

CCGS Private Robertson Intermediate Dry Docking

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G1.0 GENERAL

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G 1.0 GENERAL NOTES

G 1.1 Vessel Particulars

G 1.1.1 Details

Name:	CCGS Private Robertson VC
Official No.:	
IMO No.:	
Type:	Twin Screw, Mid Shore Patrol Vessel
Class:	Near Coastal Class 1
Year Built:	2012 Irving Shipbuilders
Principle Dimensions	
Length Overall:	39.72 m
Breadth:	7.00 m
Depth:	3.80 m
Tonnage, Gross:	253 tonnes
Tonnage, Net	75 Tonnes
Propulsion	Twin screw, Controllable Pitch Propeller, MTU S4000 M93L 12V. 1 bow thruster
Construction Material	Steel

G 1.1.2 Equipment - Not Used

Equipment	Make	Model	Serial#

G 1.2 References

G 1.2.1 Regulations

G 1.2.1.1 All 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 provincial regulations and standards. CCG procedures are to be used as a guide if no other regulation takes precedence.

G 1.2.1.2 In the following table “Included – Yes” means that the document will be provided by CCG to the Contractor. “Included – No” means that the Contractor must obtain the document separately. “Included – N/A” means that the document is not relevant to this specification.

FSM Procedures	Title	Included Yes/No
FSM	Fleet Safety Manual (Latest Edition)	Yes
Ship Specific	Vessel Specific - Asbestos Risk Assessment Report and Management Plan	No
Ship Specific	Vessel Specific – Lead Paint Test Report	No
Publications		
TP 127	Ships Electrical Standards	No
TP 3669	Standards for Navigating Appliances and Equipment	N/A
TP3177	Standard for the Control of Gas Hazards in Vessels to be Repaired or Altered	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.	N/A
IEEE 45	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	N/A
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.	N/A

Standards		
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
18-080-000-SG-001	Welding of Ferrous Materials	No
18-080-000-SG-002	Welding of Aluminum and Aluminum Alloys	No
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		
MOHS	Maritime Occupational Health and Safety	No
CSA	Canada Shipping Act 2001	No
Machinery Regs.	Marine Machinery Regulations (SOR/90-264)	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
WorkSafe BC.	Occupational Health and Safety (OHS) Regulation https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation	No

G 1.2.2 Guidance 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.

Drawing Number	Description
AF6102-89940-02	Tank Arrangement, Capacity Plan
6094-63300-01_B	Scheme of cathodic protection Sheet 5_5
AF6101-59300-04	Oily Waste System
AF6101-5200-01	Bilge Drainage And Dewatering System
AF6101-53000-02	Sanitary Fresh Water system
AF6101-63100-01	Paint Schedule
AF6102-25600-01	AS-BUILT COOLING WATER SYSTEM
AF6102-52600-01	AF SCUPPERS AND DRAINS
AF6102-55100-01	AS-BUILT COMPRESSED AIR SYSTEM.
AF6102-59300-02	AS-BUILT BLACK GREY WATER AND SANITARY FLUSHING SYSTEM
J16003-S01_R0	Sea Chest Modification Details
J15073-M01-R4	M.E. Exhaust Outlets Sheet 1
J15073-M01-R4	M.E. Exhaust Outlets Sheet 2
J15073-S01-R0	Strip-Out
AF6101-56100-02	AS-BUILT STEERING SYSTEM SCHEMATIC OF THE HYDRAULIC SYSTEM.
AF6101-56100-03	AF STEERING GEAR ROOM ARRANGEMENT.
AF6101-10000-11	AF Rudders Construction Plan 1
AF6101-10000-11	AF Rudders Construction Plan 2
C185-12-02	Kamewa CP-A D Installation Manual (10Sooo239/49341-E)
C185	Simplan Seal Manual
6094-25433-01-01	Shaft Line arrangement
C15-49-002-02.pdf Rev.1	R1 Installation Drawing
C15-49-506-01 Rev. 1	Air Pipes and Sounding Diagram
C185-17-06	Marine Crane Model TB10-23 Manual.pdf
	EcoShield Application Guide
	EcoShield technical information

G 1.2.3 Abbreviations

ACM	Asbestos Containing Material
CA	Contract Authority (PWGSC)
CCG	Canadian Coast Guard
CFM	Contractor Furnished Material and/or equipment
CLC	Canada Labour Code
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
DFO/CCG	Department of Fisheries and Oceans, Canadian Coast Guard
DFT	Dry Film Thickness
FSSM or FSM	Fleet Safety Manual (CCG)
FSR	Manufacturer's Field Service Representative
GSM	Government Supplied Material and/or equipment
HC	Health Canada
IACS	International Association of Classification Societies
IEEE	The Institute of Electrical & Electronic Engineers Inc.
ITS – ME	Integrated Technical Services, Marine Engineering
ITS – E&I	Integrated Technical Services, Electronics & Informatics
LOA	Length Overall
RO	TBD, will announce at bidders conference
MSDS	Material Safety Data Sheet
NDT	Non Destructive Testing
OHS	Occupational Health and Safety
PWGSC	Public Works and Government Services Canada
SSMS	Safety & Security Management System
RO	Recognized Organization as defined by Canada Shipping Act.
TA	Technical Authority - CCG Superintendent, Marine Engineering Western Region, or her delegated Representative.
TBS	Treasury Board of Canada Secretariat
TCMS	Transport Canada Marine Safety
TI	Technical Inspector – CCG delegated.
VCA	Vessel Condition Assessment
VLE	Vessel Life Extension
WCB	Workers' Compensation Board of North West Territories

Note: For the purposes of this specification the TA will be the TI.

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:

- a) the word "install" means that the Contractor must connect mechanically and electrically and provide the labor and materiel to complete the installation;
- b) The word "reinstall" means a piece of equipment that the Contractor has affected repairs on and is to be returned/installed in its original location and be mechanically and electrically connected. The Contractor must provide the labor and materiel to complete the reinstallation;
- c) The word "remove" means that the Contractor must provide all labor and materiel to remove the unit, equipment, materiel, or system in its entirety. Part of the removal process is to blank openings, restore insulation and paint;
- d) the word "relocate" means that the Contractor must provide all labor and material to remove the unit, piece of equipment, or system and to install the same unit, piece of equipment, or system in the new location;
- e) The term "or equivalent" means a substitute which has equal characteristics i.e. (size, materiel type, life, weight, input, and output) as approved by the TA. A comparison of the general specifications must be provided to the TA for the equipment specified and the "or equivalent" (i.e. old compared to the new);
- f) the term "overhaul" as applied to any mechanical equipment, structure or system comprises: disassembly into component parts; cleaning examination of parts for defects; gauging of parts for wear; reporting of parts worn beyond specification limits or otherwise defective and reassembly followed by specification adjustments; tests; and functional trials;
- g) the word "disconnect" means the Contractor must mechanically and electrically disconnect the piece of equipment of all piping, wiring, seatings and other attachments permitting the removal of the unit as a whole;
- h) the word "disassemble" means that the Contractor must provide all labor to take apart, piece by piece, the equipment, machinery or system to be examined or repaired;
- i) the word "reassemble" means that the Contractor must provide all labor and material to put together, piece by piece, the equipment, machinery or system on completion of examination or repair;

- j) the words "Additional Work Procedures" means the procedures as defined in solicitation and contract and includes any additional work required on a system, sub-system or equipment which the original specification did not specify;
- k) the word "calibrate" means the adjustment of readings and measurements to a known standard;
- l) The word "check" means that the Contractor must provide labor to find faults by sighting, feeling or listening. The checking of any equipment does not involve the disturbance or removal of parts, components or sub-assemblies;
- m) the word "examine" means that the Contractor must provide labor for the process of systematically examining, checking and testing equipment, records or administrative procedures to detect actual or potential defects or errors;
- n) the word "test" means that the Contractor must provide labor to conduct the operation of a unit in relation to a stated standard or procedure;
- o) The words "set-to-work" means the tuning, alignment and adjustment of equipment/systems required subsequent to satisfactory installation. Inspection to make the equipment/systems ready for technical acceptance trials;
- p) the word "trials" is an element of QA that means an action(s) by which the Contractor proves by a visual or instrumental presentation that the equipment or system satisfies the requirements of the specified trials agenda; and
- q) the term "functional test" means operation of a piece of equipment in all its normal operating modes and throughout its operating range to establish that it will perform its designed function within normal operating parameters as indicated in the manufacturer's documentation.

G 1.4 Miscellaneous Information

G 1.4.1 Occupational 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. The Contractor and Contractor's employees will not have access to the vessel's washrooms and crew mess facilities. The Contractor must provide the necessary amenities as required.
- 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.
- 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.
- 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.
- G 1.4.2.2 CCG 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. The CCG will provide copies of all available lead testing results.

G 1.4.3 Asbestos Containing Materials (ACM)

- G 1.4.3.1 The Contractor must use insulation that contains 0% ACM.
- G 1.4.3.2 The Contractor will be supplied the most recent copy of the vessel's Green Passport, by CCG prior to Assumption of Custody.

- G 1.4.3.3 Handling of any asbestos containing materials must be performed by trained personnel and/or a company certified in the removal of asbestos in accordance with Federal, Provincial and Municipal regulations.
- G 1.4.3.4 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 1.4.3.5 The vessel maintains a Green Passport under RO's Register which states in Part A.1A Summary of Asbestos Status: Material Declarations confirms that no asbestos has been used in the construction of this vessel. The Contractor must provide an "Observation Report (OR)" with reference to any concerns or intentions in regards to asbestos containing materials not already specified. Any approved work resulting from the OR will follow the Additional Work Procedures.

G 1.4.4 Confined Spaces

- G 1.4.4.1 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. All copies of certificates generated are to be provided to the TA in accordance with the Documentation section of the General Notes.
- G 1.4.4.2 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.

G 1.4.5 Hot Work

- G 1.4.5.1 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, deck-heads or decks. 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.

G 1.4.5.2 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 with the Documentation section of the General Notes named in accordance with the specification item generating the required work.

G 1.4.6 Work Aloft

G 1.4.6.1 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 1.4.7 Electrical Equipment

G 1.4.7.1 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.

G 1.4.7.2 Any lock-out requirements onboard the vessel during the contract period must be conducted in accordance with the safety management system.

G 1.4.7.3 The TA must be notified of all such ongoing work.

G 1.4.8 Workplace Hazardous Materials Information System (WHIMS)

- G 1.4.8.1 The Contractor must provide the TA with Material Safety Data Sheets (MSDS) for all Contractor and sub-contractor supplied WHIMS controlled products. MSDS sheets are to be the formats requested in the Documentation section of the General Notes.
- G 1.4.8.2 All MSDS sheets must be maintained in accordance with OHS procedures.
- G 1.4.8.3 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 1.4.9 Smoking in the Work Space

- G 1.4.9.1 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-contractors.

G 1.4.10 Touch-up / Disturbed Paint

- G 1.4.10.1 The Contractor must prepare and coat all touch-up work in accordance with the paint specification provided for the particular area involved in accordance with interspec.

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 information 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 1.4.12 Government Supplied Materials (GSM) & Tools

- G 1.4.12.1 All tools are Contractor supplied unless otherwise stated in the technical specifications.
- G 1.4.12.2 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 1.4.12.3 All GSM material will be brought to the Contractor's facility onboard the vessel and will remain stored onboard the vessel until required by the Contractor.

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 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. RO, HC, Environment Canada or others as indicated by individual specifications.
- G 1.4.14.2 For the purposes of this contract all regulatory inspection will be conducted by RO, Canada will be paying all RO's fees, including all TCMS inspections. TCMS retains the authority to inspect the vessel at any time. Inspection expenses occurred by TCMS or the RO will be handled outside of this contract. Any work arising within this contract due to TCMS inspections results or additional work not covered by this statement of work handled through PWGSC 1379 action.
- G 1.4.14.3 Documentation generated by the above inspections and/or surveys indicating that the inspections and/or surveys were conducted (i.e. original signed and dated certificates) must be provided to the TA in accordance with the "Documentation" Section of these General Notes.
- G 1.4.14.4 The Contractor must not substitute inspection by the TA for the required regulatory inspections.
- G 1.4.14.5 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 1.4.14.6 The Contractor must arrange for all visits and inspections associated with ROS, HC, Environment Canada, or any other Inspection required by the specification unless otherwise indicated. All costs and fees associated with these visits and inspections will be billed directly to Canada.

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 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 photos, 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 layout of newly installed machinery and equipment must be designed and constructed to permit ready access for routine maintenance, operational checks and operational inspections without disturbance of other machinery, equipment or structure.
- G 1.4.17.2 The Contractor must determine best routes for installing and removing equipment. All lifting points currently fitted on the ship must be treated as uncertified, and must be certified before use by the Contractor.
- G 1.4.17.3 Temporary lifting points installed by the Contractor must be removed prior to transfer of custody with welds ground flush, and paint coatings applied in accordance with the Interspec paint specification.
- G 1.4.17.4 Manufacturer's recommended removal clearances must be allowed for.
- G 1.4.17.5 After equipment installation and/or removal the Contractor must make good all equipment relocations, blemishes, and penetrations and must return the affected areas of the ship to the As-Delivered working condition.

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 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 nut and bolt torques must be used.

G 1.4.19 Protection of Equipment

- G 1.4.19.1 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 1.4.19.2 All electrical and electronic equipment and components must be protected during the contract against physical damage, internal damage, and by the effects of adverse temperatures or other environmental conditions.
- G 1.4.19.3 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 1.4.19.4 Any damage to surfaces, equipment, furnishings or decor incurred prior to acceptance must be returned to As Delivered condition by the Contractor.
- G 1.4.19.5 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 1.4.19.6 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 1.4.19.7 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 1.4.19.8 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 1.5 Documentation

G 1.5.1 Documentation is identified as a deliverable in the specification items requesting them.

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 Contractor's QA program. An electronic copy of all documentation must also be provided to the TA in accordance with the formats described in this specification item.

G 1.5.2.2 All copies of documents generated as a result of specified deliverables will be referred to as the "Data Book".

G 1.5.2.3 The Contractor must provide to the TA all the files generated as part of the Data Book must be received prior to the contract being considered complete. The files must be in hard format (CD-ROM, DVD-ROM, Flash Drive / Memory Stick). Each specification item is to have its own folder named according to the specification item. For example "G1.0 General Notes".

G 1.5.2.4 Any documentation, media, and reports, that are the result of Additional Work, are also to be included as part of the Data Book.

G 1.5.3 File Naming

G 1.5.3.1 File naming must be in the following format: *Specification#.# – Date (yyyy-mm-dd) – File Name Describing Information*. For Example: "G1.0 – 2016-12-01 – Details of file naming.pdf".

G 1.5.4 E-mails

G 1.5.4.1 Any files sent to the CA/TA by e-mail must be named as per the "File Naming" section of this specification. All files that are e-mailed must have in the subject name: "Contract# - DATA BOOK – Date – Specification #". For Example: ***F1782-0 – DATA BOOK – 2015-11-30 – G1.0 General Notes*** . Files sent by e-mail must also be included in the "Data Book".

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 (preferably 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 1.5.7 Measurements, Calibrations, and Readings.

- 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 may require transcription into electronic format in order to be acceptable. The original must be signed by RO, 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 1.6 Drawings

- 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 to be drawings.
- G 1.6.2 The Contractor must have on staff or through a sub-contractor a person qualified and experienced in the use of AutoCAD who will create or modify drawings that result from the work.
- G 1.6.3 The Contractor must comply with the Canadian Coast Guard National CAD Standards titled "*Computer Aided Design (CAD) using AUTOCAD*" provided.
- G 1.6.4 Drawing disks must be clearly labeled with the Contract Number, file names and drawing numbers. If a complete listing exceeds the label size, a "readme.txt" file in ASCII format must be provided with each disk. A printed copy of the Readme file must accompany each disk. Disks must be labeled As-Fitted drawings for those drawings that have been approved and finalized.
- G 1.6.5 Final As-Fitted prints/plots must not contain markings or corrections by hand (i.e. marker, pen, pencil, etc.). Drawings containing mark-ups must be revised and re-printed/plotted.
- G 1.6.6 The Contractor must prepare all the working drawings necessary for the project requirements and modernization work.
- G 1.6.7 The Contractor must furnish all drawings required by sub-Contractors, trades and other consultants.
- G 1.6.8 Schematic drawings of systems must include all pertinent system information, including sizes, dimensions, labeling, equipment locations, and all information relating to system fittings.
- G 1.6.9 The Contractor must have in place a complete system of documenting and controlling all drawing revisions affected by the work of this project. Drawing numbering system and titles must match the original drawings for clarity and include a revision number with date.

G 1.6.10 Guidance Drawings

G 1.6.10.1 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 1.6.10.2 All departures from the provided guidance drawings and project specifications must be clearly indicated by the Contractor and written approval obtained from the TA before carrying out such alterations or departures.

G 1.6.10.3 Specification deviations must be documented using an Observation Report.

G 1.6.11 As Fitted Drawings

G 1.6.11.1 The As-Fitted Drawings are identified as a deliverable in the specification item requesting them.

G 1.6.11.2 Upon completion of specified work, the Contractor must transfer the mark-ups from any working drawings where installation changes were made to drawings affected by the project work. These drawings become the As-Fitted drawings for the project work. The Contractor is responsible for providing updated vessel drawings affected by the project work to the TA prior to completion of the contract. The affected drawings must be submitted in the following formats:

- a) Five (5) plotted copies of the latest revision of each of the As-Fitted drawings;
- b) Two (2) electronic copies of the latest revision of each As-Fitted drawing.

G 1.6.11.3 Plotted drawings must be on standard ANSI paper sizes.

G 1.6.11.4 Marked up drawings are to be AutoCAD drawings where original AutoCAD drawings are provided. If no AutoCAD drawings were provided then scanned files (raster format) must be supplied to CCG in one of the following formats:

- a) DXF format;
- b) TIFF format;
- c) PDF format.

G 1.7 Manuals

G 1.7.1 This section, to be referred to as the Manuals section of the General Notes, is intended to be used as reference for the minimum standards when specified deliverables are to be manuals.

G 1.7.2 General

G 1.7.2.1 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 information printed thereon:

- a) CCGS M Charles;
- b) Equipment Identification;
- c) Equipment Manufacturer;
- d) Date.

G 1.7.2.2 Plastic tabbed indices must be provided for all sections of the manuals. Major equipment components must be subdivided into separate sections of the manuals.

G 1.7.2.3 A master index must be provided at the beginning of each binder indicating all items included in each section.

G 1.7.2.4 A list of names, addresses and telephone numbers of contacts associated with the equipment manufacturers must be provided that can be used after the project completion for maintenance and information data purposes.

G 1.7.2.5 A copy of the final reviewed and approved As-Fitted drawing(s) must be provided within the maintenance manual.

G 1.7.2.6 One (1) electronic copy of each manual must be provided in accordance with the Data Book section of this specification.

G 1.7.2.7 Two (2) paper copies of manuals and data sheets must be supplied in English for all Contractor Furnished Equipment items.

G 1.7.3 Operation Manuals – As-Fitted

G 1.7.3.1 Operation manuals must include the following items:

- a) General description of equipment operating sequence;
- b) Step by step procedure to follow in commissioning the equipment;
- c) Schematic wiring diagram for the fitted equipment; and

d) All pertinent equipment performance criteria.

G 1.7.3.2 Where software/hardware systems are fitted, the operation manual must include the full software documentation manual in paper form for the system and an electronic copy in accordance with the Documentation Section. The minimum software documentation must include:

- a) System level diagrams describing the overall scheme of the software/hardware system;
- b) The functional specifications, which must describe in detail the functional capabilities of the system and each software components; and
- c) Project specific program listings including all comments describing the details of the code functions.

G 1.7.4 Maintenance Manuals – As-Fitted

G 1.7.4.1 Maintenance manuals are to include:

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

G 1.8 Identification

G 1.8.1 Nameplates

- G 1.8.1.1 Nameplates are identified as a deliverable in the individual specification item requesting them.
- G 1.8.1.2 All nameplates must be in English, except where required in English and French by RO for reasons of emergency operation.
- G 1.8.1.3 Lettering must be clear and concise with the minimum use of abbreviations. Primary information must be given in larger size lettering than secondary information.
- G 1.8.1.4 The type of nameplates must suit the location in the vessel as specified below:
- G 1.8.1.5 Plastic:
 - a) Laminated plastic nameplates, black with white core engraved through to the center core, must be provided for all devices located on the exterior surfaces of switchboards, MCC's, or local control panels. Nameplates must be secured to the equipment with machine screws.
 - b) New nameplates to be fitted on the existing equipment must be consistent in size and lettering with those already fitted or those being replaced.
 - c) Nameplates indicating feeder circuits must identify each circuit by name and number and the fuse size or trip element rating.
 - d) The Following Labels must be of laminated plastic, red with white core engraved through to the center core:
 - i) Safe Working Loads,
 - ii) Warning/Caution labels,
 - iii) Circuit Breakers with shunt trips requiring completion of remote circuits prior to being operated,
 - iv) Equipment with multiple power sources,
 - v) Circuit breaks having a potential power source connected to both sides
 - vi) Indication of any other potentially hazardous condition.

G 1.8.1.6 Engraved on Metal:

- a) Must be used in machinery spaces and where exposed to the weather or susceptible to covering by paint, oil or grease. Nameplates exposed to weather must be stainless steel or brass. Engraved metal nameplates must be of stainless steel or brass with lettering accentuated by means of black wax unless otherwise noted, and secured with stainless steel or brass machine screws.
- b) A complete list of nameplates, detailing size of plate, size of lettering and inscription must be submitted to the TA for review prior to ordering and/or manufacturing.

G 1.8.2 Wire Labeling

- G 1.8.2.1 Wire Labeling is identified as a deliverable in the individual specification item requesting them.
- G 1.8.2.2 All permanently installed cables must be tagged with the circuit designation at all points of connection and on both sides of bulkheads, decks, etc. Tags must be of metal compatible with the armor or cable sheathing. Both ends of the tags must be strapped to the cable with compatible metal strap after all painting has been completed. Straps must pass through holes in the tags so that tags are positively secured. Strap ends must be permanently folded and crimped. Adhesives of any kind will not be acceptable.
- G 1.8.2.3 All wiring in panels specified to be labeled must be labeled with the Cable Number and their conductor # unless otherwise specified in equipment installation drawings.

G 2.0 GENERAL TECHNICAL REFERENCE

G 2.1 Identification

- G 2.1.1 This section is intended to be used as reference for the minimum standards when conducting certain work items and will be individually referenced within individual specifications and/or additional work items.

G 2.2 Electronic Compartments

- G 2.2.1 Compartments containing electronic equipment must be provided with ship's services to maintain the following conditions:

G 2.3 Manned Compartments:

- i. Room temperature: 20°C to 25°C;
- ii. Relative humidity: 5 to 70%;
- iii. Noise level: 65 dBA.

Unmanned Compartments:

- i. Room Temperature: 20°C to 25°C;
- ii. Relative humidity: 40 to 70%;
- iii. Noise level: 80 dBA.

G 2.4 Painting

G 2.4.1 The final top coats must not be applied, as far as practicable, until all welding, burning, etc., is completed in order that all touch-up work must be generally confined to the priming coats. The final top coats must be protected from soiling or damage until the vessel is handed over to the TA. Care must be taken in the application of final top coats to ensure that furnishings, and in particular electronic or other equipment liable to more serious damage due to excess spray, must be adequately protected.

G 2.4.2 The following must NOT be painted:

- a. Screw threads;
- b. Grease fittings;
- c. Bronze pins;
- d. Door screens;
- e. Nameplates;
- f. Gaskets;
- g. Stainless steel or monel metal fittings;
- h. Machined surfaces;
- i. Instrumentation;
- j. Interior gratings;
- k. Electrical wires, insulation and fittings;
- l. Electrical panels;
- m. Rubber seals of watertight doors and hatches;
- n. Fire door seals; and,
- o. in general, all working parts.

G 2.5 Piping

G 2.5.1 This section is to be identified within the individual specification items that this section may apply to.

G 2.5.2 Piping must be installed so as not to interfere with:

- a. Operation of, or passage through doors, hatches, scuttles, openings covered by portable plates or working areas.
- b. Operation of machinery, equipment, controls, and with routine maintenance of machinery and the ship's structure;

- c. Designated equipment removal routes or removable structural portions of the ship provided for equipment access, removal, and/or maintenance.

G 2.5.3 Piping installations must be located where it would not likely be subject to mechanical damage. Protection for piping must be provided wherever susceptibility to mechanical damage is unavoidable.

G 2.5.4 Piping installations in way of mechanical, electrical or hydraulic systems requiring periodic overhaul must be removable.

G 2.5.5 Where high and low points in piping installations are unavoidable, vent drains or other effective means must be installed to assure proper system function.

G 2.5.6 Installed pump suction piping must be short and arranged to rise without forming bends likely to cause air pockets.

G 2.5.7 Installed tank suction must be 0.5D above the bottom of the tank at the deepest point, D being the inside diameter of the suction pipe.

G 2.5.8 Bulkheads and decks must generally be pierced close to boundaries of compartments. Piping installations must be arranged to avoid cutting bulkhead stiffeners, deck beams and plating butts and seams.

G 2.5.9 Piping must not be led through inner bottom tanks and voids except as necessary to serve the tanks themselves, or as necessary to avoid penetrations of fuel tanks and ballast tanks. Piping normally under pressure must be kept out of voids, cofferdams and other normally non-vented spaces.

G 2.5.10 Deflections of bulkheads, decks and other structures due to air or water pressure or working of the ship must be considered and the piping arranged for the necessary clearance and flexibility.

G 2.5.11 The amount of piping led through messing and living spaces must be minimized. Piping in such places must be symmetrically and neatly arranged for the necessary clearance and flexibility.

G 2.5.12 Piping must not be led through the following spaces, except as necessary to serve the space:

- a. Chain lockers;
- b. Fresh water tanks; and
- c. Wiring trunks and enclosures.

G 2.5.13 When systems other than those serving a tank are permitted to pass through fuel oil or diesel oil tanks, the piping must be welded Schedule 80 steel.

G 2.5.14 New piping installations must be kept clear of the machinery control room.

G 2.5.15 Supports must be designed and located to safely support the weight of piping, its operating or test fluid (whichever is heavier) and its insulation and lagging (where installed). The supports must also carry the loads imposed by expansion and contraction of the piping and working of the ship.

G 2.5.16 The number of supports installed, the type selected and their location must prevent excessive vibration of the piping under all system operating conditions. They must not constrain the piping under any system operating condition, and they must not constrain the piping to such an extent so as to cause excessive transfer of load from support to piping or from support to support. The location and type of support selected must prevent excessive stress from being transmitted by the piping to machinery, equipment or the ship's structure.

G 2.5.17 Rigid anchors must be designed so that noise and vibration from piping system components and excessive heat from high temperature systems are not transferred through the anchor into surrounding areas.

G 2.5.18 Changes in direction of piping must be made by pipe bends and offsets where space permits; otherwise, straight length of pipe and pipe fittings for the system must be used. Miter joints are permitted only in piping such as air escapes, vents and overflows where their use would not cause objectionable pressure drop or turbulence in the fluid flow. Branch connections must be located to minimize turbulent flow and the type used, (crosses, single and double-sweep tees, Y and lateral fittings), must be suitable for the required flow characteristics.

G 2.5.19 Direct reading thermometers, pressure, and/or compound gauges must be located in positions where they can be easily read and safe from damage. All pressure and compound gauges must be provided with an isolating cock.

G 2.5.20 Galvanic corrosion must be minimized in the sea water systems that couple dissimilar metals of high potential differences. Control of galvanic corrosion is to be obtained by the coupling of a relatively small area of cathodic material to a large area of anodic material or the dissimilar metals may be separated with a short length of extra heavy galvanized steel pipe (waste piece).

G 2.5.21 Raised face flanges must not be used against bronze or other relatively low strength composition valves, fittings or flanges.

G 2.5.22 Where pipes pass through holes in non-watertight structure, provision must be made to keep the pipes from bearing on the structure.

G 2.5.23 Piping runs must be as direct as possible and utilize the minimum amount of fittings that would increase the frictional flow characteristics of the piping run.

G 2.5.24 Bending of hard drawn tubing is not acceptable. Straight length and fittings must be used. All joints must be silver-soldered.

G 2.6 Piping Fabrication for piping installations

G 2.6.1 Flange faces must be on a plane perpendicular to the longitudinal centerline of the pipe, tube or fitting to which they are attached.

G 2.6.2 All components and assemblies of components must be thoroughly cleaned after fabrication and before installation in the ship. Foreign matter, such as dirt, grit and shavings, must be removed by methods and materials compatible with the fluids employed in the service aboard ship..

G 2.7 Hydraulic Piping

G 2.7.1 Hydraulic piping must be phosphate pickled, neutralized, flushed with oil and blown dry prior to installation.

G 2.8 Refrigeration Piping Installations

G 2.8.1 Refrigeration piping must consist of processed tubing specifically designed for refrigeration installations, be deoxidized, dehydrated, and sealed.

G 2.8.2 Hard copper tube type must be Type L in accordance with ASTM B88M-83.

G 2.8.3 Annealed copper tube must be in accordance with CSA B52-99 for minimum wall thickness.

G 2.8.4 All fittings must be wrought copper fittings.

G 2.8.5 Where necessary, flexible lines must be fitted and properly supported to reduce the effects of equipment vibration affecting the piping installation.

G 2.8.6 Suitable shut-off valves must be fitted to allow all major components of the system to be isolated for maintenance purposes.

G 2.8.7 Brazing must be done with Sil-Fos, Easy-Flo or equivalent.

G 2.8.8 Refrigeration and air conditioning tubing installations must be hard drawn copper having a wall thickness as specified below:

Outside diameter	Wall thickness (in thousandths of an inch)
1/4"	0.030"
3/8"	0.032"

1/2"	0.032"
5/8"	0.035"
3/4"	0.035"
7/8"	0.045"
1 1/8"	0.050"
1 3/8"	0.055"

G 2.9 Identification of Piping

G 2.9.1 Piping systems must be identified in accordance with the CCG Piping Identification Standard CGFM 308.00.03.

G 2.10 Testing of Piping Systems

G 2.10.1 All sub-assemblies and piping systems that are to be tested by the Contractor must be hydrostatically tested to 1.5 times the system's working pressure and proven tight to the satisfaction of the TA.

G 2.10.2 Clean fresh water or the service fluid must be used when testing systems hydrostatically. Failure to correct leakage or inability of manually operated valves to be opened and closed tightly by one person without mechanical assistance is unacceptable.

G 2.10.3 Machinery and equipment must not be subjected to pressures higher than their maximum allowable operating pressure during system pressure tests. Valves at the components may be closed, or the connection blanked off to protect such components from excessive pressure. If there are any flanged joints in the piping between a tank isolating valve and the open end of the suction pipe, or where a tank isolating valve has not been installed, the flanged joint next to the open end of the suction pipe must be temporarily blanked off so the system may be pressure tested up to that point. Instruments, pressure switches and other components that could be damaged by excessive pressure of system tests must be removed or otherwise protected during the tests.

G 2.10.4 For tests, calibrated pressure gauges must be installed at the connections provided in the gauge piping for this purpose. During tests, readings of installed gauges must be checked with the calibrated test gauges. Installed gauges must be adjusted where necessary to register pressure accurately.

G 2.10.5 Individual length of shop fabricated and shop tested piping may be insulated before shipboard testing. All mechanical joints and all fittings installed during system assembly must be left exposed until tests have been satisfactorily completed.

G 2.10.6 Tests with fluids subject to freezing must not be conducted during freezing weather.

G 2.10.7 For operating tests, the service fluid must be used. Failure to correct leakage or meet system operating conditions as a minimum must be cause for rejection.

G 2.10.8 When the duration of a pressure test is not specified, the test pressure must be held a sufficient length of time to permit a thorough examination of the system for leaks to the satisfaction of the TA.

G 2.10.9 Relief and safety valves and all other components installed to limit operating pressures must be removed, blanked or bypassed where necessary to build up to the pressure specified for the test. After a system has satisfactorily passed these tests, such components must be reinstalled and tested under pressure to assure they operate at approved set pressures. Set pressures indicated on identification plates of these valves must conform to the approved set pressures.

G 2.10.10 All components necessary for the safe operation of the system must be checked and adjusted during the operating tests to demonstrate compliance with the requirements and approved for the system. Operating tests must demonstrate that the piping design and installation adequately meet the service demands. Priming, venting, bleed-off, recirculating and other system provisions must be tested for proper operation. Components, such as spring hangers must be adjusted where necessary, and flexible piping connections, slip joints, expansion joints and noise isolation pipe fittings must be checked for satisfactory operation while the system in which they are installed is being operated.

G 2.10.11 Where pumps have suctions from tanks or compartments, the operating test must demonstrate the ability of the system to remove the service liquid down to the level of the open end of the suction pipe, or to another level relative to the suction pipe when so specified for a particular system.

G 2.10.12 Open systems such as air escapes, overflows and deck drains must be tested for unobstructed flow with compressed air or water at not more than 100 PSI. Systems for hand pumps, portable drainage facilities and similar miscellaneous systems must be given an operating test and the specified pressure test. Pressure tests must precede operating tests. All systems must have a visual inspection and must be leak-free during the tests.

G 2.10.13 All of the system pressure and operating tests must be completed before the system trials.

G 2.11 Rotating Machinery

G 2.11.1 Where a danger to personnel attending and/or working on newly installed machinery exists, the machinery must be provided with shielding to prevent contact with rotating elements.

G 2.11.2 Shielding is to be constructed in either steel or aluminum.

G 2.11.3 Shielding arrangements are to be designed to be easily removed to conduct maintenance on the components being shielded.

G 2.12 Shock and Vibration

G 2.12.1 Shipboard equipment, racks, cables and other accessories must be mounted so as to be capable of performing their intended operation under the following conditions:

G 2.12.2 Shipboard Vibration

- a. 0 to 13.2 Hz with displacement amplitude of +/- 1.0mm;
- b. 13.2 to 80.0 Hz acceleration amplitude of +/- 0.7g with a maximum acceleration of 0.7g.

G 2.12.3 Natural frequencies at supports for equipment and parts of equipment must not be within the 0 to 80 Hz range except that where they cannot be kept outside this range by constructional design methods, the vibration must be damped so that undue amplification is avoided.

G 2.13 Electrical

G 2.13.1 The electrical workmanship involved in the modifications to the vessel must be to the satisfaction of RO, and the following standards:

- a. TP 127E entitled “Ships Electrical Standards”
<http://www.tc.gc.ca/marinesafety/TP/Tp127/pdf-version.htm>
- b. IEEE standard 45-2002 entitled “Recommended Practice for Electric Installations on Shipboard 2002”;

In any conflict between these standards, the requirements of TP127 must prevail.

G 2.13.2 The Contractor must supply and install equipment that conforms to the requirements of ANSI/IEC 60529-2004 Degrees of Protection Provided by Enclosures (IP Code)

G 2.13.3 The Contractor must comply with all aspects of Section 36 of TP 127E with regard to RO approvals for Electrical Modifications.

G 2.14 Cable Penetration Systems

G 2.14.1 Cable penetrations in watertight bulkheads must be fitted with RO approved glands and transits.

G 2.14.2 Penetration systems must be Type Approved Roxtech Cable Penetration systems or equivalent and installed according to manufacturer’s recommendations.

G 2.15 New Electrical Rotating Machinery

G 2.15.1 Motors must be furnished to suit the requirements of each application.

G 2.15.2 Motors must be of commercial marine quality in accordance with TP127E Ships Electrical Standards.

G 2.15.3 Motor enclosures for various installations must conform with IEC 60529 requirements

G 2.15.4 Motors must be continuously rated except for deck machinery where one (1) full hour @ rated load, and continuous light running load are applicable.

G 2.15.5 All motors must have their windings covered with a class F insulating material, highly resistant to oil and water, and must be considered to be operating in an ambient temperature of 50 Degree C when installed inside machinery spaces and 40 Degree C when installed on enclosed decks. For motors operating on the open deck, the low ambient temperature must be considered as minus 40 degree C. Temperature rises, as measured by thermometer after an 8 hour heat run must not exceed those laid down by RO, TP 127E Class B.

- G 2.15.6 Rotating machinery with enclosed slip rings or commutators must not have any form of silicone impregnated material incorporated into their windings, or introduced into the enclosure.
- G 2.15.7 Any rotating equipment incorporating brushes must be fitted with inspection windows.
- G 2.15.8 All A/C motors rated in excess of 0.37 kW (1/2 HP) must be of squirrel cage induction type, be rated for continuous duty and be capable of reaching design parameters at 440 Volts, 60 Hz, 3 phase, unless otherwise specified. Induction motors of 0.37 kW rating and less may be designed for operation on 115 Volts, 1 phase or 230 Volts, 3 phase, unless otherwise specified.
- G 2.15.9 Particular care should be exercised in the selection of induction motors to ensure that each motor is not too large for the intended service and thus avoid the low power factor inherent in under-loaded induction motors.
- G 2.15.10 Induction motors must be of a 4-pole 1800 RPM design in the case of single speed motors, unless otherwise specified.
- G 2.15.11 Motors of 0.18 kW (1/4 HP) and over must be equipped with anti-friction bearings of suitable design to meet the imposed thrust and radial loads. Where motors are used with solid couplings a bearing to take thrust must be fixed to the shaft end housing, and shaft end play limited to the clearance in the bearing. Use of tandem ball bearings for axial thrust loads is not acceptable.
- G 2.15.12 Motors equipped with anti-friction bearings using pressure grease fittings must have positive means, either by relief plugs or fittings, or by a clearance differential relief system, to prevent grease from being forced out onto the motor windings.
- G 2.15.13 Where anti-friction type bearings (ball bearings) are specified for rotating electrical machinery, they must be:
- a. rated and suitable for the type of drive;
 - b. noise tested;
 - c. of the deep groove type where the drive introduces end thrust; and
 - d. of the pre-lubricated type, unless otherwise specified.
- G 2.15.14 Axial flow fan motors must be equipped with factory sealed pre-lubricated ball bearings or factory sealed pre-lubricated ball bearing housings. The bearing housing must not be drilled.
- G 2.15.15 Motors for V-belt applications must have their bearings designed for this purpose.
- G 2.15.16 Motors rated above 0.75 kW (1 HP) must have their rotor both statically and dynamically balanced. All windings must be vacuum pressure impregnated followed by

oven curing. Particular attention must be paid to the elimination of dust and dirt traps within both windings and the motor enclosure.

G 2.15.17 Induction motors driving ventilation fans or pumps requiring both high and low operating speeds must be of the 2 speed 2 winding type with the top speed not greater than the 4 pole design, unless otherwise specified.

G 2.15.18 Motor overload protection must normally be provided by the controller overload relay. Alternative built-in motor thermal protection may also be used if considered a requirement for the intended service.

G 2.15.19 Rotating A/C machines rated 50 kW to 199 kW must be provided with at least one resistance type thermal detector implanted in each phase winding.

G 2.15.20 The Contractor must confirm all pertinent characteristics of replacement motors prior to procurement and to ensure compatibility with requirements of retained machinery. Before placing any purchase orders, the Contractor must submit a list of all electric motors to be purchased and installed to the TA. This list must include but not be limited to the following:

- a. Manufacturer's name;
- b. Duty/service factor;
- c. kW and full load speed;
- d. Enclosure type;
- e. Efficiency;
- f. PF for full, $\frac{3}{4}$ and $\frac{1}{2}$ load (A/C motors);
- g. Locked rotor torque and current;
- h. Weight;
- i. EEMAC design characteristics;
- j. Insulation Class;
- k. Full Load Current;
- l. Temperature rise class;
- m. Voltage;
- n. Frequency; and
- o. Frame size.

G 2.16 Anti-Condensation Heaters

G 2.16.1 Black heat, tubular or strip type space heaters must be fitted to all new motors rated 15KW or larger and to electric equipment installed in open decks or in damp or unheated spaces where specified. These space heaters must be arranged for operation from a separate supply. Heaters must be suitable for operation from 120 volt, single phase, 60 Hz. AC.

G 2.16.2A suitable interlocking arrangement must be provided at the equipment control station to ensure that the heater is de-energized when the respective equipment comes into service.

G 2.16.3 Visual ON/OFF status indication must be provided at the equipment control station as detailed:

- a. For motors on their respective control station or local starting panel; and
- b. For electrical control equipment on their relevant panel.

G 2.16.4 Isolation switches or control station disabling arrangements must be provided at equipment requiring local maintenance, where the feeder breaker is not in sight. The isolating switch or lock-out station must be within sight from the protected equipment.

G 2.17 Cables

G 2.17.1 All cables selected for installation must be manufactured, tested and installed in accordance with the latest RO, IEEE and Classification Society requirements. Cables not meeting the RO vertical fire and cold bending test requirements will not be accepted.

G 2.17.2 All cables must be suitable for marine installations.

G 2.17.3 Cables must be installed on hangers and spaced in accordance with RO requirements. Unless suitable de-rating is applied, there must not be more than two (2) layers of cable in each hanger tier.

G 2.17.4 Cable splicing must not be permitted. Splices in 600V or less cable may be permitted with special prior permission of RO providing splices are performed in accordance with TP 127E Sections 11.40, 13.39 and 13.41.

G 2.17.5 Where cables enter drip proof or watertight cubicles, motors, or other equipment, RO approved glands and/or strain relief devices must be used.

G 2.17.6 Cable entry into drip proof enclosures should be from the bottom or side of the enclosure.

G 2.17.7 Guards must protect wire ways or cable runs subject to mechanical damage. Where the risk of mechanical damage is otherwise unavoidable, protective plating must be fitted over the cables or the cable must be installed in rigid metal conduit.

G 2.17.8 A minimum of 15% spare space must be provided on each new cableway and on all modified cable runs.

G 2.17.9 Cables must be concealed, except in machinery spaces, workshops, and storerooms. The location of cable runs, connection boxes, hangers, etc., concealed by paneling or linings must be clearly indicated on the "As Fitted" drawings. Concealed connection boxes

must have the circuit designation stamped or painted on a part of the box not subject to being removed.

G 2.17.10 All wire and cable must be terminated in accordance with TP127 Section 13 (22).

G 2.17.11 To avoid mutual interference, cables must be grouped and separated in accordance with the Specification for the Installation of Shipboard Electronic Equipment – CCG Publication number 70-000-000-EU-JA-00, as referenced in G.2.12.1..

G 2.17.12 If the spacing is impractical, additional shielding must be provided as approved by RO. This constraint may be relaxed where the cables cross at right angles.

G 2.17.13 Shielded cable must have the shield bonded to ground at one end of the cable run only, preferably at the input signal end. Care must be taken to prevent both ends of the shield from being grounded to prevent loop currents in the shield.

G 2.18 Circuit Breakers

G 2.18.1 Breakers must be equipped with individually insulated, braced and protected connectors. Tripped indication must be clearly shown by the handle at a position between ON and OFF and/or a visual trip indicator.

G 2.18.2 All breakers must be rated for the application with due consideration to voltage, amps, interrupting rating, number of poles, auxiliaries, etc.

G 2.18.3 Breakers must be calibrated at 50°C.

G 2.18.4 Breakers must be suitable for marine application;

- a. Be the moulded case type;
- b. Be rated for 600 VAC or 240 VAC;
- c. Be the quick make/quick break type;
- d. Have inverse time overcurrent characteristics; and
- e. Have overload device in each phase.

G 2.19 Motor Controllers

G 2.19.1 Motor controllers must be suitable for marine duty. Motor controllers and contactors controlling machines which require continuous operation, must be fitted with low voltage release complete with timing circuitry, adjustable for 0.5 to 10 seconds, which must restart all running motors in case of a short duration power interruption.

G 2.19.2 Motors 30 kW and above must be equipped with solid state reduced voltage starters to limit inrush current.

G 2.19.3 Individual starters controlling 3-ph A/C motors must conform to the latest edition of TP 127 and IEEE 45(27) and must be:

- a. Housed in a ventilated drip proof IP22 enclosure, suitable for bulkhead mounting and arranged for front opening;
- b. Located away from open decks or in locations where exposed to water (new starters);
- c. Fitted with legend plates mounted on the cover, in accordance with IEEE 45, indicating the duty which the starter is controlling;
- d. Magnetically operated from 115 V, 1-ph, 60 Hz control supply.
- e. Fitted with 115 V fused control transformer;
- f. Fitted with a means of locally isolating the motor where the starter is not located adjacent to the motor;
- g. Fitted with indicating lights at the starter to indicate the state of the isolating switch;
- h. Fitted with molded case type circuit breaker for each motor circuit to isolate the power supply and provide short circuit protection. The circuit breaker must have means to indicate its status locally and auxiliary contacts for remote monitoring;
- i. Fitted with under voltage release or protection, depending on the operational requirement and safety of the personnel;
- j. Fitted with two indicating lights to show when associated motor is operating and a stop light;
- k. Indicating lights must be low voltage 6.3 V transformer type;
- l. Coloring of lenses must be in accordance with TP 127;
- m. Fitted with shrouded type START and STOP pushbutton;
- n. Fitted with one (1) externally operated, overload reset button mounted in the front, for all three overload relays;
- o. Fitted with auxiliary contact to operate anti-condensation heaters where required;
- p. Arranged for bottom entry through suitable glands; and
- q. Fitted with an ammeter with selector switch for motor ratings of 20 kW and over.

d.

G 2.19.4 Where alarm indication lights are provided at the local control station, facilities must be provided for a lamp test. Where alarm buzzers are provided at the local control stations, facilities must be provided for buzzer mute.

G 2.19.5 Starters controlling single phase motors less than 0.37 kW, unless they are for automatic duty, may be totally enclosed, double pole, manually operated, marine type switches, complete with overloads, provided the required protection is included within the switch enclosure.

G 2.19.6 All internal wiring must be numbered in a durable manner. Numbering must be included in schematic and wiring diagrams to be supplied under the As Fitted requirement. Each

motor controller or starter must have a wiring diagram mounted on the inside of the door or cover.

G 2.19.7 A schematic diagram for each starter must be submitted. In the event that a number of motors have the same control schematic, the submission of one drawing must suffice providing that it is cross-referenced with a table listing the conductor identification for each circuit.

G 2.19.8 Before placing any purchase orders, the Contractor must submit a list to the TA of all motor starters to be purchased and fitted during the vessel life extension. This list must include but not be limited to the following:

- a. Manufacturer's name;
- b. Duty;
- c. Type of starter;
- d. Type of protection - overcurrent under voltage;
- e. Weight;
- f. Enclosure;
- g. Schematic wiring diagram; and
- h. Starter size.

G 2.20 Transformers

G 2.20.1 Where a 3-phase bank of transformers is required, it must be made of three (3) 1-phase transformers connected delta/delta, except where otherwise specified.

G 2.20.2 Transformers with electrostatic shields must be used.

G 2.20.3 In general, the following principles must apply:

- a. Be of the single phase type (unless otherwise specified);
- b. Be suitable for 3-phase operation, delta/delta;
- c. Be suitable for bulkhead or deck mounting up to 50 kVA and platform or deck mounting above 50 kVA;
- d. Be of the air cooled type;
- e. Have a drip proof enclosure with louvers;
- f. Have a winding insulation of Class F or better;
- g. Have final operating temperature not exceeding Class B temperature rise;
- h. Have +/- 2 ½ % and +/- 5% taps on all primary windings (2 FCAN and 2 FCBN);
- i. Be supplied with copper windings;
- j. Be built in accordance with the latest edition of TP 127E and IEEE 45; and
- k. Sound levels must be at or below the latest CSA standards.

G 2.20.4 Transformers must have nameplates consisting of the following:

- a. Manufacturer's name;
- b. Rating in kVA;
- c. Rate full load temperature rise;
- d. Primary and secondary voltage ratings;
- e. Frequency in Hz;
- f. Rated impedance; and
- g. Low noise level.

G 2.20.5 Where a transformer may be de-energized for relatively long periods of time, the transformer enclosure must include a space heater. Space heaters must be capable of raising the internal temperature to, and maintaining it at 5 degree C above ambient.

G 2.21 Electronic Equipment

G 2.21.1 All work relating to Electronic Equipment must comply with the following Specification:

G 2.21.2 Specification for the Installation of Shipboard Electronic Equipment – CCG Publication number 70-000-000-EU-JA-001, Revised 2004:

- a. Chapter 4 – Removal of Equipment
- b. Chapter 5 – Installation
- c. Chapter 7 – Setting to Work
- d. Chapter 8 – Test Requirements
- e. Chapter 10 – Reports and Certificates
- f. Appendix C – Installation of Cable and Waveguide
- g. Appendix D – Choice of Electrical Materials
- h. Appendix F – Choice of Materials

G 2.22 Electromagnetic Compatibility and Interference (EMC, EMI).

G 2.22.1 The Contractor is responsible for:

- a. Maintaining Electromagnetic Compatibility throughout the vessel, on completion of all electrical and electronic work in this specification. Electromagnetic Compatibility (EMC) is defined as the ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment (IEC 60533).
 - i. In order to ensure EMC, consideration must be given to the selection of electrical and electronic equipment, in addition to the installation requirements as referenced herein.
- b. the identification of sources of any electromagnetic interference, and for their subsequent suppression.

G 2.22.2 The following Standards are provided as guidelines to the identification, measurement, and prevention of various forms of interference:

- a. Specification for the Installation of Shipboard Electronic Equipment – CCG Publication number 70-000-000-EU-JA-001, Revised 2004: Chapter 6 – Electromagnetic Interference
- b. IEC 60533 Electrical and electronic installations in ships – Electromagnetic Compatibility.
- c. IEC 60945 Maritime navigation and radio communication equipment and systems – General requirements – Methods of testing and required test results.

G 2.22.3 Measurements to these standards will only be required if encountered levels of interference are sufficient to interfere with the normal operation of equipment.

G 2.23 Interference Suppression

G 2.23.1 In general, interference must be suppressed at its source or receiver using the following guidelines:

- a. Any sensitive electronic equipment housed in a tested and certified enclosure providing at least 40 dBm of shielding for the onboard electromagnetic environment;
- b. The minimal cable separations to be observed;
- c. If capacitors are used, they should be on the equipment side of any isolating switch or the capacitor must be provided with an uninterruptable leakage path;
- d. Capacitors must not be used to suppress arcs across electrical contacts;
- e. Components in metal boxes must have the boxes bonded to the metal of the interfering source;
- f. Electrostatically shielded isolation transformers and/or suitable power line conditioners must be fitted in the power lines to electronic equipment, preferably at the equipment end of the feeder;
- g. Double sided PCB's must be utilized wherever practicable.

G 2.24 Screening of Cables

G 2.24.1 The screening of cables must satisfy the following ground rules:

- a. Screens should have a shielding efficiency of at least 90%;
- b. Low frequency cables should use a ferrous screen material, grounded at a single point, i.e., below 15 kHz;
- c. High frequency cable should use bronze, copper, or aluminum material and should be grounded at intervals of less than 0.15 wavelengths at the highest frequency of interest, wherever practical;

- d. Metallic trunking may provide effective screening provided it is bonded as it passes through any bulkhead and any seams and joints are continuously welded.

G 2.25 Grounding and Bonding

G 2.25.1 The Contractor must refer to TP7369E.

G 2.25.2 Grounding and bonding is an important prerequisite in the proper performance and safety of electronic equipment. The Contractor must comply with the following requirements:

- a. Racks and Consoles:
 - i. The following applies to the grounding of equipment racks and consoles:
 - ii. Racks and consoles should be of all welded construction with direct electrical connection of the rack or console to ship's metal. Where direct connection is not feasible, ground straps are required;
 - iii. The use of non-welded racks and consoles is subject to the requirement that each individual member is properly grounded. Members may be either individually grounded or they may be bonded to each other by means of a strap. Electrically continuity between adjacent members must not be inferred from their proximity and mechanical connection;
- b. Equipment Cases
 - i. Equipment cases must have at least 40 dB attenuation capability. Sheet steel is preferred. Individual equipment cases must be grounded as follows:
 - A. Cases must be connected to the ground rail or metal of the rack or console in which they are mounted;
 - B. Each case must be individually grounded, i.e., case-to-case connection is not allowed for grounding;
 - ii. If practical, equipment within a single system must be located close together and connected to a single point ground;
 - iii. The grounding of equipment cases must not rely upon their retaining hardware;
 - iv. Access doors/covers must be bonded to the equipment case;
 - v. Slide mounted equipment must use straps which allow for the withdrawal of equipment;

- vi. On permanently mounted equipment, the ground strap must be as short as possible;
 - vii. Flexible braid straps may be used only where movement of equipment or components so dictates.
- c. Methods and Materials
- i. The following applies to materials and methods used in grounding and bonding.
 - ii. All contact surfaces must be clean and free from paint, scale, rust or any material considered likely to impair the contact efficiency;
 - iii. The contact surface area must be as large as practical;
 - iv. Contact surfaces must be bonded using a method which will not impair contact efficiency, i.e., welding, welded stud, etc.;
 - v. Straps must be a minimum of 2.5 cm (1") solid copper, 0.6 mm (0.025") thick and as short as possible while avoiding the creating of sharp bends and corners;
 - vi. Ground straps and joints must be readily accessible for maintenance;
 - vii. Other low resistance, chemically compatible, corrosion-resistant materials may be approved for use by RO;
 - viii. All bonding hardware must be of low resistance, corrosion-resistant material, preferably stainless steel. Upper deck hardware must be of stainless steel.
- d. Additional Precautions
- i. Care must be taken in the grounding and bonding of metallic structures and of equipment in areas of high-level radio frequency energy, such as radio and electronic equipment rooms.
 - ii. Antennae, antenna tuners and radar transceivers are also critical regardless of where they are located.
 - iii. In these locations, all floating metallic structures such as conduit, air ducting, steam or water pipes, box cable, cable screens, metal support frames for liner board or ceiling tiles must be grounded, preferably at intervals of less than 1 m (3 ft.).
 - iv. The use of metal faces liner-board and/or ceiling tiles must be avoided in these locations.

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

CCGS Private Robertson

Specification No: F1782-20C104

S1.0 SERVICES

Prepared by:

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S 1.0 SERVICES

S 1.1 GENERAL

- S 1.1.1 The Contractor must supply the following services to the vessel for the entire work period and disconnect upon completion of the work period. The Contractor must re-establish all services if the vessel is moved during the work period.
- S 1.1.2 The Contractor must supply all material, hoses, cables, etc. and labor required to connect and disconnect the services to the vessel. Unless otherwise stated these services must be available 24 hours a day 7 days a week for the entire contract period.
- S 1.1.3 All staging, crange, screens, lighting, and any other support service, equipment, and material necessary to carry out the work identified in these specifications must be Contractor supplied.
- S 1.1.4 The CCG will announce the RO at the bidders conference

S 1.2 TOWING TO AND FROM CONTRACTORS FACILITY

- S 1.2.1 The contractor must assume custody of the vessel at the institute of Ocean Science in Sidney British Columbia.
- S 1.2.2 The contractor must tow the vessel from the institute of Ocean Science to the contractors facility.
- S 1.2.3 The contractor is responsible for all aspects of the towing operation. There is a requirement to have 1 to 2 CG personal on board to maintain generator watch, while under tow the propellers will windmill, this can cause damage to the gearbox if the trailing lubrication pumps are not running, to run these pumps power must be maintained on board.
- S 1.2.4 All Towing must be in accordance with the Canadian Coast Guard Fleet Safety Manual 7.C.4. and J12 D3-23 AL21 Towing.
- S 1.2.5 Contractor is responsible to provide all lines and securing arrangements necessary to tow the vessel and secure it at the contractors facility.
- S 1.2.6 The contractor must tow the vessel To the institute of Ocean Science from the contractors facility at the end of the work period.

S 1.3 BERTHING

- S 1.3.1 The berthing and mooring facilities must be suitable for a vessel of this size in local weather / tide / sea conditions. Fenders must be supplied by the Contractor to prevent the vessel from contacting the wharf in said local conditions.
- S 1.3.2 The length of the dock must be a minimum of 90% of the keel length of the vessel.
- S 1.3.3 During the contract period, when the ship is afloat, the ship must be berthed at the Contractor's wharf at a safe and secure location with a minimum clearance of 0.45 meters (1.5 feet) under the vessel at extreme low tide to ensure the vessel will not touch bottom.
- S 1.3.4 The Contractor must responsible for all movements of the vessel, including berthing and mooring of the vessel for the contract period and arrangements and costs for line handlers, tugs, and pilots.

S 1.4 MOORING LINES

- S 1.4.1 The Contractor must provide the labor required to secure the vessel alongside the facilities.
- S 1.4.2 The Contractor must provide CFM mooring lines while vessel is secured alongside the Contractor's facilities. The ship's mooring lines must not be used.

S 1.5 GANGWAYS

- S 1.5.1 The Contractor must supply two means of access to the vessel and escape from the vessel while in possession of the vessel. One means of access and escape must be by gangway.
- S 1.5.2 The Contractor must supply all labor and services required for the installation and removal of all gangways, complete with handrails, safety nets, and lighting for the duration of the contract while the vessel is moored.
- S 1.5.3 Any movement of the gangway required by the Contractor is the responsibility of the Contractor.
- S 1.5.4 The Contractor must provide gangways in accordance with TCMS, Worksafe BC, and Canada Labour laws and regulations.

S 1.6 ELECTRICAL POWER

- S 1.6.1 The Contractor must supply 600 Volt Alternating Current, 60 hertz, 3 Phase, 4 wire with floating neutral, 200 Ampere electrical power, through the vessel's shore power system, for the duration of the contract.

- S 1.6.2 The Vessel's shore power cable and associated plug connection may be used by the Contractor. However, the Contractor is responsible to replace the entire length of cable with an equal quality, size, and length of cable should the shore power cable be damaged during the contract period. Damage to the shore power cable also includes damage to the plug-in connections which must be replaced if damaged. Splicing any section of the cable is not acceptable.
- S 1.6.3 The Cable condition must be inspected at the start and completion of the work period. The Contractor and the TA must record in writing all defects prior to the start of the contract period and all parties must sign the original document. Photos must be taken of general condition and close-ups of existing damage. All photos and documents are to be provided to the TA in accordance with the Documentation section of the General Notes.
- S 1.6.4 The Contractor must ensure the correct phase rotation on a 3 phase system is established prior to energizing the ship's distribution system from shore. Any changes to the ship's power system to accommodate the Contractor supplied shore power connections must be returned to the original setup by the Contractor upon the disconnection of the Contractor supplied power cable and equipment. All work must be carried out by certified electricians.
- S 1.6.5 When connected to shore power, it must be connected to a Contractor supplied kilowatt-hour meter. The Contractor must read the kilowatt-hour meter when the connection is made and once again when the power is disconnected. Both readings of the meter must be witnessed by the TA and recorded.
- S 1.6.6 If temporary lighting is required for any of the work, the temporary power system must be feed through a Contractor supplied kilowatt-hour meter. The Contractor must read the kilowatt-hour meter when the connection is made and once again when the power is disconnected. Both readings of the meter must be witnessed by the TA and recorded.
- S 1.6.7 Temporary lighting and power must meet provincial regulations for safe work conditions and there must be sufficient number of lights set up to provide safe passage through the accommodation and machinery spaces.
- S 1.6.8 The Contractor must supply a price quote per kilowatt-hour for electrical power for the duration of the work period. The final price for this item must be determined at the end of the contract once the meter has been read The final power consumption total must be adjusted up or down by PWGSC 1379 action .
- S 1.6.9 For the purposes of this contract the bidders are to quote for 25,000 kilowatt-hours.

S 1.7 ACCOMMODATION/MACHINERY AREA DECK PROTECTION

- S 1.7.1 The Contractor must supply and install ¼” hard board deck covering protection on all accommodation decks. Hard board edges and joints must be taped and damaged protection must be repaired within 24 hours of receiving damage.
- S 1.7.2 The Contractor must protect decks in machinery spaces from damage to structure and coating systems during the process of specified work. Damage to the coating systems or structure of machinery spaces decks must be repaired by the Contractor. Any coatings are to be applied according to manufacturer’s specifications.
- S 1.7.3 Removal and storage of components that may be subject to damage during the work period, such as deck plates, grating, etc. is the responsibility of the Contractor.

S 1.8 HEATING

- S 1.8.1 The Contractor must supply the heating required, to a minimum of 17 degrees C onboard the vessel to facilitate specified work.

S 1.9 WORKSITE INSPECTIONS

- S 1.9.1 Before the Contractor starts any work on the vessel the Contractor’s Quality Assurance Representative and the TA must walk through each space and area where work is to take place, including access and removal routes and areas adjacent to those where the work is to be done as a result of this specification. The Walk-through must occur during vessel demobilization and the Contractor’s Quality Assurance Representative must identify all items that are to be removed or secured prior to the Contractor assuming Care and Custody of the Vessel.
- S 1.9.2 The Contractor’s Quality Assurance Representative must take digital pictures of each area showing the outfit therein. Each picture must be dated and named as to the location on the vessel and that it represents As-Delivered conditions. These photos must be in the format; as well as named, in accordance with the Documentation section of the General Notes. A Copy of these photos must be provided to the TA within 48 hours of the start of contract on a memory stick, CD, or DVD.
- S 1.9.3 During the work period, the Contractor must maintain work areas in the vessel, in a clean condition, free from debris and remove garbage daily.
- S 1.9.4 Upon completion of the contract, the Contractor must return the vessel to the As-Delivered state of cleanliness.
- S 1.9.5 Prior to the completion of the Acceptance Document, the Contractor’s QA Representative, and the TA must perform an inspection of the vessel to view all areas where work was performed by the Contractor.

- S 1.9.6 Copies of all photos, documentation, and inspection sign off sheets must be provided in accordance with the Documentation section of the General Notes.

S 1.10 FIRE PROTECTION

- S 1.10.1 The Contractor must ensure protection against fire 24 hours/day and 7 days/week throughout the contract period.
- S 1.10.2 The Contractor must isolate the vessel's fixed fire suppression system for the duration of the contract period to prevent accidental discharge.
- S 1.10.3 The Contractor must ensure the isolation, removal, installation and reactivation of the shipboard fire detection and suppression systems or any components thereof, is performed by a qualified technician. When the shipboard fire detection or fire suppression system is deactivated or disabled by the Contractor during the contract period, the system must be recertified by a qualified technician prior to the end of the work period, as fully functional. A signed and dated original copy of the certificate must be delivered according to the Documentation section of the General Notes.
- S 1.10.4 The Contractor must note that failure to take the necessary precautions while performing work on the vessel's fire suppression system(s) could result in the accidental discharge of the fire suppression agent(s). The Contractor must recharge and certify at his cost, container(s) or systems that are discharged as a result of the Contractor's or subcontractor's activities.

S 1.11 PROJECT FACILITIES

- S 1.11.1 The Contractor must provide 1 secure office space. The space must have 2 separate desks; one for the TA and delegates, and one for the CA. The space is for the exclusive use of Government personnel, must be within suitable distance to rest rooms, and must be environmentally controlled. The space must be available from one week prior to the work commencing to two weeks after vessel acceptance.
- S 1.11.2 Each desk must include a minimum of 2 chairs; and have a minimum of 2 electrical plugin sockets per desk.
- S 1.11.3 There must be a telephone that has a direct outside telephone line. The cost of long distance telephone calls must be directly billed to CCG. Cellular services are not acceptable.
- S 1.11.4 Each desk must be provided with a wired Ethernet LAN connection with direct internet access. The Contractor must supply a broadband high speed internet service to this connection.

- S 1.11.5 Contractor must provide 4 reserved parking spots adjacent to building with offices specified. Parking spaces are for the exclusive use of Government Personnel; 3 spots for the TA and 1 for the CA and are to be available 24-7 from one week prior to work commencing to one weeks after vessel acceptance.

The Contractor must supply and maintain a washroom facility that is accessible to the CCG personnel for the duration of the contract.

S.11 SECURITY

- S.1.11.1 The Contractor must provide security for the vessel during quiet hours at the Contractor's facility. Security rounds must be conducted at minimum every 4 hours during quiet hours 7 days a week including holidays during the entire work period.
- S.1.11.2 Contractor provided Security log books are to be signed during every set of rounds in the following spaces –
- Bridge
 - Forward Machinery Space (Bow Thruster Compartment)
 - Main Machinery Room
 - Auxiliary Machinery Room
 - Steering Gear Compartment

10.0 SAFETY AND SECURITY

10.1 NOT USED

11.0 HULL AND RELATED STRUCTURES

11.0 PAINTING AND PRESERVATION

11.0.A Hoarding and Containment

- A.1 The Contractor must hoard the vessel to ensure it meets the coating requirements as laid out in the Interspec. The Contractor is advised that inclement weather must be anticipated during the Work Period and the Contractor must include the cost of hoarding in its bid. Canada will not pay for any additional hoarding or repairs to the hoarding unless at least one of the following conditions is recorded at the

Environment and Climate Change Canada buoy or land station closest to the Contractor's work site:

- (a) Temperatures fall below -5.0 degrees Celsius for more than 72 consecutive hours; or
- (b) The accumulation of more than 40.0 centimetres of snow; or
- (c) Steady winds over 45.0 km/h; or
- (d) Wind gusts over 75.0 km/h.

The data from the Environment and Climate Change Canada buoy or land station closest to the Contractor's work site will be used for measuring and verifying the parameters above as well as to provide the recorded environmental conditions.

The location of the Environment Canada buoy or land stations can be found at http://weather.gc.ca/marine/weatherConditions-currentConditions_e.html?mapID=02&siteID=16200&stationID=WHC.

The conversion rates identified in the Environment and Climate Change Canada Weather and Meteorology Glossary available at <http://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=B8CD636F-1&def=show0FA7E4EE1> will be used in the event that any of the recorded data needs to be converted to the measurement units used in the parameters above.

11.0.B Preparation and Paint Quality Management

- B.1 The Canadian Coast Guard will be contracting International Paint contact – Dillon Olsen, Technical Sales Rep, International Paint, tel 604 291 8242, cell 604 366 9871, dillon.olsen@akzonobel.com directly as its technical inspector for all coating system work. International Paint will be given authority by The Canadian Coast Guard to perform technical inspections. The contractor must present International Paint a coating time line and update International Paint of any changes.
- B.2 Dillon Olsen may designate another NACE inspector within International Paint to act as technical inspector if agreed to by the TA. The Designate must be NACE level 2 with 2 years experience in the marine industry, or under the direct supervision of a NACE Level 3 inspector.
- B.3 The Contractor must hoard the vessel to ensure they meet the coating requirements as laid out in the Interspec.
- B.4 The Contractor must follow the quality control requirements identified in the Paint Specification and Product Data Sheets.

- B.5 The Contractor must afford the International Paint NACE inspector the opportunity to view the work prior to commencement of painting, and after each coating.

11.1 DOCKING AND UNDOCKING (RO SURVEY)

11.1.A Identification

- A.1 The intent of this specification it is to conduct docking and undocking activities for the purpose of conducting an underwater hull survey by RO and other work specified.
- A.2 The vessel must be docked at the Contractor's facility, and the vessel hull must be surveyed by the TA and by RO. On completion of all related work the vessel must be undocked and secured alongside at the Contractor's facility.
- A.3 RO must complete initial inspection of the hull as soon as the dock is clear of water and before the hull is washed.

11.1.B References

B.1 Equipment Data – Not Used

B.2 Drawings

B.1.2 AF6102-10000-14_AF Dry-Docking Plan-1_2

B.1.3 AF6102-10000-14_AF Dry-Docking Plan-2_2

B.1 Regulations

FSSM Procedures	Title	Included Yes/No
Publications		
Standards		
Regulations		
	Canada Shipping Act 2001	No
	Hull Inspection Regulations (C.R.C., C. 1432)	No

11.1.C Technical

- C.1 The Contractor must afford the ship's crew the opportunity, alongside and prior to docking, to complete a tank condition report (soundings). The report must be signed by the TA and the Contractor's Dock Master. This report must be included in the shipyards final docking report.

- C.2 A docking report must be completed which indicates current tank condition, docking plan and block locations and be in accordance with the Documentation section of the General Notes.
- C.3 The TA must be afforded the opportunity to review the docking report prior to docking.
- C.4 The Contractor must demonstrate that all support locations are in accordance with the docking plan. The Contractor must ensure that the docking blocks align with the vessel's internal support structure.
- C.5 The Contractor must also ensure that all tank docking plugs are accessible and not obscured by the docking blocks.
- C.6 The Contractor must ensure that no transducers or any other underwater device are damaged or obscured by the docking blocks.
- C.7 The TA must be afforded the opportunity to inspect all arrangements carried out by the Contractor prior to flooding the dock.
- C.8 The Contractor must supply shore crews, tugs, divers and whatever facilities may be required for the safe and correct dry-docking and undocking of the vessel.
- C.9 Before the hull is washed and as soon as possible after the ship is docked and the dock is clear of water the Contractor must afford the opportunity for RO to inspect the Hull. The Contractor must afford the TA the opportunity to attend at the time of RO inspection.
- C.10 The Contractor must take the following measures as soon as practical after docking:
- i) All keel and bilge blocks must be inspected and wedged up if necessary to ensure good hull contact and minimize hull sagging during the dry-dock period.
 - ii) The entire hull (approximately 580 m²) must be pressure washed at minimum 5000 psi from the keel to the bulwarks, including the rudders and sea chests. Marine growth must be hand scraped prior to pressure washing; allow for 90 square meters of heavy marine growth to be hand scraped and disposed.
 - iii) Hull framing numbers must be marked on the hull every five frame spaces to facilitate a RO/TCM hull survey.
- C.11 The Contractor must allow for a total of 10 hours (non-continuous) of man lift services for the RO surveyor for inspection purposes.

- C.12 Upon the completion of pressure washing the hull and marking the hull frame spacing the contractor must afford the opportunity for RO to inspect the hull. The Contractor must afford the TA the opportunity to attend at the time of RO inspection.
- C.13 The Contractor must ensure that all docking plugs have been properly replaced and the TA been afforded the opportunity to view before any flooding procedures start.
- C.14 Prior to undocking, the Contractor must provide a tank condition report to be verified by TA in accordance with the Documentation section of the General Notes.
- C.15 Any changes in quantities or location of tank contents from the original tank condition report (soundings) must be noted and agreed upon as Satisfactory for Undocking by the TA and the Contractors Dock Master.
- C.16 The dock must not be flooded until the approval of the TA has been given.
- C.17 Flooding of the dock must proceed until the water is 12 inches below the level at which the ship will float. Flooding must then cease until the Contractor has completed an inspection of all underwater fittings and found all to be water tight. The Contractor must afford the TA the opportunity to conduct the same inspection prior to continuation of flooding. Upon confirmation of water tight integrity flooding will continue.

11.1.D Proof of Performance

D.1 Inspections

- D.1.1 Inspections must be completed as detailed in section 3.3.
- D.1.2 The contractor must allow for the TA and the RO Surveyor to complete a full survey of the vessel after the vessel has been docked. Any observations or defects noted by the surveyor will be addressed through PSPC work arising procedures.

D.2 Testing/Trials – Not Used

D.3 Certification

- D.3.1 The Contractor must afford RO the opportunity to conduct a survey of the hull below and above the water line for the purpose of receiving a credit for the vessel's continuous survey. The TA must be informed and must be afforded the opportunity to attend with RO. An 8 hour notice is required.
- D.3.2 The TA is responsible to ensure that the Survey Record Book is signed off by RO.

D.4 Documentation (Reports/Drawings/Manuals)

D.4.1 The Contractor must provide a Docking Report in accordance with the Documentation section of the General Notes.

D.4.2 The Contractor must provide Tank Soundings, before and after docking in accordance with the Documentation section of the General Notes.

D.5 **Training – Not Used**

11.2 HULL ULTRASONIC TESTING

11.2.A Identification

A.1 The intent of this specification is to survey and map the vessels hull. The Contractor is to have an approved RO NDT service supplier onsite for 16 hours complete an ultrasonic hull thickness survey of the vessel. The ROD NDT technician will be directed by the TA and the RO surveyor on where to test based on a visual inspection of the hull.

A.2 The Contractor is to quote on 16 hours for the NDT service supplier.

A.3 Prior to commencing work there must be a meeting attended by the Contractor, TA, and NDT service supplier to review the drawings and areas of inspection. Hull or structural repairs identified thru the UTS testing are subject to PSPC work arising procedures.

11.2.B References

B.1 Equipment Data

B.1.1 The technician must use and be familiar with digital instrumentation capable of the Double Echo method to measure plate thickness through existing paint coatings.

B.2 Drawings

B.2.1 All Drawings are listed in the General Notes.

B.3 Regulations and Standards

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

11.2.C Statement of Work

C.1 The Contractor must supply an approved RO NDT service supplier to conduct ultrasonic hull thickness surveys of the hull. The technician must take hull thickness measurements as soon as possible after the ship has been docked, power washed, and temporary frame markings have been added. The Contractor to quote on having the technician available

on-site for one (2) eight (8) hour day. Extra days or time to be prorated and handled thru PWGSC 1379 action. A report indicating the details and findings of the survey must be provided to the TA.

- C.2 The Contractor is responsible for the necessary surface preparation for the instrument used for the NDT Ultrasonic Survey.
- C.3 The Contractor must provide a man lift to with operator to facilitate the survey. The Contractor is to bid on supplying a man lift for 2 day during the Ultrasonic Survey.
- C.4 Any resulting hull repairs will be by 1379 action. Additional time requested by TA will be by 1379 action.

11.2.D Proof of Performance

D.1 Inspection Points

- D.1.1 Testing must be witnessed by the TA and RO representative.

D.2 Testing/Trials – Not Used

- D.2.1 Details of any tests or trials

D.3 Certification

- D.3.1 A copy must be provided of the calibration certificate for the instrument used.

D.4 Documentation

- D.4.1 Any test results which indicate wastage requiring plate replacement must be brought to the attention of the TA immediately by an Observation Report.
- D.4.2 The complete test results must be presented in electronic format. The final test report is to include location and reference to frame and centerline distance in millimeters, the thickness measured as well as the original thickness. The test results to be submitted to the TA prior to flooding the dock.

Training – Not Used

11.3 PAINTING OF SHIPS HULL BELOW WATERLINE

11.3.A Identification

- A.1 The intent of this specification is to renew the underwater hull coating system.

11.3.B References

B.1 Equipment Data

B.1.1 The existing underwater hull coating system consists of:

- i) Intershield 300 @5 mils
- ii) Intergard 263 @4 mils
- iii) Interspeed 640 @4 mils

B.2 Drawings & Documents

Drawing Number	Description
	CCGS Private Robertson Tech Coating Spec

B.3 Regulations and Standards

B.3.1 As indicated in the Interspec document.

11.3.C Technical

C.1 The following precautions and preparations must be undertaken;

- C.1.1 Immediately after docking, hull openings must be securely plugged as may be necessary to prevent contamination of the area below and to avoid ingress of sand or other contaminants. Scuppers must be plugged as necessary and all appropriate measures taken to ensure that weather conditions or any other factors do not jeopardize the quality of the finished work. Water discharge must be directed away from ship side.
- C.1.2 The propellers, shafts, stern tubes, bow thruster, sonar, sounders, transducers, and all other equipment and fittings must be properly protected during all refit operations, to avoid damage from sandblasting or any other cause. Zincs must be removed from their pockets and all fasteners protected from damage. All davit wires and crane wires are to be completely wrapped to prevent entry of grit. The Contractor must supply all coverings.
- C.1.3 Before undocking the ship, all temporary protective materials and coatings must be removed to the approval of the TA.
- C.1.4 The approximate area of the underwater hull is: 330 m². The above water hull has been calculated separately at 250 m².

- C.1.5 The Contractor must prepare and paint 100% of the underwater hull in accordance with the supplied Paint Specification. This work is to include 100% blasting of the below waterline hull in order to remove all previous applied paint and to provide a profile for the new coating system. The Contractor must include in this work block-spotting of the area under the bilge blocks.
- C.1.6 The Contractor must have the rudders painted as part of the underwater hull with an total surface area of 5m². The contractor must not coat the rudder post, paint is to end at the radius from the rudder top to the post. The rudders are stainless steel and were not originally coated. The Contractor must sandblast the rudders using non-ferrous media when preparing them. After preparing the rudders, the rudders are to be coated with product designed for use in high cavitation areas. Canada suggests the following;
- i) Belzona 1341, to be applied by Authorized representative for Belzona.
- C.1.7 All internal surfaces of the seabays, sea chests, sea boxes and thruster tunnel must be painted as per the underwater hull with special attention to fully coating the internal surfaces of supply piping and sea suction stand (stub) pipes.
- C.1.8 The forward machinery space sea suction feeds the reverse osmosis water makers and must be painted separately with Interline 925 in accordance with the Paint Spec. The sea bay is located between frames 31 and 32 on the port side of the vessel.
- C.1.9 Paint procedure is as specified in the Interspec specification. All coatings must be applied in accordance with the manufacturer's instructions. Re-coat times must be adhered to.

11.3.D Proof of Performance

D.1 Inspections

- D.1.1 The Contractor must follow the quality control requirements identified in the Paint Specification and Product Data Sheets. All paint work preparation must be in accordance with manufacturer recommendations and printed reports must be provided. The TA must view the work prior to commencement of painting, and after each coating.
- D.1.2 The shipyard QA must obtain the latest information and advice on the Paint system from Mr. Keegan Gemmil, Account Executive, International Paint, 2435 Beta Avenue, Burnaby BC V5C 5N1, tel 604 940 4479, cel 604 315 4347, Keegan.Gemmill@akzonobel.com

D.2 Testing/Trials – Not Used

- D.3 **Certification – Not Used**
- D.4 **Documentation (Reports/Drawings/Manuals) – Not Used**
- D.5 **Training – Not Used**

11.4 PAINTING OF HULL ABOVE WATERLINE

11.4.A Identification

- A.1 The intent of this specification is to repair the coating system above the waterline including the inboards side of the bulwarks and to tie-coat this entire surface, renewing the CCG identification program.

11.4.B References

B.1 Equipment Data

- B.1.1 The existing above water hull coating system consists of:

- i) Interstores Uniprimer – Aluminum (ISA600/A)
- ii) Interstores Uniprimer – Aluminum (ISA600/A)
- iii) Interthane 990

- B.1.2 Reference documents

	Description	Date
Paint Spec.	CCGS Private Robertson Tech Coating Spec	

B.2 Drawings & Documents

- B.2.1 All Drawings are listed in the General Notes.

B.3 Regulations and Standards

- B.3.1 As indicated in the Interspec document.

11.4.C Statement of Work

- C.1 The following precautions and preparations must be undertaken;

- C.1.1 Immediately after docking, hull openings must be securely plugged as may be necessary to prevent contamination of the area below and to avoid ingress of sand or other contaminants. Scuppers must be plugged as necessary and all appropriate measures taken to ensure that weather conditions or any other factors do not jeopardize the quality of the finished work. Water discharge must be directed away from ship side.
- C.1.2 The propellers, shafts, stern tubes, bow thruster, sonar, sounders, transducers, and all other equipment and fittings must be properly protected during all refit operations, to avoid damage from sandblasting or any other cause. Zincs must be removed from their pockets and all fasteners protected from damage. All davit wires and crane wires are to be completely wrapped to prevent entry of grit. The Contractor must supply all coverings.
- C.1.3 Before undocking the ship, all temporary protective materials must be removed to the approval of the TA.
- C.1.4 All interference items must be removed for access and painted separately.
- C.1.5 The Upper Hull consists of the entire hull area from the waterline to the inboard surface of the bulwarks down to the interconnection with the deck coating system.
- C.1.6 The approximate area of the above water hull is: 250 m².
- C.1.7 The Contractor must prepare and paint 100% of the Above waterline hull in accordance with the supplied Paint Specification. This work is to include 100% blasting of the above waterline hull in order to remove all previous applied paint and to provide a profile for the new coating system.
- C.1.8 Identifying insignias, stripes, vessel's name, port of registry, load line, etc. must be given two coats of white paint as specified in the Interspec specification. All the identification markings must be painted; decals must not be used.
- C.1.9 The identifying stripe border and rope fairleads must be given two coats black paint as specified in the Interspec specification.
- C.1.10 Paint procedures for all painting is as specified in the Interspec specification including, All coatings must be applied in accordance with the manufacturer's instructions. Re-coat times must be adhered to.

11.4.D Proof of Performance

D.1 Inspection Points

- D.1.1 The Contractor must follow the quality control requirements identified in the Paint Specification, including the hold points.
- D.1.2 All paint work preparation must be in accordance with manufacturer recommendations and under guidance of a NACE certified Inspector and printed reports must be provided. The inspector must view the work prior to commencement of painting, and after each coating. The shipyard must contract the NACE Inspector from International Paint (contact Mr. Keegan Gemmil)
- D.1.3 The NACE Inspector must obtain the latest information and advice on the Paint system from Mr. Keegan Gemmil, Account Executive, International Paint, 2435 Beta Avenue, Burnaby BC V5C 5N1, tel 604 940 4479, cel 604 315 4347, Keegan.Gemmill@akzonobel.com
- D.2 **Testing/Trials – Not Used**
- D.3 **Certification – Not Used**
- D.4 **Documentation – Not Used**
- D.4.1 The Contractor must prepare and submit paint reports to verify that coatings were applied in accordance with the Interspec Paint Specification.
- D.5 **Training – Not Used**

11.5 PAINTING OF DECK SURFACES

11.5.A Identification

- A.1 The intent of this specification item is to renew the main deck coating system.

11.5.B References

- B.1 Equipment Data
 - B.1.1 The existing deck coating system consists of:
- B.2 Drawings

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

Drawing Number	DRAWING TITLE	Number of Sheets
	CCGS Private Robertson Tech Coating Spec	

11.5.C Statement of Work

- C.1 The Contractor must paint the main deck area as detailed in the separate Interspec Paint Specification.
- C.2 The approximate area of the main deck is:150 m2.
- C.3 The approximate area of the Bridge Deck is: 12.34m2
- C.4 The approximate area of Monkeys island is: 6.16m2
- C.5 The deck surface includes all horizontal surfaces of the deck plus all vertical surfaces to a height of 2 inches.
- C.6 The Contractor must prepare and paint 100% of the main deck in accordance with the supplied Paint Specification. This work is to include 100% blasting of main deck in order to remove all previous applied paint and to provide a profile for the new coating system.
- C.7 The Contractor must repair the coating and apply one overcoat on the Bridge Deck and Monkeys island area as detailed in the separate Interspec Paint Specification.
- C.8 The Contractor must bid on a total repair area of 3m2, any variance in this will be adjusted through PSPC work arising procedures.
- C.9 Prior to painting all coatings and contamination must be removed from the deck surface. All corrosion must be removed. The deck surface must be taken down to bare metal. Surface preparation must be to the Interspec Paint Specification.
- C.10 The lights, fans and all openings and fittings must be properly protected during all refit operations, to avoid damage from sandblasting or any other cause. Before

undocking the ship, all temporary protective materials and coatings must be removed.

- C.11 No sandblasting operations will be performed when there is a risk of mechanical, pneumatic or electrical components becoming contaminated by the ingress of abrasive materials. For this reason, every effort must be made by the contractor to ensure that all sandblasting work is completed before machinery disassembly. When this is not possible, the contractor must take the appropriate measures to ensure that all vulnerable machinery items are protected in an efficient and effective manner. All davit wires and crane wires are to be completely wrapped to prevent entry of grit. The Contractor must supply all coverings.
- C.12 Immediately after docking, hull openings must be securely plugged as may be necessary to prevent contamination of the area below and to avoid ingress of sand or other contaminants. The vessel's fitted vent covers may be used by the Contractor. Scuppers must be plugged as necessary and all appropriate measures taken to ensure that weather conditions or any other factors do not jeopardize the quality of the finished work.
- C.13 All coatings must be applied in accordance with the manufacturer's instructions. Re-coat times must be adhered to.

11.5.D Proof of Performance

D.1 Inspections

D.1.1 The Contractor must follow the quality control requirements identified in the Paint Specification and Product Data Sheets, including the hold points.

D.1.2 All paint work preparation must be in accordance with manufacturer recommendations and under guidance of a NACE certified Inspector and printed reports must be provided. The inspector must view the work prior to commencement of painting, and after each coating. The shipyard must contract the NACE Inspector from International Paint (contact Mr. Keegan Gemmil who will assign an inspector.)

D.1.3 The NACE Inspector must obtain the latest information and advice on the Paint system

11.5.E Proof of Performance

D.1 Inspection Points – Not Used

D.2 Testing/Trials – Not Used

D.3 Certification -

D.3.1 A copy of NACE inspector's certification must be provided.

D.4 Documentation (Reports/Drawings/Manuals)

D.4.1 The Contractor must prepare and submit paint reports to verify that coatings were applied in accordance with the Interspec Paint Specification

D.5 Training – Not Used

11.6 PAINTING OF SUPERSTRUCTURE

11.6.A Identification

A.1 The intent of this specification item is to repair the superstructure coating system.

11.6.B References

B.1 Equipment Data

B.1.1 The existing coating system consists of:

B.2 Drawings

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

Drawing Number	DRAWING TITLE	Number of Sheets
	CCGS M Charles M.B. Coating Spec DD2018 09 07 2018 rev1	

11.6.C Statement of Work

C.1 The Contractor must paint the Superstructure area as detailed in the separate Interspec Paint Specification.

- C.2 The approximate area of the Superstructure is 342 square meters.
- C.3 The deck surface includes all Vertical surfaces of the superstructure.
- C.4 The Contractor must repair the coating and apply one overcoat on Superstructure area as detailed in the separate Interspec Paint Specification.
- C.5 The Contractor must bid on a total repair area of 10m², any variance in this will be adjusted through PSPC work arising procedures.
- C.6 Prior to painting all coatings and contamination must be removed from the deck surface. All corrosion must be removed. The deck surface must be taken down to bare metal. Surface preparation must be to the Interspec Paint Specification.
- C.7 Identifying insignias, stripes, vessel's name, port of registry, load line, etc. must be given two coats of white paint as specified in the Interspec specification. All the identification markings must be painted; decals must not be used.
- a) The Robertson currently has an RCMP stripe down it's stbd side. It's a vinyl decal that must be removed. It is not to be replaced after painting. The decal is approximately 10 meters long and is 0.5 meters thick
- C.8 The lights, fans and all openings and fittings must be properly protected during all refit operations, to avoid damage from sandblasting or any other cause. Before undocking the ship, all temporary protective materials and coatings must be removed.
- C.9 No sandblasting operations will be performed when there is a risk of mechanical, pneumatic or electrical components becoming contaminated by the ingress of abrasive materials. For this reason, every effort must be made by the contractor to ensure that all sandblasting work is completed before machinery disassembly. When this is not possible, the contractor must take the appropriate measures to ensure that all vulnerable machinery items are protected in an efficient and effective manner. All davit wires and crane wires are to be completely wrapped to prevent entry of grit. The Contractor must supply all coverings.
- C.10 Immediately after docking, hull openings must be securely plugged as may be necessary to prevent contamination of the area below and to avoid ingress of sand or other contaminants. The vessel's fitted vent covers may be used by the Contractor. Scuppers must be plugged as necessary and all appropriate measures taken to ensure that weather conditions or any other factors do not jeopardize the quality of the finished work.

- C.11 All coatings must be applied in accordance with the manufacturer's instructions. Re-coat times must be adhered to.

11.6.D Proof of Performance

D.1 Inspections

D.1.1 The Contractor must follow the quality control requirements identified in the Paint Specification and Product Data Sheets, including the hold points.

D.1.2 All paint work preparation must be in accordance with manufacturer recommendations and under guidance of a NACE certified Inspector and printed reports must be provided. The inspector must view the work prior to commencement of painting, and after each coating. The shipyard must contract the NACE Inspector from International Paint (contact Mr. Keegan Gemmil who will assign an inspector.)

D.1.3 The NACE Inspector must obtain the latest information and advice on the Paint system from Mr. Keegan Gemmil, Account Executive, International Paint, 2435 Beta Avenue, Burnaby BC V5C 5N1, tel 604 940 4479, cel 604 315 4347, Keegan.Gemmill@akzonobel.com

11.6.E Proof of Performance

D.1 Inspection Points – Not Used

D.2 Testing/Trials – Not Used

D.3 Certification -

D.3.1 A copy of NACE inspector's certification must be provided.

D.4 Documentation (Reports/Drawings/Manuals)

D.4.1 The Contractor must prepare and submit paint reports to verify that coatings were applied in accordance with the Interspec Paint Specification

D.5 Training – Not Used

11.7 SEA BAYS INSPECTION AND INSTALLATION OF MGPS ANODES (RO SURVEY)

11.7.A Identification

- A.1 The Intent of this specification item is to prepare the sea bays for RO inspection and renew the fitted anodes.

11.7.B References

B.1 Equipment Data – Not Used

B.2 Reference documents

	Description	Date
Paint Spec.	Interspec Paint Spec	
	MARELCO System Technical Manual – 2019	

B.3 Drawings & Documents

- B.1.1 All Drawings are listed in the General Notes.

B.2 Regulations and Standards

- B.2.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

FSSM Procedures	Title	Included Yes/No
Publications		
Standards	Interspec Paint Specification	Yes
Regulations	Canada Shipping Act 2001, Hull Regulations	No
	RO's Register, Rules & Regulations for the Classification of Special Service Craft.	

11.7.C Statement of Work

- C.1 The hull must be docked so that shell grids are accessible for inspection and removal.
- C.2 The Contractor must remove all 3 (three) sea inlet grates, which are upper sea suction, lower sea suction and forward sea suction. All holes in the grates must be mechanically cleaned to remove all marine growth. Contractor to quote on 20 liters of sea growth total and disposal, between the sea suctions. Preparation, painting, re-installation, and securing of the grates must be included. Grates must be blasted and then primed and

painted in accordance with the underwater hull coatings specification. New stainless steel nyloc fasteners must be used to secure the grates upon reinstallation.

- C.3 The Contractor must remove, prepare, paint, re-install, and secure the bow thruster grates. Grates must be blasted and then primed and painted in accordance with the underwater hull coatings specification. New stainless steel nyloc fasteners must be used to secure the grates upon reinstallation.
- C.4 The Contractor must remove all marine growth. All internal surfaces of the sea bay, sea boxes and thruster tunnel must be hydro blasted with suggested 3000 PSI with fresh water, the remainder of debris must be removed using hand and powered tools. Contractor to quote on 500 liters of debris disposal.
- C.5 All anodes and fairing plates must be removed. Areas of weld in way of anode straps and fairing plates removed must be ground smooth before attachment / re-attachment of anodes or fairing plates and before repainting.
- C.6 Anode straps and fairing plates must be primed and painted in accordance with the underwater hull coatings specification. Prior to installation of anodes the Contractor must complete the coating application to areas behind the anode straps.
- C.7 After satisfactory inspection of the sea suctions and bow thruster tunnel by RO and the TA the Contractor must supply and install new 316L stainless steel nyloc fasteners. Hardening up of any grates, guard bars, docking plugs, and manhole covers must be witnessed by the TA.

11.7.D Installation of MGPS Anodes on MMR Sea Bays

- D.1 The contractor must weld on 2 of the MORELCO “Safety Caps” (GSM) on to the sea bays as per the MARELCO System Technical Manual – 2019 Section C “installation” on the lower (port) MMR Sea Bay.
- D.2 The contractor must weld on 1 of the MORELCO “Safety Caps” (GSM) on to the sea bays as per the MARELCO System Technical Manual – 2019 Section C “installation” on the upper (stbd) sea bay.
- D.3 The Contractor must use welds in compliance with the CCG Welding Specification CT-043-eq-eg-001
- D.4 The Contractor must touch up any paint around the Safety Caps as per the interspec paint specification.
- D.5 The contractor must install 2 copper anodes (GSM) in each sea bay as per the Technical Manual.

D.6

11.7.E Proof of Performance

E.1 Inspection Points

- E.1.1 The TA and RO inspector must inspect the sea bay, sea chests and sea boxes after cleaning.
- E.1.2 The TA and RO inspector or delegate must inspect the sea bay coatings and zincs prior to installing sea inlet gratings or undocking.
- E.1.3 The Contractor must conduct weld inspections in accordance with the CCG Welding Specification CT-043-eq-eg-001.
- E.1.4 All welds are to be subject to 100% visual inspection.
- E.1.5 All full penetration butt and T-joint welds are to be subject to 5% MT/PT and 5% RT/UT.
- E.1.6 All partial penetration butt and T-joint welds are to be subject to 5% MT/PT.
- E.1.7 Copies of the NDT testing must be provided to the TA in accordance with the Documentation section of the General Notes. Any defects found are to be repaired at Contractor's expense.

E.2 Testing/Trials

- E.2.1 The Contractor must ensure that all glands (2 per sea bay where the anode penetrates the sea chest) are leak free during the floating of the vessel. The contractor will pause the floating of the vessel just before it comes off the blocks for 15m while the glands are witnessed by the TA for leaks.

E.1 Documentation

- E.1.1 The Contractor's final report must include details of the anodes replaced, quantity, and location.

E.2 Training – Not Used

11.8 ANODES

11.8.A Identification

- A.1 The intent of this specification is to inspect and renew the vessels anodes.
- A.2 The following zincs must be replaced with new CFM, unless otherwise specified.

11.8.B References

B.1 Equipment Data

B.1.1 List of Anodes

TYPE	QUANTITY	Location	Note
MME 28AB	20	Hull	10 on each side – Aluminium – circular with hole for a M16 bolt.
MME 26AA	3	Sea bays	See 6094-25600-02 – Aluminium - Welded
MME 26AA	4	Bow Thruster Tunnel	2 on each side – Aluminium -Welded
39213	2	Bow Thruster	Nose cone - Aluminium

B.2 Drawings & Documents

Drawing Number	Description
6094-63300-01_B	Scheme of cathodic protection Sheet 5_5

B.3 Regulations and Standards

11.8.C Statement of Work

- C.1 The Contractor must replace all anodes.
- C.2 Recessed hull anodes, type MM 28AB, will be CFM.
- C.3 The Contractor must supply 20 of new M16 stainless steel fasteners of the appropriate length to secure the new recessed hull anodes.
- C.4 The Contractor must clean and paint the anode recesses according to the Paint Spec underwater hull section.
- C.5 The two conical Bowthruster anodes, mounted by bolts on the thruster hubs, are GSM.
- C.6 The contractor must replace all other anodes type MM 26Aa for sea chests, sea bays and bow thruster tunnels as must be CFM.
- C.7 Prior to installation of new anodes all old zinc strap scabs must be removed and ground flush. Any disturbed or damaged area behind and around the anodes must be properly prepared and painted in accordance with the paint schedule.
- C.8 Immediately after welding on the new anodes, the slag, oxidation etc. is to be removed and all disturbed areas are to be treated in accordance with the paint schedule.

- C.9 The anodes must be covered with tape after installation to prevent them from becoming coated with paint during the hull painting process.
- C.10 The tape must be removed prior to undocking the vessel.

11.8.D Proof of Performance

D.1 Inspection Points

- D.1.1 The TA and RO inspector or delegate must inspect the sea bay, sea chests and sea boxes after cleaning. The Contractor is responsible for coordinating inspections by RO.
- D.1.2 The TA and RO inspector or delegate must inspect the sea bay coatings and zincs prior to replacement of the manhole cover and prior to re-installing sea inlet gratings or undocking.
- D.1.3 The TA must be afforded the opportunity to check that all anodes are secure and that the protective tape has been removed.

D.2 Testing/Trials – Not Used

D.3 Certification – Not Used

D.4 Documentation

- D.4.1 The Contractor's final report must include details of the anodes replaced, quantity, and location.

D.5 Training – Not Used

11.9 FRESH WATER TANK INSPECTION (RO SURVEY)

11.9.A Identification

- A.1 The intention of this specification is to inspect and survey the vessel's fresh water tanks.
- A.2 The fresh water tanks must be opened up for inspection, cleaning, maintenance and RO inspection requirements.
- A.3 The existing liner is International Paint Interline 975P this product must be used for repairs.

- A.4 The work must meet Health Canada Guidelines for Canadian Drinking Water Quality:
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2012-sum_guide-res_recom/index-eng.php

11.9.B References

B.1 Equipment Data

B.1.1 The existing paint system is International Paint Interline 925

B.1.2 List of Tanks.

Description	Volume	Surface Area (m²)	RO Field No.
Port FW Tank	3.214 m ³		
Starboard FW Tank	3.214 m ³		

Reference Documents	
7.A.12	Fleet Safety manual Section 7.A.12- Potable Water Quality
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index-eng.php	Health Canada Guidelines for Canadian Drinking Water Quality
International Paint	CCGS M Charles Coating Spec DD2016 05 09 2016 rev1
Interline 975P	Application Guidelines Potable Water Tanks Interline 975P

B.1.2 All Drawings are listed in the General Notes. The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE
AF6102-89940-02	Tank Arrangement and Capacity plan
AF6102-53000-02	Sanitary Fresh Water system
AF6102-63100-01	Paint Schedule

B.1 Regulations and Standards

- B.1.1 The following Standards and Regulations apply to work carried out in this section; The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

	Title	Included Yes/No
FSM Procedures		
7.A.12	Potable Water Quality	YES
Publications		
Standards		
	Health Canada Guidelines for Canadian Drinking Water Quality.	No
Regulations		
	Canada Shipping Act 2001, Safe Working Practices Regulations (C.R.C., c. 1467).	No

http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._1467/page-1.html

http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._1467/page-6.html#h-8

11.9.C Statement of Work

- C.1 The Contractor must drain and open the water tanks. The Contractor must vent tanks and certify they are safe for entry.
- C.2 The water must be removed from the tanks using the test cocks which are located in the bow thruster compartment. The water must be pumped out using the Contractors equipment. The shipboard freshwater pumps cannot be used for this purpose.
- C.3 The Contractor must pressure washed and wiped clean all tanks. The Contractor must allow for 100 Liters of liquid waste, not including the cleaning media used.
- C.4 The Contractor must clean all the internal tank suction. The striking plate under the sounding tube must be inspected. The Contractor must ensure that all vents, suction and filling lines are clear.
- C.5 The Contractor must take every precaution to ensure there is no solvent added to the applied paint, to avoid Ethylbenzene contamination.

- C.6 The Contractor must quote on preparation and repair of 2 m² total in 10 random areas, as per the Paint Spec.
- C.7 The Contractor must use the product recommended by the Paint Manufacturer Representative and adhere exactly to the application procedures stated by the Paint Manufacturer Representative. The use of thinners is not acceptable; all curing between coats and ventilation requirements must be adhered to. New hoses must be used for the application of paint in the Potable Fresh Water Tank. Hoses must not be flushed with thinner and then reused for the potable water tank. The work schedule for tank coating must provide drying times consistent with the paint manufacturer's recommendations for fresh water tanks.
- C.8 The Contractor must install one visual sight glass on each tank. These gauges must be of RO approved design and allow for the visual indication of the level in the tank. All penetrations into the tank must be touched up according to the interspec.
- C.9 The Contractor must arrange for the cleaned tanks to be inspected to the approval of RO and the TA.
- C.10 The Contractor must close up both tanks after inspection by RO's and by the TA. New nitrile (or neoprene) gaskets must be used. The TA must witness the hardening up of all manholes, closures, and docking plugs.

11.9.D Proof of Performance

D.1 Inspection Points

- D.1.1 Once all work has been completed and the tank is cleaned of all debris and work by-products, the contractor arrange for inspection and survey of the potable water tank by RO and inspection by the TA.

D.2 Testing/Trials

- D.2.1 The Potable Water tanks and the ship's fresh water system must be super-chlorinated in accordance with the procedures laid out in the Coast Guard Fleet Safety Manual (FSM) procedure Potable Water Quality 7.A.12. On completion of super-chlorination the tanks must be drained and flushed twice before being returned to service. The Contractor must be responsible to dispose of all water used to treat the fresh water tanks, allowing for 3.25 m³ per fill for each of the 2 tanks, including de-chlorination of the super-chlorinated water.
- D.2.2 The Contractor must arrange for testing of potable water tank and system in accordance with the Annual Testing of Potable Water as specified in the Canada Drinking Water

Guidelines as prescribed by Health Canada. To verify this, the following procedure must be followed for each tank:

- i) The tanks must be filled with fresh water, super-chlorinated, de-chlorinated and then drained in accordance with the CCG Fleet Safety manual (FSM) Potable Water Quality Guidelines contained in section 7.A.12 prior to filling for testing.
- ii) The potable water distribution system must be super chlorinated as per FSM. The main charcoal media filter must be bypassed and locked out while system super chlorination takes place. Refer to AF6101-53000-02, Sanitary Fresh Water system.
- iii) The tank must be filled with potable water to approximately fifty (50) percent of the working volume of the tank.
- iv) The tank must be allowed to remain stagnant for forty eight (48) hours before samples are taken.
- v) One (1) blank water sample must be collected from the freshwater supply line used to fill the tank.
- vi) Two water samples must be taken from the water inside the tank.
- vii) Samples from the distribution system must be taken in accordance with FSM.
- viii) The water samples listed above must be sent to an accredited laboratory for analysis. The water samples must be tested for all the parameters identified in the FSM. Results must be provided immediately to the TA.

D.3 Certification

- D.3.1 The TA is responsible to ensure that the Survey Record Book is signed off by RO.
- D.3.2 The Contractor must coordinate RO inspection.

D.4 Documentation

- D.4.1 The Contractor must include all test reports in their final documentation. The Contractor must provide evidence of acceptable tank water quality; prior to acceptance of the potable tank refit work by the CCG. The super chlorination and testing must be completed near the end of the work period and documentation describing how the super chlorination was conducted must be included in the final documentation.

D.5 Training – Not Used

11.10 ANCHOR CHAIN AND CHAIN LOCKER (RO SURVEY)

11.10.A Identification

- A.1 The intent of this specification is to have the anchor, anchor chain, and chain locker prepared for survey by RO.

11.10.B References

B.1 Equipment Data

B.2 Drawings

- B.2.1 All Drawings are listed in the General Notes.

B.3 Regulations and Standards

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

FSSM Procedures	Title	Included Yes/No
Publications	Canada Shipping Act, 2001: Marine Machinery Regulations (SOR/90-264)	
	RO's Register, Rules & Regulations for the Classification of Special Service Craft Standard	
	ISO 9712:2012, International Standards for Qualification and Certification of NDT Personnel	
	ANSI/ASNT CP-189-2011, ASNT Standard for Qualification and Certification of NDT Personnel	

Standards	Interspec Paint Specification	Yes
Regulations		
	Canada Shipping Act 2001	No
	RO's Register, Rules & Regulations for the Classification of Special Service Craft.	

11.10.C Statement of Work

C.1 General

- C.1.1 The Contractor must clean and lay out the anchors and chains for RO Surveyor's inspection.
- C.1.2 The Contractor must accomplish the lowering and raising of the anchor, without the vessel's hydraulic power available for operating the winch.
- C.1.3 The Contractor must ensure prior to the start of disassembly, precautions are taken to ensure the reassembly and reinstallation of all system and equipment are as per original and in accordance with manufacturer's specification.
- C.1.4 The Contractor must complete a thorough visual inspection of the anchor and chain for indications of excessive wear, wastage and other defects must be performed. All evidence of defects must be brought to the attention of the attending RO's Surveyor and TA.
- C.1.5 Areas of concern must be assessed in accordance with in this specification; required repairs must be actioned prior to the close of contract as unscheduled work.
- C.1.6 The Contractor must inspect the anchor eye and anchor shackles using liquid penetrant testing performed by a NDT LPT Level II certified Technician approved by the RO
- C.1.7 Any unplanned repair work required on the anchor or the chain will be negotiated using from PWGSC 1379
- C.1.8 Following completion of inspections, the Contractor must mark the anchor chain with stainless steel wire at each joining shackle based on the length, first shot of chain one wrap of stainless wire, 2nd shot of chain wrapped with 2 wraps of stainless wire ect. Links adjacent to the joining shackle must be prepped and painted white in accordance with the Paint Representative's recommendations. The number of painted links each

side of the joining shackle must correspond with the order number of the adjacent anchor side shot, for example shot 2 must have 2 shackles painted on either side of the joining shackle.

- C.1.9 The Contractor must arrange the chain locker for RO's Surveyor inspection. The Contractor must establish the confine space entry procedure prior to start the inspection.
- C.1.10 The Contractor must open the chain locker. The chain locker must be vented and certified for entry. The certificate of entry must be valid for each entry.
- C.1.11 The Contractor must pressure wash the chain locker with a minimum of 5000 psi. The Contractor must allow for 100 liters of liquid waste not including the cleaning media used and 10 Kg of sludge to dispose.
- C.1.12 The Contractor must clean all the internal chain locker suction to SSPC-1 standard.
- C.1.13 After the final approval of the chain locker by the RO's surveyor and the TA, the Contractor must close the manhole cover with a new gasket and new nuts of the same grade as those removed.
- C.1.14 The Contractor must, prior to undocking of the vessel, store the chain and anchor as per original.

11.10.D Proof of Performance

D.1 Inspection Points

- D.1.1 Inspections must include inspection by RO. The Contractor is responsible for scheduling RO attendance.
- D.1.2 The Contractor must arrange the attending RO Surveyor and the TA the opportunity to visually inspect the ranged anchor, anchor chain and the chain locker.

D.2 Testing/Trials

- D.2.1 The Contractor must afford the attending RO Surveyor and the TA the opportunity to witness the successful operation of anchor and anchor chain.

D.3 Certification

D.4 Documentation

- D.4.1 Documentation must be in accordance with the Documentation section of the General Notes.

D.4.2 Prior to the close of contract, certification or other documentation must be submitted to the TA attesting to the quality of new materials and parts such as shackles, links and other components replaced on the anchor and anchor chain assembly.

D.5 **Spares**

11.11 TRANSOM EXHAUST RENEWALS (RO SURVEY)

11.11.A Identification

The intent of this specification item is for the Contractor to remove the existing after most section of the main engine exhaust, along with its adjoining transition piece to the transom and its penetration piece and fabricate and install a replacement, as per the drawings and MSPV SS Exhaust Spec 2017 04 19 provided.

11.11.B References

B.1 Equipment Data

B.2 Drawings

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

Drawing Number	DRAWING TITLE	Number of Sheets
J15073-M01-R4	M.E. Exhaust Outlets Sheet 1	
J15073-M01-R4	M.E. Exhaust Outlets Sheet 2	
J15073-S01-R0	Strip-Out	

B.3 Regulations and Standards

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

FSSM Procedures	Title	Included Yes/No

Publications		
Standards		
Regulations		
	Canada Shipping Act 2001	
	RO's Register, Rules & Regulations for the Classification of Special Service Craft.	

11.11.C Statement of Work

- C.1 The Contractor must refer to provided MSPV SS Exhaust Spec 2017 04 19 for the complete work specification.
- C.2 The Contractor must remove the exhaust blankets covering the main engine exhaust within the steering gear compartment and store the blankets in a safe, dry location for the duration of the work period.
- C.3 The Contractor must unbolt and remove all main engine exhaust pieces within the steering gear compartment which are necessary to access the exhaust ports.
- C.4 The Contractor must fabricate the new exhaust port inserts from GSM materials.
- C.5 The GSM material is:

C.6	Part No.	Quantity	Description	Dimensions
1		1	Pipe, 18" Dia., Sch. 10S	681mm* length
2		2	Pipe, 18" Dia., Sch. 10S	705mm length
3		2	Plate Flange, 5/8" Thk.	595mm O.D.
4		2	Plate Flange, 5/8" Thk.	680 mm O.D.
5		2	Pipe, 5" Dia., Sch. 10S	150mm length
6		2	Plate Flange, 5/8" Thk.	250mm O.D.
7		4	Plate, 3/16" Thk.	27mm x 150mm
8		2	Plate 3/16" Thk.	420mm x 827mm (512 I.D.)
9		4	Plate, 5/16" Thk.	415mm x 1040mm (662 O.D.)
10		2	Insert Ring, 5/16" Thk.	800mm O.D.
11		2	Plate Flange, 5/8" Thk.	680mm O.D.
12		2	Flap plate, 3/16" Thk.	Cut to drawing dimensions
13		2	Stiffener plate, 3/16" Thk.	Cut to drawing dimensions
14		4	Hinge plate, 3/16" Thk.	Cut to drawing dimensions
15		4	Exhaust Flap Tab plate, 5/16" Thk.	Cut to drawing dimensions
16		4	Transom Insert Stiffener, 3/16" Thk.	Cut to drawing dimensions
17		1	Pipe, 18" Dia., Sch. 10S	681mm* length

	1	RO stamped 4mm Grade A – 275 YS Steel Plating	2000mm x 3000mm
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Note: Dimensions with (*) have 20% more material (green material) than what is shown on the reference drawings for custom fabrication at shipyard

- C.7 The exhaust cooling pipes, nozzles and flanges are to be retained and reused in the new installation. Also the exhaust flaps are to be retained and reused. This includes one per exhaust port.
- C.8 The Contractor must remove the existing exhaust ports including the hull penetration and connecting flange.
- C.9 The Contractor must weld the new stainless transom pieces directly the transom plating.
- C.10 All welds must be to the approval of RO. The RO accepts CWB pre approved weld procedures. Any weld procedures not on the list of CWP pre approved will need to be approved by the RO prior to any work completed.
- C.11 The Contractor must reinstall the main engine exhaust pipes using new gasket material.
- C.12 The Contractor must reinstall all exhaust blankets following a test of the main engines to confirm that there are no exhaust leaks.

11.11.D Proof of Performance

D.1 Inspection Points –

All welds must be to the approval of RO.

D.2 Testing/Trials –

Main engines must be test run to inspect for exhaust leaks prior to reinstalling the exhaust blankets.

D.3 Certification –

Certificates in accordance with the Documentation section of the General Notes.

D.4 Documentation –

Documentation in accordance with the Documentation section of the General Notes.

11.12 TRANSDUCER INSTLATION AND NEW BLISTER

11.12.A Identification

- A.1 The intent of this specification must install a transducer blister on the hull to provide a mounting location for a new Airmar transducer and the existing EM log sensor. The transducer blister will provide a clean flow of water across the transducers and prevent damage in the event of log strikes.
- A.2 The Contractor must fabricate and install the transducer blister and install the transducers.

11.12.B References

B.1 Equipment Data

- B.1.2 The following table lists the transducers that are currently installed, and the work to be carried out to each:

ID	Vendor	Model	Action
<i>A</i>	<i>Simrad</i>	<i>ES70</i>	<i>No Change</i>
<i>B</i>	<i>Sperry</i>	<i>EM-Log Sensor FNF III, Type 4874</i>	<i>Relocate to new Blister</i>

B.1 Drawings & Documents

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

Drawing Number	DRAWING TITLE
AF6102-18-48-428-01	CCGS M. Charles M.B. Transducer Blister Installation

- B.1.4 The following documents are to be considered as Reference Documents.

VENDOR	SENSOR	Document Number	TITLE
<i>Simrad</i>	<i>A</i> <i>Simrad ES70</i>	<i>346061</i>	<i>Operator Manual Simard ES70 Fish finding echo sounder</i>

VENDOR	SENSOR		Document Number	TITLE
<i>Sperry Marine</i>	<i>B</i>	<i>EM-Log Sensor FNF III, Type 4874</i>	<i>CCG 349429</i>	<i>Installation, Maintenance and Service Instructions 004874 Rev.A</i>
<i>Airmar</i>	<i>C</i>	<i>Airmar CM265 LH</i>	<i>N/A</i>	<i>Transducers Broadband / Chirp</i>

B.1 Regulations and Standards

B.1.5 The following Standards and Regulations apply to work carried out in this section. The Contractor must ensure all work completed in this section meets these Standards and Regulations as well as any other pertinent Federal/Territorial Regulation or Standard:

FSSM Procedures	Title	Included Yes/No
Publications		
	Interspec Paint Specification	Yes
Standards		
CSA CWB Standards W59	Canadian Standards Association - Welded Steel Construction (Metal Arc Welding)	No
IACS Rec47 SARQS	IACS Recommendation No 47 - Shipbuilding and Repair Quality Standard	No
CT-043-eq-eg-001-E	Canadian Coast Guard – Welding Specification	Yes
18-080-000-SG-003	Canadian Coast Guard – Paints and Coatings Standard	Yes
FC 08-2007	Canadian Coast Guard – Fleet Identity Color Standard	Yes
Regulations		
LR SSC	Lloyd’s Register of Shipping Rules and Regulations for the design and Construction of Special Service Craft, 2013	No
C.R.C., c. 1431	Transport Canada Hull Construction Regulations, 2014	No

B.1 Abbreviations

B.1.6 The following abbreviations are used throughout this specification:

ISO	International Standards Organization
MT	Weld inspection by Magnetic Particle Inspection
PQR	(Weld) Procedure Qualification Record
PT	Weld inspection by Dye Penetrant Inspection
RT	Weld inspection by Radiographic Inspection
UT	Weld inspection by Ultrasonic Inspection

11.12.C Statement of Work

C.1 General

- C.1.1 Transducers are extremely sensitive sensors. The Contractor must take all necessary precautions to prevent the transducers and their cables from all forms of damage, including mechanical, heat, and electromagnetic. All other cables, pipes, and equipment in way of work areas are to be protected from the same. The Contractor must remove all transducers during hot work.
- C.1.2 The Contractor must remove the existing transducer B and its existing transducer blister. The existing transducer B and the new transducer C must be mounted in the new transducer blister. Transducer A must remain unchanged. All Transducers are GSM.
- C.1.3 Any existing internal structure that has been damaged by the installation or removal of the transducers must be repaired by the Contractor as per the surrounding structure (note frames 25 and 26, ABS Grade A, thickness to match existing hull plate thickness).
- C.1.4 New material only must be used for the fabrication of the blister and any structural repairs.
- C.1.5 The Contractor must reinstall all any items that were temporarily stripped out for access and must return the affected areas to the condition in which they were found. It is the responsibility of the Contractor to repair any damage caused during construction.

C.2 Welding Requirements

- C.2.1 All welding and weld inspection must be in accordance with the CCG Welding Specification CT-043-eq-eg-001.
- C.2.2 For any item requiring the application of fusion welding for steel structures, the Contractor and all Sub-Contractors must be certified by the Canadian Welding Bureau to CSA W47.1 – latest edition, Division 1 or 2.

- C.2.3 For structural steels > 3 mm in thickness, welding must meet the requirements of CSA Standards W47.1 and W59, except as modified by the CCG Welding Specification CT-043-eq-eg-001.
- C.2.4 The Contractor must provide documentation to the TA clearly identifying compliance with the welding certification requirements specified herein and the CCG Welding Specification CT-043-eq-eg-001. Typical documents include but are not necessarily limited to: Letter of Validation, Welding Procedures, Welder Performance Qualification Cards, Inspection Personnel Qualification Cards, Inspection Reports, etc.
- C.2.5 The CCG Welding Specification is an owner's requirement. TCMS support both CSA Standards and RO Rules for welding. The IACS materials and welding working group ruled that CSA Standards for welding may be used.
- C.2.6 RO's accept welder performance and welding procedure testing to CSA Standards for steel and aluminum. To be accepted, Welding Procedure Specifications and supporting Data Sheets must be tested and have Procedure Qualification Records (PQR) meeting the technical intent of IACS W28.
- C.2.7 Welding procedures approved by the CWB on the sole basis of CSA Standard W59 pre-qualified joints for steels are not accepted by ROs. As such, for CCG vessels maintained in-class by a RO, the contractor must use weld procedures supported by PQRs for joining steel, unless otherwise accepted by the attending RO Surveyor.
- C.2.8 All fillet welding must be double continuous unless noted otherwise. All fillet welds are to be 6.4mm leg length (4.5mm throat thickness). Unless noted otherwise in the design drawings, all butt welds are to be full penetration.
- C.3 Weld Inspections
 - C.3.1 The Contractor must conduct weld inspections in accordance with the CCG Welding Specification CT-043-eq-eg-001.
 - C.3.2 All welds are to be subject to 100% visual inspection.
 - C.3.3 All full penetration butt and T-joint welds are to be subject to 5% MT/PT and 5% RT/UT.
 - C.3.4 All partial penetration butt and T-joint welds are to be subject to 5% MT/PT.
 - C.3.5 Welds are to be NDT tested by a certified person in accordance with the requirements of CSA CWB W59, CCG Welding Specification CT-043-eq-eg-001, and ISO 9712:2005 International Standards for NDT. In the event of any conflict between the two requirements, CSA CWB W59 must take precedence. Copies of the NDT testing

must be provided to the TA in accordance with the Documentation section of the General Notes. Any defects found are to be repaired at Contractor's expense.

C.4 Strip-Out

- C.4.1 The Contractor must completely remove transducer B with the full length of cable attached. Cables must be disconnected at their termination point. Care must be taken to ensure that the cables are not damaged in any way during removal. The existing stuffing box must be retained for reinstallation. Transducer B must be retained for reinstallation.
- C.4.2 The Contractor must strip out the existing transducer blister and mounting ring for transducer B.
- C.4.3 The mounting ring for transducer B must be retained for reinstallation if possible. If the mounting ring cannot be reused the Contractor must fabricate a new mounting ring in accordance with the installation documentation for transducer B. The existing mounting ring for transducer B is assumed to be the same size as the cut-out for the Sperry Speed log in the new blister.

C.5 Transducer Blister Installation

- C.5.1 The Contractor must fabricate and install the transducer blister in accordance with drawing AF6102-18-48-428-01.
- C.5.2 The Contractor must install watertight cable glands in the hull in accordance with the guidance design and the reference drawings. Cable Glands must be watertight and must be suitable for underwater through-hull applications. The cable glands must be sized appropriately for the cable that will pass through the gland. Cable glands must be installed where the cables pass through the cofferdam top plating.
- C.5.3 The Contractor must fabricate the transducer blister in accordance with the guidance drawing. The transducer blister must be fabricated from ABS Grade A (or equal) steel, and fully welded.
- C.5.4 The transducer blister must be of non-watertight construction, with air and drain holes provided in accordance with the guidance drawings. These openings are to allow the structure to flood and drain when the vessel is in the water.
- C.5.5 The blister has a vertical 19mm thick steel plate at the front to prevent logs, ropes and flotsam from becoming trapped by the blister. The leading edge of this must be ground smooth by the Contractor with a 19mm diameter rounded profile along the entire length.

- C.5.6 The Contractor must fit the leading edge of the blister with a 1-1/4" diameter schedule 80 pipe. The purpose of this pipe must be minimize flow separation (and consequently turbulent flow).
- C.5.7 The Contractor must grind all edges of the blister smooth in accordance with the guidance drawing.
- C.5.8 The Contractor must fabricate the transducer blister with a mounting ring for sensor B and the bolting and top plate arrangement for sensor C. The transducer mounting must be either fabricated by the Contractor, or purchased from the vendor. If fabricated by the Contractor, they are to be fabricated in accordance with the appropriate reference drawing.
- C.5.9 The Contractor must weld the transducer blister to the hull in accordance with the guidance drawing.
- C.5.10 The Contractor must install a new top plate and cover plate in accordance with the guidance drawing. This top plate must form a fully watertight enclosure.
- C.6 Transducer Installation
 - C.6.1 The Contractor must install the transducers in the new transducer blister in the locations specified on the guidance drawing. Mounting must be in accordance with the requirements of the reference documentation for the respective transducer. The transducer must be oriented correctly with the forward direction oriented towards the bow of the vessel.
 - C.6.2 The Contractor must route the cables for transducers B and C to the terminating equipment as per the existing sensor cable routing and arrangement. Where possible, cables are to be run to the equipment in a single continuous run.
 - C.6.3 The Contractor must provide the cable runs with service loops at both the transducer end and the terminating equipment.
 - C.6.4 The Contractor must engage with the respective transducer vendors' Field Service Representatives to carry out commissioning and calibration of the transducers.
- C.7 Painting
 - C.7.1 All painting must be in accordance with Canadian Coast Guard Paints and Coatings Standard 18-080-000-SG-003. The specification of the paint must be confirmed with the Owner prior to application.
 - C.7.2 The Contractor must paint the transducer blister and cofferdam in accordance with the CCG paint and hull coatings specification. All new material must be painted, and

any existing paint that is disturbed or damaged in any way during the work must be stripped and repaired in accordance with the CCG Paint and Hull coatings specification.

- C.7.3 All fixtures and adjacent surfaces must be properly protected during painting. All new surfaces must be thoroughly clean and dry and free of grease or oil before painting is commenced. All plates and shapes used in construction and all areas in way of new paint must have surface preparation performed according to the paint manufacturer's specifications to completely remove scale, rust, and other surface contaminants.
- C.7.4 The Contractor must take care when applying paint to the inside of angled members and other difficult areas to ensure full build-up of coatings is attained.
- C.7.5 Removal and disposal of all hazardous wastes from painting (residuals) must be in accordance with local and provincial environmental regulations.
- C.7.6 All new steel and welded areas must be painted prior to the installation of the transducers. All transducers installed at the time of painting are to be protected from paint. Transducers are not to be painted.
- C.7.7 The Contractor must apply primer coats to clean metal surfaces per the manufacturer's specifications. Primer must be uniform, free of pinholes and holidays, and compatible with specified coating systems. The method of application and all work must be performed in strict accordance with the manufacturer's instructions and as specified herein.

11.12.D Proof of Performance

D.1 Inspection points

- D.1.1 The Contractor must afford the TA an opportunity to witness all welding carried out during the installation of the new transducer blister. The contractor and the TA must agree on inspection points and schedule prior to the start of the work.
- D.1.2 The Contractor must carry out weld inspections in accordance with the CCG Welding Specification CT-043-eq-eg-001.

D.2 Testing/Trials

- D.2.1 The Contractor must ensure that all glands are leak free during the floating of the vessel.

D.3 Certification

- D.3.1 The Contractor must provide a copy of the class society material certificate for each plate used in accordance with the Documentation section of the General Notes.
- D.3.2 The Contractor must provide copies of all company or individual welding certificates indicating compliance with CSA regulations referenced. All certificates must be provided to the TA in accordance with the Documentation section of the General Notes.
- D.3.3 The Contractor must provide copies of the NDT technician's or company's certification in accordance with ISO 9712:2005 International Standards for NDT.
- D.3.4 Calibration certificates for all transducers affected by this project must be provided to the TA.
- D.4 Documentation
 - D.4.1 The Contractor must submit to the TA a report of all NDT test results in accordance with the Documentation section of the General Notes.
 - D.4.2 The Contractor must provide copies of all approved welding procedures in accordance with the Documentation section of the General Notes.
 - D.4.3 Drawing indicating location of all plate used with its corresponding mill certificate number in accordance with the Drawings section of the General Notes.
- D.5 Training – Not Used

12.0 PROPULSION AND MANEUVERING

12.1 DOCK TRIALS

12.1.A Identification

- A.1 The intent of this specification is to trial the vessel prior to reacceptance.
- A.2 The Contractor must conduct dock trials sufficient to test all equipment that has been overhauled or repaired during the docking or alongside. The contractor must allow for 4 hours alongside to conduct dock trials.

12.1.B References

- B.1 **Equipment Data** - Not Used

B.2 Drawings –

B.2.1 All Drawings are listed in the General Notes

B.3 Regulations and Standards

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

FSSM Procedures	Title	Included Yes/No
Publications		
Standards		
Regulations		
	Canada Shipping Act 2001	No
	Marine Machinery Regulations (SOR/90-264)	No
	RO's Register, Rules & Regulations for the Classification of Special Service Craft.	

12.1.C Statement of Work

C.1 The CCG will provide sufficient officers and crew to command and crew the vessel for dock trials.

C.2 The Jastram Engineering FSR must attend the sea trials to ensure the steering systems are operating correctly, and test the high pressure relief valves on the steering system.

C.3 The Contractor must allow for CG personnel to sensor sweet the new transducer that was installed.

12.1.D Proof of Performance

D.1 Inspection Points

D.2 Testing/Trials

D.2.1 The Contractor must, under the direction of the Jastram FSR test the steering system as per the OEM manual and record the hard over to hard over time at 0 speed.

D.3 Certification – Not Used

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

D.4 **Documentation**

D.4.1 The Contractor must provide readings taken during the trials and any FSR reports in the final documentation.

D.5 **Training – Not Used**

12.2 RUDDER AND RUDDER STOCK (RO SURVEY)

12.2.A Identification

A.1 The intent of this specification is to inspect and survey the vessels rudders, rudder stock stocks and rudder bearings.

A.2 The Contractor must unship the rudder and rudderstock for inspection and survey. The rudder must be hydrostatically tested and must be prepared for survey by the TA and RO and must be reinstalled with new CFM Micarta fairing plates.

A.3 The work must be carried out in conjunction with the specification items for Painting of the Underwater Hull and any other interference work.

A.4 The Contractor must be responsible for any damage resulting from insufficient care taken.

12.2.B References

B.1 **Equipment Data**

B.2 **Drawings**

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

Drawing Number	DRAWING TITLE
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AF6102-56100-02	AS-BUILT STEERING SYSTEM SCHEMATIC OF THE HYDRAULIC SYSTEM.
AF6102-56100-03	AF STEERING GEAR ROOM ARRANGEMENT.
AF6102-10000-11	AF Rudders Construction Plan 1
AF6102-10000-11	AF Rudders Construction Plan 2
	Interspec paint specification

B.3 Regulations and Standards

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

FSSM Procedures	Title	Included Yes/No
Publications	Jastram Steering System Installation and Service Manual	
Standards	Interspec Paint Specification	Yes
Regulations		
	Canada Shipping Act 2001	No
	RO's Register, Rules & Regulations for the Classification of Special Service Craft.	No

12.2.C Statement of Work

C.1 General

C.1.1 The Contractor must ensure that the vessel is docked such that a minimum height of 1.3 meters is maintained between the keel of the vessel and the dry dock.

- C.1.2 The rudders reactive times must be measured prior to removing the rudder from the vessel. The tests must include hard over to hard over times.. The rudder reactive times must be measured following the reinstallation of the rudder. The times for the same tests must be equal to or less than those prior to removal and must be within Transport Canada Regulations.
- C.1.3 The Contractor must include all staging, crantage, screens, lighting and any other support services, equipment, paint and materials required.
- C.1.4 The Contractor must obtain and record all rudder bearing clearances prior to the removal of the rudder stocks. The measurements must be submitted to the TA and to RO as soon as possible and within three (3) days of docking.
- C.1.5 The Contractor must mark all items on the rudders and associated equipment prior to disassembly. All identifying marks must be recorded and all marked items must be re-assembled to the same position from which they were disassembled.
- C.1.6 The Contractor must inspect the condition of the pintle and bushings and afford the opportunity to RO and to the TA to inspect. Any deficiencies will be repaired by 1379 action.

C.2 Removal of Rudder & Stock

- C.2.1 All rudder bearing clearances must be measured and recorded prior to removal of rudder stocks.
- C.2.2 The two rudders and rudder stock assemblies must be disconnected, removed and laid out for RO's inspection.
- C.2.3 The Contractor to bid on pressing out the rudder stocks.
- C.2.4 The two rudders must be visually inspected and also pressure tested for defects and the findings recorded. On each rudder, the Contractor must remove the docking plug and must perform a pressure test of not more than 2 psi for 1 hour witnessed by RO and the TA. Recommendations for repairs must be made accordingly.
- C.2.5 The rudder stocks must be visually inspected for defects, diameters measured and findings recorded. Recommendations for repairs must be made accordingly.
- C.2.6 All rudder stock keyways must be inspected for defects using NDT LP Level II testing in full compliance with CAN/ONGC-48.9712. All findings must be recorded.

- C.2.7 The top rudder bearings and bearing fasteners for both rudder stocks must be visually inspected for defects and findings recorded and submitted to RO and the TA.
- C.2.8 The rudder carrier bearings for both rudder stocks must be visually inspected for defects and findings recorded and submitted to RO and the TA.
- C.2.9 Following inspection, both rudder assemblies must be reassembled as per original and in accordance with manufacturer's specifications.

C.3 **Rudder Reinstallation**

- C.3.1 The Contractor must manufacture new fairing plates out of Celeron Composite or Equivalent, the equivalent must have a low water absorption rate, for installation above the rudders.
- C.3.2 The Contractor must install the new fairing plates to act as insulation between the stainless steel rudders and steel hull.
- C.3.3 The Contractor is to bid on the requirement of chilling the rudder stocks with dry ice prior to reinstallation.
- C.3.4 The Contractor must re-install the rudders and reconnect all equipment and items removed during the removal of the rudders.

C.4 **Skegs**

- C.4.1 The Contractor must remove the Port and Starboard skegs docking plugs in attendance of the TA with the intent of inspecting the internal coating mixture in the skegs. The expectation is that the skegs will contain a white grease and the grease will be in acceptable condition that it can be left in place.
- C.4.2 Contractor must ensure all applicable safety precautions are taken to collect and contain any liquid or other filling mixture inside in the skegs.
- C.4.3 The Contractor must assure that the hardening up of the skeg plugs is witnessed by the TA.
- C.4.4 Any additional work generated by this inspection will be by PWGSC 1389 action.

C.5 **Steering**

- C.5.1 The Contractor must ensure that all steering values recorded prior to disassembly are achieved during assembly and that all electrical connections and otherwise are re-established as recorded.

- C.5.2 The Contractor must ensure that the tiller achieves a proper fit and that the tiller nut is hardened up in the presence of the TA.
- C.5.3 The Contractor must ensure that all autopilot and rudder feedback components are re-aligned to their original position.
- C.5.4 The Contractor must conduct operational testing of the steering system under full load to the approval of RO and the TA.

12.2.D Proof of Performance

D.1 Inspection Points

- D.1.1 Inspections must include surveys by RO. The Contractor is responsible for scheduling RO attendance. RO and TA must be afforded the opportunity to inspect all disassembled parts and any other tests or procedures the inspector wants to witness.
- D.1.2 The Contractor must obtain and record all rudder bearing clearances prior to the removal of the rudder stocks. The measurements must be submitted to the TA and to RO as soon as possible and within three (3) days of docking.
- D.1.3 The TA must be afforded the opportunity to witness all disassembled parts, fitting of the rudder stock taper, and hardening up of rudder plugs..
- D.1.4 The Contractor must assure that pressure testing of the rudders and skegs is witnessed by RO and the TA is afforded the opportunity to witness.
- D.1.5 The TA must be afforded the opportunity to witness the removal of skeg fluid and reinstallation of skeg drain plugs.

D.2 Testing/Trials

- D.2.1 The rudder must be air pressure tested to 2.0 psi as described in the specification.
- D.2.2 The Contractor must conduct tests of the steering system to the approval of the TA and RO. The rudder must be shown to be free and clean and must smoothly through its entire range of motion.
- D.2.3 The Contactor must conduct trials to measure the rudder reactive times prior to removing the rudder from the vessel. The tests must include hard over to hard over times.
- D.2.4 The Contactor must conduct trials to measure the rudder reactive times following the reinstallation of the rudder. The times for the same tests must be equal to or less than those prior to removal and must be within Transport Canada Regulations.

D.3 **Certification**

D.3.1 The TA is responsible to ensure that the Survey Record Book is signed off by RO.

D.4 **Documentation**

D.4.1 Documentation must be in accordance with the Documentation section of the General Notes.

D.4.2 The Contractor must provide a Quality Assurance (QA) report indicating that RO inspector has inspected all the parts signed off on the survey credit.

D.5 **Spares – Not Used**

12.3 BOW THRUSTER GEAR OIL AND SEAL CHANGE

12.3.A Identification

A.1 The contractor must change the bow thruster gear oil and the propeller shaft seals.

12.3.B References

B.1 Equipment Data

B.1.1 ABT-Trac PKK 24 Hydraulic Bow thruster

B.2 Drawings

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

Drawing Number	DRAWING TITLE	Number of Sheets
35989_b	Hydraulic Thruster (PKK 24 TRAC (24)	

B.3 Regulations and Standards

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

FSSM Procedures	Title	Included Yes/No
Publications		
	Canada Shipping Act, 2001;	
Standards		
Regulations	ROs SSC 2009 ROs Register Special Service Craft	

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12.3.C Statement of Work

- C.1 The Contractor must ensure that all applicable safety precautions including equipment lock outs and tag outs are implemented prior to the start of work.
- C.2 The Contractor must ensure that, prior to the start of disassembly, precautions are taken to ensure the reassembly and reinstallation of all system and equipment will be as per original and in accordance with manufacturer's specification.
- C.3 The Contractor must report, by email, all deficiencies as they are identified to the TA and make recommendations for their remedial action.
- C.4 The Contractor must remove the bow thruster grates to access the thruster unit.
- C.5 The Contractor must notify the TA when the oil will be drained from the bow thruster unit such that the TA can take an oil sample for analysis mid-stream through the draining process. The oil must be drained into a clean container to allow for the examination of the oil condition by the TA. The Contractor must quote on disposal of 10 liters of oil.
- C.6 The Contractor must follow the TRAC shaft seal change procedure manual to change the oil and seals. The oil and seals are GSM.
- C.7 Following the completion of all disassembly, and prior to reassembly, the Contractor must afford the TA the opportunity to inspect all disassembled components.

12.3.D Proof of Performance

- D.1 The Contractor must conduct a sea trial where the thruster will be used with maximum thrust for a period of five minutes in each direction. The operational level of the oil header tank is to be recorded before trials and monitored during all trials.

13.0 POWER GENERATION SYSTEMS

13.1 NOT USED

14.0 POWER DISTRIBUTION SYSTEMS

14.1 NOT USED

15.0 AUXILIARY SYSTEMS

15.1 NOT USED

16.0 DOMESTIC SYSTEMS

16.1 NOT USED

17.0 DECK EQUIPMENT

17.1 FISHING GEAR INSTALLATION

17.1.A Identification

- A.1 The intent of this specification is to install the 2 pedestal mounts for the fishing gear on the stbd side aft deck of the vessel.

17.1.B References

B.1 Equipment Data

B.2 Drawings

B.3 19-10-180-01 CCGS MSPV Deck Insert R2 (2May19)_Stamped

B.4 Regulations and Standards

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

FSSM Procedures	Title	Included Yes/No
Publications		
Standards		
Regulations		

	Canada Shipping Act 2001	No
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17.1.C Statement of Work

C.1 General

- C.1.2 The Contractor must install the GSM insert plates as per 19-10-180-01 CCGS MSPV Deck Insert R2 (2May19)_Stamped
- C.1.3 The Contractor must remove the lagging over the stbd main engine exhaust, and the deck head insulation in the AMR to provide full penetration welds, there is very little clearance in the AMR and the welding will not be able to be done without removing the lagging.



- C.1.4 The contractor must remove the lagging on the exhaust in a way that it can be re installed after the work has been completed.
- C.1.5 All new steel and welded areas must be painted as per the international paint specification

C.2 Welding Requirements

- C.2.1 All welding and weld inspection must be in accordance with the CCG Welding Specification CT-043-eq-eg-001.
- C.2.2 For any item requiring the application of fusion welding for steel structures, the Contractor and all Sub-Contractors must be certified by the Canadian Welding Bureau to CSA W47.1 – latest edition, Division 1 or 2.

- C.2.3 For structural steels > 3 mm in thickness, welding must meet the requirements of CSA Standards W47.1 and W59, except as modified by the CCG Welding Specification CT-043-eq-eg-001.
- C.2.4 The Contractor must provide documentation to the TA clearly identifying compliance with the welding certification requirements specified herein and the CCG Welding Specification CT-043-eq-eg-001. Typical documents include but are not necessarily limited to: Letter of Validation, Welding Procedures, Welder Performance Qualification Cards, Inspection Personnel Qualification Cards, Inspection Reports, etc.
- C.2.5 The CCG Welding Specification is an owner's requirement. TCMS support both CSA Standards and RO Rules for welding. The IACS materials and welding working group ruled that CSA Standards for welding may be used.
- C.2.6 RO's accept welder performance and welding procedure testing to CSA Standards for steel and aluminum. To be accepted, Welding Procedure Specifications and supporting Data Sheets must be tested and have Procedure Qualification Records (PQR) meeting the technical intent of IACS W28.
- C.2.7 Welding procedures approved by the CWB on the sole basis of CSA Standard W59 pre-qualified joints for steels are not accepted by ROs. As such, for CCG vessels maintained in-class by a RO, the contractor must use weld procedures supported by PQRs for joining steel, unless otherwise accepted by the attending RO Surveyor.
- C.2.8 All fillet welding must be double continuous unless noted otherwise. All fillet welds are to be 6.4mm leg length (4.5mm throat thickness). Unless noted otherwise in the design drawings, all butt welds are to be full penetration.
- C.3 Weld Inspections**
- C.3.1 The Contractor must conduct weld inspections in accordance with the CCG Welding Specification CT-043-eq-eg-001.
- C.3.2 All welds are to be subject to 100% visual inspection.
- C.3.3 All full penetration butt and T-joint welds are to be subject to 5% MT/PT and 5% RT/UT.
- C.3.4 All partial penetration butt and T-joint welds are to be subject to 5% MT/PT.
- C.3.5 Welds are to be NDT tested by a certified person in accordance with the requirements of CSA CWB W59, CCG Welding Specification CT-043-eq-eg-001, and ISO 9712:2005 International Standards for NDT. In the event of any conflict between the two requirements, CSA CWB W59 must take precedence. Copies of the NDT testing

must be provided to the TA in accordance with the Documentation section of the General Notes. Any defects found are to be repaired at Contractor's expense.

17.1.D Proof of Performance

D.1 **Testing/Trials – Not Used**

D.2 **Certification – Not Used**

D.3 **Documentation**

D.3.1 Documentation must be in accordance with the Documentation section of the General Notes.

D.4 **Spares – Not Used**

18.0 CONTROL SYSTEMS

18.1 NOT USED