welding

- G 1.4.33.1 In addition to Article 7.16 Certification of Welding Standards – Contract, All welding and weld inspection must be in accordance with the CCG Welding Specification CT-043-eq-eg-001. This document shall be provided to the Contractor within 48 hours of a written request to the TA.
- G 1.4.33.2 Standards governing the welding of material less than 3 mm thick shall comply with the requirements of CCG Welding Specification CT-043-eq-eg-001. For materials over 3 mm thick, the contractor must meet the following requirements:

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- a) For structural steel greater than 3 mm in thickness, welding shall meet the requirements of CSA standards W47.1 and W59, except as modified in CCG specification CT-043-eq-eg-001.
- b) For structural aluminum greater than 3 mm in thickness, welding shall meet the requirements of CSA Standards W47.2 and W59.2, except as modified in CCG Specification CT-043-eq-eg-001.
- c) For stainless steel with a structure thickness greater than 3 mm, welding shall meet the requirements of CSA Standard W47.1 and AWS Standard D1.6 and CCG Specification CT-043-eq-eg-001.

G 1.5 Documentation

G 1.5.1 Documents

- G 1.5.1.1 All text deliverables must be accompanied by a PDF file that contains the complete document. The contractor must perform a quality control to verify that the content accurately reproduces the content and formatting of the master document file. In case of changes, a second PDF file containing only the changed pages must be provided.
- G 1.5.1.2 Further guidance is provided in the Canadian Coast Guard specification CA-014-000-NU-TD-002 - Electronic Technical Data Products to be Delivered.

G 1.5.2 Data Book

- G 1.5.2.1 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 1.5.2.2 Toutes les copies des documents découlant de produits livrables précisés seront appelées « Recueil de données ».
- G 1.5.2.3 L'entrepreneur doit fournir à l'AT tous les fichiers créés dans le cadre du Recueil de données avant que le contrat ne soit considéré comme étant exécuté. Les fichiers doivent être en format physique (CD-ROM, DVD-ROM et clé USB). Chaque tâche

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du devis doit être dotée de son propre dossier nommé en fonction de la tâche du devis. Par exemple, « G1.0 Remarques générales ».

- G 1.5.2.4 All copies of documents generated as a result of specified deliverables will be referred to as the “Data Book”.

G 1.5.3 File Naming

- G 1.5.3.1 [N/A]

G 1.5.4 E-mails

- G 1.5.4.1 Project Officer : _____

Contracting Officer : Steve Simoneau

steve.simoneau@tpsgc-pwgsc.gc.ca

G 1.5.5 File Formatting

- G 1.5.5.1 All documentation, reports, test results, certificates, or data obtained by the contractor in paper form must be scanned into unprotected (and searchable) Adobe PDF formatted files and named according to the File Naming section of this specification.

- G 1.5.5.2 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 of this specification. Both the original and the converted copy are to be provided as part of the Data Book.

G 1.5.6 Photos

- G 1.5.6.1 All photos 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 of this specification.

- G 1.5.6.2 The contractor must take sufficient photos during the work period to provide an adequate record of the progress of the work. The date on which the photo was taken should automatically appear on all images.

G 1.5.7 Measurements, Calibrations, and Readings.

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- G 1.5.7.1 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 1.5.7.2 Recorded dimensions must be to a precision of three decimal places (unless otherwise stated) in the measuring system currently in use on the vessel.
- G 1.5.7.3 The Contractor must provide to the TA current and valid calibration certificates 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 1.5.8 Test Inspection Records and Certificates

- G 1.5.8.1 Test Inspection Records and Certificates are identified as a deliverable in the individual specification item requesting them.
- G 1.5.8.2 Test Inspection Records and Certificates must be included as a separate section in the DATA BOOK and indexed/arranged in numeric order by specification number.
- G 1.5.8.3 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 1.5.8.4 All tests and trials data must be legible both in hard copy and electronic format. If necessary, handwritten records are required to be transcribed into electronic format (State format) in order to be acceptable. The original must be signed by 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 of these General Notes.
- G 1.5.8.5 The contractor shall also provide the TA with the originals of each certification document in an envelope bearing the name of the ship and the words "Original Certificates".

G 1.6 Drawings

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- G 1.6.1 This section, to be referred to as the Drawings section of the General Notes, is intended to be used as reference for the minimum standards when specified deliverables are drawings.
- G 1.6.1.1 The Contractor shall provide all schematics & technical drawings of the various systems added or modified during the work, including schematics & technical manuals produced by manufacturers or subcontractors.
- G 1.6.1.2 All new plans and drawings must be submitted as individual files compatible with the DWG format (AutoCAD 2013 version). These files must be provided to the Technical Authority (TA) on a storage medium such as USB key, clearly identified with the project title and number.
- G 1.6.1.3 The schematics and drawings shall allow a detailed and complete visualization of the various systems added or modified, whether mechanical or electrical. The plans must provide all the necessary information to enable a qualified technician to conduct a quick, complete and accurate search in the event of defects or for any other reason.
- G 1.6.1.4 Overall, plans should include or describe all of the following:
- Cover pages and detailed indexes of the plans;
 - Abbreviations and symbols used;
 - Identification and specification of equipment;
 - Location, physical representation and mechanical dimensions;
 - Block diagrams, system overview;
 - Electrical circuits: Control, power, wiring and interconnection;
 - Any other references or details required to understand the systems.
- G 1.6.1.5 It is the responsibility of the contractor to update or redraw all original ship plans affected by the modernization projects. Changes made to the old plans must be distinctive by colour or a different style. If an original schematic must undergo a global modification of more than 50%, it must be completely redrawn in DWG (AutoCAD) format. If some original diagrams are kept within a series, this should not prevent all the plans from being homogeneous in presentation, numbering and interpretation method.

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- G 1.6.1.6 The contractor shall have an effective method to record and control all drawings and revisions resulting from the work. The contractor must maintain an up-to-date list of plans and revisions, which must be provided to the TA at the monthly progress meeting. This list must include a column listing of all drawings submitted to TCMS for approval.
- G 1.6.1.7 The contractor shall provide the inspection authority and the technical authority with all drawings requested or produced by subcontractors.
- G 1.6.1.8 A final version approved by the IA or TA of the plans as fitted must be provided at the end of the project. Individual files compatible with the DWG format (AutoCAD) must not be protected electronically and the CCG must have the ability to modify all elements if necessary for future modifications.

G 1.7 Guidance Drawings

- G 1.7.1.1 All technical guidance drawings are issued to the Contractor for guidance purposes only. It is the responsibility of the Contractor to develop working drawings and to ensure that all such drawings receive applicable regulatory approval. The Contractor is to note that not all technical guidance drawings supplied are As-Fitted drawings. It is the responsibility of the Contractor to physically verify all affected items.

G 1.8 Working Drawings

- G 1.8.1.1 The Contractor shall develop details of the project working drawings as required by the regulatory authority. All variations must be included in revisions of working drawings.
- G 1.8.1.2 Working drawings shall clearly indicate the materials or equipment provided, all construction details, precise dimensions, capacity, operational characteristics and performance. Each As fitted drawing must have a unique identification number, and blocks of numbers must be used to identify the various elements of the specifications. Where more than one As fitted drawing is required, each drawing must indicate the total number of sheets in its series.

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G 1.8.1.3 Each working drawings for items that are not previously identified must be customized prepared for this project. As fitted drawings and brochures of identified items should be clearly marked to show the items provided.

G 1.8.1.4 The contractor shall verify all working drawings and indicate the following:

- That the conformity of the drawing with all the requirements of the specification has been verified.
- That the equipment has been properly integrated with the other equipment to which it is attached or connected.
- That all dimensions have been checked to ensure proper installation of the equipment within the available space.

G 1.8.1 Reference Drawings –3 copies

G 1.8.2 [N/A]

G 1.9 Manuals

G 1.9.1 General

G 1.9.1.2 Instruction Manuals must be individually bound in a hard cover 3 ring book format with a page size of 8 1/2" x 11". Drawings of a larger size must be concertina folded to suit. The covers must have the following inTraining printed thereon:

- CCGS Frederick G Creed
- SOW ID # and Contract #
- Equipment and/or System Identification
- Equipment Manufacturer;
- Revision # and Date.

G 1.9.1.3 Plastic tabbed indices must be provided for all sections of the manuals. Major equipment components must be subdivided into separate sections of the manuals.

G 1.9.1.4 A master index must be provided at the beginning of each binder indicating all items included in each section.

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- G 1.9.1.5 A list of names, addresses and telephone numbers of contacts associated with the equipment manufacturers must be provided that can be used after the project completion for maintenance and inTraining data purposes.
- G 1.9.1.6 A copy of the final reviewed and approved As-Fitted drawing(s) must be provided within the maintenance manual.
- G 1.9.1.7 The Contractor shall provide the Technical Authority with two paper copies of all manuals and data sheets in English and French (one copy each) of the equipment provided by the Contractor prior to the expiry of the contract...
- G 1.9.1.8 The Contractor shall provide two copies to the Technical Authority of all manuals and data sheets on individual USB sticks, in PDF compatible format, before the completion of the work.

G 1.9.2 **Operation Manuals**

G 1.9.2.1 Operation manuals must include the following items:

- a) General description of equipment operating sequence in French and English;
- b) Step by step procedure to follow in commissioning the equipment in French and English;
- c) Schematic wiring diagram for the fitted equipment; and
- d) All pertinent equipment performance criteria.

G 1.9.2.2 When systems are accompanied by software or hardware, a user manual must include the following elements:

- the complete system-specific software documentation manual, in a digital format, so that Canada can revise programs without the need for the contractor.
- The minimum software documentation must include:
 - system level diagrams describing the overall software or hardware plan;
 - functional specifications that must describe in detail the functional capabilities of the system and each software component;

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- a list of project-specific programs, including any comments describing the particularities of the code functions;
- all lists, files, manuals and related documents must be delivered and become the property of Canada.

G 1.9.2.3 The Contractor shall provide 2 copies, both paper and electronic, of the operating manuals.

G 1.9.3 **Maintenance manuals**

G 1.9.3.1 These manuals must include the following:

- 1) The manufacturer's maintenance instructions for each piece of equipment requiring maintenance;
- 2) 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;
- 3) 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;
- 4) Troubleshooting sections must be included for all equipment in the maintenance manual under a separate header.

G 1.9.3.2 The Contractor must supply the number of paper copies and electronic copies of the maintenance manuals as indicated in the section G.8.1.

G 1.10 **Identification**

G 1.10.1 **Nameplates**

G 1.10.1.1 All mechanical and electrical equipment must be equipped with nameplates. Each nameplate must identify the equipment and indicate the name of the manufacturer, type, serial number, model number, rated power and date of manufacture of the equipment.

G 1.10.1.2 All special precautions and instructions for maintenance or operation shall be recorded on the nameplate or on a separate plate attached to the equipment.

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- G 1.10.1.3 All high voltage electrical equipment and the compartments in which they are located shall have a warning that there is a danger and shall specify the maximum system voltage.
- G 1.10.1.4 Switchboards shall be provided with nameplates indicating the following:
- The name of the distribution panel;
 - The manufacturer;
 - The serial number (if applicable);
 - The date of manufacture
- G 1.10.1.5 Each circuit-breaker must be provided with a nameplate indicating the name and function of the circuit and the configuration of the circuit-breaker. The contractor must correctly identify the functions and name of each instrument, switch, etc. on the switchboard and mark the full load or normal operating value with a red line.
- G 1.10.1.6 Distribution panels must be equipped with nameplates indicating:
- The space, service, device or circuits controlled and the designation of the power supply conductor.
- G 1.10.1.7 Switchboards, distribution panels and motor controls shall have internal nameplates to identify bus bars and bollards. The phases of the bus bars must be identified by means of a colour code.
- G 1.10.1.8 Electrical enclosures containing more than one electrical or electronic appliance and device shall have a unique identification code for each appliance, and each appliance shall be labelled accordingly. Box mounting drawings must clearly indicate the mounting and identification codes of the devices in the box.
- G 1.10.1.9 Terminal blocks and terminal wiring must be marked with the circuit designation and must be treated as devices inside the boxes. The terminals must be labelled consecutively and in ascending order from left to right and from top to bottom.

G 1.11 Tests, Dock Trials and Sea Trials

G 1.11.1 General Requirements

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- G 1.11.2 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, by manufacturers or by regulatory bodies in order to obtain all appropriate certificates required for the ship. The Contractor must obtain, and supply to the CGTA, all necessary certificates for the vessel to ensure that the vessel is fully certified and seaworthy, for a vessel of its class, prior to the completion of the contract.
- G 1.11.3 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 1.11.4 The Contractor must coordinate the testing schedule with Transport Canada Marine Safety (TCMS) 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 1.11.5 The Inspection Authority must be present for all tests, as well as the TCMS, FSR or subcontractors, where applicable.
- G 1.11.6 Tests must follow the recommended procedures described below. Any defects must be corrected to the satisfaction of the Inspection Authority, TCMS and the attending FSR on. Once defects are corrected, the tests and trials must be repeated to the satisfaction of the Inspection Authority, and where necessary TCMS.
- G 1.11.7 Upon completion of each specification item, the Contractor must notify the IA and TCMS (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 1.11.8 Inspections completed by the Inspection Authority do not in any way, replace those inspections required by TCMS and/or HC.

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- G 1.11.9 Shop testing, dock and sea trials must be to the standards required by TCMS. Where TCMS has no requirements for shop test procedures, the Contractor must adhere to SNAME guidelines as referenced in section 1.4 of this Specification package. The minimum standard for all electrical dock and sea trial must comply with TCMS, 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 1.11.10 Mechanical and piping systems must be tested in accordance with Section 7.2.
- G 1.11.11 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 1.11.12 The Contractor must provide the Technical Authority with a complete list of disturbed services and ship's 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 1.12 Mechanical and Piping Systems

- G 1.12.1 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 satisfaction of the Inspection Authority prior to installation onboard the ship.
- G 1.12.2 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

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excessive pressure must be removed or otherwise protected during hydrostatic testing.

- G 1.12.3 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 Inspection Authority and Technical Authority.
- G 1.12.4 When the duration of a pressure test is not specified, the test pressure must be maintained for a sufficient length of time to permit a thorough examination of the system for leaks, to the satisfaction of the Inspection Authority.
- G 1.12.5 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 1.12.6 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 1.12.7 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 1.12.8 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 1.12.9 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

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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 1.12.10 All systems must undergo visual inspection and must be leak free during the specified tests.
- G 1.12.11 All pressure and operating tests must be completed before system trials.
- G 1.12.12 Where tanks have been opened for the purpose of conducting work, they must be cleared, cleaned and inspected by the Inspection Authority prior to being closed. Failure to notify the Inspection Authority does not absolve the Contractor of its responsibility of providing the opportunity to inspect any completed items.
- G 1.12.13 Tank and space inspections completed by the Inspection Authority do not in any way, replace those inspections required by TCMS.
- G 1.12.14 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), TCMS inspector and the Contractor responsible representative attesting that all work and inspections have been completed.
- G 1.12.15 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 TCMS. Hydrostatic pressure tests must be documented as per section 6.2 of this Specification package.

G 1.13 Ship Performance Sea Trials

- G 1.13.1 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 Inspection Authority and Technical Authority for review and approval 20 days before the start of sea trials.

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- G 1.13.2 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 1.13.3 The sea trials must be completed over the course of one day. The Contractor must provide four shipyard personnel, including one supervisor, for the duration of the trials in order to make all necessary adjustments.
- G 1.13.4 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.

S 1.0 **SERVICES**

S 1.1 **General**

- S 1.1.1 The purpose of this specification is to provide the vessel with the required mentioned services at the beginning of the refit and to remove them at the end of the refit. These services will be supervised by the Chief Engineer and will remain for the duration of the refit. The contractor must provide all equipment and tools for all connections.
- S 1.1.2 **The CCGS is currently located at Section 17 of the Quebec city Port. Given its condition it is currently declared unfit for navigation by CCG Technical Services. Therefore, interested suppliers will have to include in their proposal the towing costs and the responsibility for moving the vessel to their facilities.**
- S 1.1.3 **The Contractor must afford GCC personnel and subcontractors the opportunity to conduct a meticulous vessel inspection in parallel with the inspection specified in 11.1.A.1, the purpose of this inspection is to assess hull condition and to determine the feasibility of a major refurbishment or decommissioning in the event that the ship is declared no longer to structurally sound for service.**

S 1.2 **Berthing, Mooring, Dry-Docking And Refloating**

- S 1.2.1 **BERTHING** - Berthing and mooring facilities are appropriate for a vessel of this size and must satisfy the Commanding Officer. Throughout the contract, if the vessel

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is not in dry dock, it may be moored at the contractor's dock at a safe berth where the water level is sufficient even at low tides so that the vessel does not touch the bottom. The contractor is responsible for all vessel movements for the duration of the contract. The contractor is responsible for all services of mooring attendants, tugs, pilots, etc..

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

S 1.2.3 References

DRAWING #	Drawing Title	# of Sheets
176	Docking plan Starboard version 2013	
176	Docking plan Port	

S 1.2.4 Statement of Work

S 1.2.5 The contractor shall place the ship in dry dock in accordance with the Docking plan drawing. Given the vessel's compromised structural integrity, a longitudinal hull alignment check, one hull relative to the other must be performed once the vessel is blocked. A report proving its alignment, must be submitted to the TA no later than 24 hours following the vessel's dry-docking.

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

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

S 1.2.8 A copy of the Docking plan shall be provided to the contractor prior to the date of entry into the basin. The Contractor must prepare the blocks and any shoring required to maintain the true alignment of the ship's hull and machinery throughout the dry-

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docking period. The Contractor must align the blocks with a laser and submit an alignment report to the owner's representative before dry-docking.

- S 1.2.9** The contractor shall record the following in Training on the vessel's condition reports:
- S 1.2.10** Before entering the basin, all ship's tanks shall be sounded and their contents recorded. A copy must be signed by the ship's master, the chief engineer and the contractor's dock master.
- S 1.2.11** Upon entering the basin, all empty tanks shall be documented and copies shall be kept by the contractor and the chief engineer.
- S 1.2.12** Upon exiting the basin, all tanks shall be filled to the same draught and trim as at the dry dock and in the condition agreed upon by the dock master, the ship's captain and the chief engineer.
- S 1.2.13** The contractor shall provide diver services to confirm that the vessel is resting uniformly on the blocks.
- S 1.2.14** There must be a minimum clearance of 122 cm (4 ft.) under the keel.
- S 1.2.15** The contractor is responsible for the handling of ropes during mooring and undocking operations, as well as towing and/or pilotage service fees.
- S 1.2.16** The contractor shall avoid resting transducer plates on the blocks between frames no. 29-30 and 38-39.
- S 1.2.17** Frame shall be marked on the hull to facilitate inspection TCMS Surveyor and the owner's representative. Immediately after hull cleaning and before sand blasting the hull, the contractor must mark frames at five frame intervals from the stern (frame 0); the marks must be 6 feet high, on the curvature of the bilge well, port and starboard. The blocks aligned with the frames must be marked in the same way, on the starboard and port sides.
- S 1.2.18** The contractor shall remove the drain plugs to drain the accumulated water. All removed drain plugs must be labelled immediately after removal, stored in an appropriate container and given to the owner's representative. A ship's officer must be present when removing and replacing the drain plugs (3). The plugs to be removed are located near the frames 24-40-41. The location of the plugs is indicated on the docking plan. Any plug removed requires temporary filling of its opening with

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wooden plugs when performing work such as sandblasting, painting, etc. that could cause contamination of the tanks.

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

S 1.2.20 **Proof of performance and documentation**

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

S 1.3 **Mooring Lines**

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

S 1.4 **Gangways**

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

S 1.5 **Electrical Power Supply**

S 1.5.1 The vessel must be supplied with electricity from a single source of 100 amps using contractor supplied cables and fittings. The ship shore power transformer requires a one-phase power supply, 220 VAC, 60 Hz, 100 amperes. The contractor provides a

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price for a total consumption estimated at 55000 kWh (see Annex J for this purpose). Throughout the wintering period, the vessel (accommodations, two (2) engine rooms and the wheelhouse) will be heated to the needs of the Canadian Coast Guard. Final consumption will be adjusted up or down on PWGSC Form 1379. The contractor provides the meter to take consumption readings in kWh. Meter readings are recorded by the Contractor and the Chief Engineer when connecting and disconnecting. In the event of a power failure, the contractor will be responsible for providing an alternative power source to prevent the vessel from freezing.

S 1.6 Accommodations and Machinery Spaces Deck Protection

S 1.6.1 All damage resulting from work related to this SOW must be repaired at Contractor's expense. All materials used in a replacement or repair must meet the criteria for material provided by the contractor as indicated above in the section for Tools and Material provided by the contractor.

S 1.6.2 The contractor shall protect all equipment and surrounding areas from damage. Work areas must be protected from flooding and water leaks, debris caused by sandblasting, welding, etc. Temporary protective tarpaulins must be installed above the work areas.

S 1.6.3 Provide equipment and labour to temporarily secure drainage pipes to prevent water from flowing on the hull and to carry this water to the dry dock sumps.

S 1.6.4 To avoid damaging the gangway floors, provide and spread 1/16" cardboard on the surface of the main inboard decks, gangways, chief engineer's cabins and wheelhouse, dining room. The area to be covered is 45 m². The installation must be done as soon as the ship enters the dry dock. Replace the cardboard if necessary when it is damaged.

S 1.7 Heating

S 1.7.1 The vessel must remain heated for the duration of all contract work. Extended power outages must be authorized by the chief engineer or TA.

S 1.8 Workplace Inspections

S 1.8.1 The Contractor shall coordinate with the TA and IA an inspection of the condition and location of all items to be removed before the start of work or prior to accessing a location to perform the work.

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S 1.9 Fire Protection

S 1.9.1 If the ship is in winter condition, no liquid should flow into the fire hydrant supply line to prevent any risk of freezing. The ship's fire hydrant is drained for winter so the contractor will have to provide the installation of a non-pressurized fire hose, but ready to be used at any time with the necessary lengths of hose.

S 1.10 Project Facilities

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

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

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

S 1.11 Crane Operation - Optional

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

S 1.12 Telephone/Internet

S 1.12.1 Provide an office for the CCG representative with a telephone line and high-speed Internet access. Provide a printer with integrated fax and 8-1/2" X 11" paper for the entire duration of the work.

S 1.13 Oily Water

S 1.13.1 **Oily Water:** The contractor shall provide a price for the disposal of approximately 200 litres of oily water mixture from the ship's holds. It must indicate a unit price for each additional 50 litres, regardless of the quantity. Disposal shall be adjusted up or

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down upon presentation of invoices by the contractor. The quantities of disposal depend on the needs of the vessel and should not be included in the contractor's requirements for performing work in the SOW. The contractor must provide the IA with the identity of the company or companies authorized to pump and dispose of used oil. Receipts for the disposal of oil from the ship for inclusion in the oil service booklet.

S 1.14 Cleanliness

- S 1.14.1** At the completion of the work, the Contractor shall remove all waste, debris and unnecessary equipment created by the work and return the vessel to a state of cleanliness similar to that which existed at the time the custody of the vessel was transferred to the Contractor at the beginning of the refit period.
- S 1.14.2** Once all work has been completed and the last clean-up completed, the Contractor's Quality Assurance (QA) Representative and the TA will jointly visit the vessel to see all the locations and spaces where work has been performed by the Contractor. Any deficiencies or damage discovered during this visit will be recorded and compared to the digital images captured during the initial inspection of the vessel (section 1.10).
- S 1.14.3** The Contractor shall at its own expense correct any damage or deficiencies caused by the Contract Work.

S 1.15 Parking

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

S 1.16 Vessel Responsibility And Security

- S 1.16.1** Safety - The yard will be responsible for conducting daily end-of-day safety patrols on board throughout the dry-dock period in addition to responding to alarms from the monitoring system. For each of the alarms responded to, the site will report to the coast guard official. This will be recorded in a logbook by the shipyard and given to

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the ccg representative when the vessel is delivered. Include five (5) alarm visits in the contract.

- S 1.16.2** Ship responsibility - the contractor shall be responsible for the ship during the period of the contract. The contractor shall ensure at the completion of the work that the vessel is delivered to the coast guard representative in a clean and dust-free condition both inside and out.
- S 1.16.3** The yard shall authorize the coast guard and certain contractors to work on board the vessel during the period at the yard. Among others, there will be the visit of:
- S 1.16.4** Five (5) crew members from the coast guard vessel will be present to perform minor maintenance and repairs on the vessel for a period of two (2) weeks. The crew members' schedule will be 14 consecutive days in the off-duty system, from 08:00 to 20:00.
- One (1) Integrated Technical Support Project Officer
 - A mechanic for a period of 4 weeks to do maintenance
 - DFO electronics technicians
 - Two (2) Institut Maurice Lamontagne Technicians

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S 2.0 **PRODUCTION DIAGRAM**

S 2.1 **Scope**

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

S 2.2 **Technical Description**

S 2.2.1 The contractor shall provide three bound copies of a detailed bar chart (Gantt chart) that illustrates the planned schedule for the vessel's refit work. This diagram should show each task in the quotation with its start date, duration and expected and actual completion date. An electronic version must also be sent to the TA. The contractor must also send a copy of the production diagram to the contracting authority.

S 2.2.2 Any critical work sequence must be indicated, with critical tasks that could delay refit work if they do not meet the planned work schedule. These may include labour problems or tasks that cannot be performed in parallel with other tasks.

S 2.2.3 All inspections, tests and trials shall be recorded in the production diagram.

S 2.2.4 The TA shall be notified immediately of all work affecting the critical path. Every effort must be made not to delay the ship's refit. Regular quality assurance procedures must be applied.

S 2.2.5 The schedule must be updated weekly and in advance of each production meeting to illustrate the actual progress of the refit work and changes to the completion date of each component. The contractor shall include in its updates to the diagram any special work requested on PWGSC Form 1379 and indicate the impact that this additional work will have on the work schedule.

S 2.3 **Acceptance Work**

S 2.4 **Inspection**

S 2.4.1 All work must be approved by the TA.

S 2.5 **Deliverable Documents**

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

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10.0 SAFETY AND SECURITY

10.1 Inspection Of Portable Fire Extinguishers

10.1.A Identification

10.1.A.1 The contractor shall inspect all fire extinguishers and certify fire extinguishers whose certification date has expired.

10.1.A.2 The inspection certificate shall be issued by a classification society (ABS, Bureau Veritas, Lloyds, DNVL) recognized supplier.

10.1.B References

10.1.B.1 Equipment data

10.1.B.1.1 Portable fire extinguishers see list.

10.1.B.2 Drawings

10.1.B.2.2 All drawings are indicated in the "General Notes". The following drawings are to be considered as reference drawings, as defined in the "Drawings" section of the "General Notes".

DWG #	DWG TITLE	# OF SHEETS
	CCGS Frederik Creed – Portable Extinguishers	

10.1.B.3 Regulations and Standards

N/A

10.1.C Statement of Work

10.1.C.1 The Contractor shall perform the following work:

10.1.C.1.1 Conduct annual inspection and maintenance of portable and fixed kitchen fire extinguishers. The inspection and maintenance of the fire extinguishers will be carried out by a qualified representative. The inspection certificate must be issued by a supplier authorized by TC or a recognized classification society (Bureau Veritas (BV), ABS, Lloyds, DNVL).

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- 10.1.C.1.2 Remove the extinguishers in a sequence that ensures that the number of extinguishers off the ship never exceeds one third (maximum 5) of those on board. The chief engineer will determine the order in which the fire extinguishers will be removed.
- 10.1.C.1.3 Include the price of preventive maintenance, hydrostatic test, recharge, annual inspection according to the information provided in the Frederick G Creed portable fire extinguishers list.
- 10.1.C.1.4 Once maintenance is complete, return all fire extinguishers to the vessel and replace them as instructed by the chief engineer.

10.1.D Proof of Performance

10.1.D.1 Inspection Points

- 10.1.D.1.1 All work shall be completed to the satisfaction of the Chief Engineer and the TC Inspector.

10.1.D.2 Tests and Trials

- 10.1.D.2.2 Fire extinguisher tests shall be conducted in accordance with Transport Canada rules.

10.1.D.3 Certification

- 10.1.D.3.3 The contractor must provide the chief engineer with two (2) paper copies of the maintenance certificates with their original copies. The contractor must also send an electronic copy of all reports and certificates to the vessel's maintenance manager.

10.1.D.4 Documentation

- 10.1.D.4.4 The Contractor shall provide the Chief Engineer with two (2) hard copies of the reports and checklists that detail the work and modifications required. The contractor also sends an electronic copy of all reports to the vessel's maintenance manager.

10.1.D.5 Training

- 10.1.D.5.5 N/A

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10.2 Annual Inspection Of The Fixed Fire-Fighting System

10.2.A Identification

- 10.2.A.1 The purpose of this specification is to maintain and certify the vessel's engine room and kitchen fixed firefighting systems. Check copper pipe connections to switches and alarms.
- 10.2.A.1.1 The contractor shall contact the chief engineer prior to commencing work on this system. This work must be done in conjunction with the maintenance of portable fire extinguishers without reducing the firefighting capability on board the vessel.
- 10.2.A.1.2 The inspection certificate must be issued by a classification society (ABS, Bureau Veritas, Lloyds, DNVL) recognized supplier.
- 10.2.A.1.3 The fixed fire-fighting system is a FM 200 system.

10.2.B Reference

-The fixed firefighting system is an FM 200 system.

-Fixed Kitchen System Class K, AMEREX - 6 liters # 1060 Model B260 Sentinel Kidde 4 Kg TCH 032684

Drawing #	Drawing Title	# of Sheets
02604-10	Fire Fighting System Location	

10.2.C Statement of Work

The Contractor must carry out the following work:

- 10.2.C.1.1 Provide the qualified personnel who will perform the testing and inspection of the Vessel's FM200 system as part of the annual inspection and certification of this system. The chief engineer must be present at all tests.

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- 10.2.C.1.2 In addition to the following tests, perform all tests required by the TC inspector on site. The contractor must provide in its specifications the cost for testing alarms (lights and sirens) for all devices, testing cylinders, testing ventilation closures, and testing release loops and cables.
- 10.2.C.1.3 Clean pneumatic hoses and actuators with air pressure and ensure that they operate properly. Pipes and nozzles must be free of obstructions.
- 10.2.C.1.4 Ensure that alarm displays and sirens are functioning properly.
- 10.2.C.1.5 Weigh each cylinder and record its results. At the end of the refit, the Contractor must provide the Chief Engineer with copies of all certificates.
- 10.2.C.1.6 At the end of the tests and inspections, reassemble the systems and return them to service.

10.2.D **Proof of Performance**

10.2.D.1 **Inspection Points**

- 10.2.D.1.1 All work shall be completed to the satisfaction of the chief engineer, the ship's maintenance manager and the TC inspector.

10.2.D.2 **Tests and Trials**

- 10.2.D.2.2 The chief engineer shall be present during system inspection and testing.

10.2.D.3 **Certification**

- 10.2.D.3.1 The contractor shall provide the chief engineer with two paper copies of the maintenance certificates with their original copies. The contractor must also send an electronic copy of all reports and certificates to the ship's maintenance manager.

10.2.D.4 **Documentation**

- 10.2.D.4.1 The Contractor shall provide the Chief Engineer with a hard copy of his report detailing the inspections, modifications and repairs made prior to acceptance of this element. The contractor must also send an electronic copy of the report to the TA.

10.2.D.5 **Training**

- 10.2.D.5.1 N/A

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10.3 Fire Detection System

10.3.A Identification

10.3.A.1 The purpose of this specification is to perform the annual inspection and certification of the fire detection system.

10.3.A.2 The inspection certificate must be issued by a supplier authorized by a classification society recognized by ABS, Bureau Veritas, Loyds, DNVL.

10.3.B References

Drawing #	Drawing Title	# of Sheets
11212	Fire Detection/Alarm System	

10.3.C Statement of Work

The Contractor must carry out the following work

10.3.C.1.1 Le navire est muni d'un système intégré de détection d'incendie BES Marine inc. avec panneau d'alarme incendie Honeywell 9050UDC. Le panneau Honeywell 9050UDC est relié au système intégré d'alarme d'incendie qui fait partie du système de surveillance et d'alarme du navire.

10.3.C.1.2 Provide certified personnel to perform the annual inspection and certification of the fire detection system.

10.3.C.1.3 The fire detection system control panel is located on the port side of the wheelhouse.

10.3.C.1.4 Any breakage or failure will be addressed as additional work on a Form 1379.

10.3.D Proof of Performance

10.3.D.1 Inspection Points

10.3.D.1.1 All work shall be completed to the satisfaction of the Chief Engineer/Maintenance Manager.

10.3.D.2 Tests and Trials

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10.3.D.2.2 N/A

10.3.D.3 **Certification**

10.3.D.3.3 The contractor shall provide the chief engineer with two paper copies of the maintenance certificates with their original copies. The contractor must also send an electronic copy of all reports and certificates to the TA.

10.3.D.4 **Documentation**

10.3.D.4.4 The Contractor shall provide the Chief Engineer with a hard copy of his report detailing the inspections, modifications and repairs made prior to acceptance of this work. The contractor must also send an electronic copy of all reports and certificates to the TA.

10.3.D.5 **Training**

10.3.D.5.1 N/A

10.4 Inspection Of The Liferaft And Zodiac

10.4.A Identification

10.4.A.1 The contractor shall be responsible for handling and shipping the liferafts to the workshops selected by the CCG

10.4.B References

10.4.B.1 2 Liferaft 16 persons

type : MKIV

Serial number: 5086110213643 et 5086110213570

Date of manufacture: May 2006

10.4.C Statement of Work

10.4.C.1 Once the ship is in dry dock, the contractor shall remove the two rafts and load on shipper's vehicle as designated by the AT.

10.4.C.2 No crane time recorded in the general terms shall be deducted by this work.

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10.4.D Proof of Performance

10.4.D.1 Inspection Points

10.4.D.1.1 All work shall be completed to the satisfaction of the Chief Engineer/TA.

10.4.D.2 Tests and Trials

10.4.D.2.1 N/A

10.4.D.3 Certification

10.4.D.3.1 N/A

10.4.D.4 Documentation

10.4.D.4.1 The Contractor shall provide the Chief Engineer with a hard copy of the delivery notes and tracking number. The Contractor must also send an electronic copy to the TA.

10.4.D.5 Training

10.4.D.5.1 N/A

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11.0 HULL AND RELATED STRUCTURES

11.1 Inspection And Hull Painting

11.1.A Identification

- 11.1.A.1 The purpose of this item is to clean, thoroughly inspect the welds and ship structure, and prepare the ship's hull for inspection by CCG services
- 11.1.A.2 **Optional:** The Contractor must proceed with the application of a red paint coating compatible with the ship's paint system, as paint overlay and substrate profiling may be required on the hull. The paint must be Contractor supplied and the surfaces to be painted will be negotiated after the inspection work. The contractor must propose a price to cover the entire area of approximately 214m². The price will be adjusted downward using Form 1379 to reflect the actual area covered.

11.1.B References

11.1.B.1 Equipment Data

11.1.B.1.2 Paint currently applied to the ship.

- TRI-LUX II
- INTER THANNE 990
- INTER GARD 264
- BELZONA 1111 surface repair composite

11.1.B.2 Drawings

DRAWING #	DRAWING TITLE	# OF SHEETS
02604-S02	Port Hull	
65B4	Deck framing plan	
65B1	Construction	
02604	Equipment Location	
02604	Elevation	

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11.1.C Standards and Regulations

11.1.C.1 TP12445E Standards for Paints and Coatings

11.1.D Statement of Work

11.1.D.1 **Hull Cleaning**

11.1.D.1.1 Clean the hull below the waterline with a high-pressure water jet (3000psi). The contractor shall clean by water jet the entire surface area of the ship's hull to the load line within 24 hours of the ship's dry-docking.

11.1.D.2 **Hull Inspection**

11.1.D.2.1 Together with the TA and the TCMS Inspector the Contractor must inspect the hull's cleaned surfaces. Following the inspection, the Contractor shall indicate on a copy of the shell expansion drawing all hull surfaces below the load line which must be blasted or repainted with Contractor supplied paint.

11.1.D.2.2 Together with the TA and the TCMS Inspector, the Contractor must complete the inspections described in section 11 within 36 hours of the vessel being placed in dry dock.

11.1.D.2.3 The contractor shall provide 60 hours of labor for the removal of Belzona metal surface repair in preparation for structural inspections. The price will be adjusted up or down using Form 1379 to reflect the work performed.

11.1.D.3 **Hull Damage Repairs (Optional)**

11.1.D.3.1 The Contractor shall make all prescribed repairs resulting from the inspection of the hull by TCMS or a recognized organization. Repairs must comply with all applicable standards and regulations. The hull repair work will be negotiated using Form 1379.

11.1.D.3.2 The contractor shall indicate the cost of 200 linear feet of joint and butt welding to be renewed. The length of the welds to be replaced will be determined by the hull inspection and the total renewed length will be prorated using Form 1379.

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- 11.1.D.3.3 Including the following:
- i. removal of the existing coating system;
 - ii. gouging to a depth such that a single welding pass provides the necessary finishing profile;
 - iii. application of the coating system in accordance with section 11.1.C.5.
- 11.1.D.3.4 All welding operations must be performed in the presence of a CWB Level 2 structural aluminium certified inspector, ABS...
- 11.1.D.3.5 All materials used to carry out the prescribed hull repairs shall meet or exceed the original specifications and shall comply with applicable rules and standards.
- 11.1.D.3.6 The Contractor shall provide a price for 20 m² of 5086 H116 marine aluminum 6.35 mm (or ¼ in) thick. Additional aluminum if necessary will be processed at this rate by PSPC form 1379.
- 11.1.D.3.7 Once the prescribed repairs are completed, the contractor shall reinstall all seawater intake grids, schedule an inspection with the TCMS inspector or a recognized organization for acceptance of repairs and modifications before the hull coating system is applied. The TA and IA must be present for this inspection.
- 11.1.D.3.8 All new aluminium surfaces or aluminium surfaces disturbed by prescribed repairs or modifications shall be prepared and coated in accordance with these specifications.
- 11.1.D.3.9 The Contractor shall provide a price for 20 m² X 6.35mm (1/4) thick of Belzona 1111 to redo the surfaces disturbed by inspections.
- 11.1.D.4 **Hull Plating Thickness**
- 11.1.D.4.1 The contractor shall assess and record the hull thickness as detailed below and submit the results to TCMS and obtain proof of inspection for readings.
- 11.1.D.4.2 The contractor shall take approximately 100 ultrasonic readings from the keel to the load line mark; the contractor shall take at least four readings from each hull panel and at least four readings from each panel inside each seawater box, and four readings from the inside of each hull valve pipe fitting .

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- 11.1.D.4.3 Particular attention shall be paid to the shell plating near hull openings and areas of damage and corrosion.
- 11.1.D.5 **Substrate Preparation Prior to Painting (Optional)**
- 11.1.D.5.1 The Contractor shall provide all scaffolding and cherry pickers necessary to perform the work in this specification, including inspections by TCMS and the Technical Authority.
- 11.1.D.5.2 The area to be considered is approximately 214 m², including the submerged surface of the hull including the rudders, the interior of the seachests, etc. A fixed price including all costs incurred to apply the paint must be provided.
- 11.1.D.5.3 Provide SP10 sandblasting below the waterline over 30% of the surface and SP6 sandblasting over the entire anti-fouling paint layer and the remainder of the hull.
- 11.1.D.5.4 Protect all hull valves, propellers, rudder bearings, seawater intake and any area deemed necessary. In the event of ingress during sandblasting and painting, the contractor shall correct and clean at his own expense.
- 11.1.D.5.5 In particular, care should be taken to protect the plates covering the transducer for the acoustic sounder. These elements must be identified and properly marked, and then covered to protect them from blasting.
- 11.1.D.5.6 Surfaces that have been sandblasted shall be properly cleaned with compressed air before painting.
- 11.1.D.5.7 Surfaces shall be cleaned with an alkaline cleaner.
- 11.1.D.5.8 All precautions shall be taken to minimize aluminium oxidation after sandblasting by applying International paint according to application standards. It will therefore be necessary to coordinate the area that can be prepared in the time period when employees can work non-stop.
- 11.1.D.5.9 The shipyard shall provide and apply the International or equivalent red paint using the appropriate equipment to the satisfaction of the inspection authorities.
- 11.1.D.5.10 Particular care should be taken during the application of the International paint (or equivalent) so that the minimum thicknesses required in the dry state are obtained over the entire surface.

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11.1.D.5.11 The Contractor must allow a curing period in accordance with manufacturer's specifications before vessel undocking.

11.1.D.6 Hull Paint Application (Optional)

11.1.D.6.1 The contractor shall supply and apply a coating compatible with the ship's painting system, Coast Guard Red (RAL 3000).

11.1.D.6.2 Existing Paint

- TRI-LUX II
- INTERTHANE 990
- INTERGARD 264
- The contractor must supply and apply a marine paint coating compatible with the ship's paint system using the appropriate equipment and as recommended by the paint manufacturer. The contractor will have to choose a single paint manufacturer for the entire work.

11.1.D.6.3 Apply a third (3rd) and fourth (4th) layer of INTERSPEED 640 (red RAL3000) antifouling or equivalent, with a thickness of .002" (dry) over the entire 194 m2 area including the second (2nd) layer when the latter is slightly sticky.

11.1.D.6.4 The Contractor must ensure that the entire hull surface, from main deck to keel, including rudders, propellers, and stabilizer fins, is cleaned with fresh water under high pressure (3000 PSI) within two hours of the vessel's dry-docking. The Contractor must remove all soiling for a preliminary inspection. Before starting power wash, all equipment mounted on the hull and all openings must be completely protected. The owner's representative will inspect the entire hull surface.

11.1.D.6.5 (Optional) During the dry dock period, the shipyard shall provide and install a temporary shelter covering all hulls of the ship from the main deck, unless the ship is inside a heated building. This shelter shall be ventilated, heated and weathertight with the hull. A heated and ventilated shelter is mandatory regardless of climatic conditions.

11.1.D.6.6 The total area of this section is 214m2. Including the hull which includes: submerged parts of the keel up to 150mm above the load line of both hulls, including rudders, all stabilizers.

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- 11.1.D.6.7 The Contractor shall protect all transponders and sensors of sonars, sounders, docking plugs, propellers, seawater suctions, overboard discharges and rudder bearings and any other location deemed necessary by the ship's chief engineer to avoid sand or paint contamination during the work.
- 11.1.D.6.8 The Contractor must remove the damaged zinc sacrificial anodes attached to the hull and appendages and cover the anodes in good condition that have not been removed prior to re-painting the hull.
- 11.1.D.6.9 The Contractor must thoroughly inspect the vessel following hull cleaning and prior to blasting and painting. A CCG representative along with the Contractor must inspect the vessel and determine the total surface area to be sandblasted and recoated.
- 11.1.D.6.10 The Contractor must provide in its bid the price for sandblasting and recoating of 40 m² of damaged hull surface. The contractor must provide all material and equipment required to achieve the commercial standard (SA21/2') on all surfaces identified for recoating. All remaining existing paint edges must be feathered to accommodate the new coating. The Contractor must contain and dispose of all materials used for substrate preparation.
- 11.1.D.6.11 The Contractor must provide in its bid the price for recoating 40 m² (square meters) of the keel to the load line of both hulls, including the rudders, all stabilizers.
- 11.1.D.6.12 The Contractor must prepare the substrate and recoat in accordance with manufacturer's specifications all areas where paint flaking is observed.
- 11.1.D.6.13 All prepared surfaces to be recoated must be blown with compressed air followed by a visual inspection for abnormalities. A detailed report complete with photos must be submitted to the TA.
- 11.1.D.6.14 Every precaution should be taken to minimize the oxidation of aluminum after cleaning by applying paint according to manufacturer's specifications.
- 11.1.D.6.15 The Contractor must adhere to the manufacturer's recommendations for paint application: Paint type, paint colour, dry thickness, drying time, etc.
- 11.1.D.6.16 The Contractor must supply and apply the following coatings to the identified hull surfaces:

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- Two (2) or more layers of epoxy paint, minimum 15 mils dry, self-priming, surface resistant and a semi-gloss, grey finish that will be compatible with the existing Intergard 264 coating.
- Two coats of concentrated anti-fouling paint, 2 mils dry per coat, black colour and compatible with the Tri-lux II coating already in place.
- This application will be done as late as possible before the ship is launched.

11.1.D.6.17 The Contractor must ensure that the seachest grids are protected from the applied coating. The diameter of their ports will be checked before the vessel is refloated to ensure that they are not clogged in whole or in part.

11.1.D.6.18 The Contractor must ensure that the hull is clean before, during and immediately after the coating is applied.

11.1.D.6.19 A CCG contracted NACE inspector shall be onsite to ensure that surfaces are prepared and coated in accordance with the manufacturer's instructions.

11.1.D.6.20 The Contractor must supply all materials and equipment required for all hull cleaning, surface preparation and recoating.

11.1.D.6.21 All new paint must be stored in accordance with manufacturer's specifications prior to coating application.

11.1.D.6.22 All coating application equipment and coating parameters must be in complete compliance with manufacturer's specifications during the application process.

11.1.D.7 **Hull Markings Replacement (Optional)**

11.1.D.7.1 The Contractor must renew all freeboard symbols, letters, load lines and draught marks on the ship by removing all original markings to bare aluminium and remarking as per original.

11.1.D.7.2 **Draught markers must be converted into metric units.** For white markings and symbols, the Contractor must provide and apply two (2) or more coats of epoxy paint, minimum 15 mils dry, self-priming, surface resistant and semi-gloss, grey finish compatible with the existing Intergard 264 coating and two (2) layers of a two-component acrylic polyurethane finish offering excellent durability and long-term coating capability that will be compatible with the existing white Intherthane 990 coating.

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- 11.1.D.7.3 Applications of white epoxy paint to renew draught markings must be compatible with the vessel's hull coating. These marks must be renewed after the final hull coating application and curing.
- 11.1.D.7.4 All new draught marks must be correctly located with relation to the vessel's keels and approved by the attending TCMS Inspector.
- 11.1.D.7.5 The Federal Identity Program registration also includes "COAST GUARD/GARDE CÔTIÈRE", the Canadian flag, and "Fisheries and Oceans Canada/Pêches et Océans Canada" located at the stern of the vessel.
- i. Name of vessel port side Frederick G Creed
 - ii. Name of vessel starboard forward Frederick G Creed
 - iii. Name of vessel after Frederick G Creed
 - iv. After Identification (OTTAWA)

11.1.E Hull Paint Above the Waterline (Optional)

- 11.1.E.1 The purpose of this specification is to clean and re-paint the total hull surface above the waterline of both (2) vessel hulls up to the deck height including all surfaces between the two (2) hulls.
- 11.1.E.2 The Contractor must supply and apply a marine coating compatible with the ship's existing paint system in accordance with the manufacturer's specifications. The contractor must select a single paint manufacturer for the entire work.
- 11.1.E.3 The total hull surface area (272 m²) above the waterline from the load line of the two hulls to the height of the deck including all surfaces between the two hulls must be cleaned of all contaminants with fresh water under minimum high pressure (3000 PSI).
- 11.1.E.4 The Contractor must supply all materials required to prepare all identified surfaces to the commercial standard (SA2 1/2'). The Contractor must contain and dispose of all residual surface preparation material in accordance with

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applicable environmental regulations. All disturbed deck coating resulting from the hull recoating process must be renewed as per original at Contractor's expense.

- 11.1.E.5 Before powerwashing the hull, all deck-mounted equipment and openings must be completely protected. The owner's representative will inspect the entire surface of the plating above the waterline.
- 11.1.E.6 All vessel openings must be sealed closed and deck equipment protected during all surface preparation and recoating work to protect against the ingress of contaminants. All protection material must be removed at completion of all coating work.
- 11.1.E.7 The Contractor must remove and dispose of in accordance with applicable environmental regulations any abrasive contamination and overspray left by the surface preparation and recoating process and ensure that all lights, windows, openings, controls, antennas, identifications and equipment are well covered to avoid damage and dust encrustation caused by the surface preparation and recoating process.
- 11.1.E.8 During the dry dock period, the shipyard must supply and install a temporary shelter covering all hulls of the vessel from the main deck. This shelter shall be ventilated, heated and weathertight with the hull. Heated and ventilated shelter is mandatory regardless of climatic conditions.
- 11.1.E.9 Every precaution should be taken to minimize the oxidation of aluminum after cleaning by applying paint according to manufacturer's specifications.
- 11.1.E.10 All surfaces must be blown with compressed air prior to the coating application.
- 11.1.E.11 The coating application must be in accordance with manufacturer's specifications : coating type, color, dry thickness, curing time etc.
- 11.1.E.12 A CCG contracted NACE inspector shall be onsite to ensure that the coating application process is carried out in accordance with manufacturer's specifications.
- 11.1.E.13 All materials and equipment required for the surface preparation and recoating processes must be Contractor supplied.

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- 11.1.E.14 The Contractor must supply and apply in several layers on the entire total surface (272m²) (according to the NACE inspector's guidelines) 10 dry mils of epoxy paint, self-priming, resistant to the surface and a semi-gloss finish, gray color compatible with the existing Intergard 264 coating.
- 11.1.E.15 The Contractor must supply and apply one (1) 2-mils dry layer with epoxy paint, self-priming, resistant to surface and semi-gloss finish, gray color such as "INTERGARD 264" or equivalent two-component acrylic polyurethane finish that provides excellent durability and a long-term coating capability compatible with the existing "INTERTHANE 990" red Coast Guard RAL 3000 coating on surfaces already treated.
- 11.1.E.16 The Contractor must supply and apply one (1) 2-mils dry layer of a two-component acrylic polyurethane finish to the entire surface providing excellent durability and a long-term coating capability that will be compatible with the existing "INTERTHANE 990" coating red Coast Guard RAL 3000. 11.1.E.16 The Contractor must take care to delineate in a straight line 11' foot mark from the front draft to the 10.5' foot mark from the rear draft.

11.1.F **Proof of Performance**

11.1.F.1 **Inspection points**

- 11.1.F.1.1 All work must be performed to the satisfaction of the Chief Engineer, the TA, the NACE Inspector and the manufacturer's field service representative (FSR). During and after each phase of this work, the Contractor must allow the onsite inspection by the NACE Inspector who will be mandated by the Coast Guard to monitor the work.
- 11.1.F.1.2 The Contractor must have the surface preparation inspected and approved by the Nace Inspector and the manufacturer's FSR. The Nace Inspector and the manufacturer's FSR, in the presence of the technical authority, shall ensure that all bare surfaces have been stripped to the standard and that all rough edges of the

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existing hull paint have been prepared in accordance with the paint manufacturer's recommendations.

11.1.F.1.3 The Contractor must provide a Quality Assurance Report identifying all locations identified in this specification that have been inspected by the Contractor's Quality Assurance Department and all locations where deficiencies requiring corrective action have been identified.

11.1.F.1.4 The Contractor must take and record wet thickness measurements during each application of Interprime 539 and Interprime 198 or equivalent at the request of the NACE Inspector. These readings and where they are taken must be recorded in the final report.

11.1.F.1.5 Once all paint applications have been completed, the Contractor must take and record at least 30 dry film thickness measurements at the request of the NACE Inspector and the Technical Authority. These readings and where they are taken must be recorded in the final report.

11.1.F.2 **Test and trials**

11.1.F.2.1 N/A

11.1.F.3 **Certification**

11.1.F.3.1 The TCMS Inspector and the TA must be present for approval.

11.1.F.4 **Documentation**

11.1.F.4.1 The Contractor must submit a written and electronic report no later than five days after the Work.

11.1.F.4.2 The Contractor must provide a report of the findings, the work completed and the final status of the work.

11.1.F.4.3 The Contractor must provide the Technical Authority with a Coating Application Report, completed by the FSR, containing all information on the coating application process performed by the Contractor. The report shall include the environmental conditions at the time the hull coatings were applied and the sections of hull on which they were applied. The information includes, but is not limited to, dry and wet thermometer temperatures, relative humidity, dew point, and the times the paint

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was started and finished. Product temperature at time of application and wet and dry film thickness gauge readings should also be recorded.

- 11.1.F.4.4 The Contractor must also report the joint welding and the freeboard welding that it was required to perform. It must also indicate the location and length of each weld. Finally, the report must also include the approval of each final weld by the TCMS inspector and the results of the tests performed on each weld.

11.1.F.5 Training

- 11.1.F.5.1 N/A

11.2 Sacrificial Anodes- Optional

11.2.A Identification

- 11.2.A.1 The Contractor must replace all exhausted or defective anodes, and corrosion protection products on the hull and in the ship's sea chests and sea bays. The technical authority must determine the anodes to be replaced.

11.2.B References

- 11.2.B.1 Existing Equipment : Approximate Size

Location	Quantity	Dimensions/model
Hull Frames 24,19,14,7 & 4	5	Rectangular 5''5/8 X 11''5/8 X 1''
Aft ballast external sea box suction frame 9	1	Fish 5"1/2 X 2"1/2
Hull Frame 6	1	Fish 5"1/2 X 2"1/2
Port Interior	Quantity	Dimensions/model
Hull Frames 24, 19, 13 et 5	4	Rectangular 5''5/8 X 11''5/8 X 1''
M/E, SSG & fire pump sea box suction frame 15	2	Fish 5"1/2 X 2"1/2
Sanitary and AC sea suction frame 7		Fish 5"1/2 X 2"1/2
Starboard Exterior	Quantity	Dimensions/model
Frames 24,19, 14, 7 et 4.	5	Rectangular 5''5/8 X 11''5/8 X 1''
Hull frame 9	1	Fish 5"1/2 X 2"1/2

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Aft ballast external sea suction frame 19		Fish 5"1/2 X 2"1/2
Simrad Transducer Hole Frame 5	1	Rectangular 5"X 1"1/4
M/E, SSG & fire pump sea box suction frame 15	2	Fish 5"1/2 X 2"1/2
Starboard Interior	Quantity	Dimensions/model
Frames 24, 19, 14 et 5	4	Rectangular 5"5/8 X 11"5/8 X 1"
RO & AC stbd fwd sea suction	1	Fish 5"1/2 X 2"1/2
Simrad Transducer Hole	1	Rectangular 5"X 1"1/4 X 1"
Port Shaft Well	2	Fish 5"1/2 X 2"1/2
Stbd Shaft Well	2	Fish 5"1/2 X 2"1/2
Port & Stbd Fwd Ballast Tanks	8	Rectangular 5"X 1"1/4 X 1"
Port & Stbd Aft Ballast Tanks	4	Rectangular 5"X 1"1/4 X 1"

11.2.C Regulations

11.2.C.1 Canada Shipping Act, 2001 (2001, c. 26)

11.2.C.2 TCMS; Ships' Machinery Regulations (SOR/90-264)

11.2.D Statement of Work

11.2.D.1 **General**

11.2.D.1.2 The contractor shall replace all exhausted or defective anodes and corrosion protection products on the ship's hull. The technical authority must determine the anodes to be replaced. The anodes to be replaced will be negotiated with Form 1379.

11.2.D.1.3 The Contractor shall include in its bid the price for the supply and installation of:

- Eighteen (18) anodes (5'5/8 X 11'5/8 X 1') of rectangular shapes,
- one (1) anode (5.5''X 2.5''X 1'') rectangular,
- fourteen (14) fish anodes (5.5''X 2.5'''),
- two (2) anodes (5''X 1.25'X 1'') rectangular in shape

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- twelve (12) anodes (5'X 11'X 1'') of rectangular shapes.

11.2.D.1.4 The Contractor shall provide the price of one anode of each model to be used to correct the final total amount on PSPC Form 1379.

Additional damaged anodes noted during dry docking will be replaced and the final cost will be adjusted on PSPC Form 1379 at the cost discussed above.

11.2.D.2 Anode Replacement

11.2.D.2.1 The contractor shall remove all anodes that are exhausted or damaged. The contractor must install the new anodes in the same areas as the ones he removed, and ensure that there is maximum contact between the anodes and the hull. Replacement must be done after the shell coating has been applied. All welded surfaces must be retouched with the shell coating after installation of the anodes.

11.2.D.2.2 The Contractor shall record all anode locations on a copy of a general layout drawing provided by the CCG; a copy of the modified dry dock drawing shall be provided to the Technical Authority after completion of the anode replacement.

11.2.D.2.3 All anodes shall be protected from the coating material to be applied. All anode covers must be removed once the coating has been applied. All anodes covered with coating must be replaced at the contractor's expense.

11.2.E Proof of Performance

11.2.E.1 Inspection Pointss

11.2.E.1.2 The Contractor shall notify the Technical Authority once the work is completed to allow sufficient time for inspection. The technical authority must ensure that the work has been carried out in accordance with the provisions of this section.

11.2.E.2 Tests and Trials

11.2.E.2.1 N/A

11.2.E.3 Certification

11.2.E.3.1 N/A

11.2.E.4 Documentation

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- 11.2.E.4.1 The contractor shall describe in detail the anodes that have been replaced. The report should include the specification of the newly installed anodes as well as the status of all retained anodes.

11.3 Sea Chests

11.3.A Identification

- 11.3.A.1 The contractor shall remove and clean the sea chest grids, clean all sea chest internal surfaces, prepare them for TCMS approval and obtain proof of inspection. The sea chests and water intakes must then be covered and the grids reinstalled.

11.3.B References

11.3.B.1 Sea chest grid access.

- 11.3.B.1.1 The contractor shall remove the six (6) grids or covers from the items listed below:

Description	Location	dimensions
Port Sea Chest	Engine Room Frames 14-15	≈ 3 ft ²
Port Sea Chest	Forward Section Frames 5-6	≈ 1 ft ²
Stbd Sea Chest	Engine Room Frames 14-15	≈ 3 ft ²
Stbd Sea Chest	Forward Section Frames 5-6	≈ 1 ft ²
Port Aft Sea Chest	Aft Section Frames 18-19	≈ 1 ft ²
Stbd Aft Sea Chest	Aft Section Frames 18-19	≈ 1 ft ²

11.3.B.2 Drawings

DRAWING #	DRAWING TITLE	# OF SHEETS
176	Port & Stbd Docking Plan	

11.3.B.2.1

11.3.B.3 Regulations

- 11.3.B.3.1 Canada Shipping Act, 2001 (2001, c. 26)~
- 11.3.B.3.2 TCMS; Ships' Machinery Regulations (SOR/90-264)
- 11.3.B.3.3 Vessel Pollution and Dangerous Chemicals Regulations (SOR/2012-69)

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11.3.B.4 Statement of Work

- 11.3.B.4.1 Remove the sea chest grids and clean grids and sea chests with a high-pressure water jet. Dispose of all residue. Paint the strainers and the inside of the boxes with the same paint system as the hull described in 11.1 as required.
- 11.3.B.4.2 The contractor shall remove all sea chest access covers. He must note the condition of the defective grid bolts and report it to the technical authority. The contractor will provide replacement bolts for the defective bolts identified and stainless steel locking wire.
- 11.3.B.4.3 **Optional:** It must also ream grid holes to restore their original diameter
- 11.3.B.4.4 **Optional:** The contractor, in collaboration with the technical authority and the FSR, shall inspect and determine the condition of the sea chest coatings. Based on this inspection, the TA and the contractor must agree on the surfaces to be coated with bare aluminium, and on any other work necessary to properly restore the sea chest/sea bay coatings. See 11.1.D.5 and 11.1.D.6 for paint specifications.
- 11.3.B.4.5 **Optional:** The contractor shall propose a price for coating the entire area, i.e. a total of 2 m². The price will be adjusted downward using Form 1379 to reflect the area actually covered.

11.3.C Proof of Performance

11.3.C.1 Inspection Points

- 11.3.C.1.2 The Contractor shall have the surface preparation and coating layers inspected by the manufacturer's FSR and the Technical Authority to ensure that the agreed surfaces have been properly covered. The contractor must allow sufficient time at the dockside for the paint system to completely cure before undocking the vessel.

11.3.C.2 Tests and Trials

- 11.3.C.2.1 N/A

11.3.C.3 Certification

- 11.3.C.3.1 The Contractor shall provide a report on the conclusions, work and final status of the work referred to in section 11.4 in accordance with the inspection, test and trial

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plan. The report must be submitted to the TA within 5 working days of the completion of the painting work in this section.

11.3.C.4 Documentation

- 11.3.C.4.1 The Contractor shall provide the Technical Authority with a Coating Application Report that contains all information on the contractor's coating application process. The report shall include the environmental conditions at the time the shell coatings were applied and the hull areas on which they were applied. Information includes, but is not limited to, dry and wet thermometer temperatures, relative humidity, dew point and times when painting was started and completed. The product temperature at the time of application and wet and dry film thickness gauge readings should also be recorded in the detailed report.
- 11.3.C.4.2 The Contractor shall provide TCMS with the work inspection documents referred to in section 11.4.

11.4 PROVIDE A TIME ALLOWANCE FOR WELDING AND STRUCTURAL WORK (OPTIONAL)

11.4.A Identification

- 11.4.A.1 The contractor must provide a price for a block of 1500 hrs for various welding work.

11.4.B References

11.4.B.1 Personnel Certification Requirements

- 11.4.B.1.1 Welders must possess the competency cards listed in G.1.4.5 and take safety precautions, and have a minimum of three (3) years' experience working on ships.

11.4.B.2 Drawings

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- 11.4.B.2.2 All drawings are listed in the General Remarks. The following drawings shall be considered as reference drawings as defined in the Drawings section of the General Remarks.

Dwg #	Drawing Title	# of Sheets
	N/A	

11.4.B.3 Regulations and Standards

- 11.4.B.3.1 CSA W59.2 Welding Standard on Aluminum Structures
- 11.4.B.3.2 ISO 9712:2005 International Standards on Non-destructive Testing.
- 11.4.B.3.3 CCG Welding Specifications CT-043-EQ-EG-001-E

11.4.C Statement of Work

- 11.4.C.1 Grinding, oxycutting and welding work on steel, aluminium (1500 hrs).
- 11.4.C.2 Bulkhead penetrations, pipe repair and replacement, brackets, cable tray installation, etc., as appropriate.
- 11.4.C.3 The Contractor must, in agreement with the TA, plan a maximum amount of work within the same period of time to avoid time lost in mobilizations and demobilization.
- 11.4.C.4 All work must be approved by the CCG Technical Authority and the hours signed by the TA or the Chief Engineer each day.
- 11.4.C.5 Contractor supplied equipment and material must be processed with PSPC Form 1379.

11.4.D Proof of Performance

11.4.D.1 Inspection Points

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

11.4.D.2 Tests and Trials

N/A

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11.4.D.3 Certification

N/A

11.4.D.4 Documentation

Provide a detailed report on the work performed by the welder(s).

11.4.D.5 Training

N/A

11.5 STARBOARD FOREPEAK HATCH REPLACEMENT (OPTIONAL)

11.5.A Identification

11.5.A.1 Currently, the starboard bow hatch frame has several cracks, which have already been repaired in the past. This work will be optional.

11.5.A.2 L'entrepreneur devra enlever et installer une nouvelle écoutille, qu'il sera responsable de fournir en incluant son cadre.

11.5.B Equipment Data

11.5.B.1 Freeman Marine Model 1524 Hatch, 15 x 24 inches interior clearance.

Dwg #	Drawing Title	# of Sheets
2434-0002	15x24 hinge free	

11.5.B.2 Regulations and Standards

11.5.B.2.1 CSA W59.2 Welding Standard on Aluminum Structures

11.5.B.2.2 ISO 9712:2005 International Standards on Non-destructive Testing.

11.5.B.2.3 CCG Welding Specifications CT-043-EQ-EG-001-E

11.5.C Statement of Work

11.5.C.1 Remove the old hatch and its frame and weld the new frame and replace the new hatch.

11.5.D Proof of Performance

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11.5.D.1 Inspection Points

11.5.D.1.1 The Contractor must advise the Technical Authority once the work has been completed to allow sufficient time for TCMS inspection of welds.

11.5.D.1.2 The Technical Authority shall ensure that the work has been completed as described in this section.

11.5.D.2 Tests and Trials

11.5.D.2.1 A leak test with water shall be conducted in the presence of the inspector.

11.5.D.2.2 Welds shall be verified and certified by a TCMS inspector.

11.5.D.3 Certification

The Contractor will provide the Certificate of Hatch Approval.

11.6 VESSEL DECOMMISSIONING (OPTIONAL)

11.6.A Identification

11.6.A.1 If the vessel is found to be unfit for navigation, the contractor must provide a price for the dismantling of the ship to recover certain equipment and put the metals in containers for the sale of metals by crown assets.

11.6.B Equipment Data

11.6.B.1.1 Aluminum construction estimated total weight: 75 T.

Dwg #	Drawing Title	# of Sheets
65-B1	Construction Profile	
171-09529-36	Creed_Hazmat2018_20181219_sign	

11.6.B.2 Regulations and Standards

11.6.B.2.1 Environmental Protocol for the disposal of CCG Ships

11.6.C Statement of Work

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11.6.C.1 The contractor must review the documents provided, and take careful note of the hazardous material contained in the vessel (the vessel does not have a significant environmental hazard according to the report). The points to watch are:

1. Traces of lead in 4 paints (see Creed Hazmat2018 report)
2. Ballast arrangements for neon.
3. Arrangement of the vessel's neon lights.
4. Disposal of the ship's 10 batteries.
5. Pumping and disposal of hydraulic oil (2 tanks of 110 litres) and lubricating oils (2 tanks of 190 litres) used oil tanks (2 tanks of 720 litres)

11.6.C.2 Prior to decommissioning, some equipment will be removed by Fisheries and Oceans technicians. All assistance required from the Contractor for this work must be processed through the PSPC Form 1379.

11.6.C.3 The equipment listed as follows must be disassembled with care in collaboration and under the direction of CHS (Canadian Hydrographic Service) technicians:

Scientist:

1. EM2040 Sounding System (New Slim PU, Tx and Single Rx);
2. INS Applanix POSMV (IMU, Antennas and PCS);
3. The 2 Microx;
4. Knudsen Sub-bottom profiler (chirp) transducer;
5. Rapidcast; and
6. Computer monitors and workstations;
7. Some communication components (Startech USB serial ports, Edgeport, Ethernet switches, etc.).

11.6.C.4 The following is a list of equipment to carefully disassemble in collaboration with and under the direction of CCG electronics technicians.

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1. Radio systems.
2. ISA.
3. Radar.
4. Gyro compass.
5. Intercom.
6. Electronic chart navigation system.

11.6.C.5 The following is a list of mechanical systems and units removed by the contractor in full and with care. If the Contractor damages the following, the Contractor will be held responsible for repairing or compensating Canada for the amount of the repairs.

1. The two Volvo D13 powertrains and their ZF2200 transmission, as well as all alarm panels and controller. The engines must be completely drained of engine oil and antifreeze.
2. Both John Deer 30 Kw generators, motors and generators only. They will need to be completely drained of engine oil and antifreeze.
3. The reverse osmosis system.
4. The black water treatment system and the two toilettes.
5. The small 5Hp compressor.
6. Samsung galley fridge, freezer and stove.
7. Washer, dryer.

11.6.C.6 The dismantling of the ship for disposal will have to follow certain steps.

1. Degassing, inspection of cleaning of all fuel tanks, already clean after inspection of section 15.1.
2. Degassing, inspection of cleaning of 6 tanks, hydraulic (2) lubricating oils (2) used oil (2).

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3. Dismantling of FM200 Fixed Fire Extinguishing System for Standard Disposal by a Specialized Company. (Cylinders only)
4. Dismantling walls, insulations, floors, furniture and ceilings for recycling or disposal for non-recyclable materials.
5. All copper wiring will be placed in a copper container and sold by crown property.
6. Dismantling and placing electrical panels in wooden boxes or pallets for sale by crown property.
7. Disposal of metal, piping, pumps, furnace (oil from the stack) and ventilation ducts.
8. The contractor will be required to clean using a degreaser to reduce environmental risks, hoses or rigid hydraulic/fuel lines. Rigid lines can be disposed of as metal, but PVC hoses or hoses will be disposed of as non-recyclable.
9. Disposal of halocarbons in 5 air conditioning units by a specialized company in accordance with federal halocarbon regulations SOR/2003-289.
10. Shredding of the ship's structure according to the process chosen by the contractor, then placing aluminum in containers for sale by crown assets.
11. The length of time for storage of containers and equipment for sale by crown assets is unknown so the contractor will have to provide a daily and weekly price, for this storage and the final amount will be negotiated with PSPC Form 1379.

11.6.D Proof of Performance

11.6.D.1 Inspection Points

- 11.6.D.1.2 The Contractor must provide a schedule for the work preceding section 11.6.E no later than 5 days after the decision is made for the decommissioning option.

11.6.D.2 Tests and Trials

- 11.6.D.2.1 N/A

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11.6.D.3 Certification

11.6.D.3.1 The Contractor shall provide the Halocarbon Recovery Certificate.

11.6.D.4 Documentation

11.6.D.4.1 The Contractor must provide a detailed report on the disposal and inventory of equipment, weight and an inventory of all metal scrap containers to be sold by crown assets.

11.6.D.4.2 A detailed report of all 11.6.C.1 action items and tank cleaning.

12.0 PROPULSION AND MANOEUVRING

12.1 Rudders, Foward and Aft Stabilizers

12.1.A Identification

12.1.A.1 This specification consists of a complete inspection of the rudders, forward and aft stabilizers and their supporting structure.

12.1.A.2 All repairs, 12.1.C.4 TO 12.1.C.7 inclusive, are optional.

12.1.B References

Equipment Data

- Port and stbd rudder plates
- Port and stbd forward stabilizers
- Port and stbd aft stabilizers

12.1.B.1 Drawings

12.1.B.1.1 All drawings are indicated in the “General Remarks”. The following drawings are to be considered reference drawings as defined in the “Drawings” section of the “General Remarks”.

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DRAWING #	DRAWING TITLE	# OF SHEETS
02604-S02	Port Hull	
65A3	Forward Stabilizer	
65A4	After Stabilizer	
65A5	Rudder Plate	

12.1.B.2 Standards and Regulations

N/A

12.1.C Statement of Work

- 12.1.C.1 The Contractor must disassemble the forward and aft stabilizers and the (8) hydraulic cylinders, remove the Thordon XL bearings, put the tubular supports on the aluminum, inspect and take measurements of Chockfast where applicable, perform ultrasonic and/or xray NDT testing on tubes, welds and adjacent structure. Take 10 thickness measurements in proximity to the 6 structures.
- 12.1.C.2 The Contractor must inspect the rudder plates and forward and aft stabilizers as in 12.1.C.1 . The Contractor must conduct a hydrostatic test of the two (2) rudders in the presence of the CCG representative.
- 12.1.C.3 Any structural defects noted during inspections from 12.C.1 to C.2 will be negotiated and reported on a PSPC 1379 form.
- 12.1.C.4 (Optional) The Contractor must have all hydraulic cylinders inspected and overhauled on a test bench by a recognized hydraulics company. A price must be negotiated beforehand and include labour and all parts of a standard cylinder assembly, except the casing, rod, piston, and gland nut. If any of these parts are found to be defective, the Contractor must negotiate the cost of the repairs and this will be done on a PSPC 1379 or credited if the inspection does not detect anything.
- 12.1.C.5 (Optional) Replace all stabilizer hydraulic hoses, provide a linear price for replacement of all flexible lines fitted from the generator to the hydraulic cylinder with stainless steel lines. The hydraulic filters must be relocated from the engine level to the higher level to facilitate maintenance.

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12.1.C.6 (Optional) Replace Thordon XL bearings on forward and aft stabilizers. Rudder stock bearings must be replaced as deemed necessary by the TA/TCMS Inspector; the cost of repairs will be covered on a PSPC 1379 form.

12.1.C.7 (Optional) The Contractor must have the steering and stabilizer system adjusted by a qualified technician experienced with SWATH type steering and stabilizer systems.

12.1.D Proof of Performance – Optional

12.1.D.1 Inspection Points

12.1.D.1.1 The Contractor must advise the Technical Authority once the work has been completed to allow sufficient time for inspection. The Technical Authority shall ensure that the work has been completed as described in this section.

12.1.D.2 Tests and Trials

12.1.D.2.1 Stabilizers shall be tested and adjusted out of water with the presence of the Chief Engineer and/or the TA.

12.1.D.2.2 Once the ship is in the water further adjustments shall be made at the same time as the sea trials, by the specialist in 12.C.7

12.1.D.3 Coating

N/A

12.2 Stern Tube Inspections

12.2.A Identification

12.2.A.1 The purpose of this specification is to conduct a complete inspection of the internal structure of the stern tubes, propeller shafts and propellers.

12.2.A.2 Repairs and reassembly of shaft lines 12.2.C.2.9 to 12.2.C.2.11 inclusive will be optional.

12.2.B References

12.2.B.1 Equipment Data

12.2.B.1.1 3.5 inch Aquamet shaft

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12.2.B.1.2

DRAWING #	DRAWING TITLE	# OF SHEETS
65-C8	Shaft Line	

12.2.B.2 Regulations and Standards

N/A

12.2.C Statement of Work

12.2.C.1 Propellers

- 12.2.C.1.1 Remove the propellers from their shaft and place them ashore for inspection. Check propeller keyways and blades with liquid penetrant. Following inspection by an accredited propeller surveyor damaged propellers as applicable must be loaded in a truck and shipped to an accredited propeller repair facility. The price for reconditioning work will be adjusted on PWGSC Form 1379 as per their invoice.
- 12.2.C.1.2 The propellers must be reinstalled in accordance with the work schedule. The Contractor must perform a blueing fit on each propeller to the satisfaction of the attending TCMS Inspector.
- 12.2.C.1.3 Include three (3) blueing fits for each propeller of the ship to be adjusted up or down on PWGSC Form 1379.
- 12.2.C.1.4 Afterwards, the propellers will be permanently installed on their shaft and then tightened and locked to the satisfaction of the attending TCMS Inspector.
- 12.2.C.1.5 Following the inspections, the shaft lines and propellers must be reassembled in accordance with manufacturer's specifications as identified in the reference plans and manuals.
- 12.2.C.1.6 All part replacements must be OEM as per original in accordance with manufacturer's specifications.
- 12.2.C.1.7 Propeller nuts must be locked in place.

12.2.C.2 Propeller Shaft

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- 12.2.C.2.1 Take concentricity and wear down readings in place prior to partially removing the shafts. Remove the cable cutters.
- 12.2.C.2.2 The Contractor must measure coupling alignment with transmissions before removing shafts and following shaft reinstallation and vessel refloated.
- 12.2.C.2.3 The Contractor must disassemble transmission couplings and inboard shaft glands. Withdraw the shafts outboard to allow inspection of shafts and shaft bearings by the attending TCMS Inspector. Clean the shafts and stern tubes. Using liquid dye penetrant inspect shaft and coupling key ways.
- 12.2.C.2.4 The Contractor must measure shaft outside diameters in way of the shaft bearings. Measure corresponding shaft bearing inside diameters.
- 12.2.C.2.5 The Contractor must check shaft runout using Contractor's equipment at the Contractor's facility.
- 12.2.C.2.6 The Contractor must remove the port and starboard stuffing boxes from the stern tubes and submit same to the Chief Engineer. The Contractor must supply new packing and install the new CCG supplied stuffing boxes.
- 12.2.C.2.7 The Contractor must remove the two (2) "Thordon" bearings in each of the stern tubes and measure the the three (3)/stern tube bearing housings. The Contractor must pressure wash the inside of the stern tubes.
- 12.2.C.2.8 Following stern tube pressure washing, the Contractor must afford the TA the opportunity to perform a comprehensive internal tube video scope inspection.
- 12.2.C.2.9 (Optional) The Contractor must supply (4) new bearings as required and have the bearing housings machined as required. Costs will be adjusted on PWGSC Form 1379.
- 12.2.C.2.10 (Optional) The Contractor must provide the services of a specialized laser or optical alignment firm to maintain the alignment of the stern tubes with propulsion systems during machining. The Contractor must provide a written report confirming that the alignment is maintained after the machining has been completed.
- 12.2.C.2.11 (Optional) After inspection, the Contractor must reinstall the shafts and connect the couplings to the transmissions. Re-install the seals and replenish with new packing provided by the CCG. The Contractor must reinstall the cable cutters with new parts.

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12.2.D Proof of Performance

12.2.D.1 Inspection Points

- 12.2.D.1.1 The Contractor must allow the Technical Authority to assist in the measurement of propeller shaft and stern tube bearings.
- 12.2.D.1.2 The Contractor must test for conicity percentages (80%) as requested by the TCMS inspector.

12.2.D.2 Test and Trials

- 12.2.D.2.1 The Contractor must test the shaft seals to ensure that they do not leak prior to the vessel's undocking. The Contractor must seal any leaks before the end of the Contract.
- 12.2.D.2.2 The Contractor must record radial packing temperatures for both shafts during vessel dock and sea trials.

12.2.D.3 Certification

- 12.2.D.3.1 The Contractor must provide a proof of TCMS inspection.

12.2.D.4 Documentation

- 12.2.D.4.1 The Contractor must provide a report of the findings, work and end state in accordance with the inspection, test and trials.
- 12.2.D.4.2 The Contractor must submit the following documents to the Technical Authority before the end of the Contract:
 - (a) propeller shaft bearing readings for each shaft bearing;
 - b) stern tube bearing readings;
 - (c) forward shaft seal temperature readings during dockside and sea trials;
 - (d) the results of all non-destructive tests performed on propeller shafts and fasteners;
 - e) proof of TCMS or classification society inspection for both shafts.

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13.0 POWER GENERATION SYSTEMS

13.1 REFURBISHMENT AND INSTALLATION OF THE JOHN DEERE SHIP SERVICE GENERATOR SET (OPTIONAL)

13.1.A Identification

13.1.A.1 This specification consists of a complete overhaul of a John Deere engine that has already been removed from the ship, and once refurbished by a John Deere authorized service facility, the Contractor must install same on the Starboard side.

13.1.A.2 The Contractor must completely remove the existing starboard SSG and install the rebuilt SSG.

13.1.A.3 The Contractor is responsible for returning the vessel to functional status, including providing all current certificates and approvals for the new equipment installed.

13.1.B References

13.1.B.1 Equipment Data

Reconditioning Generator: John Deere 30 Kw

- Model Number: 4239DF001

Starboard Generator replaced: John Deere 30 Kw

- Model Number: 4239DF001

13.1.B.2 Drawings

13.1.B.2.1 All drawings are indicated in the “General Remarks”. The following drawings are to be considered reference drawings as defined in the “Drawings” section of the “General Remarks”.

DRAWING #	DRAWING TITLE	# OF SHEETS
	N/A	

13.1.B.3 Regulations and Standards

N/A.

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13.1.C Statement of Work

- 13.1.C.1 SSG Removal
- 13.1.C.2 The Contractor must disconnect and remove the existing starboard John Deere ship service generator. The contractor must ensure that the existing cables between the motor and the alarm and control panel are removed. None of these cables should be retained, they must be replaced by the Contractor.
- 13.1.C.3 The Contractor must remove the existing starboard generator and all associated equipment off the vessel.
- 13.1.C.4 The Contractor must use the hatch on the auxiliary engine room deck head to remove the equipment from the vessel. The Contractor must provide crane services to remove the equipment from the vessel.
- 13.1.C.5 The Contractor must disable all SSG alarms from the vessel's general alarm system.
- 13.1.C.6 All materials and equipment remain the property of the Crown. All removed equipment must be placed on the dock and the TA must be advised of its status. The removed SSG's must be secured to Contractor supplied pallets and associated components (i.e. cables, piping, control panels etc.) must be placed inside Contractor supplied wooden crates. CCG will make transportation arrangements for all equipment and associated components to a designated storage area.

13.1.D John Deere Engine Overhaul

- 13.1.D.1 The engine stored in the CCG Quebec City warehouse will be shipped to the John Deere authorized service facility as identified by the Contractor, no later than 5 days after the contract is awarded to avoid scheduling delays.
- 13.1.D.2 The Contractor must supply all parts and labour required to overhaul the engine using new or refurbished OEM parts only.
- 13.1.D.3 The bid must include a price for the replacement, if applicable, of the following components:

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- 4 x Power Packs (Complete cylinder assemblies including pistons)
- 4 x Connecting rod assemblies including bearings
- 4 x injectors
- 1 x diesel fuel pump
- 1 x Complete gasket kit
- 1 x Crankshaft bearing set
- 1 x Cam shaft bearing set
- Intermediate gears
- 1 x Water pump
- 1 x Injection pump
- 1 x Oil pump
- 1 x Cylinder head
- 1 x Motor block

13.1.D.4 The Contractor must completely disassemble the engine for inspection and part replacement as required. The Contractor must provide the TA and the attending TCMS inspector 48 hrs notice prior to the inspection of the disassembled engine.

13.1.D.5 The bid will include the following work:

- Magnaflux polishing of crankshaft
- Magnaflux polishing of camshafts
- Exhaust manifold descaling
- Oil cooler test
- Water pump test
- Replace the thermostat

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- Replacement of the complete electrical harness and transducers (CCG will retain the old transducers)
- Replacement of accessories such as hoses, bolts, collars, etc. (with TA approval)
- Transportation of engine to the shipyard

13.1.E Proof of Performance

13.1.E.1 **Inspection Points**

- 13.1.E.1.1 The Contractor must ensure that the engine is inspected by the TA and the Transport Canada (TC) Inspector once the engine has been disassembled. The Contractor must provide at least 48 hours notice to the TA and TC to permit inspections.
- 13.1.E.1.2 Once the engine is reassembled, a load test must be performed at the contractor's facility. The test must be conducted in the presence of the TA and the TC inspector. A 100% load must be applied and oil, coolant and exhaust temperatures must be recorded in transient mode and the load must be maintained one hour after temperatures have stabilized.
- 13.1.E.1.3 Once the engine is installed on board the vessel, the contractor must fill the engine with new fluids that meet the engine manufacturer's specifications. The Contractor must plan a 4-hour sea test with a load corresponding to 100% of the generator's electrical load. The same temperatures as during the factory load test must be recorded throughout the test. Sea trials must be conducted in the presence of at least one Contractor representative, the TA and TC.
- 13.1.E.1.4 The Contractor must provide one (1) PDF service report that must, as a minimum, include:
- Engine model number and serial number;
 - all work and adjustments made, as well as all control point control sheets and parameters of all work completed and acceptances signed by the competent on site authorities;
 - a report on the tests performed, as well as all test sheets completed and acceptances signed by the on site Authority;

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- A clear list of all replaced parts.

13.1.E.1.5 One unprotected PDF copy of the report must be submitted to the TA.

13.1.E.2 **Training**

N/A

13.1.F **Port and Starboard Generator Inspection**

13.1.F.1 The Contractor must have the generators inspected by a qualified technician for the following:

- Stator and rotor grounding
- Diode bridge check
- Commutator check
- Excitation check
- Voltage Controller check
- Shaft coupling check

13.1.F.2 The Contractor must:

- Replace all bearings

13.1.G **Starboard John Deere Engine Installation**

13.1.G.1 The Contractor must transport the engine to its location in the auxiliary engine room using the deckhead hatch.

13.1.G.2 The Contractor must have cleaned and degreased and inspected the engine base prior to installation.

13.1.G.3 The Contractor must install the generator, connect the control and monitoring system and the alarm system.

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- 13.1.G.4 The installation must conform to the manufacturer's specifications.
- 13.1.G.5 The Contractor must connect the generator's cooling water, exhaust and fuel systems.
- 13.1.G.6 The Contractor must connect the following alarm points to the ship's alarm system:
- Port generator common alarm
 - Port generator low lube oil level
 - Port jacket water high temperature
 - Starboard generator common alarm
 - Starboard generator low lube oil level
 - Starboard jacket water high temperature

13.1.H Proof of Performance

13.1.H.1 **Inspection Points**

- 13.1.H.1.1 The Contractor must arrange all Classification Society inspections and approvals to ensure that the system is certified upon completion of the contract.
- 13.1.H.1.2 All costs associated with the inspection of the TCMS or classification society are borne by the CCG.

13.1.H.2 **Tests and Trials**

- 13.1.H.2.1 Commissioning must include static inspection, start-up and dock testing and a report of commissioning.
- 13.1.H.2.2 The FSR must provide a commissioning report. The report must include a narrative description of the work performed, all equipment parameters and settings, all measurements and observations made, and a statement that the equipment has been installed in accordance with the manufacturer's requirements.
- 13.1.H.2.3 A written report shall be provided prior to the completion of the work demonstrating the values of the various engine parameters (RPM, OIL PRESSURE, WATER TEMP., EXH. TEMP., OIL TEMP., ETC) during the final tests.

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13.1.H.2.4 All protections must be checked and the values recorded in the report

13.1.H.3 Dock Trials

13.1.H.3.1 The approved dock test plan shall include, as a minimum, all of the following tests: the Contractor shall provide a load bank to perform the tests to the satisfaction of the TCMS Inspector or the Classification Society:

- Starting and stopping the generator
- Emergency stop switches;
- All regulatory stops;
- All regulatory alarms;
- Engine room controls and displays;
- Wheel-house screens; and
- Rated speed for 30 minutes, generator disconnected. Monitoring and measurement of pressures, temperatures and speeds shall be carried out every 15 minutes during the test.
- Rated speed for 3 hours, generator in service on a load cell. Application of various loads during the test. Monitoring and measurement of pressure, temperature and speed shall be recorded every 15 minutes during the test

13.1.H.3.2 Dockside testing must be conducted in the presence of the FSR, the TA and the TCMS Inspector. TCMS inspection costs are the responsibility of the CCG.

13.1.H.3.3 The commissioning report must include all raw test data and a description of all tests performed. The report must be submitted to the TA within two (2) days of commissioning.

13.1.H.4 Certification

13.1.H.4.1 The attending TCMS Inspector and the TA must be notified 48 hours in advance to witness the start-up and final test to verify engine protection.

13.1.H.5 Documentation

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13.1.H.5.1 Within 10 days of the completion of the Dockside Trials, the Contractor must provide "as-fitted" drawings. These drawings should reflect changes that occur during the installation process. Drawings must be submitted in PDF/A format and marked "AS FITTED". These drawings must also be submitted in Autocad 2010 DWG format or later, with only one hard copy of the original size of the drawing.

13.1.H.5.2 The report shall contain the following:

- Date of work and date of report
- Name of the technician
- Diagnosis of identified problems
- Description of work performed
- List of equipment and all parts replaced or installed.

13.1.H.6 **Training**

N/A

14.0 POWER DISTRIBUTION SYSTEMS

14.1 INSULATION RESISTANCE TESTING

14.1.A Identification

14.1.A.1 Perform insulation testing of the ship's AC electrical systems as required by Transport Canada regulations for vessels over 20 years of age.

14.1.A.2 **Important** this work must be done by an electrician with at least 5 years experience in marine electricity.

14.1.B References

- Creed Megger List

14.1.C Statement of Work

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The Contractor must perform the following work :

- 14.1.C.1 The Contractor must perform insulation tests on all electrical systems on the ship and record the results on the Creed Megger registry.
- 14.1.C.1.1 All tests are performed between one phase and ground. For circuits with more than one phase, each phase must be tested independently.
- 14.1.C.1.2 Always consider the distribution list notes to avoid damage to equipment.
- 14.1.C.1.3 Voltages used for insulation tests are recorded on the Creed Megger document.
- 14.1.C.1.4 For distribution circuits:
1. Disconnect all equipment connected to the circuit to be tested (everything in a power outlet)
 2. All switches on the circuit must be closed (ON) to perform the test.
 3. Open (OFF) the circuit breaker of the circuit to be tested.
- 14.1.C.1.5 For generators:
1. Open (OFF) the generator circuit breaker
 2. Disconnect the voltage regulator
- 14.1.C.1.6 14.1.C.1.6 For electric motors:
1. Open (OFF) the motor circuit breaker.
 2. Test all phases independently downstream of the circuit breaker (between the circuit breaker and the motor)
 3. Find and open the motor starter to be tested and test all phases downstream of the starter (between starter and motor).

All tested circuits with a result of less than 5 Mega-Ohm msut be investigated to find and correct the cause of the loss of insulation.

14.1.D Proof of Performance

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14.1.D.1 Inspection Points

14.1.D.2 Test and Trials

N/A

14.1.D.3 Certification

N/A

14.1.D.4 Documentation

14.1.D.4.1 The Contractor must provide the Chief Engineer with two hard copies of the original inspection report. The Contractor must send an electronic copy of the certificates to the TA.

14.1.D.4.2 The report must be made with the digitally completed “Creed Megger Registry”, signed and dated by the person performing the work.

14.1.D.4.3 The report shall include the make, model and serial number of the measuring device used to perform the electrical insulation tests.

14.1.D.5 Training

N/A

14.2 Time Allowance for Electrical Work On Distribution System - Optional

14.2.A Identification

14.2.A.1 The case of the FG.Creed is particular, and CCG cannot quantify the sum of the work that will be undertaken during its winterizing.

14.2.A.2 Providing a block of time of 1500 hrs the block can be divided by one or more electricians with marine experience (3-5 years minimum experience), to accomplish several jobs and maintenance on the electrical distribution.

14.2.B References

14.2.B.1 Equipment Data

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14.2.B.1.1 Circuits 24v dc, circuits 120 v, Circuits power 240v.

14.2.B.1.2 All drawings are listed in the General Remarks. The following drawings shall be considered as reference drawings as defined in the Drawings section of the General Remarks.

DRAWING #	DRAWING TITLE	# OF SHEETS
	One line schematic FG Creed	

14.2.B.2 Regulations and Standards

14.2.B.2.1 IEEE 45-2002: Recommended Practice for Electrical Installations on Shipboard.

14.2.B.2.2 Ships Electrical Standards (2008) - TP 127 E.

14.2.C Statement of Work

14.2.C.1 Provide a block of 1500 hrs to perform the following work. Consumables such as duct tape and small connectors will need to be included in the hourly rate.

14.2.C.2 Diagnose and repair electrical insulation defects (Ground).

14.2.C.3 Modify electrical schematics (Sketch).

14.2.C.4 Installation and connection of electrical appliances, such as electrical sockets and circuit breakers. Replace and run cables.

14.2.C.5 All work must be approved by the CCG Technical Authority and the hours signed by the TA or Chief Engineer each day.

14.2.C.6 An hourly rate will have to be negotiated beforehand with PSPC if there are additional hours, or credited if there was less work than expected.

14.2.C.7 Electrical equipment and material not provided by CCG will be processed using PSPC Form 1379.

14.2.D Proof of Performance

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14.2.D.1 **Inspection Points**

14.2.D.1.1 All work shall be completed to the satisfaction of the Chief Engineer, the TA and the ABS Inspector.

14.2.D.2 **Tests and Trials**

14.2.D.2.1 N/A

14.2.D.3 **Certification**

14.2.D.3.2 N/A

14.2.D.4 **Documentation**

14.2.D.4.1 A report of all completed work must be written, the document will be titled 'FCG Creed Electrical Work' filled out digitally, signed and dated by the technician performing the work.

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15.0 AUXILIARY SYSTEMS

15.1 Fuel Tanks

15.1.A.1 Identification

15.1.A.1.1 The Contractor must open, clean and prepare selected fuel tanks for inspection by TCMS or classification society Inspectors. Tanks shall be visually inspected and pressure tested. Once the work is completed, the tanks must be returned to operational readiness.

15.1.A.1.2 Port, starboard, and aft tank quick shut-off valves and return valves must be inspected and returned to service.

15.1.B References

15.1.B.1 Equipment Data

Tank Description	Location	Capacity
Port Forward Fuel Tank	Frames 8 to 11	4.49 m ³
Starboard Forward Fuel Tank	Frames 8 to 11	4.49 m ³
Port aft fuel tank	Frames 17 to 18	2.02 m ³
Réservoir de carburant arrière tribord	Frames 17 to 18	2.02 m ³
Port Day Tank M/E	Frames 10 to 11	0.28 m ³
Stbd Day Tank M/E	Frames 10 to 11	0.28 m ³
Port SSG Day Tank	Frames 14 to 15	
Stbd SSG Day Tank	Frames 14 to 15	
Vannes	Type	Dimensions
Port aft tank quick shut-off	Spring loaded valve	0,75 po
Stbd aft tank quick shut-off	Valve	0,75 po
Port tank discharge	Control point	1 ¼ po

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Port tank return	Control point	1 ½ po
Stbd tank discharge	Control point	1 ¼ po
Stbd tank return	Control point	1 ½ po

15.1.B.2 Documents

DRAWING #	Description	Location
42-83-703	FO Piping Diagram	

15.1.B.3 Regulations

15.1.B.3.1 Canada Shipping Act, 2001 (2001, c. 26)

15.1.B.3.2 TCMS; Ships' Machinery Regulations (SOR/90-264)

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

15.1.C Statement of Work

15.1.C.1.1 The Contractor shall record the soundings of all on-board fuel tanks. The Contractor must remove the fuel from the ship and store it, and then refuel the ship once the tanks have been inspected. The Contractor's bid shall be for the removal, storage and return of approximately 2000 litres of type 2 marine diesel fuel for the ship.

15.1.C.1.2 Upon completion of this task, the tanks must contain the same amount of fuel as when the vessel arrived at the contractor's facility.

15.1.C.1.3 The Contractor must open and aerate all tanks. A marine chemist or other qualified person must be on site to determine if it is safe to enter the tank before starting the cleaning.

15.1.C.1.4 The Contractor must display hot work and entrance certificates when opening each tank in a visible location and as close to the entrance as possible. These certificates must be signed by a marine chemist or other qualified person and must be valid for the entire time the tank is open.

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- 15.1.C.1.5 The Contractor must clean all tanks and have them inspected by the TCMS or Classification Society inspector to obtain proof of inspection.
- 15.1.C.1.6 The Contractor's bid must be for the removal and disposal of one cubic metre of sludge and debris from the fuel tanks that will be adjusted upwards or downwards using Form 1379.
- 15.1.C.1.7 Mud and debris in tanks must be disposed of ashore in accordance with existing federal, provincial and municipal regulations.
- 15.1.C.1.8 The Contractor must perform a pressure test for each tank according to the requirements of the "Hydrostatic Test Procedures" section of this specification.
- 15.1.C.1.9 Upon completion of the TCMS or Classification Society inspection, the Contractor must close all tanks, Install the drain plugs and apply new fuel-resistant fibre-reinforced seals to the cover of all manholes.
- 15.1.C.1.10 The contractor must remove, disassemble and clean all components of the spring loaded drain valves. Valves must be disassembled and displayed for inspection by the TCMS or classification society inspector.
- 15.1.C.1.11 The Contractor must grind all valve discs and seats after inspection. A final run-in must be performed to ensure that the entire surface of the valve discs completely touches the surface of the valve seat.
- 15.1.C.1.12 The Contractor must reassemble the valves with new gaskets and seals supplied by the Contractor. All valves must be installed and held in the closed position.

15.1.D Proof of Performance

15.1.D.1 Inspection Points

- 15.1.D.1.1 The Contractor must allow the Technical Authority to examine all disassembled valves. The Contractor must coordinate the inspection with the TCMS or classification society inspector.
- 15.1.D.1.2 The Contractor must allow the Technical Authority to examine the interior of all tanks prior to closing. The Contractor must coordinate the inspection with the TCMS or classification society inspector.

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- 15.1.D.1.3 The Contractor must ensure that a Certificate of Entry is issued for all open tanks for inspection throughout the period they are open.
- 15.1.D.1.4 To comply with Marine Safety Board (TCMS) regulations, a hydrostatic test will be conducted on each of the four (4) tanks in such a way that the test pressure equals the pressure that would be exerted by a column of 8 feet of water above the full tank.
- 15.1.D.1.5 The Contractor must supply, install and then remove any blanks required to perform the pressure test. The Contractor must ensure that valves in the piping system are returned to the open position and that all gaskets are replaced.
- 15.1.D.2 **Certification**
 - 15.1.D.1.1 The Contractor must provide TCMS or the Classification Society with documents attesting to the inspection of the work in this section.
 - 15.1.D.1.2 The Contractor must provide certificates of disposal of used oil and oily water to the Technical Authority prior to the end of the Contract.
- 15.1.D.3 **Documentation**
 - 15.1.D.3.1 The Contractor must provide a report of the findings, work and final status of the work under section 11 in accordance with the inspection, test and trials plan.
 - 15.1.D.3.2 Prior to the end of the contract, the Contractor must provide the Technical Authority with the Confined Space Entry and Hot Work Certificates for each tank.

15.2 Ballast Tank

15.2.A Identification

- 15.2.A.1 The vessel's forward ballast tank must be cleaned with high pressure water (2000 psi) and all residues will be removed from the vessel. This tank will be cleaned so that it can be inspected by the TCMS Marine Safety office or the classification society and the Canadian Coast Guard representative. A Confined Space Work Certificate will be issued.

15.2.B References

15.2.B.1 Equipment Data

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Description	Location	Capacity
Forward Ballast Tank	Frames 3 to Fwd	3m ³
Starboard Forward Ballast Tank	Frames 3 to Fwd	3m ³
Port Aft Ballast Tank	Frames 20-23	2.4 m ³
Starboard Aft Ballast Tank	Frames 20-23	2.4 m ³

15.2.B.1.1

15.2.B.2 Drawings

DRAWING #	File Name	Location
65 B1	Construction profile	

15.2.B.3 Regulations

15.2.B.3.1 Canada Shipping Act, 2001 (2001, c. 26)

15.2.B.3.2 TCMS; Ships' Machinery Regulations (SOR/90-264)

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

15.2.B.4 Standards

15.2.B.4.1 Ships Electrical Standards (2008) - TP 127 E

15.2.B.4.2 Standards for Navigating Appliances and Equipment - TP 3668 E

15.2.B.4.3 TCMS; TP 7301F – Stability, Subdivision and Load Line Standards

15.2.C Statement of Work

15.2.C.1.1 The Contractor's bid must be for the removal of 0.5 cubic metres of solid debris from each ballast tank that will be adjusted upwards or downwards using Form 1379.

15.2.C.1.2 The Contractor's bid is for the removal of 0.5 cubic metres of solid debris from the forepeak ballast to be adjusted upwards or downwards using Form 1379.

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- 15.2.C.1.3 The Contractor's bid must be for the removal of 100 litres of wastewater and sludge from each wastewater holding tank that will be adjusted upwards or downwards using Form 1379.
- 15.2.C.1.4 Before tank cleaning, the Contractor must open the tank, ventilate it and have it certified by a marine chemist or qualified person to ensure safe entry or if necessary hot work.
- 15.2.C.1.5 The Contractor must clean all interior surfaces of the tank and use pressurized hot fresh water. The Contractor must remove blistered paint, scales, salt deposits, dirt and other debris from aluminum surfaces. All debris and wash water must be removed from the vessel.
- 15.2.C.1.6 The Contractor must post a Hot Work and Entry Certificate at the opening of the tank in a visible location and as close to the entrance as possible. This certificate must be signed by a marine chemist or other qualified person and must be valid for the entire time the tank is open.
- 15.2.C.1.7 The Contractor must clean the tank and inspect all sounding pipes and remove any foreign material from them. Mud and debris in tanks must be disposed of ashore in accordance with existing federal, provincial and municipal regulations.
- 15.2.C.1.8 The Contractor must supply and apply two (2) coats of epoxy paint, minimum 15 mils dry, self-priming, surface resistant and a semi-glossy finish such as Intergard FP264 or equivalent, white or grey at damaged areas in the bottom and on the tank walls.
- 15.2.C.1.9 The Contractor must have the tank inspected by the TCMS or Classification Society inspector to obtain proof of inspection. At the end of the inspection, the Contractor must close all tank covers with 1/8 inch thick fibre reinforced sea water resistant neoprene seals.
- 15.2.C.1.10 The Contractor must install the drain plugs in the presence of the Technical Authority using Contractor supplied rubber seals.
- 15.2.C.1.11 The Contractor must perform a pressure test on the tank in accordance with the requirements of the "Hydrostatic Test Procedures" section of this specification.

15.2.D Proof of Performance

15.2.D.1 Inspection Points

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- 15.2.D.1.1 The Contractor must allow the Technical Authority to examine the interior of all tanks prior to closing.
- 15.2.D.1.2 The Contractor must ensure that a Certificate of Entry is issued for all open tanks for inspection throughout the period they are open.
- 15.2.D.1.3 The Contractor must seal all fittings. The Contractor must also supply and install all the plugs and blanks for the pressure test and remove same at completion of testing.
- 15.2.D.1.4 If the pressure test was conducted with water, the Contractor must empty the tanks after the test. The Contractor must dispose of all water used in the hydrostatic test in accordance with all applicable federal, provincial and municipal regulations.
- 15.2.D.2 **Certification**
 - 15.2.D.2.1 The Contractor must provide TCMS or the Classification Society with the Work Inspection Documents provided in section 11.0.
- 15.2.D.3 **Documentation**
 - 15.2.D.3.1 The Contractor must provide a report of the findings, work and final status of the work under section 11.0 in accordance with the inspection, test and trials plan.
 - 15.2.D.3.2 Before the end of the Contract, the Contractor must provide the Technical Authority with the Waste Water and Waste Disposal Certificates.
 - 15.2.D.3.3 Prior to the end of the Contract, the Contractor must submit all tank safe entry certificates to the Technical Authority.

15.3 Potable Water Tank

15.3.A Identification

- 15.3.A.1 The Contractor must open, clean and perform the annual inspection of the potable water tanks for cracks and punctures and damage to the Marinecoat cement coating. The tank must be cleaned, visually inspected, and pressure tested. Once the work is completed, the tank must be returned to operational readiness

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15.3.B References

15.3.B.1 Equipment Data

Tank	Location	Volume	Zone
Port Potable Water Tank	Frames 5 to 7	1.44m ³	
Stbd Potable Water Tank	Frames 5 to 7	1.44m ³	

15.3.B.2 Drawings

DRAWING #	Nom du fichier	Location
65 B1	Construction profile Rev J.B	
	Fuel Tank Layout	

15.3.C Regulations

- 15.3.C.1 Canada Shipping Act, 2001 (2001, c. 26)
- 15.3.C.2 TCMS; Ships' Machinery Regulations (SOR/90-264)
- 15.3.C.3 Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals (SOR/2007-86)

15.3.D Standards

- 15.3.D.1 CCG Fleet Safety and Security Manual, Section 7F12

15.3.E Statement of Work

- 15.3.E.1 The tank must be emptied, opened, cleaned and thoroughly inspected by the TA.
- 15.3.E.2 After cleaning, tanks will be inspected by the TCMS or classification society inspector. The Contractor must obtain proof of inspection for the items inspected.

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- 15.3.E.3 The Contractor must close all tank access covers after the final inspection by the TCMS or Classification Society Inspector and the Technical Authority. The Contractor must replace the gaskets on the access covers with new, fibre-reinforced 1/8" water resistant neoprene gaskets.
- 15.3.E.4 The Contractor must perform a pressure test on the potable water tank in accordance with TCMS requirements.

15.3.F Potable Water Tank Disinfection - Optional

- 15.3.F.1 Following the successful hydrostatic pressure testing, the Contractor must disinfect the potable water tanks using Contractor supplied disinfection equipment in accordance with Procedure 7F12 of the Fleet Safety and Security Manual.
- 15.3.F.2 All potable water tanks must be filled with hyperchlorinated drinking water for 24 hours. Hyperchlorinated water must contain 50 ppm (parts per million) of free chlorine.
- 15.3.F.3 After the 24-hour disinfection period, the Contractor must empty and rinse the drinking water tanks and then test the water for the following:

Free Chloring	0,2 and 0,4 ppm		
E. coli	0 per 100 ml	Nitrate/Nitrite	45 mg/L
Coliformes total	0 per 100 ml	Mercury	0,001 mg/L
Turbidity	1 uTN	Selenium	0,01 mg/L
Antimony	0,006 mg/L	Uranium	0,02 mg/L
Barium	1 mg/l	Benzene	0,005 mg/L
Boron	5 mg/L	Xylenes	0,3 mg/L
Cadmium	0,005 mg/L	Fluoride	1,5 mg/L
Chromium	0,05 mg/L	Lead	0,01 mg/L

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Copper	1 mg/l	Sodium	200 mg/L
Iron	0,3 mg/L	Zinc	5 mg/l
Manganese	0,05 mg/L	Ethylbenzene	0,00024 mg/L
pH	Units of pH between 6,5 et 8,5	Toluene	0,024 mg/L
Color	15 UCV	Sulfates	500 mg/L
Total Dissolved Solids	500 mg/L	Chlorine	250 mg/L

- 15.3.F.4 These measurements must be verified by an independent laboratory approved by the province to conduct drinking water tests. A copy of all final results shall be provided to the Technical Authority.
- 15.3.F.5 The Contractor must rinse the drinking water tank until the free chlorine level decreases to an acceptable level of not more than 5 ppm.
- 15.3.F.6 The Contractor must dispose of all hyperchlorinated water in accordance with applicable federal, provincial and municipal regulations.
- 15.3.F.7 The Contractor must fill the tank with municipal potable water at the same level as when the vessel arrived, prior to the undocking.

15.3.G Inspection Points

- 15.3.G.1 The Contractor must allow the Technical Authority to examine the interior of the tank before closing it.
- 15.3.G.2 The Contractor must ensure that a Certificate of Entry is issued for all open tanks for inspection throughout the period they are open.
- 15.3.G.3 The Contractor must seal the fittings. The Contractor is also responsible for supplying, installing and removing all the plugs.
- 15.3.G.4 If the hydrostatic test is performed with water, the Contractor must empty the tank after the test is completed. The Contractor must dispose of all water used

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in the hydrostatic test in accordance with applicable federal, provincial and municipal regulations.

15.3.H Certification

- 15.3.H.1 Prior to the end of the contract, the Contractor must provide the Technical Authority with the TCMS or Classification Society inspection documentation.

15.3.I Documentation

- 15.3.I.1 The Contractor must provide a report of the findings, work and final status of the work under this section in accordance with the inspection, test and trials plan.
- 15.3.I.2 Before the end of the Contract, the Contractor must provide the Technical Authority with the Waste and Hyperchlorinated Water Disposal Certificates.
- 15.3.I.3 Prior to the end of the contract, the Contractor must provide the Technical Authority with tank safe entry certificates.
- 15.3.I.4 Prior to the end of the contract, the Contractor must provide the Technical Authority with the TCMS or Classification Society inspection documentation.
- 15.3.I.5 Before the end of the contract, the Contractor must submit the independent laboratory potable water analysis reports to the Technical Authority.

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16.0 Domestic Systems

N/A

17.0 Deck Equipment

17.1 PORT LADDER AND STARBOARD GANGWAY MODIFICATIONS (OPTIONAL)

17.1.A Identification

17.1.A.1 The starboard gangway must be reinstalled in line with the wheelhouse deck line.

17.1.A.2 The Contractor must remove the port ladder and replace same by a properly secured CCG supplied ladder.

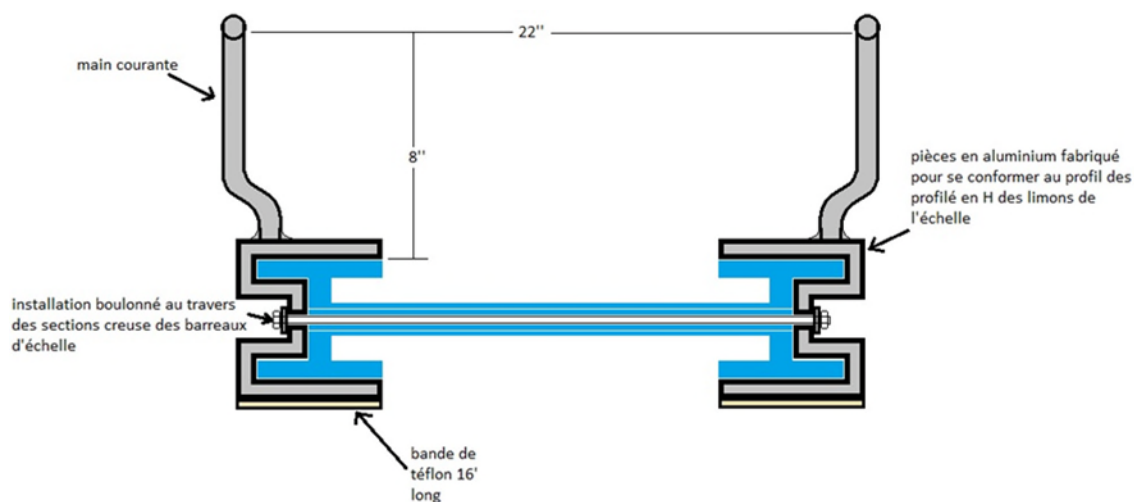
17.1.B References

17.1.B.1 Port ladder dimensions :

- Length : 20'
- Width : ?
- Material : Fibre Glass
- Capacity : 250 lbs

17.1.B.2 **Port Ladder Modification Plan**

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Plan notes translation :

Français	English
Main courante	Hand Rail
Installation boulonné au travers des sections creuse des barreaux d'échelle	Bolted installation through the deep areas of the ladder rungs
Bande de Teflon 16' long	16' long teflon band
Pièces en aluminium fabriqué pour se conformer au profil des profilé en H des limons de l'échelle	Fabricated aluminium parts to conform with the ladder string H profile

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17.1.B.3 Starboard Gangway



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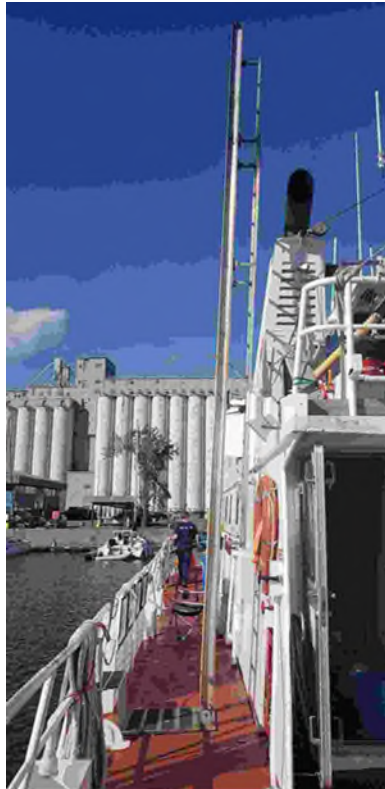
Note Translation :

Français	English
Reperçer ces trous afin de corriger l'angle de la passerelle	Redrill these holes in order to correct the gangway angle



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Port Gangway



Photos



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- 17.1.B.4 All drawings are indicated in the General Remarks. The following drawings shall be considered as reference drawings as defined in the Drawings section of the General Remarks.

Dwg No.	Drawing Title	No. of Sheets
	N/A	

17.1.B.5 Standards and Regulations

N/A

17.1.C Statement of Work

Port Ladder

- 17.1.C.1 The Contractor must remove and dispose of the ladder.
- 17.1.C.2 The new ladder must be reinforced in accordance with the sketch and then installed securely on the deck of the vessel to the satisfaction of the TA and the TC Inspector.
- 17.1.C.3 **The ladder capacity must be labeled on both sides.**
- Starboard gangway**
- 17.1.C.4 The starboard gangway must be reinstalled in line with the wheelhouse deck line.
- 17.1.C.5 The contractor must redrill the gangway base to angle towards the stack so that it is straight with the deck of the vessel.
- 17.1.C.6 A capacity test shall be performed at the end of the work to determine the capacity and then record the information on a riveted stainless steel plate on its guard

17.1.D Proof of Performance

17.1.D.1 Inspection Points

- 17.1.D.1.1 All work must be completed to the satisfaction of the Chief Engineer, the TA and the attending TCMS Inspector.

17.1.D.2 Tests and Trials

- 17.1.D.2.1 N/A

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17.1.D.3 **Certification**

17.1.D.3.1 The Contractor must provide certificates attesting to the gangway and ladder capacities.

17.1.D.4 **Documentation**

17.1.D.4.1 The Contractor must provide a port ladder plan.

17.1.D.5 **Training**

N/A

18.0 COMMUNICATIONS AND NAVIGATION EQUIPMENT – N/A

19.0 CONTROL SYSTEMS- N/A