



CCGS TELEOST

FISHERIES RESEARCH VESSEL

Specification for Annual Refit 2017

Jan.3, 2017 - Feb.10, 2017

CCGS TELEOST

Annual Refit 2017

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PREAMBLE

1. INTENT

These specifications are supplied to the ship repairer, here in after referred to as the Contractor for the purpose of outlining the objectives, performance, standards and basic engineering requirements for the refit, including Drydocking of the CCGS TELEOST for the Canadian Coast Guard, Department of Fisheries and Oceans.

Intent of this specification shall describe the necessary work involved in carrying out the ship's Annual Refit Repairs. All work specified herein and all repairs, inspections and renewals shall be carried out to the satisfaction of the Owner's Representative and where applicable, the attending Transport Canada Marine Safety Inspector (TCMS). Unless otherwise specifically stated, the Owner's Representative is the Chief Engineer.

Refit to start January 3 and end February 10, 2017.

2. MANUFACTURER'S RECOMMENDATIONS

The overhaul and installation of all machinery and equipment specified herein shall be as per the manufacturer's applicable instructions, drawings and specifications.

3. TESTING AND RECORDS

All test results, calibrations, measurements and readings shall be properly tabulated, compiled and three typewritten copies shall be presented to the Owner's Representative and attending Surveyors in a timely manner.

4. WORKMANSHIP

The contractor shall use fully qualified, certified and competent tradesmen and supervision to ensure a uniform high level of workmanship as judged by normally accepted shipbuilding standards and to the Owner's satisfaction.

5. FACILITIES

Quotation is to include all the necessary parts, labor and equipment required for the erection of access staging, rigging, lighting, necessary craneage, transportation and line handling. During the entire Refit including Drydocking, the Contractor will maintain in a state of good order all walkways, scaffolding, ladders guardrails and similar appliances that are necessary for the safety of persons working or on business in the areas where work is in progress.

6. MATERIALS AND SUBSTITUTIONS

All material shall be supplied by the contractor and all materials shall be new and unused unless otherwise specified. All replacement material in the form of jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings, etc., shall be in accordance with the equipment manufacturer's drawings, manuals or instructions. Where no particular item is specified, or where substitution must be made, the Owner's representative must approve all material offered in advance of utilization.

7. TOOLS

The Contractor is to supply all of the tools required to do the work except for certain specialty tools which will be issued to the Contractor and which must be returned in good order to the Chief Engineer. In all other instances, ship's tools are not to be used by the Contractor.

8. REMOVALS

Any items of equipment to be removed and subsequently reinstalled in order to carry out work specified or to gain access to carry out the work specified, shall be jointly inspected for damages prior to removal by both the contractor and Owner's representative.

9. EXPOSURE AND PROTECTION OF EQUIPMENT

The contractor shall provide adequate temporary protection for any equipment or areas affected by this refit. The contractor shall take proper precautions to maintain in a proper state of preservation any machinery, equipment, fittings, stores or items of outfit which might become damaged by exposure, movement of materials, sand grit or shot blasting, airborne particles from sand, grit or shot blasting, welding, grinding, burning, gouging, painting or airborne particles of paint. Any damage shall be the responsibility of the contractor.

Government furnished equipment and materials shall be received by the contractor and stored in a secure warehouse or storeroom having a controlled environment appropriate to the equipment as per the manufacturer's instructions. The contractor shall cover all deck machinery and openings into the ship to prevent ingress of grit from blasting. The contractor shall remove any and all coverings after the coating operations are complete.

10. CLEANLINESS

The contractor shall at all times, maintain the work areas in which his personnel have access in a clean condition and free from debris. Upon completion of this refit, the contractor shall ensure that the vessel is in a clean condition, free from all foreign material in any system or location placed there as a result of this refit. The contractor shall provide adequate temporary protection for any equipment or areas affected by this refit. The contractor shall dispose of any and all oil and water residue, which accumulates in the machinery space bilges as a result of any repair work detailed in this specification.

11. LIGHTING AND VENTILATION

Temporary lighting and/or temporary ventilation, required by the Contractor to carry out any item of this specification, shall be supplied, installed and maintained in safe working condition by the Contractor. It shall be removed on completion of the work. The Contractor can use the ship's electrical receptacles (if available) for 120 VAC power providing that they do not overload circuits, use electrical equipment that is functioning properly and they do not impede the work of the ship's crew.

12. ASBESTOS

Any and all insulation materials shall be asbestos free and approved for the required application.

13. ENTRY INTO ENCLOSED SPACES - CHEMIST'S CERTIFICATES

The Contractor shall be aware that the vessel is considered to be a Federal Work Place and thereby regulated by the Canada Labor Code.

In addition, the Contractor is required to keep a log of all personnel entering and leaving any enclosed space / vessel.

The Contractor shall supply the Owner's Representative with Marine Chemist's certificates or a Qualified Person in accordance with CCG/SSB TP 3177E before any cleaning, painting or hot work is commenced in confined spaces or machinery compartments. Certificates shall clearly state the type of work permitted and shall be renewed as required by regulations. Copies of the certificates shall be posted in conspicuous locations for the information of the Ship's and Contractor's personnel.

The Contractor shall ensure that any work carried out in confined spaces as defined by the Canada Labor Code must comply fully with all provisions of the applicable Provincial Regulations. **Contractor shall have tank rescue team onsite during work in any confined space.**

14. HOTWORK

Any item of work, involving the use of heat including welding, cutting, arc gouging in its execution, requires that the Contractor advise the Owner's Representative prior to starting such heating and upon its completion. The Contractor shall be responsible for maintaining a competent and properly equipped fire watch during, and for one full hour after, all hot work. The fire watch shall be arranged such that all sides of surfaces being worked on are visible and accessible. The Contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such heating and until the work has cooled.

Ship's extinguishers are not to be used except in the event of an emergency. The Chief Engineer shall be notified immediately should an incident of this nature occur.

All Hot Work shall be completed in accordance with Coast Guard Fleet Safety Manual Section 7.D.11 and 7.D.11 (N). and applicable Provincial Regulations.

15. LOCKOUT AND TAGOUT PROCEDURES

The Contractor shall be responsible to protect persons working on board the vessel while working on or near shipboard systems and equipment from accidental exposure to:

- Electrical currents
- Hydraulic
- Pneumatic
- Gas or stem pressure and vacuum
- High temperatures
- Cryogenic temperatures
- Radio frequency emissions
- Potentially reactive chemicals
- Stored mechanical energy
- Equipment actuation

The contractor, under the supervision of the Chief Engineer and his delegate, shall be responsible for the Lockout and Tagout of equipment and systems as listed in the specification.

The Contractor shall supply and install all locks and tags and shall complete the Lockout Tagout Log sheet provided by the Vessel.

The Contractor shall remove all locks and tags and complete the Lockout Tagout Log sheet provided by the Vessel.

16. PAINTING

All new and disturbed steel work that will not be on the underwater wetted surface of the ship's hull shall be protected with two (2) coats of primer. Unless otherwise stated in the Individual Specification item the primer shall be International Paints Interplate Zinc Silicate NQA262/NQA026 red. The paint shall be applied as per the Manufacturer's Instructions on their product data sheet.

The contractor shall strictly adhere to the manufacturer's instructions and will be supervised by a Coast Guard contracted National Association of Corrosion Engineers (Nace) Inspector in the preparation, application and curing of all coatings during this refit.

17. WELDING

Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)

The Contractor shall be currently certified by the Canadian Welding Bureau (CWB) in accordance with CWB 47.1 latest revision Division I, II or III at the time of bid closing.

The Contractor shall provide a current letter of validation from the CWB indicating compliance with standard CSA W47.1, Division I, II or III. (latest revision)

The Contractor may be required to provide approved procedure data sheets for each type of joint and welding position that will be involved in this refit.

The Contractor may be required to supply a current Welders Ticket for each individual welder that will be involved in this refit.

18. SMOKING

The Public Service Smoking Policy forbids smoking in all Government ships in areas inside the ship where Contractor personnel will be working. The contractor shall inform workers of this policy and ensure that it is complied with.

19. RESTRICTED AREAS

The following areas are out of bounds to Contractor personnel except to perform work as required by the specifications: all cabins, offices, Wheelhouse, Control Room, Engineer's office, public washrooms, cafeteria, dining room and lounge areas.

20. ELECTRICAL STANDARDS

Any electrical installations or renewals shall be in accordance with the latest editions of the following marine standards:

(a) TP 127E-TC Marine Safety Electrical Standards.

(b) IEEE Standard 45: Recommended Practice for Electrical Installation on Shipboard.

If any cable installed within this contract is found to be damaged, shorted or opened as a result of the manner of installation, the entire length of cable shall be replaced and installed at no cost to the Department. Plastic tie-wraps may be used to secure wiring in panels or junction boxes only.

21. DRAWINGS

All drawings and drawing revisions that the contractor is requested to do in the execution of this contract shall be of a quality equal to that of the drawings that are requested to be updated. For example, drawings that have been lettered and dimensioned in a professional manner shall not be updated using freehand. Prints and reproductions that a contractor is required to provide shall be made on one piece of paper.

22. TRANSDUCERS

The Contractor shall not paint the transducers and all transducers shall be afforded the necessary protection during hull cleaning, blasting, welding and coating operations.

23. FIRE DETECTION AND SUPPRESSION SYSTEM

If any Specification Item will require disturbing, removing or isolating any heat or smoke sensors the Contractor will advise the Chief Engineer before work commences.

The Ship's Crew will perform any such work. The Contractor should note that failure to observe proper precautions while performing work of this nature could result in system malfunction and spontaneous discharge of FM-200, Halon or CO₂.

24. ANNEX

The Contractor shall have in place a Safety Management System that complies with the Canada Labor Code and Provincial Regulations and deals with the contractor responsibilities for items such as Hot Work, Confined Space Entry, Diving Operations, Lock out and Tag out procedures and Working Aloft.

The Contractor shall be aware that the vessel is considered to be a Federal Work Place and thereby regulated by the Canada Labor Code.

The Contractor shall comply with the work requirements as outlined in the Canada Labor Code and applicable Provincial Regulations.

In addition, the Contractor is required to keep a log of all personnel entering and leaving any enclosed space / vessel.

The Contractor shall note that Canadian Coast Guard Ships are presently working under the International Safety Management System (ISM) code and each ship has a Fleet Safety Manual on board. The fleet Safety Manual shall be adhered to when contract work involves CCG personnel and any other Public Service Employee during the contract period.

An electronic copy of the Fisheries and Oceans Canada, Canadian Coast Guard Fleet Safety Manual (DFO 5737) - (Adobe Acrobat .PDF version) can be found at

http://142.130.14.20/fleet-flotte/Safety/main_e.htm

25. SUSPENSION OF WORK

The Technical Authority reserves the right to suspend work immediately when that work is being performed in contravention of the Coast Guard's Safety Management System. Work shall be allowed to resume when the Technical Authority, in consultation with the Contractor and PWGSC, is satisfied that the agreed-upon procedures are in place and being adhered to.

26. REGULATORY AUTHORITY INSPECTIONS

The Contractor shall confirm a schedule of inspections with the regulatory authority (TCMS) for all work described in this specification and shall be responsible for calling them when inspections are required. NOTE: The Chief Engineer shall / must be notified of these inspection dates / times.

27. VESSEL SECURITY

There will be a Visitor's Log at each main vessel access. The Contractor shall ensure that all his employees and sub-contractor personnel sign-in when entering vessel and sign out when departing vessel. This requirement pertains to all visitors to the vessel including any Inspectors or Vendors. These Visitor's Logs shall be available to the Contractor's Security Personnel in the event of any emergency.

28. WHMIS

Any WHMIS-controlled products used onboard shall be accompanied by a current MSDS; any neutralizing chemicals or specialized protective equipment required shall be provided by the Contractor, at all times these WHMIS-controlled products are onboard the vessel.

29. SHIP'S PARTICULARS

Length O.A. 63.00 M
Length B.P. 55.70 M
Breadth Moulded 14.20 M
Depth Moulded Lower Deck 6.200 M
Depth Moulded Main Deck 8.900 M
Depth Moulded Upper Deck 11.400 M
Depth Moulded Boat Deck 13.900 M
Summer Draft 5.610 M
Frame Spacing 600 mm
Accommodations 36 persons
Class DNV +1A1 MC EO ICE 1A*
Vessel Type Fisheries Survey /Research

Part 1: SCOPE:

The intent of this specification shall enable the owner's representatives an accurate time line on production and completion dates for Coast Guard Operational services.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

2.1.1 N/A

2.2 Standards

2.2.1 N/A

2.3 Regulations

2.3.1 N/A

2.4 Owner Furnished Equipment

2.4.1 N/A

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

3.1.1 The successful Contractor shall supply three (3) copies of a detailed bar chart showing the planned work schedule for the ship's refit. This bar chart shall show each specification item, the planned and actual start date, the duration and the completion date.

3.1.2 A critical path of work shall be identified, which shows the critical tasks that may delay the completion of the refit and if they shall not be completed within the estimated time frame. The critical path may exist due to labor constraints or tasks which cannot be completed concurrently with other tasks.

3.1.3 If work arises that affects the critical path, it shall be immediately brought to the attention of the Chief Engineer. Every effort shall be made to prevent the vessel from delay in completing the refit in the time provided. Regular QA procedures shall apply

3.1.4 The bar chart shall be updated weekly and for each production meeting to reflect all changes to the actual production of the refit and changes to the anticipated completion dates of each individual item. The Contractor shall include on the updates to the production chart any work arising from PWGSC 1379 action that indicates the additional work shall impact the completion schedule for the vessel.

3.1.5 Three (3) copies of the weekly update shall be given to the Chief Engineer each week.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 N/A

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Three copies of the original and three copies of each weekly update shall be given to the Chief Engineer one day prior to each weekly progress meeting.

5.2 The bar chart shall be updated weekly or for each production meeting to reflect the actual production on the refit and changes to the anticipated completion dates of each individual item. The contractor shall include on the updates to the production chart any Work Arising from PWGS 1379 action, and indicate how the additional work shall impact the completion schedule for the vessel.

5.3 Training

5.3.1 N/A

5.4 Manuals

5.4.1 N/A

Part 1: SCOPE:

1.1 The intent of this specification shall be for the Contractor to supply and connect as specified, the necessary services to the vessel at the start of Drydocking and to disconnect the same services at the completion of the repairs.

1.2 This work shall be carried out in conjunction with the entire drydocking period under the supervision of the Chief Engineer. The contractor shall supply all material, equipment and tools to the point of connection and quote on the cost of each individual service.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Date****2.1.1 General Arrangements****2.2 Standards**

2.2.1 All connections made to the ship and terminations made must be performed in a manner so as to not cause any hazards or safety concerns to the personnel staying and working onboard.

2.3 Regulations

2.3.1 All electrical and plumbing connections to the ship must be done so in accordance with local and federal regulations, including those stated in the Canada Shipping Act and Transport Canada Regulations. The contractor shall ensure any / all connections are secure and that no pollutants are released from the ship.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated to the point of connection.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1 The Contractor shall include the cost to remove and dispose of thirty thousand liters of oily water mixture and oil from engine sumps, sludge tanks, bilges, and fuel tanks to be cleaned. The Contractor must provide a quote per cubic meter for the removal of the oil water mixture to be adjusted up or down by PWGSC 1379 action.
- 3.1.2 The contractor must supply and erect two boarding gangways, complete with handrails and safety netting. The gangways shall be illuminated for safe use at night and to the satisfaction of the Chief Officer. The position of the gangways shall be decided by the Chief Officer.
- 3.1.3 The electrical power must be a continuous supply of 600 volt, three phase, 400 amp service. The contractor shall quote on 300,000 kilowatt hours and it will be adjusted up or down by PWGSC 1379 action. The contractor shall be responsible for metering the power supplied and the numbers shall be viewed by the Chief Engineer and Yard representative at the beginning and end of drydocking. The contractor shall quote on individual kilowatt hour and every additional kilowatt hour after. The contractor shall supply the power cable and connect it to the ship's shore power connection panel located in the starboard casing on the main deck.
- 3.1.4 The contractor shall supply and connect a 1.5" diameter line at 4 bar pressure to the ship's domestic fresh water system connection in the port stack, between frames 7 & 10 (seven and ten). The connection shall be equipped with a shut off valve, pressure regulating valve, and pressure gauge. It must also be fitted with a drain to prevent freezing.
- 3.1.5 The contractor shall connect a 2" (two) inch diameter shore water line to the ship's fire main. The rate of flow shall be 60 cubic meters per hour at 6 (six) bar pressure.
- 3.1.6 The contractor shall install four independent telephone lines for the duration of refit. One in the Commanding Officer's day cabin, one in the Control Room, one in the Control Lab, and one in the radio room on the bridge. A fifth line shall be connected to the fax machine on the bridge. The cost of the wiring and connections must be included in the quote. The phone bill shall be paid by PWGSC 1379 action, upon proof of invoices and bills.
- 3.1.7 The contractor shall supply the services of a 10 ton crane and the operator for ship's use to lift items on and off the ship. All other carnage required shall be included in the contract bid. For bidding purposes, the contractor shall quote on 10 hours of craneage, complete with operator. The contractor shall provide the time used on the crane during the production meeting and shall be adjusted up or down by PWGSC 1379 action.
- 3.1.8 The contractor shall hook up two connections to the sewage system. One is at frame 84-85 on the port side near the bow thruster, and the other is located at frame 22-23, port side of the wet lab. Both of these are 80 mm diameter. The grey water shall require a connection as well, and it is 50 mm in diameter and located at frame 76-77 on the port side near the carpenter's shop.
- 3.1.9 The contractor shall supply a garbage container with a minimum capacity of 4 cubic meters, and place as near to the vessel as possible. The contents of the container shall be emptied daily and shall not be for the use of the contractor.

3.1.10 The contractor shall supply compressed air (10 bar) to the vessel for the duration of the refit.

3.1.11 After the completion of the refit, the contractor shall supply the necessary personnel to sail on sea trials for 6 hours, to prove all equipment is working properly and to the satisfaction of the Chief Engineer and Transport Canada Inspector.

3.2 Location

3.2.1 N/A

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 Upon completion of the refit, the contractor shall supply sufficient dock trials and sea trials to prove that all specification items that were worked on are operating properly and to the satisfaction of the Chief Engineer & TCMS.

4.2.2 Trials shall consist of ahead and astern movements at various power levels.

4.2.3 The contractor must have sufficient supervisory staff onboard to witness the operation of all machinery worked on during the refit and should quote on 6 hour trials.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall supply the receipts from the waste management company for the amounts removed. These amounts shall be adjusted up or down by PWGS 1379 action.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CLEANING OF THE HVAC & SANITARY SYSTEM**Part 1: SCOPE:**

1.1 The intent of this specification shall be to open up and clean the upper and lower HVAC ventilation systems on the vessel. The duct work from the dryer exhaust must also be thoroughly cleaned, including the lint box fitted directly in the laundry room. All sanitary exhaust duct work must be cleaned of lint and debris from all the washrooms, and discharge duct work to outside of the ship. The contractor shall verify the operation of all isolating valves, free up and lubricate. Valves are located in the upper and lower HVAC rooms.

1.2 All deficiencies shall be reported to the Chief Engineer as soon as they are found.

1.3 The contractor shall report to the Chief Engineer prior to any work commencing on this item, to ensure proper isolation of electrical fans and scheduling of different areas.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

2.1.1 Reference drawing 4192 – 2112. O.M.S. Ventilation diagram

2.2 Standards

2.2.1 The Contractor shall ensure that all inspection covers, access plugs, and diffusers that were removed for cleaning, are properly re-installed once the cleaning is complete. There shall be no plastic plugs installed and patches/plugs are to be made of metal of the same or heavier schedule as the duct work the patch is applied to. Ships ISM, Hot-work, Confined Space, Fall Protection, and Lock-out procedures must be followed.

2.3 Regulations

2.3.1 The cleaning, reinstallation, and any work on the duct work system must be in accordance with TCMS regulations and the Canada Shipping Act regarding ventilation systems onboard ships as well as TCMS TP127E.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

2.4.2 The contractor must include an allowance of \$2,000.00 to be adjusted up or down by PWGSC 1379 action for the repairing of damaged dampers and sealing leaks.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The contractor shall ensure ventilation fans are locked and tagged out prior to commencing work on any system. Once it is safe to do so, the ventilation system shall be opened up and thoroughly cleaned.

3.1.2 The contractor shall open and thoroughly clean the lower HVAC distribution box and all of the ducting internally from the distribution box to the diffusers in all of the spaces. The contractor shall also internally clean all of the intake ducting to the distribution box.

3.1.3 The contractor shall open and thoroughly clean the upper HVAC distribution box and all of the ducting internally from the distribution box to the diffusers in all of the spaces. The contractor shall also internally clean all of the intake ducting to the distribution box.

3.1.4 The contractor shall clean the internal duct work for the laundry room dryer exhaust from the laundry room to the goose neck exhaust on the bow, on the port side. The lint trap must be opened, thoroughly cleaned, and put back in good working order.

3.1.5 The contractor shall isolate and thoroughly clean the sanitary ventilation system commencing in all the washrooms, leading to the exhaust fan, and the discharge duct work from the exhaust fan to the outside of the ship. All the diffusers in the washrooms are to be thoroughly cleaned and disinfected prior to re-installation.

3.2 Location

3.2.1 The lower HVAC unit is situated on the lower deck between frames 42-47, on the port side.

3.2.2 The upper HVAC unit is situated on the boat deck between frames 49-56 on the starboard side.

3.2.3 The laundry room is situated on the lower deck between frames 71-78, on the port side. The dryer exhaust vent is situated on the bow, on the port side, between frames 80-85.

3.2.4 The sanitary exhaust fan is located on the boat deck between frames 49-56, on the starboard side.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

4.2.1 After the work has been inspected by the Owner's Representative, the contractor shall close up all systems and test for leaks. All leaks shall be repaired by the contractor at the contractor's expense.

4.2.2 The contractor shall check the operation of all isolating valves (8 only), free up and lubricate. These Valves are located in the upper and lower HVAC rooms.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 3 copies of a detailed work report in electronic format shall be delivered to the Owner's Representative, indicating the condition of the ductwork in the beginning, the work performed and the condition after completion of this work item.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: H-4	SPECIFICATION	TCMSB Field #: N/A
SEWAGE VACUUM TANK CLEANING & INSPECTION		

Part 1: SCOPE:

1.1 The intent of this specification shall be to conduct the annual maintenance, cleaning and inspect the sewage vacuum tank.

This work shall be carried out between 2000 hrs and 0600 hrs as there will be personnel living onboard of the vessel during the refit period. The contractor shall report to the Chief Engineer prior to any work commencing with this item.

1.2 This work shall be carried out in conjunction with H-5 Sewage Treatment Tank Cleaning & Inspection, but shall be completed first.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Tank Capacity Plan

2.2 Standards

2.2.1 Ships ISM Hot-Work, Confined Space Entry, Fall Protection Procedures must be followed.

2.3 Regulations

2.3.1 The tank shall be gas freed before entering. The tanks must be certified as safe to enter. The tank is a confined space and all necessary precautions must be adhered to.

2.3.2 The contractor shall be responsible for the removal and disposal of residual sewage dirt/debris from cleaning the inside of the tank. It must be done in accordance with the local regulations.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall consult with the Chief Engineer and shall lock out the system electrically (vacuum/transfer pumps) and all supply /discharge valves in and out of the tank as indicated in the ISM Lockout Procedures. The contractor must remove 5 M³ of sewage from the vacuum tank.

3.1.2 The contractor shall remove two manhole covers and gaskets from the tank. The sealing surfaces shall be cleaned on the cover and the tank's threaded studs shall be cleaned from paint and rust.

3.1.3 The contractor shall gas free the tank and maintain gas free status throughout the cleaning and inspecting process. The contractor shall thoroughly clean the internals of the tank with a high pressure water spray of not less than 2000 psi. All debris and contaminated water from the cleaning process shall be removed and properly disposed of by the contractor and included in the bid price.

3.1.4 The contractor shall remove the three float switches, clean them, prove they are fully operational and then re-install using contractor supplied new gaskets. The contractor shall thoroughly clean the holes where the float switches are inserted and removed. The floats are to be viewed by the Chief Engineer or his designate prior to re-installation, to prove functional.

3.1.5 Bare, rusty, and loose paint scale areas are to be cleaned with a wire brush to bare metal and all debris from this process must be disposed of by the contractor.

3.1.6 Once the tank is prepared, it is to be viewed by the Chief Engineer or his designate.

3.1.7 The contractor shall quote on 5 square meters and include in their quote the cost per square meter to be adjusted up or down by PWGSC 1379 action for cleaning bare, rusty, and loose scale from the tank. The total area shall be agreed upon by the Contractor and Chief Engineer.

3.1.8 This specification should be performed in the evening or night watch, 2000 hrs. to 0600 hrs. to have minimal impact on the crew onboard.

3.1.9 The contractor shall supply one portable toilet on the trawl deck for the period of time that the sewage system will be down.

3.1.10 The contractor shall close up the tank using contractor supplied fasteners and a new neoprene gaskets of 3/16" thick. The studs shall be coated with anti-seize compound.

3.2 Location

3.2.1 The sewage vacuum tank is situated in the bow thruster compartment at frame 82-83.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

4.2.1 Once all work has been completed and the tank is closed up, the system shall be put back into service again. Automatic operation of the floats will require testing to prove the system is fully functional.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall be responsible for providing three (3) copies of a detailed work report in electronic format on the condition of the tank prior to work, the work that was performed, and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: H-5	SPECIFICATION	TCMSB Field #: N/A
SEWAGE TREATMENT TANK CLEANING & INSPECTION		

Part 1: SCOPE:

1.1 The intent of this specification shall be to conduct the annual maintenance and cleaning of the ship's sewage treatment tank.

The contractor shall report to the Chief Engineer prior to any work commencing with this item. This work shall be carried out in conjunction with H-4 Sewage Vacuum Tank Cleaning and Inspection.

1.2 The Sewage Vacuum Tank shall be completed first and then used as a holding tank while this specification is being carried out.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Hamworthy Treatment Unit 6.1 M³ Tank. Model ST-6A.

2.2 Standards

2.2.1 The tanks shall be locked out and tagged out by Owner's Representative prior to work commencing.

2.3 Regulations

2.3.1 The tank shall be gas freed before entering. The tanks must be certified as safe to enter.

The tanks are confined spaces and all necessary precautions must be adhered to. Ships ISM Hot-Work, Confined Space, Fall Protection, and Lockout Procedures must be followed.

Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for ferrous Materials, Rev. 4 (TP6151E).

2.3.2 Any and all wastes, residual sewage, dirt, and debris shall be removed from the tanks and properly disposed of in accordance with the local regulations and shall be the responsibility of the contractor.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall inform the Chief Engineer prior to commencing any work. The ship's staff shall isolate and lock out the system electrically and change over/lock out all associated valves.

The tank consists of three compartments they shall be pumped out by the contractor. There shall be 6100 liters of sewage remaining in the tank to be pumped out.

3.1.2 The contractor shall pump out the vacuum tank on a daily basis while the sewage treatment tank is being serviced. The contractor shall install a full flow isolation valve and quick coupling on the lower manhole cover of the vacuum tank for easy connection and pumping of the vacuum tank

3.1.3 The contractor shall supply a unit cost per 1000 liters of sewage removal and disposal and include in their quote the requirement for a vacuum truck for 5 pump outs (Vacuum Tank) with a unit cost per pump out. This shall be adjusted up or down by PWGSC 1379 action.

3.1.4 The contractor shall disconnect electrically and remove the float and alarm sensors from the tank and protect from damage while the tank is being cleaned and inspected.

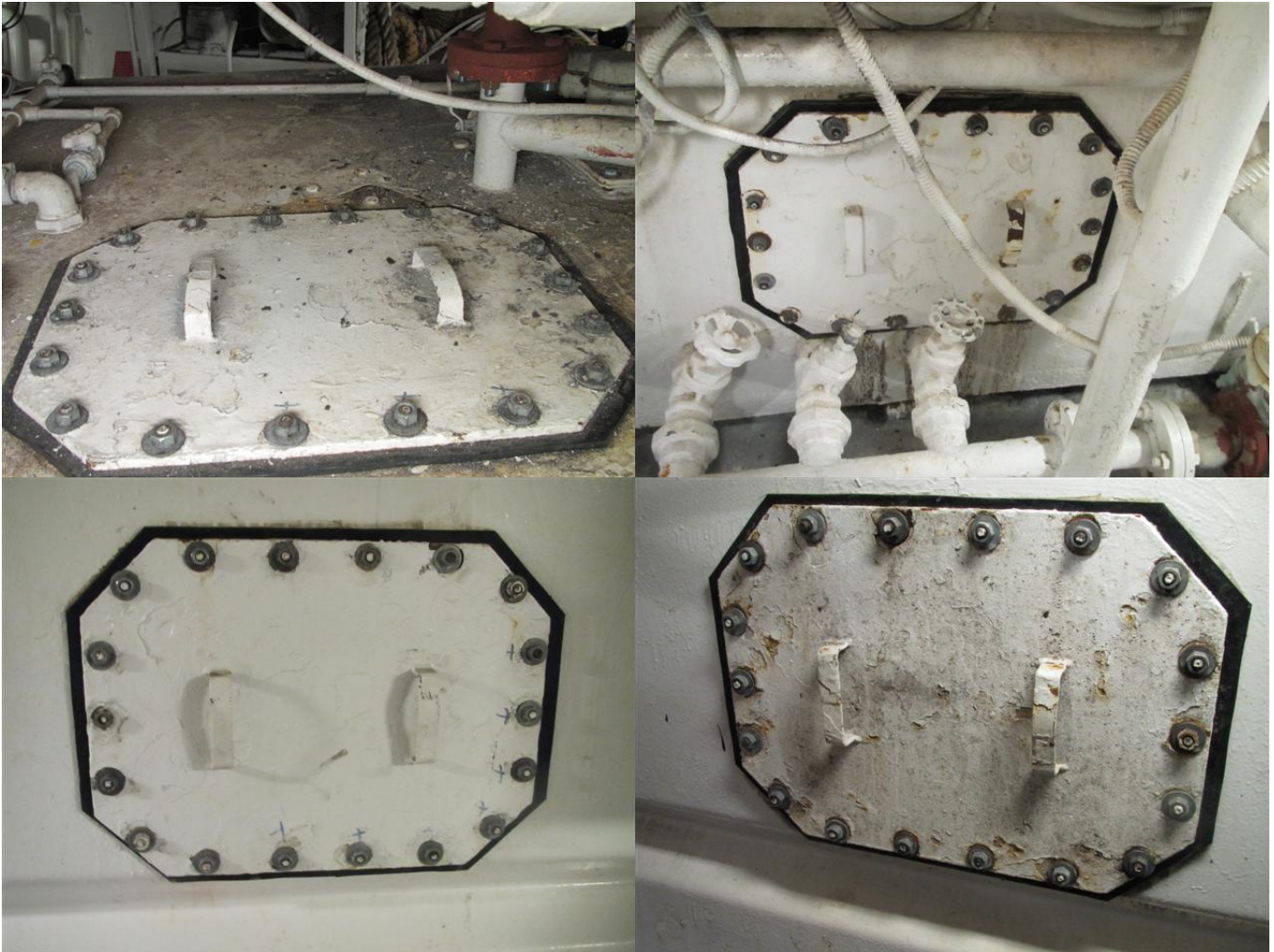
3.1.5 The contractor shall remove all four (4) manhole covers and gaskets from the tank to gain access to the tank compartments. The internals of all components including piping, screens, and overflows must be cleaned thoroughly with high pressure water spray of no less than 2000 psi and a stiff brush (not wire). All debris and waste water from cleaning shall then be removed and properly disposed of by the contractor and included in the bid price.

3.1.6 All the aeration lines/hose from the compressor to the diffusers shall be removed and cleaned and blown through with compressed air to prove clear and any deficiencies reported to the Chief Engineer as soon as found. The 24 diffusers must be removed, checked, and replaced as required and new diffusers will be supplied by the Owner.

3.1.7 The contractor shall solvent wash bare areas inside the tank in preparation for coating. The contractor shall apply a high grade of coal tar epoxy or equivalent and include in their quote 3 M² of bare area, with a cost per square meter to be adjusted up or down by PWGSC 1379 action. The coating shall be applied according to the manufacturer's specifications.

3.1.8 Prior to the contractor closing the tank, the Chief Engineer shall inspect all components of the tank.

3.1.9 The contractor shall assemble all piping and install as per original, after the Chief Engineer completes the inspection. Manhole covers shall be replaced with new 3/16" thick neoprene gaskets with the center gasket material cut out. The float and alarm sensors shall be electrically re-connected, and replaced as per original condition. These shall be tested by the contractor and witnessed by the Chief Engineer to ensure proper operation.



3.2 Location

3.2.1 Sewage treatment plant is located on the upper deck windlass compartment, between frames 86.5-90, on the port side.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer.

4.2 Testing

4.2.1 The tank shall be filled with water to test for leaks, put into automatic operation, and witnessed by the Chief Engineer.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide three (3) copies of a detailed work report in electronic format on the condition of the tank prior to work, the work that was performed, and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: H-6	SPECIFICATION	TCMSB Field #: N/A
MIRANDA DAVIT ANNUAL INSPECTION & REPAIRS		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be to have an annual inspection carried out by an FSR from the manufacturer- Harding Safety.
- 1.2 Since the Miranda Davit is part of the vessels life saving equipment it falls under the LSE Regulations and therefore must be inspected annually and quadrennially by a FSR, following the manufacturer's recommendations for annual / quadrennial inspections.
- 1.3 The contractor shall report to the Chief Engineer prior to any work commencing with this item.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Davit Type –Miranda MRT 3900, Schat-Harding Reference 203903-1/CE695
Winch Type- BHY 5300
Manual 116 stored in the Engineer's Office onboard the CCGS Teleost.

2.2 Standards

- 2.2.1 All inspections and work performed on this piece of equipment shall be completed to the highest standards regarding this essential Life Saving Equipment.
- 2.2.2 The Contractor must adhere to the Ships ISM Hot-work, Confined Space, Fall protection, and Lockout procedures.

2.3 Regulations

- 2.3.1 The regulations in the Canada Shipping Act pertaining to the inspection and maintaining of Life Saving Equipment must be strictly adhered to and passed by the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1 The contractor shall include in their bid a \$5000 allowance for the services of a Harding FSR to perform the following annual maintenance to be adjusted up or down by PWGSC 1379 action upon proof of invoice.
- 3.1.2 The annual maintenance must be completed in accordance with SOLAS Chapter III, Regulation 20, Section 11.

3.1.3 The winch brakes, drive chain, and clutch must be serviced. The contractor shall drain and dispose of winch gearbox oil. Winch brake and Clutch assemblies shall be inspected and brake friction pads shall be replaced with Owner Supplied new. Winch shall be re-assembled after inspection by Harding FSR and Chief Engineer to proper working level with new Owner Supplied oil.

3.1.4 There shall be a visual inspection of the davit and winch foundations for any sign of deformation, misalignment, excessive corrosion and excessive paint build up in way of moving parts.

3.1.5 There shall be an audit of the lifeboat, davit and winch equipment.

3.1.6 The FSR must advise the Chief Engineer of any defects as soon as they are identified.

3.1.7 The Sheaves shall be proven to rotate freely.

3.1.8 The Davit wire shall be inspected for excessive wear, abrasion or other damage.

3.1.9 The FSR shall train the crew to show operation and general maintenance required on the equipment.

3.1.10 The FSR shall issue certification to show that the lifeboat and davits are in compliance with the SOLAS Regulation.

3.1.11 Boat shall be returned to davit and davit operation proven. Brake and clutch function shall be proven. Brakes shall be adjusted as required to obtain proper function. Free return of “deadman” handle to brake full on position shall be proven when released. Over run of winch when boat is waterborne shall be demonstrated.

3.2 Location

3.2.1 The Miranda Davit is located on the Upper Deck, on the port side between frames 31 and 43.

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer and Chief Officer.

4.2 Testing

4.2.1 The operation of the Davits shall be tested including boat launch with manual brake to the satisfaction of the FSR and witnessed by the Chief Engineer and Chief Officer.

4.3 Certification

4.3.1 The Certificate indicating compliance must be provided to the Chief Officer and Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The FSR must provide 3 copies of a detailed work report in electronic format to the Chief Engineer, on the condition of the appliance as found, the work performed on the system and condition as completed.

5.2 Training

5.2.1 The FSR must explain and demonstrate to the crew the proper procedures when operating this davit, and to explain where additional attention should be given in maintaining this appliance. The FSR should also advise on any mistakes currently being done by the crew in regards to operation or maintenance.

5.3 Manuals

5.3.1 N/A

5.4 Spares

5.4.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: H-7	SPECIFICATION	TCMSB Field #: N/A
GALLEY EXHAUST FAN & VENTILATION CLEANING		

Part 1: SCOPE:

1.1 The intent of this specification shall be to have the annual maintenance for the galley exhaust ventilation completed (opened and cleaned).

1.2 This work shall be carried out in Conjunction with the operation of the galley and to have the item completed during a time to minimize the disruption in the galley. This time shall be between 1900 to 0400 hrs.

1.3 The contractor shall report to the Chief Engineer prior to any work commencing with this item.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Drawing MSL-4192-2112 O.M.S. Ventilation Drawing

2.1.2 Drawing 1-137-571-813 Galley Arrangement

2.2 Standards

2.2.1 The galley ventilation can be a source for fire hazards and has to be cleaned in such a manner as to keep the possibility to a minimum.

2.2.2 The contractor must adhere to the Ships ISM Hot-work, Confined Space, Fall protection, and Lockout procedures.

2.3 Regulations

2.3.1 The cleaning practice used must be an approved method, and the waste must be disposed of in accordance to local regulations.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall remove all the necessary ducting, access panels, and ventilators to properly clean the exhaust and ventilating systems.

3.1.2 The contractor shall open up and steam clean the exhaust ventilation trunking between the deck ventilator on the boat deck and the galley exhaust hood. The contractor shall remove the three (3) grease filters and thoroughly clean the interior of the exhaust hood in the galley. The deck ventilator shall be steam cleaned.

3.1.3 The contractor shall make every reasonable effort to minimize the disruption in the galley while performing this item. The contractor shall thoroughly clean and sanitize the galley after the work has been completed and inspected by the Chief Engineer. The contractor shall make effort to complete this specification as soon as possible.

3.1.4 The contractor shall use a video camera to visually inspect the trunking after the cleaning is complete. Copy of CD shall be given to the Chief Engineer.

3.1.5 The contractor shall re-assemble all the components in good working order.

3.2 Location

3.2.1 This system is located on the upper deck in the galley area, and the boat deck on the port side between frames 48 and 75.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer, TCMS and local Fire and Safety Authorities.

4.2 Testing

4.2.1 The ventilation system will be tested after all work is completed to verify correct operation.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall supply the Chief Engineer with three (3) copies of a detailed work report in electronic format identifying the condition of the system before, the work that was performed, copy of CD with video of cleaned trunking, and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

Part 1: SCOPE:

1.1 The intent of this specification shall be to have the fixed fire fighting systems serviced and re-certified for use on the CCGS Teleost, and credited by TCMS.

1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item. This work shall be carried out in conjunction with the servicing of the portable fire extinguishers, in a manner that does not compromise the ability to extinguish a shipboard fire.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

2.1.1 N/A

2.2 Standards

2.2.1 The contractor must be approved by TC to recertify these systems and must be done so in accordance with the latest TC regulations concerning Marine Safety. The system was installed and commissioned by “National and Marine Fire Services Corp”.

2.2.2 The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.

2.3 Regulations

2.3.1 All the systems must be labeled as being certified to use, the date, and company’s name.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all labor, materials, parts and equipment required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

3.1.1 The contractor shall provide an authorized representative to perform the tests and inspections of the vessel's FM 200, Wet Chemical, and CO2 smothering systems for annual safety inspection and certification.

3.1.2 The Chief Engineer and TCMS Inspector must witness all tests.

3.1.3 The contractor shall complete the following tests, as well as any other tests requested by the attending marine surveyor. The contractor shall include in their quote on the cost of testing of alarms (lights and sirens) on all units, testing of all of the Nitrogen start cylinders, testing of the ventilation shut downs, testing of the releasing loops, and pull cables.

3.1.4 The contractor shall blow through all piping and pneumatic actuator and prove that they are operational. All piping and nozzles are to be proven clear and free.

3.1.5 The contractor shall prove operational all alarm displays and sirens. The contractor shall weigh all bottles and the weight shall be recorded.

3.1.6 The contractor shall provide the Chief Engineer with all certificates upon completion of the refit, in duplicate.

3.1.7 Once all the testing and inspections are completed, the systems must be re-assembled and put back into operation by the Contractor.

3.2 Location

3.2.1

FM 200 & CO2 - FIXED FIRE SYSTEM

Location	Area Protected	Serial No.	Due Date	Weight	Type
Upper Deck					
Galley	Range Hood	DOT4BW250	02/11	10.0 Kg	WET CHEMICAL
Lower Deck					
Domestic Pump Room	Emerg. Gen. Compt.	AA405784	02/11	47.9 Kg	FM 200
Domestic Pump Room	Emerg. Gen. Compt.	KF 105885AA	02/11	8.4 mL	NITROGEN
Domestic Pump Room	Emerg. Gen. Compt.	KF 105890AA	02/11	8.4 mL	NITROGEN
Domestic Pump Room	Emerg. Gen. Compt.	KF 101449AA	02/11	8.4 mL	NITROGEN
Lower Deck					
Net Loft	Port Exhaust Stack	AA404149	02/11	32.5 Kg	FM 200
Net Loft	Port Exhaust Stack	AA404761	02/11	32.5 Kg	FM 200
Net Loft	Engine Room	AA4011996	02/11	91.8 Kg	FM 200
Net Loft	Engine Room	AA4011990	02/11	91.8 Kg	FM 200
Net Loft	Engine Room	AA4011991	02/11	91.1 Kg	FM 200
Net Loft	Engine Room	KF 117543AA	02/11	344 mL	NITROGEN

Net Loft	Engine Room	KF 117563AA	02/11	344 mL	NITROGEN
Net Loft	Engine Room	KF 117555AA	02/11	344 mL	NITROGEN
Net Loft	Port Exhaust Stack	KF88003AA	02/11	94.7 mL	NITROGEN
Net Loft	Port Exhaust Stack	KF101990AA	02/11	8.4 mL	NITROGEN
Net Loft	Port Exhaust Stack	104760	02/11	8.4 mL	FM 200
Main Deck					
Main Deck	Paint Locker	520-237	02/11	20 LB	CO2

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector. The Chief Engineer and TCMS Surveyor shall be present during the Inspection and testing of the FM-200 system.

4.2 Testing

4.2.1 The Chief Engineer and TCMS Inspector shall be present during the inspection and testing the FM 200 system.

4.3 Certification

4.3.1 Certificates for all systems shall be given to the Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide three (3) copies of a detailed work report in electronic format on the condition of the systems when found, the work performed by the contractor, and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: H-9	SPECIFICATION	TCMSB Field #: N/A
ANNUAL SERVICE OF THE FIRE DETECTION SYSTEM		

Part 1: SCOPE:

1.1 The intent of this specification shall be to perform the annual inspection and re-certification of the ship's fire detection system.

1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item. This work shall be carried out in conjunction with the FM-200 Service and Re-certification.

1.3 This work shall be completed and inspected as per TCMS requirements.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

Fire Alarm System is Notifier, model # NFS-3030

Drawing No. 4192-3210 Fire Detection and Alarm Wiring diagram

Drawing No. 4192-3211 Fire Detection System layout

2.2 Standards

2.2.1 The Ships ISM Hot-work, Confined Space, Fall protection, and Lockout procedures must be adhered to at all times.

2.3 Regulations

2.3.1 The contractor performing the work on this system shall be fully certified to do so and shall be recognized by TC to certify this system.

2.3.2 The testing of this equipment and the automatic functions must be witnessed by the Chief Engineer and TCMS Inspector.

2.3.3 The testing shall be in accordance to TCMS regulations, and regulations in the Canada Shipping Act pertaining to fire detection systems on ships and regulation CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall obtain the services of a qualified technician to carry out the testing and inspection of this equipment.

3.1.2 The contractor shall provide the Chief Engineer with a copy of the Fire Alarm System Test and inspection report and a certificate of inspection upon the completion of the tests.

3.1.3 The contractor shall immediately bring to the attention of the Chief Engineer, any and all deficiencies found during the testing and inspection. The deficiencies shall be approved by the Chief Engineer prior to commencing repairs.

3.1.4 Once all testing is completed, the technician shall return the Fire Detection System back into operational status.

3.2 Location

3.2.1 The main fire detection panel is located on the bridge while a secondary panel is situated in the machinery control room.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 Testing of the system shall be directed by and to the satisfaction of the Chief Engineer and TCMS Inspector.

The testing of this equipment and the automatic functions must be witnessed by the Chief Engineer and TCMS Inspector.

4.3 Certification

4.3.1 The contractor performing the work on this system shall be fully certified to do so and shall be recognized by TCMS to certify this system. The testing of this equipment and the automatic functions must be witnessed by the Chief Engineer and TCMS Inspector.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall give three (3) copies of detailed work reports in electronic format on the condition the system was found, the work performed, and the condition as left.

5.1.2 The Contractor shall supply all certificates to Chief Engineer.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: H-10	SPECIFICATION	TCMSB Field #: N/A
ANNUAL LEAK TESTING OF REFRIGERATION SYSTEMS		

Part 1: SCOPE:

1.1 The intent of this specification shall be to test the identified refrigeration systems onboard for leaks, certify the system as being leak free and indicate any deficiencies / repairs that shall be addressed by PWGSC 1379 action.

1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

Berg HVAC air conditioning system for the lower deck, wet lab and machinery control room. Model # MCR-35-X, serial # W38040694, R-22.

Sabroe, controlled sea water temperature refrigeration system. Serial # 94011.2, R-22.

Scientific freezer. Sabroe Model # MC6-F26, serial # 94011.1, R-22.

Domestic refrigeration system #1 Bitzer Verdichter, type V, 332 049, R-22.

Domestic refrigeration system # 2 Bitzer Verdichter, type V, 25720211, R-22.

Technotherm HVAC system on the boat deck. Type F5, serial # AA08260-0L, R-22.

2.2 Standards

2.2.1 The contractor shall test the systems for leaks according to the standards for protecting the environment.

2.3 Regulations

2.3.1 All the regulations pertaining to the protection of the environment, Canada Shipping Act, and Coast Guard policies must be strictly followed concerning the release of any halocarbon.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall notify the Chief Engineer when conducting the tests on each piece of equipment.

3.1.2 The contractor shall follow the lockout and tag out procedures of the vessel.

3.2 Location

3.2.1 The first three systems on the list are situated in the main engine room on the starboard side, between frames 26 and 34.

3.2.2 The Two (2) domestic refrigeration systems are in the windlass room, on the port side between frames 84 and 89, on the upper deck.

3.2.3 The final HVAC system is situated on the boat deck, on the starboard side, between frames 49 and 57.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 The contractor shall complete all work to the satisfaction of the Chief Engineer.

4.1.2 The contractor shall apply tags to each piece of equipment stating that it has been leak tested, and suitable for use.

4.1.3 The refrigeration technician must possess a halocarbon certificate and number and sign the work performed in the Halocarbon Logbook, held by the Chief Engineer.

4.2 Testing

4.2.1 Each system shall be tested to ensure proper operation by the refrigeration technician and witnessed by the Chief Engineer..

4.3 Certification

4.3.1 The Refrigeration technician must possess a halocarbon certificate and provide his certificate number to be recorded in the log book.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must supply three (3) copies of a detailed work report in electronic format on each refrigeration system. This report must include the condition of the system as found, all work performed on it, and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

Part 1: SCOPE:

1.1 The intent of this specification shall be to lower the bag lift block to the dock, transport it to a certified shop for over-haul, disassembly, inspection, testing, re-certification and report. Measurements shall be taken and recorded, and any noted defects shall be reported to the Chief Officer and then repaired by the contractor. The block must then be reassembled and reinstalled using a new Owner Supplied shackle.

1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item. This work shall be carried out in conjunction with the operations of the deck crew.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data****2.2 Standards**

2.2.1 The Ships ISM Hot-work, Confined Space, Fall Protection, and Lockout procedures must be adhered to.

2.2.2 The block shall be inspected, tested and re-certified in accordance with the cargo, fumigation, and tackle regulations.

2.3 Regulations

2.3.1 The block is contained in the vessel's tackle registry and must be certified safe as per the Canada Shipping Act Regulations pertaining to lifting equipment.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The crew shall remove the winch wire rope from the block. The contractor shall supply the services of a crane and basket lift to enable the removal and lowering of the block to the dock.

3.1.2 The block shall be unshackled and lowered to the dock by the contractor.

3.1.3 The block shall be sent by the contractor to a certified company for complete inspection & testing of the internal and external components, and witnessed by Chief Officer. (Block shall be load tested to 25 tonnes).

3.1.4 The contractor shall also provide the basket lift for the Chief Officer to inspect the securing pad on the "A" frame, looking for excessive wear on the metal pad eye.

3.1.5 If the pad eye is determined to be within tolerance, the block can be secured to the pad again with a new Owner Supplied shackle. If the pad eye is determined to not be within tolerance, the pad eye shall be removed and new pad eye installed by the contractor and Load tested to 25 tonnes with proof by Certificate. This shall be handled by PWGSC 1379 action.

3.1.6 The contractor shall secure the shackle pin in a fashion to prevent loosening and backing out, by installing stainless steel securing wire.

3.2 Location

3.2.1 The block is located on the aft "A" frame, in the center of the ship at frame 8.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be completed to the satisfaction of the Chief Officer and Chief Engineer.

4.2 Testing

4.2.1 The contractor shall perform operational testing on the block and wire once it is put back into place to ensure it is free and clear. The block shall be load tested to 25 tonnes. If new pad eye has to be secured, it also must be load tested to 25 tonnes.

4.3 Certification

4.3.1 The block is certified every five years. A certificate shall be delivered to the Chief Officer once block is certified. The repairer shall be certified to overhaul such blocks.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall complete and deliver three (3) type written copies of a detailed work report in electronic format to the Chief Officer of work performed on the block. It must indicate the condition of the block and securing arrangement as found, all work performed on it and the condition it was left. This report must be delivered to the Chief Engineer prior to testing the block.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

Part 1: SCOPE:

1.1 The intent of this specification shall be to Drydock / Undock the vessel on a certified lift for the inspection and maintenance of the underwater section of the hull and associated equipment and obtain TC credits.

1.2 This work shall be carried out in Conjunction with the following: All specification items described in this document.

1.3 The Contractor shall provide a Certified Docking Master to perform this work.

Part 2: REFERENCES:**2.1 Guidance Drawings ameplate Data**

2.1.1. MSL 4192-4130 Revised Docking Plan (As fitted with 2012 Blister).

2.2 Standards

2.2.1 The contractor shall use a certified docking master when docking and undocking the vessel. The Contractor shall quote separately the cost to dock and undock the vessel. The Contractor shall indicate the amount of lay-days required to carry out the specified work and quote the cost per lay-day for adjustment by PWGSC 1379 action.

2.3 Regulations

2.3.1 CSA Marine Machinery Regulations

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1** The Contractor shall be responsible for all line handling, tugs and divers as the vessel enters the dock and is placed in position over the blocks to confirm that the vessel is settling evenly on the bilge and keel blocks and to ensure that the transducers in the hull, anodes and sea inlet grids are clear of the blocks, and as the vessel leaves the dock.
- 3.1.2** The Contractor shall be responsible for arranging for TCMS Inspectors to carry out all inspections. The Chief Engineer & TCMS Inspectors shall be notified when this inspection is to take place.
- 3.1.3** The vessel shall be docked so that all docking plugs, transducers, anodes sea inlet grids are clear and accessible. A minimum clearance 1.22 meters shall be available below the keel. If any hull fittings are covered, the Contractor shall be responsible for all labour and materials required for making alternative arrangements to move blocks to gain access to areas of specified work. **(Note: New Hull Transducer Blister installed 2012).**
- 3.1.4** The Contractor shall prepare these blocks and necessary shoring to maintain true alignment of the vessel's hull and machinery throughout the dry-docking period. The contractor shall quote on the total layday cost and unit layday cost. Quote shall include any tug or pilot service cost. The Contractor shall quote separately for docking and undocking the vessel.
- 3.1.5** The contractor shall have a 3600 series trained Caterpillar Technician take the crankshaft deflection readings on the main engine before the vessel is taken out of the water and 24 hours after the vessel is lowered into the water after the dry-docking. The crankshaft deflection readings will be witnessed / given to the Chief Engineer or his representative. The contractor shall obtain the latest publication for the procedure to check crankshaft deflection on model number 3612 from Caterpillar. The contractor shall give a copy of this publication to the Chief Engineer before deflections are taken.
- 3.1.6** The Contractor shall be responsible for handling ship's lines but may require additional personnel (contractor supply) as required. The contractor shall quote on the services for persons for line handling. The contractor shall discuss with the Commanding Officer prior to moving the vessel. The vessels Crew shall remain onboard until after Dry-Docking.
- 3.1.7** The contractor shall be responsible for obtaining, placement, installation and final removal of any additional weights that may have to be loaded to achieve the correct trim in preparation for drydocking.
- 3.1.8** Immediately after dry-docking, all tanks on the vessel shall be sounded and contents recorded in the vessel's Ship Condition Report. A Copy shall be signed by the ship's Captain, Chief Engineer and the Contractor's Docking Master.
- 3.1.9** The Contractor shall be responsible for the safe transfer of the ship from its pre-docking berth or location onto its docking blocks. During docking, radio contact shall be maintained between the vessel's Captain and the Contractor's Docking Master.
- 3.1.10** Following the un-docking all tanks will be sounded and recorded in the Ship Condition Report. Copies shall be signed and given to the ship's Captain, Chief Engineer and the Contractor's Docking Master.

3.2 **Location** N/A

3.3 **Interferences**

3.2.1. The Contractor shall be responsible for the identification of any / all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 **Inspection**

4.1.2. All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 **Testing**

4.2.1 N/A

4.3 **Certification**

4.3.1 Copy of Docking Master Certification.

Part 5: DELIVERABLES:

5.1 Drawings/Reports
N/A

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A

HULL CLEANING & PAINTING BELOW THE WATERLINE

Part 1: SCOPE:

1.1 The intention of this specification shall be to have the hull cleaned, inspected and re-coated below the waterline.

1.2 All underwater coating shall be by spray application.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1 Refer to drawing MSL 4192-1700 Paint Schedule
- 2.1.2 Total area to paint is 1414 square meters.

2.2 Standards

2.2.1 The coatings on the Under Water Hull Area shall be applied to manufacturer's instructions.

2.3 Regulations

2.3.1 The ship falls under Transport Canada regulations and is subjected to TCMS inspections on a regular basis. All work performed must be approved by Transport Canada.

2.3.2 The application of coatings to the hull must be performed following the manufacturer's instructions and subjected to the NACE inspector requirements.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labour and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

3.1.1 The contractor shall hydro-blast the hull within 2 hours of dry docking, both above and below the water line.

3.1.2 The hydro blast must contain fresh water and be supplied at a pressure not below 420 bar. The entire underwater hull must be cleaned of marine growth, including the rudder, propeller, kort nozzle, internal transducer fairings, and thruster tunnel. The entire underwater hull will be inspected by the Chief Engineer & TCMS Inspector.

3.1.3 The contractor will ensure that all navigation equipment (radar etc.), deck equipment, including the cranes, winches, blocks, and wires are protected from any ingress or contamination from the sand or grit utilized in the blasting process. This protection will have to be removed prior to undocking and will have to be maintained if damaged by workers or weather, during the refit period. The contractor will ensure all traces of grit are removed from the hull prior to application of coatings. Grit from blasting will not be permitted to enter any part of the ship. The contractor shall be responsible for the protection against entry and the removal once finished any and all openings / vents that can allow grit to enter the vessel.

3.1.4 Following the inspection of the hull and completion of any hull repairs, the contractor will grit blast the bare damaged areas of coatings with mineral slag of 12-60 mils to SSPC-SP10, or SS SA 2-1/2. The steel profiles will be jagged after blasting at about 2-3 mils in depth. The edges of the bare areas shall be feathered back to allow proper adhesion of the new with the old coatings. The contractor shall bid on 750 square meters of bare metal below the water line, and shall provide a quote for each additional square meter after that. The total bare area will be agreed upon by the contractor and the Chief Engineer and the actual will be adjusted by PWGSC 1379 action.

3.1.5 The remaining area of the underwater hull including the rudder, shall be given a hard sweep blast to a dull finish with a profile of 1-2 mils SS SA1 or SSPC SP7.

3.1.6 The contractor shall cut and fair the waterline of the vessel.

3.1.7 The following areas shall be taken into consideration for the underwater section of the ship:

3.1.7.1 The ship's underwater hull is 1414 square meters.

3.1.7.2 Bare areas Intershield ENA300 Aluminum@ 6 mils DFT, Intershield ENA300 Bronze@ 6 mils DFT.

3.1.7.3 Full coat of Intergard 377 black@ 6 mils DFT.

3.1.7.4 Draft Marks Interseal670 HS White.

3.1.8 Thruster Tunnel:

3.1.8.1 Bare areas Intershield ENA300 Aluminum@ 6 mils DFT.

3.1.8.2 Full Coat Intershield ENA300 Bronze@ 6 mils DFT.

3.1.8.3 Final Coat Interspeed BRA570 Red@ 4 mils DFT.

3.1.9 The contractor shall remove the bow thruster tunnel grids to apply coatings to the thruster tunnel and grids. The bare areas shall be sufficiently feathered. The grids shall be reinstalled and mounting arrangements locked following coating.

3.1.10 Draft, plimsol, and deck marks shall be roughed with emery cloth and painted with two coats of interseal white.

3.1.11 All anodes and transducers shall be masked / protected to prevent them from being painted. The contractor must remove the masking prior to undocking the vessel. Any new anodes shall be affixed prior to applying coatings.

3.1.12 Sea Chest grids shall be removed for cleaning and painting, and be re-installed prior to undocking.

3.1.13 The contractor must plug the deck scuppers and discharges as well as taking measures to prevent any liquids from contaminating the areas being prepared for coating. Measures must be put in place by the contractor to ensure that surfaces and equipment, other than those specified are not coated and that the coating will not block any openings in the hull. The contractor shall also take measures to ensure that no damage, unnecessary cleaning, or repairs result from either the hull preparation process or coating application.

3.1.14 The contractor shall be responsible for all cleaning and repairs resulting from the hull cleaning, blasting, or coating processes.

3.1.15 The contractor must strictly adhere to the manufacturer's recommendations when concerning the surface preparation, environmental conditions, coating application, and curing time. Also, a Coast Guard contracted NACE inspector shall oversee all work relating to this spec item and inspection times shall be arranged by the contractor.

3.1.16 The contractor shall be responsible for taking the paint thickness readings during the application process to ensure proper coverage.

3.1.17 The contractor shall be responsible for obtaining the materials required to perform the specified work. The contractor shall include in their quote the cost to prepare the surface, supply paint and material, to coat each 10 square meters.

3.2 Location

3.2.1 The underwater hull includes all appendages, keels, rudder, transducer blisters and area from the water line down, both port and starboard sides.

3.1 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be performed to the satisfaction of the NACE Inspector, the Chief Engineer, and TCMS.

4.2 Testing

4.2.1 Paint thickness readings shall be taken by Contractor and given to the
Chief Engineer.

4.3 Certification

4.3.1 Certificates of coatings used shall be given to the Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor will provide 3 copies of detailed reports in electronic format for the underwater hull work, the areas prepared, and the thickness of the paints applied. The contractor must also supply environmental conditions / enclosure while the application is being made including temperature, humidity, and dew point.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

HULL BUTTS AND SEAMS**Part 1 : SCOPE**

1.1 The intent of this item shall be Hull Plate Welding of Butts and Seams.

1.2 This work shall be completed in conjunction with:

1.2.1 Dry-Docking.

1.2.2 Freshwater Tank Cleaning, Maintenance and Coating.

1.2.3 Kort Nozzle Testing.

1.2.4 Sea-Bays, Sea-Chest and Strainer Cleaning and Painting.

1.2.5 Hull Sacrificial Anodes.

1.2.6 Hull Coating and Inspection.

Part 2: REFERENCES:**2.1 Guidance Drawings / Name Plate Data**

2.1.1 Shell Expansion.

2.2 Standards

2.2.1 Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble.

2.3 Regulations

2.3.1 CSA Hull and Construction Regulation

2.3.2 Ships ISM Safety Procedures

2.3.3 CG Hotwork Procedures

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

3.1.1 The Hull Plate Welding of Butts and Seams to be repaired shall be determined by the TCMS and Chief Engineer.

3.1.2 Seams and butts selected for repair shall be marked, cleaned to sound metal by air arc or grinding and brought up to original levels by approved welding techniques and materials.

3.1.3 All work shall be to the satisfaction of TCMS and the Chief Engineer.

3.1.4 The Contractor shall quote on 1,000 feet of gouging and 4,000 bead feet of weld. The Contractor shall quote per bead foot for adjustment up or down by PWGSC 1379 action.

- 3.1.5 Any butts and seams falling in way of fuel tanks that require gas freeing and certification for hot work shall be covered by PWGSC 1379 action. Butts and seams falling in way of ballast/void tanks that are painted shall require paint work to be touched up in way of damage by the Contractor shall be covered by PWGSC 1379 action.

3.2 Location

- 3.2.1 Outside Hull area.

3.3 Interferences

- 3.3.1 The Contractor shall be responsible for all removals required for completion of this item. Any removals shall be replaced in good order after the completion of all work.
- 3.3.2 The Contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1 All work shall be inspected by TCMS and Chief Engineer.

4.2 Testing

- 4.2.1 N/A

4.3 Certification

- 4.3.1 All new welding shall have full documentation of the Type of welding completed and the welding procedure and all welding shall be as per specification preamble.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 3 copies of all reports in electronic format from the work specified shall be Given to the Chief Engineer.

5.2 Spares

- 5.2.1 N/A

5.3 Training

- 5.3.1 N/A

CCGS TELEOST		2017	VERSION 1
Spec item #: HD-4	SPECIFICATION		TCMSB Field #: N/A
HULL CLEANING & PAINTING ABOVE THE WATERLINE			

Part 1: SCOPE:

1.1 The intention of this specification is to repair and paint the Hull Area above the waterline.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Drawing MSL as fitted, Paint Schedule, 4192-1700

2.2 Standards

2.2.1 The work will be certified by a NACE Inspector during the grit blasting and during the application of coatings.

2.2.2 The contractor shall remove all traces of grit from the surface prior to painting and remove all traces of grit from the ship once the blasting has stopped.

2.2.3 The grit shall not be allowed to enter any part of the vessel. The contractor shall ensure that all openings / vents in the vessel are suitable covered. Any deck machinery or other equipment susceptible to damage by either grit blasting or coating material, shall be suitably protected by the contractor.

2.2.4 The repairs and painting procedures shall be performed in accordance with the latest ship building and repair practices.

2.3 Regulations

2.3.1 This vessel is regulated by Transport Canada and all work performed must be approved by and can be inspected by TCMS.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The top side shall be high pressure washed in the areas to be painted to remove the salt and soot from the surfaces.

3.1.2 The total area of the topside hull is 850 M² and the painting scheme is International.

3.1.3 The contractor shall repair the areas where the coating is rusted, missing, damaged, or blistering. The affected areas will be grit blasted to a surface of SSPC-SP6 or SS Sa 2. Areas of the undamaged coating adjacent are to be sand swept and the edges feathered to provide a suitable surface prior to application of coatings. Contractor will quote on grit blasting 150 M2 to bare steel areas and provide a quote per additional 1 M2 to be adjusted up or down by PWGSC 1379 action. The remainder of the above water line hull area shall be sand swept to a profile to accept the new paint coating.

3.1.4 Bare areas shall be coated with Intershield ENA 300 Aluminum @ 6 mils DFT. Then a coat of Intergard 377 CG Red @ 6 mils DFT, and finally two coats of Intersheen LA, CG red @ 2mils DFT (entire Hull above Waterline).

3.1.5 The ship's name, port of registry, loadline, draft marks, CG/DFO identity markings, and white stripe will be painted with Intersheen LA white, two coats.

3.1.6 The black stripe on each side of the diagonal white stripe will be painted Intersheen LA Black, two coats.

3.1.7 The contractor shall apply paint according to the manufacturer's instructions and must supply all the paints and materials to apply. The contractor shall provide a quote to repair and paint additional 1 M2 square meter areas of the ship to be adjusted up or down by PWGSC 1379 action.

3.2 Location

3.2.1 N/A.

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their removal, temporary storage, and refitting back to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the NACE Inspector and Chief Engineer.

4.2 Testing

4.2.1 Paint thickness readings shall be taken by the Contractor and given to the Chief Engineer.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide 3 copies of a detailed report in electronic format of the condition of the affected areas prior to working, the exact number of square meters attended to, the work performed, and the condition as left.

5.1.2 NACE inspector shall provide paint reports on the conditions of the prepared surface prior to painting, the environmental conditions, and the paint thickness readings.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST		2017	VERSION 1
Spec item #: HD-5	SPECIFICATION		TCMSB Field #: N/A
SEA CHESTS			

Part 1: SCOPE:

1.1 The intention of this specification shall be to have the port and starboard sea chests opened, cleaned, inspected and painted for TC credits while in dry-dock.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 Drawing MSL 4192-4130 Docking Plan

2.2 Standards

2.2.1 The coatings on the Under Water Hull Area shall be applied to manufacturer's instructions.

2.3 Regulations

2.3.1 This vessel is regulated by TCMS and is subjected to the inspection and approval from the attending surveyor, prior to commencing, during, and after any work performed.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall remove the sea chest grids and water blast the sea chest area. Particular attention must be taken on the port side since the jacket water cooler for #2 generator is fitted there. Care must be taken to not damage the cooler with the cleaning process and hydro-blast.

3.1.2 The grids and inlet areas shall be cleaned and mechanically reamed to the original diameter. The sea chests will be thoroughly cleaned of marine growth, loose scale, and rust.

3.1.3 The contractor shall remove the bonnets off the port and starboard sea bay valves and thoroughly clean, inspect and overhaul all the internals of these two valves. The contractor will then clean the piping between the sea bay valves and the sea chests on the port and starboard sides. The contractor will close up the two valves once they install new packing and new gaskets on the bonnets.

3.1.4 The contractor must protect the jacket water cooler from the painting process.

3.1.5 The sea chests are to be painted as follows:

3.1.5.1 Bare areas Intersshield ENA300 Aluminum @ 6 mils DFT.

3.1.5.2 Full Coat Intersshield ENA300 Bronze @ 6 mils DFT.

3.1.5.3 Final Coat Interspeed BRA570 Red @ 4 mils DFT.

3.1.5.4 The total area to be considered is 50 square meters.

3.1.6 Following the completion of the specified work and other related work, the grids shall be replaced and locked.

3.1.7 The contractor shall apply all coatings as per manufacturer's instructions.

5.1 Location

5.1.1 Port and starboard sea chests are located at frame 34-36 on the port and starboard sides.

5.2 Interferences

5.2.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All the work performed must be to the satisfaction of the Chief Engineer, Nace and TCMS Inspector.

4.2 Testing

4.2.1 Paint thickness readings shall be taken by the Contractor and given to the Chief Engineer.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must deliver 3 copies of detailed work reports in electronic format on the initial condition of the sea chests, what work was performed, and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: HD-6	SPECIFICATION	TCMSB Field #: N/A
ANODES		

Part 1: SCOPE:

1.2 This specification is intended for the contractor to replace all the wasted anodes on the under water portion of the vessel.

Part 2: REFERENCES:

2.2 Guidance Drawings/Nameplate Data

2.1.1 N/A

2.2 Standards

2.2.1 Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble.

2.3 Regulations

2.3.1 The ship is regulated by Transport Canada and all work performed is subjected to the approval and inspection of the attending TCMS surveyor.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all the materials, equipment, labour and parts required to perform the specified work, unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall remove the wasted anodes from the vessel's hull, bow thruster tunnel, port and starboard sea chests, rudder, kort nozzle, propeller, and transducer blisters. Wasted anodes must be replaced with new aluminum anodes of the same size. (Anodes replaced on the rudder, nozzle and propeller shall be to Martin Yeatman's recommendations).

3.1.2 The contractor will quote on supplying and installing 40 aluminum anodes and quote on the cost of a single anode to fit at each of the following sizes. All anodes will be aluminum, equivalent to Z 48 pound is the A48, and physical size remains the same.

3.1.3 Ten aluminum anodes equivalent in size to the 48 pound zinc anode.

3.1.4 Twenty aluminum anodes equivalent in size to the 26 pound zinc anode.

3.1.5 Ten aluminum anodes equivalent in size to the 5 pound zinc anode.

3.1.6 The remaining anodes that require replacement will be adjusted through PWGSC 1379 action.

3.2 Location

3.2.1 The anodes are located at various points on the ship's hull.

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the ship. Care must be taken to ensure no welding is performed on skin tanks that contain fuel. These tanks would have to be emptied and certified gas free prior to any work commencing.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work performed must be completed to the satisfaction of the Chief Engineer & TCMS Inspector.

4.2 Testing N/A

4.3 Certification N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must deliver 3 copies of detailed work reports in electronic format on the initial condition of the anodes, what work was performed, and the condition as left.

5.2 Training

N/A

5.3 Manuals

N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: HD-7	SPECIFICATION	TCMSB Field #: N/A
FRESH WATER TANKS CLEANING, INSPECTION, COATING & TESTING		

Part 1: SCOPE:

1.1 The intention of this specification shall be for the contractor to open, clean, repair the damaged coatings, inspect, Hydrostatically pressure test, and super-chlorinate the fresh water tanks. **Note:** The Contractor shall start / finish this item of work as quickly as possible so as to allow adequate curing time of tank coating.

1.2 The total surface area for the two tanks is approximately 500 square meters and the contractor shall supply a quote to repair 10 square meters of tank coating. The Contractor shall also quote on cost per additional M2 tank coating repair to be adjusted up or down by PWGSC 1379 action.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 MSL 4192-4100 Tank Capacity Plan

2.2 Standards

2.2.1 The application of the tanks coatings shall be according to the Manufacturers Specifications.

2.2.2 The contractor shall reference / adhere to FC03-2009 “Surface Coating Work in Potable Water Tanks” and Bulletin 04-2007 “Potable water Tank Refit Procedures”.

2.3 Regulations

2.3.1 This ship is regulated by Transport Canada and all work performed must be approved by TC and subjected to the inspection of the attending Marine Surveyor and NACE.

2.3.2 The water in the tank will be subjected to laboratory testing once the super-chlorination procedure is completed and flushed. It is imperative that the manufacturer’s instructions be strictly adhered to when applying the tank coatings to ensure the water held in the tanks meet the highest drinking water regulations stated by Health Canada.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The capacity of the fresh water tanks are approximately 45.54 M³ each with a surface area of each tank measured to be 250 M² each.

3.1.2 Option 1 - The contractor shall quote on the cost to power tool / clean / re-apply coating of the 10 square meters of tank coating. This shall be adjusted up or down by PWGSC 1379 action.

3.1.3 These tanks are used for ship's drinking water, so proper protection must be worn by workers inside at all times to reduce the contamination and dirt accumulation from performing the work. The contractor shall be responsible for cleaning the grit residue and any foot prints and black marks introduced by the workers.

3.1.4 The tanks shall be pumped down by ship's crew until suction is lost. The contractor shall be responsible for removing the remaining water, approximately 2000 liters including any ice that may have formed at that time. The contractor will quote on the removal and re-installation of the docking plugs for each tank and if they are removed, they are to be handed to the Chief Officer for safe keeping until they are required again.

3.1.5 Option 2 - The contractor shall quote on vacuum grit blasting 50 M² to a Sa 2-1/2 profile, and provide the cost of each square meter of surface area to be blasted and coated to be adjusted up or down by PWGSC 1379 action. The Contractor shall also separately quote the cost of cutting two holes in each fresh water tank, between the frames in a place indicated by the Chief Engineer. The openings will be 1 meter X .5 meter and have sufficient radius at the corners. There are 0.6 meters between the frames so the 0.5 meters will run fore and aft. The contractor shall quote on the cost of each hole, the replacing of the same plates, the x-ray tests required after re-welding and coating of the heat affected areas. This shall be adjusted up or down by PWGSC 1379 action (depending on tank condition will determine what process to use, grit blasting or power tooling).

3.1.6 The bare areas of the tank shall be coated with one coat of Interline 925 Epoxy Tank Coating, White @ 16 mils DFT.

3.1.7 The contractor shall adhere to the manufacturer's instructions for drying times. The coating must be applied with airless sprayer using a tip between 0.53-0.64 mm and at a pressure of not less than 211 kg/cm² (3000 as recommended by the paint manufacturer).

3.1.8 The contractor shall keep the metal at least 16 degree C. The ambient temperature during the curing period will be maintained above 16°C and the maximum relative humidity will not be more than 60% as recommended by the manufacturer. **There will be absolutely no paint thinners used when mixing the paint for coating the freshwater tanks.**

3.1.9 The contractor shall construct an enclosure around the exterior hull that bounds the two freshwater tanks. The enclosure shall be fitted in a manner that ensures the environmental conditions are met (temperature and humidity) for coating application and curing.

3.1.10 The contractor shall provide effective mechanical systems to meet environmental conditions for the surface preparation and coating application.

3.1.11 The contractor shall check for coating coverage as per paint manufacturer's recommendations. The test will be witnessed by the owner's representative and the NACE Inspector.

3.1.12 The contractor will strictly adhere to the manufacturer's instructions when quoting on the cost of renting equipment and materials to maintain the correct atmospheric conditions for the coating to cure. The contractor shall supply sufficient personnel to maintain this equipment according to manufacturers specifications until the coating has fully cured. The coating shall be contractor supplied, and all parameters will be closely monitored by the CG NACE Inspector.

3.1.13 When cleaning the tanks is completed, the contractor shall re-weld the plates removed from each fresh water tank. The welds shall be X-ray tested on the four corners and in two other locations on each plate as determined by TC Inspector. Any weld that fails the test shall be gouged and re-welded and tested at the contractor's expense.

3.1.14 The contractor shall check the pipe connections for the remote sounding bell housings to ensure they are tight. The floating valve in the housings shall be checked to ensure it is free. There are two bell housings in the starboard fresh water tank. The sounding bells in the starboard fresh water tank shall be checked for operation and their piping to the exterior of the tank is in good condition. These shall have to be well protected while blasting and applying coating is carried out.

3.1.15 Once the tanks are completed, they shall be inspected by the Chief Engineer, NACE, and TCMS. The contractor shall be responsible for contacting and scheduling the visit by NACE and TC to view the inside of the tank.

3.1.16 The contractor shall re-install the manhole covers using new 3/16" thick neoprene rubber gaskets.

3.1.17 The tanks shall be filled with fresh water and super-chlorinated as per the Fleet safety Manual. The fresh water distribution system shall be opened to ensure the chlorine reaches all parts of the associated pipe work. The chlorinated water must be removed and disposed of in accordance with provincial and federal regulations. It can be neutralized with hydrogen peroxide and dumped on the dock after it is tested for residual chlorine.

3.1.18 The tanks shall be filled and flushed two times after the chlorine is dumped and hydrostatically pressure tested for TC credits. The vent heads shall be removed prior to any vacuum grit blasting and dismantled / re-assembled to prove they are functioning properly for TC after all tank coatings have been applied. The vent heads shall be re-installed by the contractor. The contractor shall be responsible for arranging the visit by TCMS for the pressure test.

3.1.19 The contractor must quote on sending a water sample from the completed tanks to an accredited laboratory for annual testing. The testing must be in accordance with the Fleet Safety manual standards and meet the 28 parameters for testing. The original copy of the test results shall be sent to the ship.

3.1.20 The contractor shall include the cost of the water to fill the tanks 4 times, the chlorine to super-chlorinate, and the hydrogen peroxide to neutralize.

3.2 Location

3.2.1 The fresh water tanks are located between frames 16-30 on the port and starboard sides of the ship. They are 45.54 M³ each and are skin tanks

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the Chief Engineer, Nace Inspector and TCMS Inspector.

4.2 Testing

4.2.1 The tanks must be hydrostatically tested and witnessed by TCMS Surveyor.

4.2.2 The water sample must be sent to the laboratory once all work is completed and proven to meet the requirements for drinking water standards as set out by Health Canada.

4.3 Certification

4.3.1 Certificates for the water sample must be delivered to the ship prior to opening the fresh water tanks for shipboard use.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must supply 3 copies of detailed work reports in electronic format on the condition of the fresh water tanks, the work performed, the environmental conditions for painting, the thickness measurements for the coating, the x-rays of the welds and the water reports from the laboratory.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: HD-8	SPECIFICATION	TCMSB Field #: N/A
TRANSDUCER CLEANING		

Part 1: SCOPE:

1.1 The intention of this specification shall be to have the marine growth cleaned from the ice windows and transducer faces on six Simrad Transducers fitted to the hull of the Teleost. The ice windows and transducer faces will be checked for physical damage, repaired or replaced and then re-installed. The representative from DFO Science Branch (Jinshan Xu) must inspect the transducers. All the transducers are housed in fairings built out from the sides of the vessel's box keel.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

2.2 Standards

2.2.1 All work performed with relation to cleaning transducers shall be inspected by Chris Stevens.

2.3 Regulations

2.3.1 This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection of the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor must cut the blocks away as necessary to access the six transducer sites.

3.1.2 The ice windows and steel retaining rings are to be lowered and removed.

3.1.3 The ice windows and transducer faces are to be cleaned with dish detergent.

3.1.4 The metal surfaces are to be steamed cleaned to remove the marine growth.

3.1.5 The remaining rust and scaling shall be removed from all steel surfaces using power tools and procedures that will not damage the transducer faces.

3.1.6 All bare steel surfaces shall be coated with primer and painted as per the paint treatments applied to the underwater hull. The transducer faces must be protected when painting.

3.1.7 The retaining rings shall be cleaned of marine growth, have rust and scaling removed, and coated with primer and painted as per paint treatment applied to under water hull.

3.1.8 The contractor must fabricate two new gaskets for the 27 KHz ice windows which are not the same thickness. The thickness will be determined from the thickness of the old ones removed.

3.1.9 The ice windows can then be re-installed.

3.1.10 The two scanmar sites must have the faces cleaned with dish detergent. The metal surfaces shall be steam cleaned to remove the marine growth. The remaining rust and scale shall be removed by power tooling, in a manner not to disturb / damage the transducer face. All the steel surfaces shall be coated with a primer and painted to the same specification as the under water hull.

3.1.11 The ADCP tunnel with the gate valve closed must be cleaned of marine growth. The remaining rust and scaling shall be removed from the steel surfaces and coatings applied as to the specification to the under water hull. The contractor shall test the gate valve to ensure its freedom of operation.

3.1.12 The sonar must be lowered through the tunnel and the face cleaned with dish detergent to remove the marine growth. The exposed section of the sonar ram shall be lubricated with a thin coat of grease prior to retracting the transducer.

3.1.13 For all devices listed above, the marine growth should be removed using soft plastic scraping tools and dish detergent. Extreme care must be taken to not scratch the surfaces of the transducers.

3.2 Location

3.2.1 Two 27 KHz devices are located at frames 83.5 starboard and 84.5 port.

3.2.2 Two 38KHz devices are located at frames 57.5 port and 83 port.

3.2.3 One 12 KHz device is located at frame 56 port.

3.2.4 One 120 KHz device is located at frame 86 starboard.

3.2.5 Scanmar, 2 devices - frame 56 port / frame 86 stbd.

3.2.6 Sonar, 2 devices – Sonar Ram frame 79.5 stbd / ADCP Ram frame 53.5 port.

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the Chief Engineer, Nace Inspector, TCMS Inspector and DFO Science Inspector Chris Stevens or Charlie Fitzpatrick..

4.2 Testing

4.2.1 N/A.

4.3 Certification

4.3.1 N/A.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must deliver 3 copies of detailed work reports in electronic format on the initial condition of the transducers, what work was performed, and the condition as left..

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: HD-9	SPECIFICATION	TCMSB Field #: N/A
TANK CLEANING & INSPECTION		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to have the following tanks cleaned, inspected by TCMS, and air pressure tested for credits from TC: Sonar Compartment, #3 DB F/O P, #3 DB F/O S, #4 DB F/O S, ADCP Compartment, Sludge, D/O Drains, #8 Void p, #8 Void S, #17 G/O S, #14 Stern Tube L/O.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** Tank Capacity Plan MSL 4192-4100

2.2 Standards

- 2.2.1.** The contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.
- 2.2.2.** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.

2.3 Regulations

- 2.3.1 .** This ship is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1** There are a total of 11 tanks/spaces to be dealt within this specification.
- 3.1.2** The Contractor shall schedule the visit of Transport Canada when the tank/space is ready for inspection.

- 3.1.3 The contractor shall remove the manhole covers and gaskets from the tanks identified below. The sealing surfaces will be cleaned on the cover and the ship's tank side. The threaded studs shall be cleaned from rust and paint. Following the completion of the work, the covers will be fitted with new, contractor supplied 3/16" neoprene gaskets and the studs coated with moly cote and the nuts secured.
- 3.1.4 The ship's crew will pump the 3 fuel oil storage tanks down to the suction levels. The Contractor shall remove and dispose of the remaining fuel oil 1000 litres in each tk. (#3 P&S DB F/O and #4 S DB F/O). The Contractor shall supply a quote for each cubic meter of fuel or L/O to be disposed of and the actual amount will be adjusted with PWGSC 1379 action.
- 3.1.5 The contractor shall certify/gas free all 11 tanks and thoroughly clean the internals of the 11 tanks. All cleaning equipment and waste water shall be collected and properly disposed of by the contractor.
- 3.1.6 Bare, rusty, and loose paint scale areas shall be cleaned with a wire brush to the bare metal and all residual debris from cleaning shall be removed.
- 3.1.7 Following the cleaning and removal of the rusty / loose paint scale from the areas, the Chief Engineer and TCMS Inspector will complete the tank inspection.
- 3.1.8 The Contractor shall check the pipe connections for the remote sounding bell housings to ensure they are tight. The floating valve in the housings shall be checked to ensure they are free. There are two such bell housings in each of the tanks.
- 3.1.9 The Contractor must ensure the tank transducers are kept free from debris and not damaged during the cleaning process. The transducers are extremely sensitive and should be protected at all times.
- 3.1.10 The vents **must** be removed from each of the tanks/spaces **prior** to any work commencing, opened, cleaned, and proven operational and inspected by the Chief Engineer and TCMS prior to securing back to the tank. The Contractor shall re-install the (proven correct operational) vent heads after tank testing is complete.
- 3.1.11 Once the tanks/spaces are accepted by TC, the tanks/spaces shall be air pressure tested (2 PSI) by the Contractor and witnessed by TC for credit.

3.2 Location

- 3.2.1 Sonar Compartment Fr. 78-82, forward Lower deck.
- 3.2.2 No. 3 D.B. Port F.O. Fr. 66-80, Port of center line, tank top to keel. Capacity of 30.56 cubic meters.
- 3.2.3 No. 3 DB Stbd F/O Fr. 66-80, Stbd of center line, tank top to keel. Capacity of 26.02 cubic meters.
- 3.2.4 ADCP Compartment Fr.52-58, port side lower deck.
- 3.2.5 No. 4 DB Stbd F/O Fr. 49-66, stbd of center line, capacity 54.12 cubic meters.
- 3.2.6 Sludge tank, Fr. 30-30, centerline DB, capacity 9.74 cubic meters.
- 3.2.7 Diesel Oil Drains Tank, Fr. 20-27, centerline DB, capacity 7.79 cubic meters.
- 3.2.8 No. 8 Void Port, Fr. 05-07, port of centerline in Steering Gear Compt. Capacity 42.84 cubic meters.

3.2.9 No. 8 Void Stbd, Fr. 05-07, stbd of centerline in steering gear compt.
Capacity 42.83 cubic meters.

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items, their removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 The contractor shall be responsible for the air pressure testing (2 PSI) of each of the tanks and witnessed by the attending TCMS Inspector and credits obtained from TC.

4.3 Certification

4.3.1 The Contractor shall certify/gas free all 11 tanks prior to entering the confined space.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide three copies of a detailed work report in electronic format on the findings in all 11 tanks, the work and pressure tests performed, any leaks detected and repaired, and the condition of the 11 tanks as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: HD-10	SPECIFICATION	TCMSB Field #: N/A
TANK TESTING		

Part 1: SCOPE:

- 1.1 The intention of this specification shall be to test the identified tanks, to be witnessed by the Chief Engineer & TCMS, and credits obtained.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Tank Capacity Plan MSL 4192-4100

2.2 Standards

- 2.2.1. The Contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.
- 2.2.2. The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.

2.3 Regulations

- 2.3.1 . This ship is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector.

2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work, unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1 There are a total of 11 tanks to be dealt with in this specification.
- 3.1.2 The Contractor shall schedule the visit of Transport Canada when the tank/space is ready for either hydrostatic or air pressure test.
- 3.1.3 Fuel and oil tanks are normally pressure tested with compressed air to about 2 psi. Water tanks can be hydrostatically pressure tested by filling with water and allowing the water to overflow the vent on deck. **The contractor shall supply and connect the manometer to determine the pressure in the tank.** The Contractor shall install balloons into the tank vents and sounding pipes to perform the tests.

3.1.4 The Contractor shall be responsible for installing blanks in the remote sounding air tubes located in the engine room to prevent leakage into the control panels while the test is being performed. The Contractor must protect the tank transducers from damage when applying the pressure test and remove the protective cover once the test is complete. The Contractor shall be responsible for removing all fitted plugs and proving the vents are free and clear once the pressure test is completed.

3.2 Location

3.2.1 Sonar Compartment Fr. 78-82, forward Lower deck.

3.2.2 No. 3 D.B. Port F.O. Fr. 66-80, Port of center line, tank top to keel. Capacity of 30.56 cubic meters.

3.2.3 No. 3 DB Stbd F/O Fr. 66-80, Stbd of center line, tank top to keel. Capacity of 26.02 cubic meters.

3.2.4 ADCP Compartment Fr.52-58, port side lower deck.

3.2.5 No. 4 DB Stbd F/O Fr. 49-66, stbd of center line, capacity 54.12 cubic meters.

3.2.6 Sludge tank, Fr. 30-30, centerline DB, capacity 9.74 cubic meters.

3.2.7 Diesel Oil Drains Tank, Fr. 20-27, centerline DB, capacity 7.79 cubic meters.

3.2.8 No. 8 Void Port, Fr. 05-07, port of centerline in Steering Gear Compt. Capacity 42.84 cubic meters.

3.2.9 No. 8 Void Stbd, Fr. 05-07, stbd of centerline in steering gear compt. Capacity 42.83 cubic meters.

3.3 Interferences

3.3.1 The contractor shall be responsible for the identification of all interference items to complete this task, their removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All the work must be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 The contractor shall be responsible for pressure testing each of these tanks (air & hydrostatically)and coordinating the attending TCMS Inspector to witness and obtain credit from TC.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer after testing and crediting by the TCMS Inspector..

5.2 Training N/A

5.3 Manuals N/A

Spec item #:HD-11	SPECIFICATION	TCMSB Field #: N/A
SEA CONNECTION AND STORM VALVES		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be for the Contractor to open up all intakes and overboard discharge valves for overhaul and inspection by Transport Canada.
- 1.2 All damaged or improperly operating valves must be reported to the Chief Engineer, to determine the correct course of repair.
- 1.3 Valve discs must be lapped to ensure proper seating, and all glands repacked to ensure water tightness.
- 1.4 This work shall be carried out in Conjunction with the following: DRYDOCKING.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 The list of valves are shown here:

Item #	Description	Size	Type	Frame	Location
1	Emergency Fire Pump	100 mm	Butterfly	6-7	Emerg. Gen. Room
2	Seachest Vent Port	80 mm	SDSL	30-31	Port Seachest
3	M/E Recirc. Port	125 mm	SDNR	31-32	Port Seachest
4	M/E Suction Port	250 mm	SDSL	30-31	Port Seachest
5	Seachest Vent Starboard	80 mm	SDSL	30-31	Stbd Seachest
6	M/E Recirc. Starboard	125 mm	SDNR	31-32	Stbd Seachest
7	M/E Suction Stbd	250 mm	SDSL	30-31	Stbd Seachest
8	Main Engine	150 mm	SDNR	31-32	Engine Room Port
9	Bilge/Ballast Pump	100 mm	SDNR	32-33	Engine Room Port
10	Oily Water Separator	50 mm	SDNR	31-32	Engine Room Port
11	Refrigeration Cooling	150 mm	SDNR	34-35	Net Loft Port
12	Evaporator Ejector	50 mm	SDNR	35-36	Net Loft Port
13	Evaporator Condenser	65 mm	SDNR	35-36	Net Loft Port
14	Grey Water Tank	50 mm	SDNR	76-77	Carpenter Shop Port
15	Air V/V Grey Water Tank	25mm	SDNR	76-77	Carpenter Shop Port
16	Bilge Ejector	65 mm	SDNR	88-89	Bosun Stores Stbd
17	Sewage Discharge	80 mm	SDNR	84-85	Bow Thruster Compartment Port
18	Sewage Discharge	80 mm	SDNR	22-23	Wet Lab Port
19	Wet Lab Bilge Pump Port	125 mm	SD Flapper	19-20	Wet Lab Port
20	Wet Lab Bilge Pump Stbd	125 mm	SD Flapper	18-19	Wet Lab Stbd

2.2 Standards

- 2.2.1 The Contractor must complete the specified work in a manner that is acceptable to the Chief Engineer.
- 2.2.2 The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.

2.3 Regulations

- 2.3.1 This vessel is regulated by Transport Canada and all work performed on this unit shall be approved by and subjected to the inspection of the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. The contractor shall remove the valve from the location and bring to their repair facility for repairs. The valve location should be tagged and the correct valve must be returned to the original location after repairs are completed.
- 3.1.2. The contractor will disassemble the valves completely and lay out in an orderly fashion for the inspection of the attending TCMS Surveyor.
- 3.1.3. The contractor is responsible for arranging the visit of the surveyor when the valves are available.
- 3.1.4. The bonnet, stem, and valve discs must be taken out for inspection and possible repairs.
- 3.1.5. Once the inspector is finished, the contractor will lap the discs and seats for each valve. Once the lapping is completed the valves are to be inspected by the Chief Engineer, PWGS Inspector and TCMS Surveyor, prior to reassembling.
- 3.1.6. Care must be exercised to not leave any lapping compound residue, any foreign material, and that everything is free to move. The contractor must re-assemble the valves using new gaskets on the bonnet, packing on the stems and new nuts and bolts on the glands. The valves can then be re-installed in the original orientation on the vessel.
- 3.1.7. The contractor shall allow \$2000.00 for machining of damaged valves parts.

3.2 Location

3.2.1 The location of the valves is identified in the above table.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer and TCMS.

4.2 Testing

4.2.1 The valves shall be tested when the vessel is put back into the water. The contractor shall ensure there are sufficient workers onboard to attend to any leaks found in the over-hauled valves during dry dock.

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor must supply detailed work reports in electronic format on the initial condition of the valves as found, what work was performed, and the condition as left.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

KORT NOZZLE WELDING REPAIR**Part 1: SCOPE:**

- 1.1** The intent of this specification is for the contractor to gouge out and weld the wasted seams and pits on the propeller kort nozzle.
- 1.2** All repaired areas shall be coated with underwater hull coatings in the same manner as the underwater hull coating included in this specification.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

2.1.1 N/A

2.2 Standards

2.2.1 Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble.

2.3 Regulations

2.3.1 This vessel is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection of the attending TCMS surveyor.

2.3.2 Ships ISM Safety Procedures

2.3.3 CG Hotwork Procedures

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

3.1.1 For bidding purposes, the contractor shall bid on 100 linear feet of welding and the welding consists of 5 passes totaling 500 bead feet.

- 3.1.2** The contractor must supply a price to perform per bead feet of welding required to be adjusted by PWGSC 1379 action.
- 3.1.3** The contractor shall be supplied with the exact welding procedures from the Wartsila manufacturer, which will involve gouging and cleaning the pitted areas, and re-welding in the damaged spots.
- 3.1.4** The contractor must also replace the zinc anodes as part of the Anodes section in this specification and then protect the Kort nozzle with the same coatings as the underwater hull, once all work is completed.

3.2 Location

- 3.2.1** N/A.

3.3 Interferences

- 3.3.1** The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work performed must be to the satisfaction of the Chief Engineer and TCMS inspector.

4.2 Testing

- 4.2.1** N/A.

4.3 Certification

- 4.3.1** The Contractor must supply a copy of the certificates of the welders Licensed to perform the repairs on the Kort Nozzle.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The contractor must provide 3 copies of a detailed work report in electronic format on the repairs made to the kort nozzle, the exact number of feet and the condition it was left.

5.2 Training N/A

5.3 Manuals N/A

Part 1: SCOPE:

- 1.1 The intent of this specification shall be for the Contractor to fully disassemble the windlass and hydraulic motor, lay out in an orderly fashion, and have it inspected by the Chief Engineer and TCMS Inspector, reassemble and function test for full credits from TC.
- 1.2 The Contractor shall allow \$40,000.00 for the acquisition of an FSR from Rolls Royce to supervise the overhaul of the windlass.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1 Reference can be taken from the manual for the Bratvaag Winch systems kept onboard the Teleost with drawing No. 197 270 S.P.PS.
- 2.1.2 windlass is made by Hydrauk Bratvaag Type Mg 4185. The serial # is 1988 031 with a del # 29927 and a Tag Number 88040.
- 2.1.3 The Windlass is type B6MG4185-2N-2KC-E20A-F92B.

2.2 Standards

- 2.2.1 The Contractor must complete the specified work in compliance with the instructions in the manual and in a manner that is acceptable to the Chief Engineer & FSR from Rolls-Royce.
- 2.2.2 The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.2.3 Any defects noticed must be relayed to the Chief Engineer as soon as possible to ensure the necessary parts or machining is expedited and there are no delays in the refit period.

2.3 Regulations

- 2.1.1 This ship is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector.
- 2.1.2 The windlass is powered by hydraulic oil and all steps must be taken to ensure all the oil is captured when dismantling and that none is allowed to enter the environment.

- 2.1.3** The Contractor is fully responsible for the containment, collection, and disposal of all oils and contaminated clean up material, according to local laws.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1** The Contractor must schedule this work in direct consultation with the Chief Engineer/Owner's representative to ensure proper lockouts are in place prior to commencing any work on this machinery.
- 3.1.2** The system hydraulics shall be drained down by the ship's crew and then locks applied to prevent the charging of the system with the ship's pumps.
- 3.1.3** The Contractor is responsible for draining, collecting, and disposing the residual oils from the winch motor. All piping and brackets shall be removed to gain access to the work.
- 3.1.4** The contractor shall remove the brake assemblies and clutch lever assemblies for inspection. All the linkage pins shall be removed and laid out in an orderly fashion for the inspection by the attending surveyor.
- 3.1.5** The Contractor shall disconnect the shaft flanges in the motor, bearing blocks, and remove from the windlass seating. The bearings in the motor housings will have to be shifted on the shaft to disconnect shaft flanges. The shaft assemblies shall be transported to the Contractor's facility, where they shall be completely disassembled, cleaned and displayed for inspection. The clearance between the internal diameter of the chain lifter and the shaft bushing shall be determined and recorded.
- 3.1.6** The Contractor shall remove the rotor assembly in the hydraulic motor and lay out for inspection. The rotor assembly shall be fitted with new vanes and vane pins. The shaft roller bearings, shaft seals, and cover seals shall be replaced with new and will be owner supplied.

- 3.1.7** The Contractor shall overhaul the control valve for the windlass as well, installing new seals and o-rings inside to provide leak free operation until the next scheduled survey.
- 3.1.8** The Contractor shall be responsible for scheduling the visit by TC Inspector to ensure they are satisfied with the internals prior to closing up for the final time.
- 3.1.9** The Contractor shall assemble the entire windlass arrangement to the vessel and connect all piping, brackets, brake assemblies, and clutch lever assemblies.
- 3.1.10** Once reassembled, the winch motor shall be tested for leaks at a pressure of 40 bar. The brakes shall be properly adjusted and tested to prove they hold securely. The clutch assemblies shall be proven free and fully operational on the shafts. Finally the winch has to be operated to prove the shafts do not bind in the bearing blocks.
- 3.1.11** The Contractor shall allow \$5000.00 for the machining of new parts or fittings.

3.2 Location

- 3.2.1.** The Windlass is situated in the Windlass Compartment between frames 87-89 on the upper deck bow area.

3.3 Interferences

- 3.2.1.** Contractor shall be responsible for the identification of interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer and TCMS.

4.2 Testing

- 4.2.1** Once all work is completed, the windlass shall be function tested to confirm correct operation, smooth running, and sufficient speed and load capacity, and be leak free.

4.3 Certification

- TCMS inspection for credit.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer after testing and crediting by the TCMS Inspector. This report shall include, but not limited to, internal pictures of the equipment, condition survey of the windlass as found, all work and parts used on the machinery, and condition as left.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

CROSS OVER PIPE FOR SEA BAYS**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to disconnect, remove, clean, inspect, pressure test, paint, and re-install the cross over pipe connecting the port and starboard sea chests.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1** Reference drawing MSL 4192-2106 sea water cooling diagram.
- 2.1.2** Reference drawing 137-106-019 Engine Room Arr. Lower Part.
- 2.1.3** The pipe diameter is 267 mm X 4 mm and the length is 10 M.

2.2 Standards

- 2.2.1** All the work performed must be in accordance with the latest ship building and repair practices and to the satisfaction of the Chief Engineer.
- 2.2.2** The Ships ISM Hot-work, Confined Space, Fall Protection, and Lockout procedures must be adhered to.
- 2.2.3** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble.

2.3 Regulations

- 2.3.1** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection by the attending TCMS surveyor.

2.4 Owner Furnished Equipment

- 2.4.1** The contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1** The contractor will disconnect and remove all piping, valves and brackets that is necessary to remove the cross-over pipe.
- 3.1.2** The cross over pipe can be referenced on drawing.
- 3.1.3** Once all the interference items are disconnected, the pipe will be removed and thoroughly cleaned on the inside with brushes and high pressure water.
- 3.1.4** The contractor must seal off all connections and pressure test the pipe to a pressure of 4 bar for two hours. Any leaks identified shall be repaired and the pressure test applied again. Repairs shall be done through 1379. Once the pressure test is deemed satisfactory, the flange faces are to be cleaned with brushes and emery cloth to ensure proper sealing.
- 3.1.5** All the piping and valves that were removed from the sea bay, shall be inspected and cleaned of marine growth prior to re-assembly. The cross-over piping shall be repainted.
- 3.1.6** The contractor shall reassemble all piping, valves, and brackets as per original location, using new, contractor supplied, neoprene rubber gaskets where applicable.

3.2 Location

- 3.2.1** The crossover pipe is situated between the sea chests in the lower engine room at frame 35, in the centre of the ship.

3.3 Interferences

- 3.3.1** The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel any interference items preventing adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work must be performed to the satisfaction of the Chief Engineer and TCMS.

4.2 Testing

4.2.1 The removed sea bay piping shall be tested to 4 bar for 2 hours and any leaks shall be identified and repaired. If retesting is required the cost shall be included in the original price quote.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide a detailed report on the findings in the sea bay piping, the work and pressure tests performed, any leaks or questionable areas detected and repaired, and the condition of the pipe as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

HULL PLATING RENEWAL IN ENGINE ROOM BILGE AREA**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to renew the Bottom Hull Plating in way of the Engine Room Bilge Area, Sludge tank and Fuel Oil tank #5 Port.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1** Reference drawing by MSI 2735-01-00
(**BOTTOM PLATE STEEL RENEWALS**)

Dwg.# R137-1-01, Rev. AF Tank Top & Motor Foundation

Dwg.# R137-200-402 Shell Expansion

Dwg.# 4192-4100 Rev. AF Tank capacity Plan

2.2 Standards

- 2.2.1** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.2.2** The Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble. All steel work to be performed by CWB Certified welders using approved procedures.
- 2.2.3** All welding / welders shall conform to the following standards / certification: CSA W59-03 (R2008): welded steel construction. CSA W47.1-09: certification of companies for fusion welding of steel.
- 2.2.4** All repairs to follow the IACS no. 47 Shipbuilding & Repair Quality Standard.

2.3 Regulations

- 2.3.1** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection by the attending TCMS surveyor.

2.4 Owner Furnished Equipment

- 2.4.1** The contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1** The Contractor with the assistance of the ship's crew insure all lockouts are fitted.
- 3.1.2** The contractor shall contact the C/E before any work commences.
- 3.1.3** The Contractor shall remove any interference items to gain access to required areas.
- 3.1.4** All new materials shall be DNV Grade B/AH, contractor shall provide Mill certificates prior to start of work to C/E.
- 3.1.5** All welding shall be as per original.
- 3.1.6** Full penetration welds shall receive 100% UT.
- 3.1.7** Bulkhead and Bottom Frame in way of New Insert Plate shall receive double continuous welds of 9mm throat thickness.
- 3.1.8** All NDT work shall be completed by a Level II or greater qualified technician.
- 3.1.9** Crew shall have F/O transferred from tank 5P prior to work commencing.
- 3.1.10** Contractor shall bid on removing residual F/O from the F/O tank #5 Port as the Sludge tank is already involved with tank cleaning and inspection in spec item HD-9. Contractor shall bid 1000 litres and additional litres shall be adjusted up or down by PWGSC 1379 action.
- 3.1.11** Contractor shall certify/gas free tank #5 Port and thoroughly clean the internals of the tank both before and after work is completed. All cleaning equipment and waste shall be collected and properly disposed of by the contractor.
- 3.1.12** Contractor shall remove the manhole cover and gasket from the tank identified. The sealing surfaces will be cleaned on the cover and the ship's tank side. The threaded studs shall be cleaned from rust and paint. Following the completion of the work, the covers will be fitted with new, contractor supplied 3/16" neoprene gaskets and the studs coated with moly cote and the nuts secured.
- 3.1.13** Contractor must ensure the tank transducers are kept free from debris and not damaged during the work / cleaning process. The transducers are extremely sensitive and should be protected at all times.
- 3.1.14** The vents **must** be removed from each of the tanks/spaces **prior** to any work commencing, opened, cleaned, and proven operational and inspected by the Chief Engineer and TCMS prior to securing back to the tank. The Contractor shall re-install the (proven correct operational) vent heads after tank testing is complete.

- 3.1.15** The contractor shall crop out / renew the area of insert plate identified (750mm x 575mm with R100 radius) as per attached drawing MSI 2735-01-00. Plate thickness as original (25mm). DNV Grade B/AH.
- 3.1.16** Upon completion of work and once the tanks/spaces are accepted by TC, the tanks/spaces shall be air pressure tested (3 PSI) by the Contractor and witnessed by TC.
- 3.1.17** During the pressure test, all welding in way of the repairs shall be tested with a DYE Penetrant to determine if any weld defects exist. Contractor shall correct any such defects.
- 3.1.18** Contractor shall be responsible to schedule TCMS at the required steps during completion of work.
- 3.1.19** All affected areas including insert plate because of the cropping out and welding of the new insert plate shall have their appropriate primer / paint / coatings repaired. The insert plate work shall be completed prior to under water hull painting being completed.

3.2 Location

- 3.2.1** Located at between FR's 32 - 35.

3.3 Interferences

- 3.3.1** The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel any interference items preventing adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work must be performed to the satisfaction of the Chief Engineer & TCMS.

4.2 Testing

- 4.2.1** All Full Penetration Welding subject to 100% UT. All NDT shall be completed by a Level II or greater qualified technician.
- 4.2.2** Upon completion of the work covered in this specification, the adjacent tanks affected by the repair (F/O tk. 5 port & Sludge tk) shall be pressure tested to 3 PSI to the satisfaction of the C/E and TCMS.

4.3 Certification

- 4.3.1** Welders names and Welding certification shall be provided.
- 4.3.2** All NDT work shall be completed by a Level II or greater qualified technician.

- 4.3.3** All new materials shall be DNV Grade B/AH, contractor shall provide Mill certificates.

Part 5: DELIVERABLES:

5.2 Drawings/Reports

- 5.1.1** The contractor shall provide a detailed report in electronic format on the findings and work completed and pressure tests performed, any leaks or questionable areas detected and repaired.

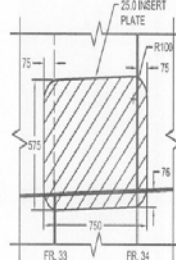
5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

(See Attached Drawing).



PLAN VIEW
INSERT PLATE DETAIL
SCALE: 1:20

1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE AND TO BE CONFIRMED BY CONTRACTOR PRIOR TO START OF WORK.
2. ALL REPAIRS TO FOLLOW THE AISC NO. 47 SHIPBUILDING AND REPAIR QUALITY STANDARD
3. ALL NEW MATERIALS TO BE DRY GRADE B/AH CONTRACTOR TO PROVIDE MILL CERTIFICATES PRIOR TO THE START OF REPAIRS.
4. ALL WELDING TO BE AS PER ORIGINAL.
5. ALL WELDING /WELDERS TO CONFORM TO THE FOLLOWING STANDARDS/CERTIFICATION:
 - CSA W59-03 (2008)-WELDED STEEL CONSTRUCTION
 - CSA W47.1-06- CERTIFICATION OF COMPANIES FOR FUSION WELDING OF STEEL.
6. FULL PENETRATION WELDS TO RECEIVE 100% UT.
7. BULKHEAD AND BOTTOM FRAME IN WAY OF NEW INSERT PLATE TO RECEIVE DOUBLE CONTINUOUS WELDS OF 9MM THROAT THICKNESS
8. ALL ADT WORK TO BE COMPLETED BY A LEVEL II OR GREATER QUALIFIED TECHNICIAN.
9. UPON COMPLETION OF REPAIRS THE ADJACENT TANKS AFFECTED BY THE REPAIR (F OR DANK UP, SLUDGE TANKS) SHALL BE PRESSURE TESTED TO 1 PSI AND HELD TO A DURATION SATISFACTORY TO THE ATTENDING TCM'S SURVEYOR. DURING THE PRESSURE TEST, ALL WELDING IN WAY OF THE REPAIRS WILL BE TESTED WITH A DYE PENETRANT TO DETERMINE IN A WELD DEFECT EXIST.
10. ALL WELDING TO BE COMPLETED TO THE SATISFACTOR OF THE ATTENDING TCM'S SURVEYOR.

1. NORDVEST CONSULT
DWG. NO R137-200-402
SHELL EXPANSION
2. NORDVEST CONSULT
DWG. NO R137-1-01, REV. C
TANK TOP AND MOTOR FOUNDATION
3. MARYSTOWN SHIPYARD LTD.
DWG. NO 4192-4100 REV. AF
TANK CAPACITY PLAN

MSI Marine Services
International (2008) Ltd.
197A Major's Path P.O. BOX 29132
St. John's, NL Canada A1A 5B5
Telephone 709 762 2700 Facsimile 709 762 2707
www.msiintl.com

BRIG:	CCGS TELEOST BOTTOM PLATE STEEL RENEWALS
CLIENT:	DFO VESSELS SERVICES

DRAWING BY:	DATE DRAWN:	
PTB	OCTOBER 2015	
CHECK BY:	DATE CHECKED:	
MSI	OCTOBER 2015	
PROJECT NO:	SCALE:	
2735	AS NOTED	
DRAWING NO:	REVISION NO:	SHEET NO:
2735-01-00	0	

PORT WET LAB BILGE REPAIR**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to make permanent repairs to the port wet lab bilge well. Thickness readings were taken and can be used as a guide as to areas to be renewed. This bilge well is situated inside the Main Engine Lube Oil tank.

Part 2: REFERENCES:**2.2 Guidance Drawings/Nameplate Data**

- 2.2.1** Reference drawing _____
- 2.2.2** Thickness Report by Eastern Technical Services 16-256-2 dated 14 April 2016

2.3 Standards

- 2.3.1** The Contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS.
- 2.3.2** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.3.3** The Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble.

2.3 Regulations

- 2.3.1** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection by the attending TCMS surveyor.

2.4 Owner Furnished Equipment

- 2.4.1** The contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1** The ship's crew with Contractor assistance will ensure all systems are locked out.
- 3.1.2** The contractor will disconnect and remove all piping, valves, brackets and pump that is necessary to gain access to the bilge well. Conveyer Belt assembly will have to be supported.
- 3.1.3** The contents of the Main Engine oil tank will have to be removed. The contractor is to quote on removal and storage of 2000 liters of oil. On completion the oil is to be filtered via portable filter cart back into the tank. The contractor is to include the cost of disposal of 200 liters of oil that will be left in the tank.
- 3.1.4** The contractor will remove the manhole covers and gaskets from the lube oil tank. The sealing surfaces will be cleaned on the cover and the ship's tank side. The threaded studs shall be cleaned from rust and paint. Following the completion of the work, the covers will be fitted with new, contractor supplied 3/16" Buna-N gaskets and the studs coated with moly coat and the nuts secured.
- 3.1.5** The contractor is responsible to provide gas free, hot work and safe entry of the tank at all times while work is being completed.
- 3.1.6** The contractor is to crop out and remove the wasted areas as indicated in the Thickness Report provided. Approximate dimensions are available on the report. New 3/8" grade 44w plate is to be used for repairs.
- 3.1.7** The contractor is to arrange with Transport Canada for inspection at various stages of the repair.
- 3.1.8** Welding debris dirt and loose paint scale shall be cleaned with a wire brush to the bare metal and all debris from cleaning must be removed.
- 3.1.9** One coat of primer is to be applied to all disturbed areas inside the lube oil tank and the bilge well side is to be coated with 2 coats of **Interseal 670HS** or equivalent.
- 3.1.10** Following the cleaning and removal of the rusty areas, the Chief Engineer, and TCMS Inspector will complete the tank inspection.
- 3.1.11** The vent must be removed from the tank prior to any work commencing, opened, cleaned and proven operational prior to securing to the tank.

- 3.1.12** On completion of repair and acceptance by Transport Canada of welded areas the Contractor will provide an air test on the Main Engine Lube oil tank for purpose of TC credit. Testing pressure will be 3 psi or as directed by TC inspector and proven using a manometer. Retesting of the tank with air if needed to make repairs of any kind will be covered by the contractor in the original quote.
- 3.1.13** Once approved by TC and the Chief Engineer, the Contractor will refit all piping, brackets and pump that were removed to gain access. All systems that were effected will be proven operational to the satisfaction of the Chief Engineer.

3.2 Location

- 3.2.1** The bilge well is located at FR 16 on the port side aft of the wet lab. Access to the Main engine lube oil tank is from engine room directly below the bilge well.

3.3 Interferences

- 3.3.1** The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel any / all interference items preventing adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work must be performed to the satisfaction of the Chief Engineer and TCMS.

4.2 Testing

- 4.2.1** Air testing of the tank will be provided by the contractor as outlined above. If retesting is required the cost shall be included in the original price quote.

4.3 Certification

- 4.3.1** Welders names and Welding certification shall be provided.

Part 5: DELIVERABLES:

5.3 Drawings/Reports

- 5.1.1** The contractor shall provide a detailed report on the findings and work completed and pressure tests performed, any leaks or questionable areas detected and repaired.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

STBD WET LAB BILGE THICKNESS READINGS**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to obtain thickness readings on the stbd wet lab bilge well for Transport Canada. This was requested as precautionary by Transport Canada due to the recent leak in the Port bilge well.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1** Reference drawing _____

2.2 Standards

- 2.2.1** The Contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS.
- 2.2.2** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.2.3** The Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble.

2.3 Regulations

- 2.3.1** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection by the attending TCMS surveyor.

2.4 Owner Furnished Equipment

- 2.4.1** The contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1** The ship's crew with Contractor assistance will ensure all systems are locked out.

- 3.1.2** The contents of the Hydraulic oil tank will have to be removed. The contractor is to quote on removal and storage of 5000 liters of oil. On completion the oil is to be filtered via portable filter cart back into the tank. The contractor is to include the cost of disposal of 200 liters of oil that will be left in the tank.
- 3.1.3** The contractor will remove the manhole covers and gaskets from the hydraulic oil tank. The sealing surfaces will be cleaned on the cover and the ship's tank side. The threaded studs shall be cleaned from rust and paint. Following the completion of the work, the covers will be fitted with new, contractor supplied 3/16" Buna-N gaskets and the studs coated with moly coat and the nuts secured.
- 3.1.4** The contractor is responsible to provide gas free, hot work and safe entry of the tank at all times while work is being completed.
- 3.1.5** The contractor is to obtain thickness readings to all sides and bottom of the bilge well. The thickness readings on the port bilge well should be used as a guide to the number and location of shots.
- 3.1.6** The contractor is to arrange with Transport Canada for inspection at various stages. The readings will be submitted to the Chief Engineer and TC inspector to determine any further extent of work.
- 3.1.7** Any repairs to steel work will be covered by 1379 and completed in the same manner as the repairs to the port bilge well.
- 3.1.8** Following the cleaning, the Chief Engineer and TCMS Inspector will complete the tank inspection.
- 3.1.9** The vent must be removed from the tank prior to any work commencing, opened, cleaned and proven operational prior to securing to the tank.
- 3.1.10** On completion of repair and acceptance by Transport Canada for internal inspection, the Contractor will provide an air test on the Hyd Oil tank for purpose of TC credit. Testing pressure will be 3 psi or as directed by TC inspector and proven using a manometer. Retesting of the tank with air if needed to make repairs of any kind will be covered by the contractor in the original quote.
- 3.1.11** All systems that were affected will be proven operational by the Contractor to the satisfaction of the Chief Engineer.

3.2 Location

3.2.1 The bilge well is located at FR 16 on the Stbd side aft of the wet lab. Access to the Hyd oil tank is from engine room directly below the bilge well.

3.3 Interferences

3.3.1 The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel any interference items preventing adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work must be performed to the satisfaction of the Chief Engineer and TCMS.

4.2 Testing

4.2.1 Air testing of the tank will be provided by the contractor as outlined above. If retesting is required the cost shall be included in the original price quote.

4.3 Certification

4.3.1 Welders names and Welding certification to be provided.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide a preliminary report the same day the thickness readings are taken. The contractor shall provide a detailed report on the readings and work completed and pressure tests performed, any leaks or questionable areas detected and repaired.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

FISH HOPPER BULKHEAD STIFFING RENEWAL**Part 1: SCOPE:**

- 1.2** The intention of this specification is for the contractor to renew the stiffing on the bulkhead of the fish hopper on the aft bulkhead of the wet lab.

Part 2: REFERENCES:**2.3 Guidance Drawings/Nameplate Data**

- 2.3.1** Reference drawing by MSI 2740-01-00
(**Fish Tank Hatch Coaming Support Structure**)

2.4 Standards

- 2.4.1** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.4.2** The Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble. All steel work to be performed by CWB Certified welders using approved procedures.
- 2.4.3** All welding / welders shall conform to the following standards / certification: CSA W59-03 (R2008): welded steel construction. CSA W47.1-09: certification of companies for fusion welding of steel.
- 2.4.4** All repairs to follow the IACS no. 47 Shipbuilding & Repair Quality Standard.

2.3 Regulations

- 2.3.1** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection by the attending TCMS surveyor.

2.4 Owner Furnished Equipment

- 2.4.1** The contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

3.1.1 The Contractor with the assistance of the ship's crew insure all lockouts are fitted.

3.1.2 The Contractor shall remove any interference items to gain access to required areas, including disassembly of any factory equipment in way of steel renewal areas and the reassembly of said equipment after completion of renewals. The doors and Teflon seals and slides will have to be removed. Teflon slides and seals shall be reused. There are 8 sections of angle to be renewed involving 4 hopper doors.

Approximate length of angle needed will be (8 sections x 3' 10").

3.1.3 The 5"x 3"x 1/4" angled stiffener supports in way of the hopper doors will be cropped out down to the Ofal Pipe. The cemented area at the bottom will have to be chipped away until solid metal is available to make repairs.

3.1.4 The contractor will cut and fit each section of angle and make repairs with the intent to provide alignment to the door guides.

3.1.5 Teflon slides and seals will be refitted with new contractor supplied stainless steel counter sunk fasteners similar to original.

3.1.6 The contractor will provide one coat of primer to all disturbed areas.

3.1.7 On completion and acceptance by the Chief Engineer the contractor will recement any disturbed areas as per original.

3.1.8 The contractor will reinstall all interference items and prove the operation to the hopper doors to the Chief Engineer.

3.1.9 All steel work to be performed by CWBCertified welders using approved procedures.

3.1.10 All new steel shall be Grade 44W or equivalent. Contractor shall provide steel Mill certificates prior to start of work.

3.1.11 New bulkhead stiffener insert sections shall be full penetration butt welds at ends and 1/4" throat thickness to bulkhead.

3.1.12 All welds subject to 100% MPI Testing.

3.2 Location

3.2.1 Located at the aft bulkhead of the wet lab at FR 16.

3.3 Interferences

3.3.1 The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel any interference items preventing adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.3 Inspection

4.1.1 All work must be performed to the satisfaction of the Chief Engineer.

4.4 Testing

4.4.1 All Welding subject to MPI testing if deemed necessary on final inspection. Cost to be included in original quote.

4.4.2 Smooth operation of the hydraulically operated hopper doors will be necessary and proven.

4.3 Certification

4.3.1 Welders names and Welding certification to be provided.

Part 5: DELIVERABLES:

5.4 Drawings/Reports

5.1.1 N/A

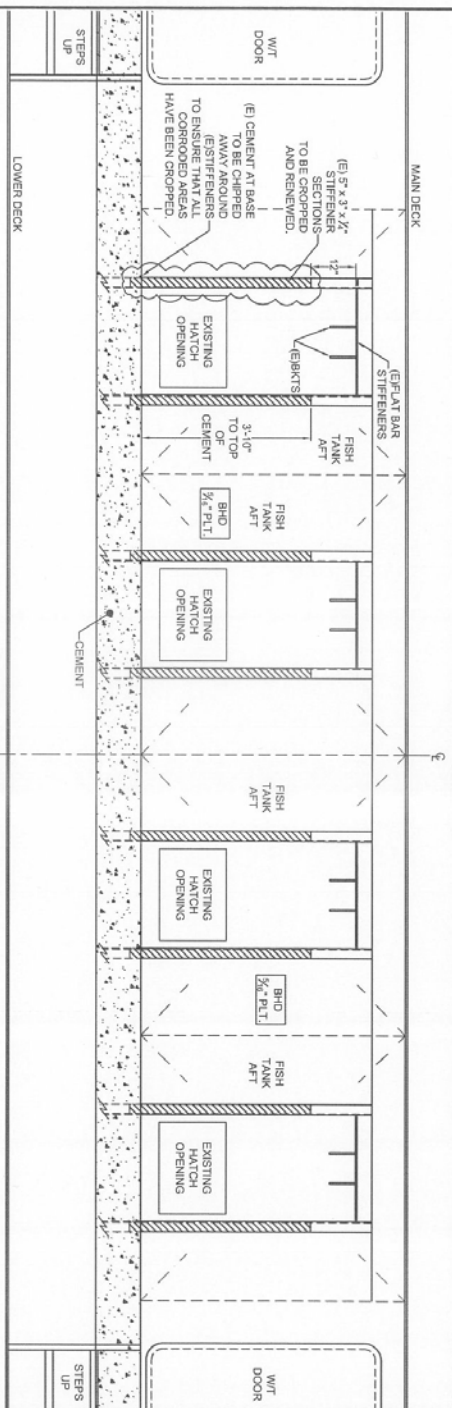
5.2 Training

5.2.1 N/A

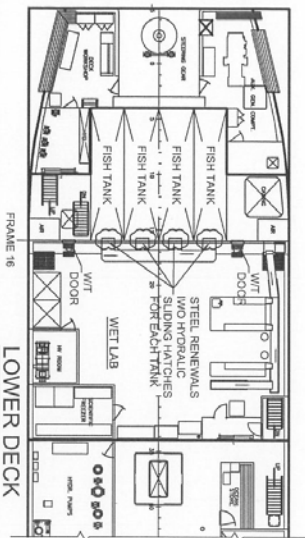
5.3 Manuals

5.3.1 N/A

(See Attached Drawing).



SECTION A-T FRAME 16
LOOKING AFT



FRAME 16

LOWER DECK

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED BY CONTRACTOR.
2. CONTRACTOR IS RESPONSIBLE FOR THE DISASSEMBLY OF FACTORY EQUIPMENT IN WAY OF STEEL RENEWAL AREAS AND THE REASSEMBLY OF SAID EQUIPMENT AFTER COMPLETION OF ALL RENEWALS.
3. ALL STEEL WORK TO BE PERFORMED BY C.W.B. CERTIFIED WELDERS USING APPROVED PROCEDURES.
4. ALL REPAIRS TO FOLLOW THE IACS NO. 47 SHIPBUILDING AND REPAIR QUALITY STANDARD.
5. ALL NEW STEEL WORK SHALL BE OF 44K OR EQUIVALENT CONTRACTOR TO PROVIDE STEEL BULKHEAD STIFFENERS IN ALL BULKHEADS AND TRANSVERSE STIFFENERS.
6. NEW BULKHEAD STIFFENER INSERT SECTIONS TO BE FULL PENETRATION BUTT WELDS AT ENDS AND 1/4" THROAT THICKNESS TO BULKHEAD.
7. ALL WELDING WELDERS TO CONFORM TO THE FOLLOWING STANDARDS: CERTIFICATION: - CSA W47-1-06 - CERTIFICATION OF COMPANIES FOR FUSION WELDING OF STEEL.
8. ALL WELDING SUBJECT TO 100% WPT TESTING.
9. ALL WORK TO BE COMPLETED TO THE SATISFACTION OF VESSEL REPRESENTATIVE.
10. THE FOLLOWING DENOTATIONS ARE USED: (E) - EXISTING

MSI Marine Services International (2008) Ltd. 197A Major's Park P.O. BOX 29132 St. John's, NL, Canada A1A 5B5 Telephone 709 782 2700 Facsimile 709 782 2707 www.msiintl.com	CCGS TELEOST - STEEL RENEWALS		DRAWN BY: MSI CHECKED BY: MSI PROJECT NO.: 2740 DRAWING NO.: 2740-01-00		DATE CHECKED: OCTOBER 2015 SCALE: 1/2" = 1" SHEET NO.: 1 OF 1	
	FISH TANK HATCH COAMINGS SUPPORT STRUCTURE		PROJECT NO.: 2740 DRAWING NO.: 2740-01-00		DATE CHECKED: OCTOBER 2015 SCALE: 1/2" = 1" SHEET NO.: 1 OF 1	
	DFO VESSEL SERVICES		PROJECT NO.: 2740 DRAWING NO.: 2740-01-00		DATE CHECKED: OCTOBER 2015 SCALE: 1/2" = 1" SHEET NO.: 1 OF 1	
	CCGS TELEOST - STEEL RENEWALS		PROJECT NO.: 2740 DRAWING NO.: 2740-01-00		DATE CHECKED: OCTOBER 2015 SCALE: 1/2" = 1" SHEET NO.: 1 OF 1	

MAIN ENGINE LO-REZ ISOLATION MOUNTS REPLACEMENT**Part 1: SCOPE:**

- 1.1** The intent of this specification shall be to remove the 6 old and install 6 new Lo-Rez vibration isolation mounts for the main engine on the Teleost. The components shall be witnessed by the Chief Engineer.
- 1.2** This work shall be carried out in Conjunction with Lo-Rez Coupling replacement (E-3) and the alignment verification of the main engine and gearbox after replacement of these mounts and Lo-Rez Coupling, the replacement of the M/E expansion joints.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1.** The main engine is fitted with 6 LoRez mounts, Type BR4-HS. The reference required for overhaul is the LoRez Instruction Manual.

2.2 Standards

- 2.2.1.** The engine mounts shall be replaced and adjusted in accordance with the standards identified in the instruction manual.
- 2.2.2.** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures as per ISM Manual and Specification Preamble.

2.3 Regulations

- 2.3.1.** The engine mounts were replaced in 2012, but it has been recommended by the Review Committee to have them replaced on an annual basis.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1. The contractor shall include in their bid an allowance of \$5000 to be adjusted by PWGSC 1379 action for the services of a Lo-Rez FSR to assist in the installation / adjustment, of the six (6) new LoRez mounts. The FSR shall ensure that mounts are properly installed, Lo-Rez Coupling properly installed and main engine re-aligned.
- 3.1.2. The piping on the front of the engine shall be disconnected to obtain sufficient height to jack the engine and permit removal of the mounts.
- 3.1.3. The contractor shall remove all piping, brackets, and covers to gain access to the work. The crew shall isolate all systems involved with this piping removal prior to any work commencing.
- 3.1.4. The contractor shall remove the six (6) spring isolation mounts. Only one isolator can be removed at a time. The engine shall have to be jacked and supported in the area of the mount. The new mount can only then be installed into position.
- 3.1.5. Once all the mounts have been replaced, the contractor shall torque down all the mounts as specified by the FSR. The Contractor shall reconnect all piping, brackets, covers, etc, that was removed to complete this work. The Contractor shall supply / install new gaskets and apply anti seize to bolts / nuts.
- 3.1.6. The contractor shall check the alignment between the main engine, lo-rez coupling and gearbox and prove acceptable to the Chief Engineer. The contractor shall include in their bid \$5000.00 to have a certified company / representative perform / confirm laser alignment and to make adjustments. This shall be adjusted up or down by PWGSC 1379 action upon proof of invoice (after Lo-Rez coupling has been replaced).
- 3.1.7. Once all the adjustments are made, the mounts can be torqued and the stops set up to the proper clearances.

3.0 Location

- 3.2.1. The six mounts are installed under the main engine, in the main engine room.

3.1 Interferences

- 3.3.1. Contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the LoRez FSR and Chief Engineer.

4.1 Testing

4.2.1 The main engine shall be run and any abnormal vibrations shall be verified.

4.3 Certification

4.3.1 Laser Alignment Company / Representative.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall provide three (3) copies of a detailed report in electronic format to the Chief Engineer indicating the Final Lazer Alignment Readings.

5.2 Training

5.2.1 The Lo-Rez FSR shall train the E/R crew on proper maintenance and adjustment procedures of the main engine mounts.

5.3 Manuals

5.3.1 N/A

Spec item #: E-2	SPECIFICATION	TCMSB Field #: N/A
MAIN ENGINE LO-REZ COUPLING REPLACEMENT		

Part 1: SCOPE:

1.1 The intention of this specification shall be to have the Lo-Rez flexible coupling removed between the main engine and gearbox, and replaced with the owner supplied coupling. Credits are to be obtained from TC.

1.2 This work shall be carried out in Conjunction with the alignment verification of the main engine and gearbox after replacement of Lo-Rez main engine mounts (specification item E-2) and the M/E expansion joints.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 The CCGS Teleost is fitted with a Lo-Rez coupling between the main engine and main gearbox. It is part of the Lo-Rez vibration Control System and it is a steel spring flexible coupling. It is Type IHF, with serial # 4994, and it is located on the main engine flywheel.

NOTE: Spare coupling stored in Coast Guard Technical Stores.

2.2 Standards

2.2.1. The coupling shall be replaced in accordance with the standards identified in the manufacturer's instruction manual / FSR.

2.2.2 The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures as per ISM Manual and Specification Preamble.

2.3 Regulations

2.3.1 This vessel is regulated by Transport Canada and all work performed shall be approved / inspected by TCMS Inspector and the Chief Engineer.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The contractor shall remove all the piping, brackets, and covers to gain access to the work area. Contractor shall transport the new coupling to the vessel and the old coupling back to fleet technical stores.

3.1.2 The contractor shall include in their bid an allowance of \$5000 to be adjusted by PWGSC 1379 action for the services of the FSR Richard Hordyk (Lo-Rez) to visit the ship to ensure the Lo-Rez Coupling is properly installed and main engine re-aligned.

3.1.3 The contractor shall remove the old coupling (under FSR supervision) from the engine and install the new coupling.

3.1.4 The contractor shall re-install the piping, brackets, and covers as found.

3.1.5 The contractor shall be responsible for arranging the visit of the TCMS Inspector to inspect the installation of the new coupling.

3.1.6 The contractor shall open the old coupling, layout the steel laminations and the spool section for Transport Canada inspection, and then re-install the laminations and spool sections.

3.1.7 The contractor shall then realign the engine using Lazer Alignment. Once the alignment is proven to be satisfactory to the Chief Engineer, all hardware has to be torqued down.

3.2 Location

3.2.1 The Flexible Coupling is fitted between the main engine and the main gearbox, in the main engine room.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work must be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 The main engine shall be run up and any abnormal vibrations shall be verified. The coupling shall be tested during the scheduled sea trials also.

4.3 Certification

4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall deliver to the Chief Engineer, 3 copies the work report in electronic format stating in detail the work performed on the flexible coupling. A copy of the final alignment shall be included in this report.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

EXHAUST GAS BOILER INTERNAL / EXTERNAL SURVEY**Part 1: SCOPE:**

- 1.1** The intent of this specification is to open up the Pyro boiler for cleaning, inspection and testing in order to obtain credits from TCMS.
- 1.2** The boiler shall be fully dismantled, cleaned, inspected by TC, re-assembled, and pressure tested to 3 bar and all deemed satisfactory to the attending surveyor and C/E.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1** The boiler is a Pyro Boiler, Hot Water
Model #A 600 S 1972 Combi
693 KW Exhaust/232 KW Oil/40 KW Electric
Maximum working pressure 2 bar.

2.2 Standards

- 2.1.1** The contractor shall meet the manufacturer's instructions for the maintenance performed on the boiler. The Ship's ISM hot work, confined space entry, fall protection, and lock out procedures must be adhered to.
- 2.1.2** Any Electrical installations or renewals shall be in accordance with the latest editions of the TP127E-TC Marine Safety Electrical Standards and IEEE Standard 45: Recommended practice for Electrical Installation on Shipboard.

2.3 Regulations

- 2.3.1** The contractor shall meet all TC regulations and follow the Canada Shipping Act pertaining to the inspection and maintenance performed on the pressure vessel.

2.4 Owner Furnished Equipment

- 2.1.1** The contractor shall supply all the materials, equipment, and parts required to perform the specified work, unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1** The contractor shall ensure the boiler is isolated and locked-out prior to commencing work on the unit.
- 3.1.2** The contractor shall provide a continuous supply of hot potable water and heating water to the ship for the period when the boiler is non-operational. The hot water has to be supplied for 24 hours a day, at 80 degrees C on both the heating and potable water systems.
- 3.1.3** Once the alternate hot water systems are in place, the boiler has to be drained to the owner's facility for disposal. All the boiler mountings must then be removed and blanks installed.
- 3.1.4** There are a total of three valves to remove for inspection. The main inlet, outlet, and drain valves shall be removed and opened for TC inspection. The valves and seats are to be lapped and new packing installed upon reassembly.
- 3.1.5** The contractor shall remove the top cover on the boiler and clean the boiler tubes, piping, and end pieces thoroughly with a stiff brush with an extended handle. The exhaust chambers are to be opened for inspection, all inspection covers are to be removed and replaced with new contractor gaskets.
- 3.1.6** The contractor shall cleaned the boiler internally using Drew Safe Acid, Oaktite, or an approved equivalent. Circulation of the solution must be pumped from a separate solution tank (contractor supplied) into the boiler at the top supply valve, and return from the bottom valve flange. The concentration and circulation of the solution must be as per manufacturer's instruction. Once the cleaning process is completed, the boiler must be thoroughly flushed with fresh water. The cleaning solution and flush water must be received at the owner's facility and disposed of in accordance to local and Environmental Regulations. Under no circumstances will these waters be permitted to enter the ship's bilge area.
- 3.1.7** The contractor is responsible for scheduling the attending surveyor at points previously agreed upon, to inspect the boiler and allow the contractor to proceed to the next stage of survey.

- 3.1.8** The contractor shall arrange a burner technician and remove the burner and burner plate. The ceramic plates in the combustion chamber and burner plate shall be inspected and replaced as necessary. The gasket for the burner plate must also be inspected and checked for damage, and replaced if necessary. The burner tube must be cleaned and checked. The burner insert shall be removed, the parts cleaned, the nozzle replaced, and the electrode adjustments confirmed. The air inlet and blower wheel must be cleaned of all debris and reassembled in good working order. The gas pressure expansion vessel shall be inspected and determined to have a working pressure that is equal to the static height over the expansion tank, when the water is cold. The filters must also be replaced in the oil pump.
- 3.1.9** The contractor shall remove the two pressure relief valves from the boiler and send them to an accredited firm to have them re-certified and returned to the vessel, along with certificates.
- 3.1.10** The ceramic plates, burner nozzle, and oil pump filters will be Owner supplied.
- 3.1.11** The contractor shall hydrostatically pressure test the boiler to 3 bar for one hour, or a pressure and time to satisfy the attending surveyor.
- 3.1.12** The contractor shall hydrostatically pressure test the potable hot water coil to 5.5 bar for one hour, or to a pressure and time to satisfy the attending surveyor.
- 3.1.13** The contractor shall arrange the attendance of the TCMS and Chief Engineer to witness the hydro-test.
- 3.1.14** After all this work is completed, and marine surveyor is completely satisfied, the contractor shall remove all the blanks and reassemble the boiler to the condition found.
- 3.1.15** The set points for the thermostats and pressure switches must all be positioned to the points identified in the boiler manual. The safety valves must be checked for leaks and the contractor should allow for safety valve testing in the event it is required by TCMS. The automatic ventilation valve has to be cleaned and checked.
- 3.1.16** The contractor shall test the function of the boiler and all the safety shut-downs to the satisfaction of TCMS and the Chief Engineer. Any leaks in the covers and fittings must be secured by the contractor at the contractor's expense.

3.1.17 The contractor shall obtain the services of a burner technician to check and adjust the burner parameters to achieve the maximum efficiency and clean burning characteristics desired. The contractor shall make an allowance of \$2000.00 for the services of a burner technician to be adjusted up or down by PWGSC 1379 action upon proof of invoice.

3.1.18 Once the boiler is tested and TCMS is satisfied, the contractor can put the boiler back into service.

3.2 Location

3.2.1 The boiler is located in the port casing, between frames 10-15.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 The contractor is responsible for arranging the attendance of the TCMS and Chief Engineer during the survey work, to allow the contractor to proceed to the next step.

4.2 Testing

4.2.1 Pressure tests have been identified in this specification and may be subjected to slightly different heights and times, depending on the TCMS.

4.3 Certification

4.3.1 The contractor shall provide the Chief Engineer with certificates verifying the tests completed on the pressure relief valves. Two copies are required.

Part 5: DELIVERABLES:

1.1 Drawings/Reports

- 5.1.1** The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer indicating the condition of the boiler prior to working, the work performed, all parts used, and the condition as left

- 5.2 Training**

- 5.2.1** N/A

- 5.3 Manuals**

- 5.3.1** N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: E - 4	SPECIFICATION	TCMSB Field #: N/A
BOW THRUSTER OIL CHANGE		

Part 1: SCOPE:

- 1.1 The intent of this specification is for the contractor to supply and replace the 130 liters of Ultima EP 68 oil in the bow thruster unit. The contractor will also replace the filters on the bow thruster, which will be Coast Guard Supplied.
- 1.2 The contractor will be responsible for the cleanliness, the disposal of the old oil and filters, and any contamination in the bow thruster compartment from the oil change.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1 The CCGS Teleost is fitted with a Brunvoll Thruster, type FU-45-LTC-1375. It has the plant No. 3919, it runs at 1770 RPM, and produces 360 KW. The electric motor is Nebb Vepp 315 ML4.
- 2.1.2 The contractor shall follow the instructions written in the Brunvoll Thruster manual kept in the engineer's office, onboard the Teleost.

2.2 Standards

- 2.2.1 The contractor shall meet the manufacturer's instructions for the maintenance performed on the boiler. The Ship's ISM hot work, confined space entry, fall protection, and lock out procedures must be adhered to.

2.3 Regulations

- 2.3.1 This vessel is regulated by Transport Canada and all work performed on this unit shall be approved by and subjected to the inspection of the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

- 2.4.1. The contractor shall supply all materials, equipment, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1. The contractor must drain the oil from the bow thruster and dispose of according to applicable environmental regulations.

- 3.1.2. Upon completion of draining, the contractor shall add 20 litres of new oil to the system to flush any remaining debris or emulsion.
- 3.1.3. The contractor shall supply new oil and fill the bow thruster to the correct level via a filter cart that filters to 3 micron absolute.
- 3.1.4. The contractor must also replace the filters used on that unit, prior to installing the new oil.
- 3.1.5. The contractor must ensure proper lock-out and tag outs are completed and filled out prior to commencing any work on the unit.
- 3.1.6. The contractor shall remove all wiring, piping, flanges, and couplings to gain access to the overhaul work. The oil shall be drained from the gear housing, sealing system, and servo unit. The contractor must change the filters, clean out the header tank, and power pack tank, in the bow thruster compartment.
- 3.1.7. The contractor shall remove and re-install the grids on the bow thruster.
- 3.1.8. The gear housing, sealing system, and servo system shall be filled with oil. The oil shall be in the system and at maximum operating pressure for four hours before undocking. The contractor must provide the personnel to check for leaks during this period. All air vents are to be opened during the re-filling process.
- 3.1.9. The servo system will be tested while on dry-dock for one full hour.
- 3.1.10. The contractor shall perform a 1 hour operational test when the vessel is back into the water. The contractor will open test cocks marked point B and point H to check for the ingress of seawater.

3.2 Location

- 3.2.1. The bow thruster is located between frames 85-87 and is on the centerline of the ship.

3.3 Interferences

- 3.3.1. The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1. All the work must be completed to the satisfaction of the Chief Engineer and TCMS surveyor.

4.2 Testing

- 4.2.1 The contractor must run the servo and check the operation of the bow thruster for one full hour prior to undocking the ship

- 4.2.2** The contractor shall perform a one hour operational test on the bow thruster once the vessel is back into the water.

4.3 Certification

- 4.3.1** N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor must supply 3 copies of a detailed report in electronic format on the condition of the oil as found, any deficiencies found, the work performed on the bow thruster, and the condition left.

5.2 Training

- 5.2.1** N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: E-5	SPECIFICATION	TCMSB Field #: N/A
MAIN ENGINE COMPLETE OVERHAUL		

Part 1: SCOPE:

- 1.1 The intent of this specification shall be for the contractor to assist the Caterpillar FSR, certified on 3600 Series Cat engines to complete an overhaul of the Teleost Main Engine. Caterpillar 3612. The Contractor shall quote an allowance of 200 hours labor to assist the FSR. Caterpillar FSR contracted by Canadian Coast Guard.
- 1.2 This work shall be carried out by the Caterpillar FSR and vessels Engineering Crew.
- 1.3 This work shall be completed in conjunction with the replacement of the Main Engine LoRez Mounts & Coupling and final engine alignment.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Caterpillar 3612 Diesel Engine. Built November 25, 1987. Built at Lafayette. Test No. 01. Cell No. 522. Arrangement No. 1W1012 3308.9 Kw. Speed. 700/850. Engine located Tank Top Fr. 18 to Fr. 30.
- 2.1.2 Reference Drawing 4192-4000 (General Arrangement)

2.2 Standards

- 2.2.1 All work conducted under supervision of Caterpillar FSR.
- 2.2.2 All parts will be OEM Owner Supplied.

2.3 Regulations

N/A

2.4 Owner Furnished Equipment.

2.4.1

The Owners shall be responsible for ordering, receiving and storage of all parts until they are required.
The Contractor shall be responsible for the transportation of parts from the Owners storage facility (Tech Stores SS Base) or FSR facility to the vessel including any crane or heavy lift equipment required to remove from vessel or place back on vessel for FSR.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The complete Main Engine overhaul shall be carried out according to the manufacturer's instructions (Caterpillar) and inspected by the Chief Engineer & TCMS Inspector.

3.1.2 The Contractor shall assist only / as directed by the Caterpillar FSR.

3.1.3 The Contractor shall arrange for TCMS inspections as directed by the C/E.

3.1.4 Parts required:

Parts shall be Owner Supplied.

Parts for complete rebuild instock at owners facility.

3.2 Location

3.2.1. E/R

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer AND TCMS Inspector.

4.2 Testing

All performance tests after service shall be according to Caterpillar FSR, Chief Engineer and TCMS Inspector.

4.3 Certification

FSR shall be Cat 3600 Series certified contracted by CCG.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The contractor must supply 3 copies of a detailed report in electronic format on the work performed on the Main Engine by the Caterpillar FSR.
- 5.2 Spares
N/A
- 5.3 Training
N/A
- 5.4 Manuals
N/A

#2 S/S GENERATOR JACKET WATER COOLER CLEANING**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to clean the and pressure test the jacket water cooler for #2 generator, fitted into the port sea chest. The top flange at sea chest shall be inspected and repairs made if needed. There is rust build up on the aft side that has to be determined if it is from the gasket or failure of the steel. This shall be covered by PWGSC 1379 action.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1** The cooler is made by NRF Engineering, type U725 FAS 45, and has the serial # 87.1386, 1A. Its performance is rated at 43 M³ at 6 bar.

2.2 Standards

- 2.2.1** All work performed on the cooler shall be in accordance with the manufacturers specifications / Chief Engineer.
- 2.2.2** The contractor shall meet the manufacturer's instructions for the maintenance performed on the boiler. The Ship's ISM hot work, confined space entry, fall protection, and lock out procedures must be adhered to.

2.3 Regulations

- 2.3.1.** This vessel is regulated by Transport Canada and all work performed on this unit shall be approved by and subjected to the inspection of the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

- 2.4.1.** The contractor shall supply all materials, equipment, labour and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1.** The cooler must be disconnected from #2 ship's service generator cooling system, removed from the port sea chest for cleaning and testing.
- 3.1.2.** Number 2 generator shall have to be locked and tagged out prior to any work being performed. The jacket water heater must be isolated for the generator by ship's crew and the 400 liters of jacket water must be drained by the contractor and properly disposed of by the contractor to shore facilities.
- 3.1.3.** The contractor shall remove all the piping and valves to gain access to the cooler.
- 3.1.4.** The cooler shall be let go from the bedding and hoisted up by the contractor for repairs.
- 3.1.5.** The contractor shall disassemble the cooler and clean the tubes internally and remove the marine growth externally. The contractor will clean the cover, studs, and nuts from rust and paint, and shall apply an anti-sieze compound on these items when re-securing.
The steel top flange at sea chest shall need to be inspected and repairs / corrective action determined. All areas of the top flange shall need to be tooled clean of rust and paint for inspection. Cost of repairs shall be covered by PWGSC 1379 action.
- 3.1.6.** The contractor must clean the sealing surfaces of the cooler to the sea chest and install a new contractor supplied gasket when returning.
- 3.1.7.** The cooler shall be inspected by TCMS and the Chief Engineer.
- 3.1.8.** The contractor must apply a 6 bar hydrostatic pressure on the cooler and allow it to set for 2 hours.
- 3.1.9.** The contractor shall then reassemble the cooler and install back into port sea chest. The contractor shall reconnect all the pipes and valves that were let go to remove the cooler.
- 3.1.10.** Once all the connections are made, the engine shall be re-filled with fresh water by the contractor and test run before adding the treatment by the ship's crew. Any leaks found shall be repaired by the contractor at their expense.

3.1 Location

- 3.2.1.** The jacket water cooler is fitted in the port sea chest at approximately frame 30.

3.2 Interferences

- 3.3.1.** The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All the work must be completed to the satisfaction of the Chief Engineer and TCMS surveyor.

Testing

- 4.2.1** The cooler must be tested and determined to be leak free at 6 bar.
- 4.2.2** The unit and all the connections shall be tested for leaks once it is back in place and the engine is filled with water and test run.
- 4.2.3** The flange of the cooler will be tested for leaks once the ship is returning to the water.
- 4.2.4** The entire operation of the cooler and the efficiency will be determined once the ship is in the water and the generator is loaded up and running with no over-heating issues, during the dock and sea trials.

4.3 Certification

- 4.3.1** N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor must supply 3 copies of a detailed report in electronic format on the cooler findings, the work performed, and the condition of the cooler as left.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

CCGS TELEOST		2017	VERSION 1
Spec item #: E - 7	SPECIFICATION		TCMSB Field #: N/A
IMPRESSED CURRENT SYSTEM			

Part 1: SCOPE:

- 1.1** The intention of this specification is for the contractor to obtain the services of a Cathelco FSR to inspect, repair, and adjust the parameters of the impressed current system, to ensure the vessel is receiving the best possible protection.
- 1.2** During a previous drydocking, the FSR determined a problem with one of the cells and by-passed it at that time. The FSR shall make repairs to this cell before the vessel is undocked.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** The contractor can refer to the CCGS Teleost Instruction manual for the C-Shield ICCP panel, kept in the Engineer's Office onboard the ship.
- 2.1.2** The Teleost is fitted with a Cathelco C-Shield ICCP Panel. It has the serial # 33559/A, and is connected to a 440 V, 3 Ph, 60 Hz input power supply. The output from this system is rated at 100 Amps.

2.2 Standards

- 2.2.1** All work performed on this system is do be done in accordance with the Cathelco FSR.

2.3 Regulations

- 2.3.1.** This ship is regulated by Transport Canada and all work performed must be approved by and is subjected to the inspection of the attending TCMS Inspector.

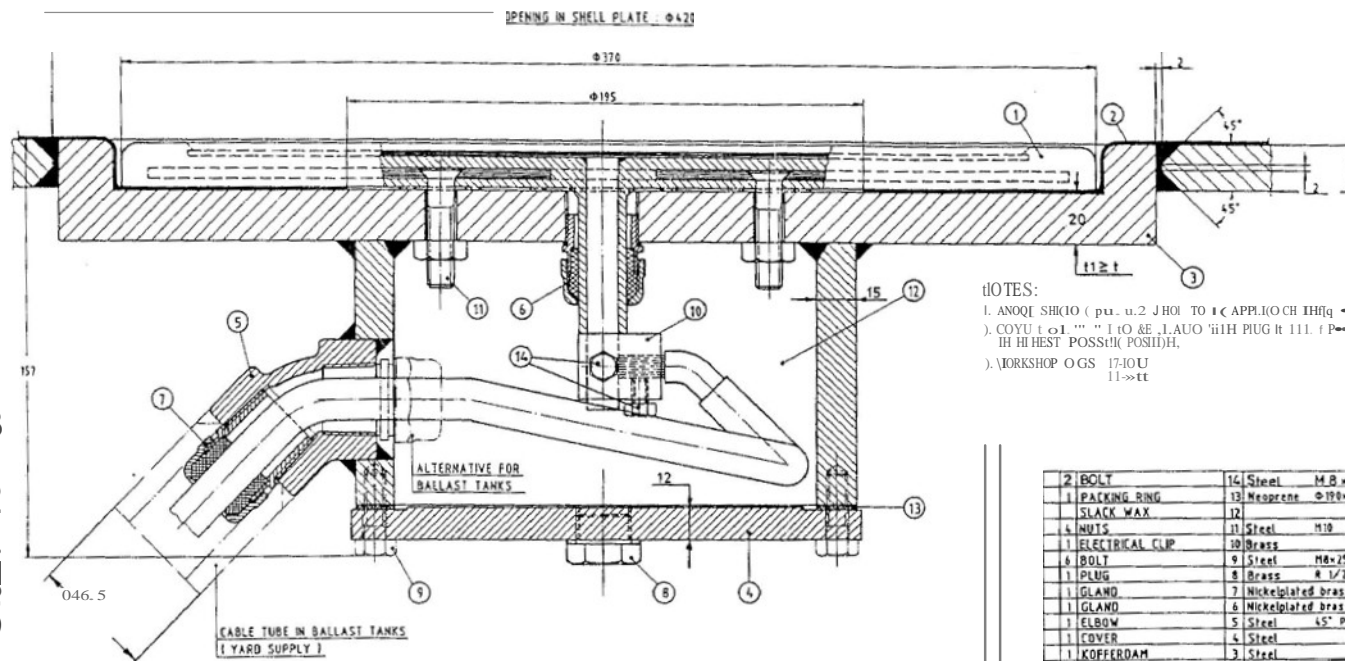
2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

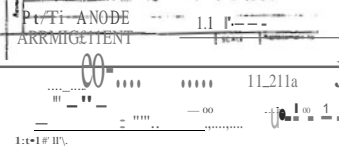
- 3.1.1** The contractor shall quote \$5000.00 for the FSR to supervise inspection of the impressed current system and to supply written reports. Martin Yeatman, from Halifax, is the authorized FSR @ (902) 464 8896 or (902) 488 4119 (email: martiny@ns.sympatico.ca).
- 3.1.2** The contractor shall remove the covers from the connection compartments to gain access to the anodes and electrodes. The contractor shall clean the compartments of all wax compounds. The contractor shall clean the sealing faces and install new contractor supplied gaskets on reassembly. The contractor shall quote \$2,000 allowance for the supply / install of new wax to be adjusted up or down by PWGSC 1379 action.
- 3.1.3** The contractor shall disconnect the two anodes and two electrodes and replace with new owner supplied units. The contractor shall replace all the watertight glands with new glands.
- 3.1.4** The contractor shall remove the old and reinstall the Naviguard Anode Shield ICCP Epoxy according to drawing 17-2118 and the anode shield technical data sheets. The contractor shall adhere to the technical information contained in these items. Some of the main items to follow are sandblasting SA 2-1/2 (ISO 8501-1:1988/SS 055900), thickness per coat, min and maximum temperatures and the times between priming and coatings. The contractor shall apply two coats of paint the same color as existing to the affected area.
- 3.1.5** The compartments shall be refilled with wax on the permanent anodes, and with vara 5200 on the reference electrode.
- 3.1.6** The reference electrode is shown next page.



NOTES:

1. ANODE SHIELD (put u. 2 J Hoi TO 1 C APPLI OCH IHf q - US - U (4
2. COYU L o 1 " " I (O & E . 1 AU O "iH PUG R 111. (P - - 1)
3. IH HIGHEST POSSIBLE POSITION.
4. WORKSHOP OGS 1740 U
5. 11 - 11

2 BOLT	14 Steel	M 8 x 20
1 PACKING RING	13 Neoprene	Ø 190 x 160 x 2
1 SLACK WAX	12	
4 NUTS	11 Steel	M 10
1 ELECTRICAL CLIP	10 Brass	
6 BOLT	9 Steel	M 8 x 25
1 PLUG	8 Brass	M 1/2"
1 GLAND	7 Nickelplated brass	Pg 21 MP1
1 GLAND	6 Nickelplated brass	Pg 21
1 ELBOW	5 Steel	45° Pg. 21 MP1
1 COVER	4 Steel	11 1/2"
1 KOPFERDAM	3 Steel	
1 ANODE SHIELD	2 Haviguard pure epoxy anode	
1 Pt/Ti ANODE	1 Vulcanized in rubber holder	



This drawing remains confidential. It is not to be distributed outside the company. Only the company can provide the original drawing. It is not to be used for any other purpose without the company's permission.

Corrosion

NO: 11 JAY

3.2 Location

- 3.2.1** The permanent anodes are located between frames 33-34 on the port and starboard sides.
- 3.2.2** The reference electrodes are located frame 70-80 on the port sonar compartment, and the other is fitted between frames 17-18 on the starboard side of the engine room.

3.3 Interferences

- 3.3.7** The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All the work must be completed and proven to the satisfaction of the Chief Engineer, TCMS surveyor, and the FSR from Cathelco.

4.2 Testing

- 4.2.1** The operation of the Impressed Current System shall be tested once the vessel is returned to the water, for correct operation and leaks at each anode.

4.3 Certification

- 4.3.1** N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor must supply 3 copies of a detailed report in electronic format on the system findings, the work performed, and the condition of the system as left.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

Spec item #: E-8	SPECIFICATION	TCMSB Field #: N/A
CLEANING OF E/R & B/T BILGES		

Part 1: SCOPE:

1.1 The intention of this specification is for the contractor to remove all debris of rust, oil, tools, rags and all other foreign materials from the bilge areas in the main engine room and the bow thruster compartment on the Teleost. Once all the solid waste is removed, a pressure washer of at least 3000 psi must be used in conjunction with hot water to wash the entire bilge areas back to a common point and to be removed via vacuum truck. The mixture of waste water must then be disposed of in accordance with local regulations. The contractor shall include in the quote the cost to remove **20,000 liters** of bilge waste water and oily residue from the bilge areas for the purpose of cleaning. This amount shall not be part of the amount given in the preamble/services and shall be adjusted up or down by 1379 action with receipts.

1.2 This work shall be completed near the end of refit after all relevant work has been completed.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

2.1.1 The contractor can use the General Arrangement 4192-4000 drawing as a guideline to the location and size of bilge area..

2.2 Standards

2.2.1 All work must be completed in compliance with the latest standards relating to ship repair. The contractor must ensure the hot water does not enter electrical equipment above the deck plates while performing this work.

2.2.2 The ship's ISM Hotwork, Confined Space Entry, Fall Protection, and Lock-out must be adhered to at all times.

2.3 Regulations

2.3.1 This ship is regulated by Transport Canada and all work must be completed to the satisfaction of the attending surveyor.

2.3.2 All waste water and oil coated debris must be disposed of by the contractor, at the contractors expense, in accordance to local laws and regulations.

2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1 The contractor shall arrange the vacuum truck to be on hand while performing this operation.
- 3.1.2 All the deck plates in the engine room and bow thruster compartment shall be lifted and all bilge water removed by the vacuum truck prior to beginning the removal of the solid debris.
- 3.1.3 Once the bilge water is removed, the contractor must remove all rags, rust, and accumulated solid waste between the framing and webs in the wells and bilges.
- 3.1.4 Once the solid waste is removed, and it has been inspected by the Chief Engineer, the high pressure wash can begin.
- 3.1.5 The contractor shall start at the forward end of the bilge area and wash toward the aft end, taking care to clean out lightening holes and drain holes. The contractor shall use at least 3000 psi hot water and have the vacuum truck removing the waste water as it's being applied.
- 3.1.6 The Contractor shall adequately protect the engine room bilge levels and all other electrical items / equipment from this process and if damaged as a result of this work by the contractor, it shall be repaired at the contractors expense.
- 3.1.6 Once the engine room bilge is complete, the contractor can complete the bilge area in the bow thruster compartment.
- 3.1.7 The contractor shall ensure all applied water is removed and the bilge areas are clean of debris and oil.
- 3.1.8 Once the bilges are cleaned and inspected by the Chief Engineer, the contractor shall return all the lifted deck plates and secure them in a manner as found.

3.2 Location

- 3.2.1 The engine room bilge runs from frames 10-34 and is situated in the main engine room of the ship.

- 3.2.2 The bow thruster compartment bilge runs from frames 82-88 and is situated below the tank top deck.

3.3 Interferences

- 3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1 All work shall be performed to the satisfaction of the Chief Engineer.

4.2 Testing

- 4.2.1 N/A

4.3 Certification

- 4.3.1 N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer indicating the condition of the work performed, any parts used and the condition as left.

5.2 Training

- 5.2.1 N/A

5.3 Manuals

- 5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: E-9	SPECIFICATION	TCMSB Field #: N/A
PIPING RENEWALS		

Part: 1 SCOPE:

1.1 The intent of this specification shall be for the Contractor to renew the sections of piping

- a. Fwd processing water pump discharge line (Galvanized Steel)
- b. Aft processing water pump discharge line (Galvanized Steel)
- c. Ballast manifold transition piece (Galvanized Steel)
- d. Evaporator ejector standby feed line (Copper)

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1

2.2 Standards

2.2.1 Piping shall be continuous weld, Schedule 40, Plain Ends, Galvanized Steel, ASTM A-53, Grade "A" or Copper schedule K, silver soldered as per original.

2.2.2 All work must be completed in compliance with the latest standards relating to ship repair. The new pipe shall be subjected to a water pressure test prior to installation and must be leak free.

2.2.3 The ship's ISM Hotwork, Confined Space Entry, Fall Protection, and Lock-out must be adhered to at all times.

2.3 Regulations

2.3.1 This ship is regulated by Transport Canada and all work shall be completed to the satisfaction of the Chief Engineer.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1 The Contractor shall remove the 4 only sections of piping as specified below.
 - 3.1.2 Bolts / nuts shall be cleaned and anti seize used when refitted.
 - 3.1.3 New gaskets shall be supplied / installed where fitted.
 - 3.1.4 Piping shall be continuous weld, Schedule 40, Plain Ends, Galvanized Steel, ASTM A-53, Grade "A" or Copper schedule K, silver soldered as per original.
 - 3.1.5 New piping shall have 1 coat prime & 1 coat white paint.
- 3.1.6 a. Fwd processing water pump is located in the engine room stbd side of main engine. Pipe to be replaced between pump and isolation valve.



- b. Aft processing water pump is located in the engine room stbd side of main engine. Pipe to be replaced between pump and isolation valve complete with fitted "T".



- c. Ballast manifold transition piece is located at ballast manifold forward lower engine room. To be renewed from fitted 4 bolt rectangular flange on manifold to flange. Flange at ballast manifold will have to be supplied by contractor.



- d. Evaporator ejector standby feed line is located at evaporator between ejector pump and evaporator. The copper line is to be renewed from elbow at deck to and include the isolation valve.



3.2 Location

- 3.2.1 The specified piping is situated in the engine room as detailed.

3.3 Interferences

- 3.3.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage, and refitting to the vessel. Any disturbed systems shall require shipboard lockouts and testing upon completion.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1 All work shall be performed to the satisfaction of the Chief Engineer.

4.2 Testing

- 4.2.1 The new pipes shall be pressure tested prior to reinstallation and again when system is put back in operation. Any other systems that have need for piping removal in order to access the bilge piping will also have to be proven operational without leaks after re-installation.

4.3 Certification

- 4.3.1 All welders must be CWB certified.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1 The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer indicating the condition of the work performed, all parts used, systems involved, tests completed and the condition as left.

5.2 Training

- 5.2.1 N/A

5.3 Manuals

- 5.3.1 N/A

Spec item #: E-10	SPECIFICATION	TCMSB Field #: N/A
AFT MAIN DECK FUEL OIL VENTS & HYDRAULIC PIPING RENEWAL		

Part 1: SCOPE:

- 1.3** The intention of this specification is for the contractor to remove / renew the 10 only Aft Main Deck Fuel Oil Vents and Hydraulic Piping Vents spools from flange to flange as specified on drawing MSI 2740-02-01.

Part 2: REFERENCES:**2.5 Guidance Drawings/Nameplate Data**

- 2.5.1** Reference drawing by MSI 2740-02-01
(STEEL RENEWALS IN WAY OF AFT MAIN DECK FUEL OIL VENTS AND HYDRAULIC PIPING)

Standards

- 2.5.2** The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.5.3** The Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E) and all welding shall be as per specification preamble. All steel work to be performed by CWB Certified welders using approved procedures.
- 2.5.4** All welding / welders shall conform to the following standards / certification: CSA W59-03 (R2008): welded steel construction. CSA W47.1-09: certification of companies for fusion welding of steel.
- 2.5.5** All repairs to follow the IACS no. 47 Shipbuilding & Repair Quality Standard.

2.3 Regulations

- 2.3.1** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection by the attending TCMS surveyor.

2.4 Owner Furnished Equipment

- 2.4.1** The contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1 The Contractor with the assistance of the ship's crew shall ensure all lockouts are fitted.
- 3.1.2 The Contractor shall remove any interference items to gain access to required areas.
- 3.1.3 The contractor shall contact the C/E before any work commences.
- 3.1.4 The Crew shall have F/O and H/O transferred from all tanks prior to work commencing.
- 3.1.5 The contractor shall bid on removing residual F/O from all the F/O tanks and Hydraulic Oil tanks pertaining to this work. Contractor shall bid 1000 litres in each tank and additional litres shall be adjusted up or down by PWGSC 1379 action.
- 3.1.6 The contractor shall certify/gas free all tanks and thoroughly clean the internals of the tanks both before and after work is completed. All cleaning equipment and waste shall be collected and properly disposed of by the contractor.
- 3.1.7 The contractor shall remove the manhole covers and gaskets from the tanks identified. The sealing surfaces will be cleaned on the covers and the ship's tanks side. The threaded studs shall be cleaned from rust and paint. Following the completion of the work, the covers will be fitted with new, contractor supplied 3/16" neoprene gaskets and the studs coated with moly cote and the nuts secured.
- 3.1.8 The contractor must ensure that all the tank transducers are kept free from debris and not damaged during the work / cleaning process. The transducers are extremely sensitive and should be protected at all times.
- 3.1.9 All vents **must** be removed from each of the tanks/spaces **prior** to any work commencing, opened, cleaned, and proven operational and inspected by the Chief Engineer and TCMS prior to securing back to the tank. The Contractor shall re-install the (proven correct operational) vent heads after tank testing is complete.
- 3.1.10 The contractor shall be responsible for the disassembly of all tank save-alls / web frames in way of piping renewals and the reassembly of said save-alls / web frames after completion of all renewals.
- 3.1.11 The contractor shall remove / renew a total of 10 tank vent pipe spools from flange to flange as specified on drawing (Emerg.Gen F/O, #7 F/O Day tk, #9 F/O port, #8 void port, #8 void stbd, #9 F/O stbd, #7 F/O Sett and 3 only hydraulic oil). Note: #8 voids P&S are already in spec item HD9 for Tank Cleaning / Inspection and HD-10 Tank Testing..
- 3.1.12 The contractor shall remove / renew 1 only Doubler plate & 6 only pipe collars as specified on drawing.

- 3.1.13** All new steel shall be Grade 44W or equivalent. Contractor shall provide steel Mill certificates prior to start of repair.
- 3.1.14** All new piping (spools) shall be continuous weld, schedule 40, plain ends, galvanized steel, ASTM A-53 Grade "A".
- 3.1.15** All new flanges shall be #150, galvanized steel, raised face, slip-on welding.
- 3.1.16** All new Pipe Collars shall be Sch 120, 4" & 5" dia., 4" long as specified on drawing.
- 3.1.17** New Doubler shall be ½" as specified on drawing.
- 3.1.18** All welding shall be subject to 100% MPI Testing.
- 3.1.19** All work shall be completed to the satisfaction of the C/E & TCMS.
- 3.1.20** Upon completion of work and once the tanks/spaces are accepted by TC, the tanks/spaces shall be air pressure tested (3 PSI) by the Contractor and witnessed by TC.
- 3.1.21** Main Deck coatings shall be re-applied in way of this work as per the existing vessel coating specification. Piping shall have one coat primer, one coat white paint after installation.
- 3.1.22** The contractor shall be responsible to schedule TCMS at the required steps during completion of work.

3.2 Location

- 3.2.1** Located at Main Deck Aft, Port & Stbd.

3.3 Interferences

- 3.3.1** The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel any interference items preventing adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work must be performed to the satisfaction of the Chief Engineer & TCMS.

4.2 Testing

- 4.2.1** All Welding subject to 100% MPI Testing.
- 4.2.2** Upon completion of the work covered in this specification, the tanks affected by the repair shall be pressure tested to 3 PSI to the satisfaction of the C/E and TCMS.

4.3 Certification

- 4.3.4** Welders names and Welding certification shall be provided.
- 4.3.5** All new steel shall be Grade 44W, contractor shall provide Mill certificates.

Part 5: DELIVERABLES:

5.5 Drawings/Reports

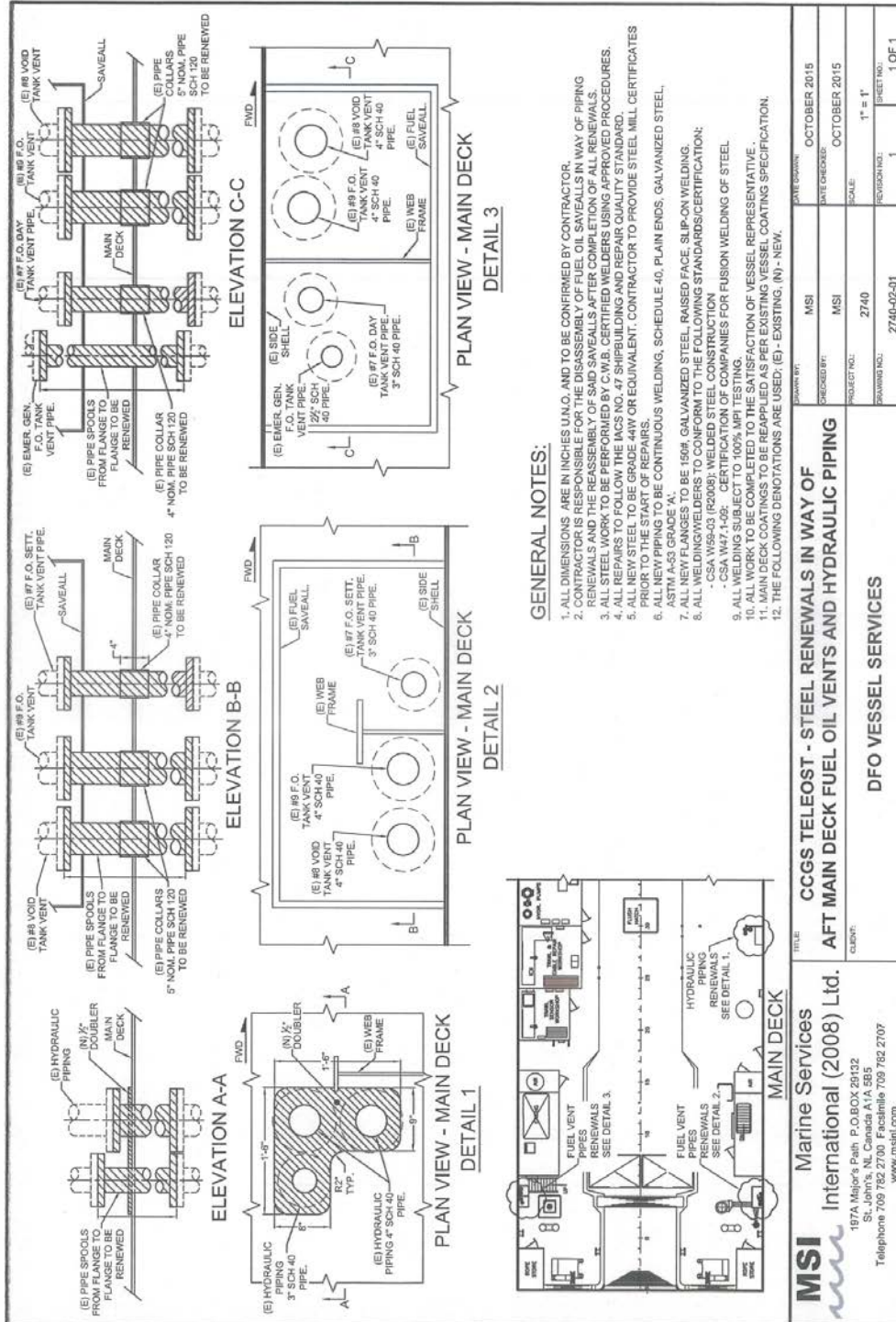
- 5.1.1** The contractor shall provide a detailed report in electronic format on the findings and work completed and pressure tests performed, any leaks detected and repaired.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A



Spec item #: E-11	SPECIFICATION	TCMSB Field #: N/A
DOCK / SEA TRIALS (VIBRATIONS)		

Part 1: SCOPE:

- 1.1 The intent of this specification is to have the Contractor onboard to perform a minimum of three hours dockside trials, and six hours of continuous sea trials.
- 1.2 The intention of the dock trials is to run up the affected machinery during the past refit (M/E Lo-Rez Mounts & Coupling) to operating temperatures and pressures, check for abnormal vibrations and temperatures, record operating parameters from the main gearbox and main engine. The load is limited on the main engine while at the dock to ensure no damage to the propeller, kort nozzle, or rudder occurs.
- 1.3 The intention of the sea trial is to run for 4 hours at 700 rpm, and 2 hours at 850 rpm, with the maximum pitch permitted on both speeds.
- 1.4 During the sea trials the Contractor shall obtain the services of P and M Mechanical to measure and record the vibration of the ship at 0 and 100% pitch at both the 700 and 850 rpm speeds. The Contractor shall include in their bid an allowance of \$5000 for P&M Mechanical to perform this work after the M/E Lo-Rez Mounts and Coupling are replaced.

Part 2: REFERENCES:

- 2.1 **Guidance Drawings/Nameplate Data**
 - 2.1.1 The location of vibration readings taken shall be in the same area as the previous years, according to the copy of the report held by the Chief Engineer.
- 2.2 **Standards**
 - 2.2.1 N/A
- 2.3 **Regulations**
 - 2.3.1 This ship is regulated by Transport Canada and all work must be approved by them, and subjected to the inspection of the attending TCMS Surveyor and Chief Engineer.
- 2.4 **Owner Furnished Equipment**
 - 2.4.1 The Contractor shall supply all materials, equipment, labor, and parts to perform the specified work unless stated otherwise.

Part 3: TECHNICAL DESCRIPTION:

- 3.1 **General**
 - 3.1.1 The Contractor shall ensure there are sufficient personnel onboard to attend to/repair any faults directly related to the equipment worked on by the Contractor during the refit.

STERN TUBE, TAILSHAFT AND PROPELLER INSPECTION**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to remove the propeller and tailshaft to enable TCMS to inspect the various components, repair any damaged areas, replace the shaft seals, and reassemble the package in good order.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1.** Refer to Wichmann 9AK0269AS4 Shafting Arrangement.
- 2.1.2.** Wichmann 9PR4-13A/BS3 Propeller Hub
- 2.1.3.** Tenjford steering gear Type 12 M 240/2GM 435

2.2 Standards

- 2.2.1.** All the work performed in this area must be in accordance with the latest standards in ship building and repair procedures.

2.3 Regulations

- 2.3.1.** This ship is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection of the attending TCMS inspector.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1** The contractor shall allow \$50,000.00 for the acquisition of a FSR to supervise all work carried out in this specification. The contractor is responsible for arranging the visit of the FSR and shall schedule him through Wartsila Canada and coordinate the propeller, stern tube, and tailshaft at the same time. The allowance is for the cost of the FSR only, and will be adjusted with proof of invoices.

- 3.1.2** To avoid delays at the end of the dry-dock, the contractor must start this work right away.
- 3.1.3** Poker gauge readings will be taken on the propeller shaft bearings and three copies of the type written readings will be handed to the Chief Engineer. The contractor must remove and store in a safe place the grounding gear on the tailshaft. The contractor must reconnect the grounding gear once everything is put back in place, and test the integrity of the grounds.
- 3.1.4** The stern tube and propeller hub use a common oil system, and must be drained by the contractor once the rope guard is removed and plug taken out. The oil must be disposed of by the contractor.
- 3.1.5** The contractor shall include in the cost the price to fabricate and install a new rope guard complete with rope cutters, to be positioned as existing one.
- 3.1.6** The contractor will disconnect the tailshaft flange from the reduction gearbox following section 4.2 in the manufacturer's instruction. The contractor will remove the propeller and tailshaft and transport it to and from the contractors shop.
- 3.1.7** The contractor shall remove the temperature sensor from the stern tube bearing oil and replace with a new one. The operation of the sensor will be confirmed during sea trials. The new sensor will be supplied by Coast Guard and confirmed for accuracy during the sea trials where the temperature will be recorded every 30 minutes.
- 3.1.8** The contractor will arrange the visit of the attending TCMS surveyor and inform the Chief Engineer that the various components are opened for inspection. The contractor will supply the Chief Engineer with three type written copies of the clearances and readings recorded.
- 3.1.9** The contractor must remember to disconnect the push/pull rod for the CPP system prior to removing the propeller blades, because the blades support the crank rings when removing the crank block as indicated in the instructions in the propeller instructions.
- 3.1.10** The contractor shall remove the propeller hub from the tailshaft and the blades from the hub. The hub must be fully disassembled and laid out in an orderly fashion for inspection by TCMS and the Chief Engineer.
- 3.1.11** The contractor must include in the quote, the cost to perform die penetrant NDT tests on the shaft flange radius where the propeller is secured.

- 3.1.12** The contractor must include in the quote, the cost to send 4 blades to Atlantic Propeller Repair for pitch testing, balancing and dressing.
- 3.1.13** The contractor must clean all parts, hub, nuts, bolts and blades. The contractor will measure and replace any worn parts that are outside the tolerance as indicated in the manual or the FSR. Three copies of the measurements must be delivered to the Chief Engineer.
- 3.1.14** The contractor will reassemble the propeller hub and blades in good working order and re-install on the tail shaft. The contractor will remove the zinc anode from the hub and replace with a new.
- 3.1.15** The contractor will chuck the shaft in a lathe to confirm trueness. The contractor will perform the necessary tests as directed by the FSR or TCMS. The contractor will record the results of these tests and deliver to the Chief Engineer in triplicate.
- 3.1.16** The contractor will check the tailshaft at 12" intervals with the dial indicator. The contractor will check the tailshaft in the areas of the forward and aft sterntube bearings are installed and the areas of the seals. The contractor will take measurements at 90 degrees from each other, record the results on a drawing and hand to Chief Engineer in triplicate.
- 3.1.17** Once all the work is performed on the propeller and tailshaft, and inspected by TCMS, the contractor will install the propeller and tailshaft as per section 4.2 in the manufacturer's instructions and reconnect the tailshaft to the reduction gearbox. The alignment of the tailshaft to the gearbox must be confirmed prior to coupling together.
- 3.1.18** The contractor will fill the system with Petro Canada Super Plus 30 oil. The contractor will drain and refill the system with oil as directed by the FSR. When filling the system, the hub will be vented to prevent air from getting trapped.
- 3.1.19** The contractor will keep the system at the maximum operating pressure for four hours before undocking. The contractor will ensure there is a dockyard person in attendance checking for leaks during this period of time.
- 3.1.20** The full function tests of the propeller will be performed by the contractor and witnessed by the Chief Engineer and TCMS to ensure correct operation and leak free.

3.2 Location

3.2.1.

3.2 Interferences

- 3.3.1.** The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel, all interference items preventing the adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work must be completed to the satisfaction of the Chief Engineer, and TCMS surveyor.

4.2 Testing

- 4.2.1** A full function test must be performed on the equipment once re-installed, and again at dock and sea trials when the vessel is returned to the water.

4.3 Certification

- 4.3.1** N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor must supply detailed work reports on the findings, measurements taken, and the repairs executed.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

CCGS TELEOST		2017	VERSION 1
Spec item #: ED-2	SPECIFICATION		TCMSB Field #: N/A
STERN TUBE BEARINGS			

Part 1: SCOPE:

2.2.1 The intention of this specification is for the contractor to remove the forward and aft stern tube bearings, have them re-babitted, machined to correct dimension, and re-install. This work has to be performed in conjunction with the propeller shaft removal.

2.2.2 The FSR from Wartsila will supervise the bearing replacement. The contractor will allow \$25,000.00 for the transportation, rebabitting, and machining the bearings and it will be paid by proof of invoices.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.2 Standards

2.2.2. All the work performed in this area must be in accordance with the latest standards in ship building and repair procedures.

2.3 Regulations

2.3.1. This ship is regulated by Transport Canada and all work performed must be approved by, and subjected to, the inspection of the attending TCMS inspector.

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1 The same FSR for the tailshaft and propeller can be used for the bearing replacement.

3.1.2 The contractor will measure and inspect the after and forward stern tube bearings in the stern tube. The readings must be presented to the Chief Engineer, TCMS and the Wartsila FSR to determine the appropriate action.

3.1.3 The contractor shall quote separately the removal and replacing of the stern tube bearings.

3.1.4 The contractor shall take bore measurements of the stern tube housing for the forward and aft bearings. There shall be two readings taken in each bore, separated by 90 degrees. The measurements will be passed to the Chief Engineer in triplicate.

3.1.5 The contractor must keep in mind that there are RTD's in the bearings and care must be taken not to break the sensors.

3.2 Location

3.2.1. The babbitt bearings are fitted inside the stern tube and are installed on the forward and after ends.

3.3 Interferences

3.3.1. The contractor is responsible for the identification, removal, temporary storage, and refitting to the vessel, all interference items preventing the adequate access to the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work must be completed to the satisfaction of the Chief Engineer, and TCMS surveyor.

4.2 Testing

4.2.1 The temperatures of the bearings will be closely monitored during the dock and sea trials once the vessel is returned to the water.

4.3 Certification

4.3.1 The contractor must provide the certificate of the babbitt used in the remanufacturing of the bearing from Canadian Babbitt.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor must supply a detailed report on the conditions of the bearings as found, the work performed and the condition as left.

5.2 Training

5.2.1 N/A

5.3 Manuals

Part 1: SCOPE:

- 1.1** The intention of this specification is for the contractor to lower the rudder to the dock, have it inspected by Transport Canada, perform any repairs required, and re-install in good working order.
- 1.2** The FSR for the steering gear will be available to supervise the tasks performed on the rudder.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1** The contractor can refer to the information in the Barkemeyer-Sciffstechnik GmbH manual.
- 2.1.2** Barke rudder parts list Drawing BRB 24-40-15/20 102 87 03
- 2.1.3** Barke rudder installation Drawing BRB 24-40/20 102 87 01

2.2 Standards

- 2.2.1** All work performed on the rudder shall be in accordance with the latest standards in ship building and repair practices.
- 2.2.2** The ship's ISM Hotwork, Confined Space Entry, Fall Protection, and Lock-out must be adhered to at all times.

2.3 Regulations

- 2.3.1** This vessel is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection of the attending TCMS surveyor.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:**3.2 General**

- 3.1.1** The contractor will inform the Chief Engineer on all findings and the general condition of the rudder and mechanical parts.

- 3.1.2** The clearances on the rudder and bearings must be taken and recorded prior to removing the rudder. The contractor will measure the clearance between the pintle bush and the rudder trunk in the forward and athwart ship directions. The contractor will also measure the clearances between the jumping collar and the hull. These readings are to be type written and handed to the Chief Engineer in triplicate.
- 3.1.3** The contractor will remove the rudder from the vessel and perform all the inspections and measurements. The contractor shall remove all drain plugs from the rudder and flap, along with any inspection covers prior to dropping the rudder to the dock.
- 3.1.4** The contractor will inspect the pintles and bushing on the aft flap on the end of the rudder. The contractor will also check the operating linkage of the flap and lubricate as required. Any suspect areas, damage, or wear must be reported to the Chief Engineer.
- 3.1.5** The contractor will clean up the threads on the rudder and flap pintles, in preparation for re-installation.
- 3.1.6** The contractor will include in the quote an allowance of \$20,000.00 for the machining required on the flap, pintles, and replacing the 316 stainless steel liner on the rudder stock. The contractor must produce the certificate for the stainless steel and provide three copies of the measurements of the new sleeve.
- 3.1.7** The contractor shall allow \$5000.00 for seals and bearings which will be paid through proof of invoices. The contractor will allow \$1500.00 for the acquisition of grease to be put into the rudder stock during installation. All anodes on the rudder shall be replaced and the costs of these are covered under the specification concerning anodes. There are a total of eight.
- 3.1.8** The contractor will re-assemble the rudder in good working order.
- 3.1.9** The contractor is responsible for arranging the visit of Transport Canada Inspector and informing the Chief Engineer of this time.
- 3.1.10** The rudder and steering gear system will be given a full function test on the dock once all is complete to prove everything is o.k.
- 3.1.11** This work has to be performed in conjunction with the steering gear overhaul, the propeller and shafting and the zinc replacement.
- 3.1.12** The rudder must be coated as per the remainder of the under water hull protection.

3.2 Location

3.2.1 N/A

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work performed must be to the satisfaction of the Chief Engineer, TCMS Surveyor, and the PWGS Insepector.

4.2 Testing

- 4.2.1** The rudder and steering gear shall be given a full function test on the dock, and witnessed by TC, Chief Engineer, and the PWGS Inspector.
- 4.1.2** The operation of the steering gear will be fully tested during the scheduled sea trials after this refit.

4.3 Certification

- 4.3.1** The contractor must supply the certificates of the stainless steel used in the rudder stock sleeve, and the brass used in any bushings required.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

STEERING GEAR INSPECTION**Part 1: SCOPE:**

- 1.1** The intention of this specification is for the contractor to completely overhaul the steering gear, including the hydraulic side and the electrical motor side, for Transport Canada credits.

Part 2: REFERENCES:**2.1 Guidance Drawings/Nameplate Data**

- 2.1.1.** The system is a Tenfjord Electro-Hydraulic Steering gear with two pumps.
- 2.1.2.** It is type 12M 240/2 GM 435
- 2.1.3.** Steering gear motors are Siemens, 3 phase 1LA5163-4SA21-Z. IEC 160 M MNROE RL8A93261715001. 1MB 5 IP 54 ROT KL16 DNV 45 degrees C volt 440 Y, Amp 21.9, KW 12.6 CI F CIS .85 Hz 60 RPM 1765

2.2 Standards

- 2.2.1.** The contractor shall perform work on this unit to the standards which are acceptable in the ship building and repair procedures.

2.3 Regulations

- 2.3.1.** This vessel is regulated by Transport Canada and all work performed must be approved and subjected to the inspection by the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:**3.1 General**

- 3.1.1.** The contractor will ensure the steering gear is locked out and completely isolated prior to commencing any work on the machinery.
- 3.1.2.** The contractor is responsible for arranging the visit of the attending TCMS surveyor at key intervals and shall never place covers or proceed with work until everything is accepted by the Inspector.
- 3.1.3.** The FSR will supervise all the work by the contractor on this specification. The contractor will arrange the visit by the FSR and shall include \$50,000.00 for that purpose. The contractor will also allow \$1000.00 for the required grease in the steering gear upon reassembly. Precision EP 2 grease will be used in the steering gear. Rolls Royce is the authorized rep for this steering gear system.
- 3.1.4.** The contractor will start this work as soon as the vessel comes out of the water.
- 3.1.5.** The contractor will drain and dispose of the waste oil from the header tank and steering gear system which is approximately 245 liters of Hydrex Aw 68.
- 3.1.6.** The contractor will then proceed to lift the upper section of the carrier bearing.
- 3.1.7.** The contractor will disconnect both electrical motor, remove, disassemble, clean and bake. The motors will be reassembled using new bearings supplied by the contractor. The D.E. bearings are 6209-2RS1/C3, and the N.D.E. bearings are 6209-2RS1/C3. The megger readings must be taken and recorded prior to disassembly and again after the motors are rebuilt. The amperage of the motors shall be taken and recorded prior to removal and again once re-installed.
- 3.1.8.** The contractor shall open the maneuvering valves and replace the o-rings and springs. The contractor will dismantle the rudder actuator for inspection. Any suspect or worn parts are to be shown to the Chief Engineer and replaced when rebuilding. New seals and o-rings have been purchased and will be supplied by Coast Guard.
- 3.1.9.** The contractor will open and lay out in an orderly fashion, all the components of the port and starboard steering gear pumps. The contractor will renew the roller bearings, o-rings, and shaft seals. The contractor will clean the header tank, pump tank, and magnetic filters.

- 3.1.10.** The contractor will dismantle the upper locking ring for the rudder stock. The contractor will have to lower the rudder post before the cylinder cover can be removed. The contractor will remove the cylinder cover using the jig that is stored in the steering flat. The emergency steering pump will have to be removed before the cover can be moved to one side.
- 3.1.11.** The contractor will dismantle the three remaining locking rings. The contractor will lower the rudder stock to the dock floor. The contractor will dismantle the pistons for inspection. The contractor will lift the rudder carrier bearing and transfer it to the side. The contractor will remove the upper rudder stock seals.
- 3.1.12.** The contractor will clean the cylinder cover, carrier bearing and the lower section of the steering gear housing. The contractor will take a measurement on the wear on the rudder carrier bearing and record it.
- 3.1.13.** The contractor will inspect the cylinders and remove the partition wall. The contractor will fabricate shims for the adjustment of the carrier bearing. The contractor will make up a guiding plate for the position of the carrier bearing.
- 3.1.14.** The contractor will install new seals on the upper rudder stock. The contractor will assemble the rudder carrier bearing with new upper and lower seals. The contractor will install the partition wall with new gaco cord. The contractor will assemble the pistons with new seals and guiding rings. The contractor will install the cylinder cover in the correct position and torque all the bolts. The contractor will install an o-ring on the upper section of the carrier bearing to 0.3-0.4mm. The contractor will fit the pump units with new flange gaskets and o-rings on pressure ports.
- 3.1.15.** The contractor will lift the rudder stock to the correct vertical position and turn it to the midship position. The contractor will perform the alignment check on the rudder carrier and rudder stock (+1-0.5mm) and torque up the lower locking ring. The contractor will torque up the three remaining locking rings and install the cover plate.
- 3.1.16.** The contractor shall confirm the alignment of the steering housing and it should be within the acceptable tolerance of +/-0.15 mm.
- 3.1.17.** The contractor must then install the maneuvering valves, feed back units, and electrical motors.

- 3.1.18.** The contractor must then re-install the emergency steering gear pump.
- 3.1.19.** The contractor will fill the system with new Coast Guard supplied oil, through a filtering cart, and vent the air from the system.
- 3.1.20.** The contractor will check the relief valve setting of 80 bar and the safety valve setting of 100 bar.
- 3.1.21.** The steering gear shall be returned to full operational condition, and in good working order.

3.2 Location

3.2.1.

3.3 Interferences

- 3.3.1.** The contractor is responsible for the identification, their temporary removal, storage, and refitting to the vessel, any interference items preventing the contractor from performing the work at hand.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All the work performed must be to the satisfaction of the Chief Engineer and TCMS inspector.

4.2 Testing

- 4.2.1** The contractor shall perform full operational testing of the steering gear prior to returning the ship to the water. This will prove full function for TCMS, and ensure the system is leak free.
- 4.2.2** More testing will be performed once the ship is returned to the water, during the scheduled dock and sea trials.

4.3 Certification

- 4.3.6** The contractor will provide certificates for any substituted materials other than those obtained from the original manufacturer or FSR.
- 4.3.7** Certificates shall be provided for the testing and possible adjusting of the relief and safety valves used in the hydraulic systems.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor shall supply the Chief Engineer detailed work reports on the condition of the steering gear components prior to starting work, the work performed, and the condition left. This shall include the motors used in the steering gear system.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

CCGS TELEOST		2017	VERSION 1
Spec item #: ED-5	SPECIFICATION		TCMSB Field #: N/A
PROPELLER SHAFTING, CP SYSTEM & SHAFT SEALS			

Part 1: SCOPE:

- 1.1** The intention of this specification is for the contractor to overhaul the CP System tailshaft and to replace the Simplex seals on the forward and aft ends of the stern tube.
- 1.2** This will have to be performed in conjunction with the rudder, steering gear, propeller, and main gearbox work.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1** The Teleost was fitted with a Wichmann system in 1988 and has since been taken over by Wartsila LIPS and the installation no. is WPNO 1043 and the type is 4PR13.
- 2.1.2** The contractor can use the Wichmann shafting manual located in the Engineer's Office, onboard the CCGS Teleost.
- 2.1.3** The Teleost is fitted with Simplex Seals on the inboard and outboard sides of the sterntube.

2.2 Standards

- 2.2.1** All the work performed on this area of the ship must be in accordance with the latest ship building and repair practices.

2.3 Regulations

- 2.3.1** This vessel is regulated by Transport Canada and all work performed must be approved by and subjected to the inspection of the attending TCMS Surveyor.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1** The contractor will schedule the visit of the FSR and will be covered under the allowance in E4. The costs of the FSR will be covered with proof of invoices. The FSR is obtained through Wartsila Canada.
- 3.1.2** Prior to commencing the removal, the run out shall be confirmed on the aft seal liner, the measurements taken and recorded.
- 3.1.3** The contractor will remove the push/pull rod for inspection and cleaning. The contractor will remove the forward and after bronze bushings for the activator rod.
- 3.1.4** The push/pull or activator rod will be chucked in a lathe and checked for trueness. The contractor will check the rod every 12” with a dial indicator and record the readings. The contractor must determine the clearance between the activator rod and the bronze bushings. All the readings will be confirmed on the manufacturer’s data sheet to ensure they are in tolerance. The copies of the readings will be handed to the Chief Engineer in triplicate.
- 3.1.5** The contractor will replace all the seals and o-rings. The contractor will replace the back piston, the inner simplex seal, cast iron wear sleeve (355 mm) and the outer simplex stainless steel sleeve. The contractor will include in the bid \$25,000.00 for the machining and acquisition of new parts required.
- 3.1.6** The contractor will reassemble all the parts in good working order. The CP System will be tested and verified for correct operation, prior to undocking the vessel. The contractor is responsible for scheduling the visit of TC to witness the pitch tests. The pitch will be tested to %100 ahead and astern, and verified to be leak free.
- 3.1.7** The contractor will clean the SKF Pilgrim Nut and supply and install two new o-rings.
- 3.1.8** The CP system will also be checked during the scheduled sea trials where the contractor shall record the speed, pitch, shaft speed, gearbox pressures, and CPP pressure. These readings must be recorded every 30 minutes and be type written and delivered to the Chief Engineer in triplicate.

3.1.9

3.2 Location

3.2.1 .

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work must be performed to the satisfaction of the Chief Engineer, PWGS Inspector, and TCMS surveyor.

4.2 Testing

- 4.1.1** The pitch must be tested prior to undocking the ship, to prove it functions in all directions correctly, and there are no leaks.
- 4.1.2** There will be more elaborate testing performed during the dock and sea trials.

4.3 Certification

- 4.3.1** Any metals used in sleeves or bushings must be accompanied by certificates to prove the metals are of the correct quality.
- 4.3.2** Any welding or machining to be performed must be accompanied by proper procedures and accepted by the manufacturer's representative.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor must supply detailed work reports on the findings for the CP system, the work performed, and the condition as left.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: L - 1	SPECIFICATION	TCMSB Field #: N/A
ELECTRICAL INSULATION TEST		

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to conduct and record the insulation tests on the Generators, Motors, cables, and Heaters in the list provided in the table. This megger test must include all feeds from the panels using a Direct Indicating Ohm meter of the Generator Type, applying a DC Voltage of 500 volts.
- 1.2** The Contractor shall report to the Chief Engineer prior to any work commencing with this item.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

- 2.1.1.** Reference Drawing # MSL 4192-4130

2.2 Standards

- 2.2.1** Megger readings must be taken and recorded in accordance with normal shipboard practices and procedures, keeping in mind that UPS and electronic equipment is susceptible to damage if meggered.
- 2.2.2** The contractor must comply with TCMS regulations and to the Canada Shipping Act, along with TC's TP127E, electrical standards.

2.3 Regulations

- 2.3.1** The readings must be recorded and be acceptable according to the limits stated in the TP 127 electrical code for ships.
- 2.3.2** The report of readings must be delivered to the attending TCMS Inspector, and be accepted.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The contractor shall inform the Chief Engineer prior to commencing the megger tests and must confirm that no electronic equipment is connected or shall be damaged by the tests.
- 3.1.2.** The Contractor shall submit readings of all insulation megger tests with noted deficiencies highlighted. This shall allow all defects to be rectified by the contractor through PWGSC 1379 action.
- 3.1.3.** The contractor shall submit three signed, type written copies of the final readings to the Chief Engineer and TCMS Inspector before the completion of refit.
- 3.1.4.** The contractor shall include in the bid \$5000.00 for the tracing and repair of ground faults detected. This amount shall be adjusted up or down by PWGSC 1379 action upon proof of invoice.
- 3.1.5.** The contractor shall use the following table to complete all circuits.

Section	ID Number	Description	Application
1	P - 104	Hydraulic Arrangement No. 7	Electric Motor
1	P - 105	Hydraulic Arrangement No. 5	Electric Motor
1	P - 108	Hydraulic Arrangement No. 1	Electric Motor
2	P - 203	Stern Acoustic	Electric Motor
2	P - 204	Hydraulic Arrangement No. 6	Electric Motor
2	P - 205	Hydraulic Arrangement No. 4	Electric Motor
2	P - 208	Hydraulic Arrangement No. 2	Electric Motor
2	P - 211	Bow Thruster	Electric Motor
5	P - 504	Emergency Tie	Feed
5	P - 507	Stbd. Deck Crane	Electric Motor
6	P - 607	Transformer No. 1	Feed
6	P - 608	Steering Pump No. 2	Electric Motor
6	P - 609	Air Compressor 1	Electric Motor
6	P - 611	Distribution Panel PP1	Motor Feeds 12 Circuits
6	P - 612	Distribution Panel PP3	Motor Feeds 13 Circuits
6	P - 613	Distribution Panel PP5	Motor / Heater Feeds
6	P - 614	FRC Hydraulic Arrangement	Electric Motor
6	P - 615	No.1 Bilge & Ballast	Electric Motor
6	P - 616	HT Cooling P/P M/E	Electric Motor
6	P - 617	LP Hydraulic Feed P/P	Electric Motor
6	P - 618	Air Handling Wet Lab	Electric Motor
6	P - 618	Air Handling Dry Lab	Electric Motor
6	P - 620	Bilge Offal Pump No. 5	Electric Motor
6	P - 621	General Service P/P No. 1	Electric Motor

6	P - 622	Exhaust Fan Net Loft	Electric Motor
6	P - 623	HP Hydraulic Arrangement No. 1	Electric Motor
6	P - 624	HP Hydraulic Arrangement No. 3	Electric Motor
6	P - 626	A/C Comp. Boat Deck	Electric Motor
6	P - 627	Hot Water Pyro Boiler	Heating
6	P - 628	Standby L/O Pump Main Engine	Electric Motor
6	P - 630	Lube Oil Heater Main Engine	Heating
6	P - 631	Lube Oil Heater Main Engine	Feed
6	P - 632	Port Deck Crane	Electric Motor
9	P - 907	Transformer No. 2	Feed
9	P - 908	Scientific Winch	Electric Motor
9	P - 909	Oceanographic Winch	Electric Motor
9	P - 910	Distribution Panel PP2	Motor Feeds 11 Circuits
9	P - 911	Distribution Panel PP4	Motor/Heating Circuits
9	P - 912	Distribution Panel PP6	Motor Feeds 14 Circuits
9	P - 913	Distribution Panel PP7	Electric Motor
9	P - 914	Engine Room Supply Fan No. 1	Electric Motor
9	P - 915	LT Cooling Pump Main Engine	Electric Motor
9	P - 916	LT Cooling Pump Main Engine	Electric Motor
9	P - 917	Fuel Oil Transfer Pump	Electric Motor
9	P - 918	Auxiliary S/W Pump No. 1	Electric Motor
9	P - 919	Auxiliary S/W Pump No. 2	Electric Motor
9	P - 920	Auxiliary S/W Pump No. 2	Electric Motor
9	P - 921	Fire/ Deck Wash P/P No. 1	Electric Motor
9	P - 922	General Service P/P No. 2	Electric Motor
9	P - 923	HP Hydraulic Arrangement No. 2	Electric Motor
9	P - 924	Receptacle Fr. 30 Main Deck	Feed
9	P - 925	Scientific Freezer Compressor	Electric Motor
9	P - 926	Trawl Davit Hydraulic Pump	Electric Motor
9	P - 927	A/C Compressor Wet & Dry Lab	Electric Motor
9	P - 928	Standby L/O P/P Gearbox	Electric Motor
9	P - 929	J/W Preheat Main Engine	Electric Motor
9	P - 930	Forward Deck Crane	Electric Motor
9	P - 931	Unit Heater Control Room	Electric Motor
9	P - 932	Fish Tank Refrigeration Unit	Electric Motor
10	P - 1007	Distribution Panel PP8	Heating Feeds 5 Circuits
11	P - 1102	Navigation Light Panel HP1 Light	Light feeds 13 Circuits
11	P - 1103	Distribution Panel HP3	Heating/Lights 22 Circuits
11	P - 1105	Distribution Panel HP7	Miscellaneous Feeds 14 Circuits
11	P - 1108	General Space Heaters	Feed
11	P - 1109	Control Circuit 230V	Feed
11	P - 1110	Distribution Panel HP2	Miscellaneous Feeds 21 Circuits
11	P - 1111	Distribution Panel HP4	Miscellaneous Feeds 25 Circuits
11	P - 1112	Distribution Panel HP6	Misc. Feeds 16 Circuits
11	P - 1113	Distribution Panel HP10	Miscellaneous Feeds 3 Circuits

11	P - 1116	Lights In Engine Room	Feed
11	P - 1117	Control Circuit 230V	Feed
11	P - 1111A	Distribution Panel 1101-A	Miscellaneous Feeds 10 Circuits
12	P - 1201 A	Distribution Panel 1201 A	Miscellaneous Feeds 10 Circuits
12	P - 1202	Distribution Panel LP1	Miscellaneous Feeds 11 Circuits
12	P - 1203	Distribution Panel LP3	Miscellaneous Feeds 20 Circuits
12	P - 1204	Distribution Panel LP3	Miscellaneous Feeds 21 Circuits
12	P - 1211	Control Circuit 115 V	Feed
13	P - 1303	Steering Pump No.1	Electric Motor
13	P - 1304	Air Compressor No. 2	Electric Motor
13	P - 1305	S/W Cooling P/P 1 Main Engine	Electric Motor
13	P - 1306	Fire/Deck Wash P/P No. 2	Electric Motor
13	P - 1307	Bilge/Ballast P/P No. 2	Electric Motor
13	P - 1308	Engine Room Supply Fan No. 2	Electric Motor
13	P - 1309	Cooling Fan Aux. Arrangement	Electric Motor
13	P - 1310	Unit Heater Auxiliary Generator	Feed
13	P - 1311	Receptacle Fr. 6 Main Deck	Feed
15	P - 1503	Navigation Light Panel	Light Feeds 11 Circuits
15	P - 1503	Distribution Panel EHP2	Light Feeds 17 Circuits
15	P - 1503	Distribution Panel EHP3	Light Feeds 16 Circuits
15	P - 1503	Lights Engine Room Feed	
15	P - 1503	Rectifier Radio Station	Feed
15	P - 1503	Supply Main Engine Rectifier	Feed
15	P - 1503	Unit Heater Fan	Feed
15	P - 1503	Heating Element Auxiliary	Feed
15	P - 1503	Control Circuit 230	Feed
16	P - 1607	Distribution Panel ELP1	Miscellaneous Feeds 16 Circuits
16	P - 1610	Control Circuit 115 V	Feed
3	Q3.1	Shaft Generator	Feed
4	Q4.1	Bus Tie	Feed
7	Q7.1	No. 1 Generator	Feed
8	Q8.1	No. 2 Generator	Feed
11	P - 1101	Transformer 1 to 230V	Feed
11	P - 1118	Transformer 2 to 230V	Feed
12	P - 1201	Transformer 1 to 115V	Feed
12	P - 1218	Transformer 2 to 115V	Feed
13	P - 1301	Emergency Tie	Feed
13	P - 1302	Transformer Emerg.	Feed
14	Q14.1	Emergency Generator	Feed
15	P - 1513	Transformer to 230V	Feed
16	P - 1611	Transformer to 230V	Feed

3.4 Location

- 3.4.1.** The location of the panels and breakers can be found in the panel and breaker index binder in the MCR.

3.5 Interferences

- 3.5.1.** The Contractor shall be responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1.** All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

- 4.2.1** Any repairs to grounded circuits shall be tested by the contractor and witnessed by the Chief Engineer before it is considered complete.

4.3 Certification

- 4.3.1** N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** 3 Copies of the completed insulation tests in electronic format must be handed to the Chief Engineer, prior to the completion of refit. A COPY OF THE FINAL REPORT WITH REPAIRS COMPLETED SHALL BE SENT TO TRANSPORT CANADA BEFORE THE SHIPS ANNUAL INSPECTION IS COMPLETED.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

CCGS TELEOST		2017	VERSION 1
Spec item #: L - 2	SPECIFICATION		TCMSB Field #: N/A
ELECTRICAL THERMAL IMAGE SCAN			

Part 1: SCOPE:

- 1.1** The intent of this specification shall be to provide the Owner's Representative with a thermal image scan of the Main Switchboard, Emergency Switchboard, Generators and Transformers. The purpose of this scan is to identify and repair any electrical defects discovered in the image.
- 1.2** This work shall be carried out in Conjunction with the operation of the ship. The Chief Engineer shall be consulted well in advance of the scheduled test to ensure ample time to set up the available loads.

Part 2: REFERENCES:

- 2.1 Guidance Drawings/Nameplate Data**
 - 2.1.1** N/A
- 2.2 Standards**
 - 2.2.1** The main and emergency buses shall be scanned in accordance to and in compliance with the TCMS Inspector, and TP 127E, Ship's Electrical Standards.
- 2.3 Regulations**
 - 2.3.1** The contracted company shall use certified equipment and produce imagery that is acceptable to the Chief Engineer and TCMS Inspector.
- 2.4 Owner Furnished Equipment**
 - 2.4.1** The contractor shall supply all materials, equipment, labour and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

- 3.1 General**

- 3.1.1. The contractor shall complete a thermal image scan as per the items in the following Thermography Inspection Equipment list:

<u>LOCATION</u>	<u>EQUIPMENT</u>
Control Room	Switchboard Section 1A, 440V Distribution 1B, 440V Distribution 2A, 440V Distribution 2B, 440V Distribution 3A, Shaft Generator Controls 3B, Shaft Generator Breaker 4A, Tie Breaker 4B, Shore Power Breaker 5A, 440V Distribution 5B, 440V Distribution 6A, 440V Distribution 6B, 440V Distribution 7A, Aux Generator #1 Controls 7B, Aux Generator #1 Breaker 8A, Aux Generator #2 Controls 8B, Aux Generator #2 Breaker 9A, 440V Distribution 10A, 440V Distribution 10B, 440V Distribution 11A, 230V Control / Monitoring 11B, 230V Distribution 12A, 115V Control / Monitoring 12B, 115V Distribution
Engine Room	Aux Generator #1 (300kw load) Aux Generator #2 (250kw load) Shaft Generator (200kw load)
Transformers	#1 12.5 KVA Heating #2 12.5 KVA Heating #3 12.5 KVA Heating #4 325 KVA Shorepower #5 88 KVA #6 88KVA
Emergency Generator Room	Emergency Generator Emergency Switchboard Section 1A 1B 2A 2B 3A 3B

3.1.2. The contractor shall include in the bid \$1000.00 to correct any defects discovered during the test. This amount shall be adjusted up or down by PWGSC 1379 action.

3.1.3. The scan shall be taken with the maximum load achievable while secured alongside.

3.1.4. The contractor shall submit three signed copies of the final readings to the Chief Engineer.

3.2 Location

3.2.1 Main switchboard located in the Machinery Control Room below the lower deck between frames 23 and 34, on the port side.

3.2.2 The Emergency Switchboard is on the lower deck on the port side, between frames -5 and 3.

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

4.2 Testing

4.2.1 The Final thermal scan shall not indicate any defects once all identified problems have been corrected by the Contractor and witnessed by the Chief Engineer.

4.3 Certification

4.3.1 The contractor performing the thermal image scans shall be certified and it shall be acceptable to the Chief Engineer and the TCMS Inspector.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall deliver 3 copies of the detailed work reports to the vessel in electronic format on the thermal images taken and problem areas clearly identified. The reports shall also include corrective measures taken to resolve all issues found.

5.1.2 Once all the repairs have been completed, the contractor shall provide the Chief Engineer with an image which shall be acceptable to TCMS Inspector and not indicating any problem areas.

5.2 Training

5.2.1 N/A

5.3 Manuals

5.3.1 N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: L - 3	SPECIFICATION	TCMSB Field #: N/A
<u>SHAFT GENERATOR CLEANING AND INSPECTION</u>		

Part 1: SCOPE:

1.1 The intent of this specification is to completely overhaul and clean the shaft generator, thoroughly clean the inside of the unit, install new bearings in the generator and replace all components in good working order. **Note: This work has to be completed in conjunction with the M/E Overhaul.**

1.2 The contractor shall supply the services of a Certified Electrical Service Technician to dismantle and recondition the electrical generator.

1.3 Credits shall be obtained from Transport Canada through inspection of the attending TCMS.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1 The CCGS Teleost is fitted with a Newage Stamford shaft generator with the following data. It is type MHC 734C, and serial # P2430/1, 440 Volt, 1820 KVa, 1755 amps, 1800 rpm @ 60 Hz

2.2 Standards

2.2.1 The contractor shall adhere to the manufacturer's instruction in the overhaul of the generator.

2.2.2 ISM hotwork, Confined Space entry, and fall protection procedures are to be strictly enforced.

2.2.3 CCG Lockout Procedure.

2.2.4 The contractor shall comply with TP 127 Electrical Standards.

2.3 Regulations

2.3.1 The contractor shall comply with the TCMS regulations and the Canada Shipping Act

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

- 3.1.1.** The shaft generator is due for a 5 year inspection by TC. The contractor will adhere to the manufacturer's instruction for the overhaul, and will schedule the visit by TC to obtain credits as the work progresses. The contractor is responsible for scheduling the TCMS Inspector visits for inspection of the various stages and components. This work has to be performed along with the main engine overhaul and tailshaft removal.
- 3.1.2.** The contractor will ensure the shaft generator is totally isolated electrically and mechanically prior to commencing any work. The contractor shall rack out the breaker in the MCR to ensure there is no possible way for electricity to reverse flow. Megger readings are to be taken and recoded prior to opening up the generator for overhaul.
- 3.1.3.** When separating the coupling between the generator and gearbox, the alignment shall be taken prior to disconnect.
- 3.1.4.** The contractor will disconnect the shaft generator from the gearbox. The contractor will disconnect the wiring from the generator. The contractor will then proceed to loosen the hold down bolts, break the chock fast, and lift the generator to the next deck, near the workbench for disassembly. The contractor will disassemble and remove the shaft generator for cleaning. The contractor will perform the cleaning onboard the vessel.
- 3.1.5.** The contractor will steam clean (or equivalent process) all components of the shaft generator. The contractor must protect all electrical equipment in the area where the cleaning is to take place. The contractor must install an exhaust fan to the exterior of the ship while the cleaning is being performed. The contractor will then bake the shaft generator until the insulation readings are as per manufacturer's acceptable readings. The contractor will then VPI the generator and let it dry, as required.
- 3.1.6.** The contractor will reassemble the shaft generator on the vessel using all new contractor supplied bearings and balance the rotor. The bearings are 6317-2Z/C3 and 6228-04-165X. The contractor will allow \$3000.00 for the procurement of parts or necessary machining, to be adjusted by 1379 with poof of invoices.
- 3.1.7.** The contractor shall break down the Rato flexible coupling between the generator and P.T.O., measure the components to ensure they are within tolerance, have it inspected by Transport Canada, and rebuild it.

- 3.1.8.** The contractor shall open the skf bearing on the shaft generator shaft, have it inspected by Transport Canada, and install new seals on both ends of the bearing.
- 3.1.9.** The contractor will have the shaft generator laser aligned to the P.T.O. and the pour new chock fast to support the generator. Alignment shall be reconfirmed when the chock fast has hardened. **Laser alignment shall be done by P&M Mechanical** since they have the parameters saved on his laser alignment equipment. This can be covered in the allowance allowed in the shafting alignment by P&M Mechanical.
- 3.1.10.** The shaft generator shall be put back into service, and tested under load.
- 3.1.11.** Once the generator is run up under load, the contractor shall obtain the services of P&M Mechanical for vibration analysis on the machine to ensure it is operating within the allowable limit.

3.2 Location

- 3.2.1** The shaft generator is located above the main gearbox and propeller shaft in the engine room.

3.3 Interferences

- 3.3.1** The Contractor shall be responsible for the identification of all interference items, their temporary removal, storage and refitting to vessel.

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** The contractor shall have the TCMS Inspector and Chief Engineer carry out the inspections on the number 2 electrical generator.

4.2 Testing

- 4.2.1** The contractor shall have the shaft generator run under load for 4 hours with maximum load available and ensure there are no vibrations / overheating issues. If any faults detected, they shall be corrected by the contractor.
- 4.2.2** The contractor shall take reading every 30 minutes and record while the generator is being tested.

4.3 Certification

- 4.3.1** The contractor shall have the shaft generator fully certified by TCMS.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

- 5.1.1** The contractor shall compile 3 copies of a detailed work report on the shaft electrical generator which shall include the repairs made, measurements taken and meggar readings taken and give to the Chief Engineer.
- 5.1.2** The contractor shall provide a detailed work report on what work was done inside the generator.
- 5.1.3** The contractor shall provide a detailed report on the amount of Chock Fast required to support the weight of the generator over the area required, for Transport Canada. This should be a drawing indicating the weight of the generator spread over a certain area, to illustrate there is sufficient Chock Fast to support this installation.
- 5.1.4** Alignment readings shall be provided prior to pouring the chock fast and again after it has cured.

5.2 Training

- 5.2.1** N/A

5.3 Manuals

- 5.3.1** N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: L - 4	SPECIFICATION	TCMSB Field #: N/A
INMARSAT - B		

Part: 1 SCOPE:

- 1.1** The intent of this specification is for the removal of the Inmarsat-B Radome and for the installation of a new Sailor FleetBroad Band 500 Radome in its place.
- 1.2** This work shall be carried out in Conjunction with the following specifications:
- 1.2.1** GPS/DGPS System Specification in L-5.
- 1.3** Contractor shall supply all materials, labor, equipment and parts required to perform the specified work unless otherwise stated.

Part: 2 REFERENCES:

2.1 Guidance Drawings

Drawing Number	Description	Electronic Number
Preliminary	CCGS Teleost FBB 500 Wiring Diagram	
4192-6118	CCGS Teleost Inmarsat B Drawing	
4192-3023	Teleost Antenna Arrangement	

2.2 Standards

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** TP127E – Ships Electrical Standards
- 2.2.3** IEEE 45:2002 – Recommended Practice for Electrical Installations on Ships
- 2.2.4** Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-JA-001)
- 2.2.5** General Information for the Rules and Regulations for the Classification of Ships.
- 2.2.6** ISM hotwork, Confined Space entry, and fall protection procedures are to be strictly enforced.
- 2.2.7** CCG Lockout Procedures shall be followed.

2.3 Regulations

- 2.3.1** Canada Shipping Act, 2001

Part: 3 TECHNICAL DESCRIPTION

3.1 General

- 3.1.1** The contractor shall supply all equipment, enclosures, ventilation, staging, chain falls, carnage, slings, crane, and shackles necessary to perform the work. All lifting equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, or a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification shall be welded into place by certified welders.
- 3.1.2** Prior to any hot work taking place, the contractor shall ensure that the area of work and all equipment, wiring, transits, etc. have been sufficiently protected from any sparks or metal filings.
- 3.1.3** All cabling, once installed, shall be marked with a stamped stainless steel metal tag for all outside cabling and an appropriate label type for all inside cabling. The labels are to be securely affixed to the cable at each end and through any deck, deck heads, and/or gland penetrations with the designation for each cable as provided in this specification.
- 3.1.4** Contractor responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering to the running of any cables and mounting of any equipment.
- 3.1.5** All cabling shall follow existing cable trays throughout the vessel where fitted. Once installed, all cabling shall be secured as per TP127.
- 3.1.6** The contractor shall be responsible to ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.1.7** Prior to the commencement of any electrical work, the contractor shall ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tag out procedure. CCG Electrical Officer will confirm feeds.
- 3.1.8** Electrical isolations for AC power are as follows:
 - 3.1.8.1** HP2-4 (220 VAC) Nav. Bridge
 - 3.1.8.2** ELP1-28 (115 VAC) Nav. Bridge
- 3.1.9** Upon final installation, testing shall be carried out as per Section 4.2 of this specification item.

3.1.10 Contractor shall be responsible for the removal of equipment listed in table below.

Equipment	Location
Inmarsat-B Radome	Third Platform Main Mast above X-Band Turning Unit
Step Down Transformer (220/110 AC)	Nav. Bridge Radio Room under desk

3.1.11 Contractor shall be responsible for the disconnection and removal of cables listed in table below.

Cable Label	From	To
? RG-214 (30m)	Inmarsat MCU Nav. Bridge Radio Room	Inmarsat-B Radome Third Platform Main Mast above the X-Band Turning Unit
HP2-4 AC Power	Panel HP2 Breaker #4 Located on Nav. Bridge	Nav. Bridge Radio Room Under Desk
? AC Power	Step Down Transformer Nav. Bridge Radio Room under desk	AC Outlet Nav. Bridge Radio Room under desk

3.1.12 Contractor shall be responsible to supply and install an AC outlet box complete with single outlet in the Radio Room under the desk.

3.1.13 Contractor shall be responsible for the protection of the new cables from the weather.

3.1.14 Contractor shall be responsible for the replacement of any cables that are deemed not usable by either Chief Engineer or Technical Authority due to water ingress or damage from not properly protecting cables as stated above.

3.1.15 Contractor shall be responsible for the installation of the following equipment listed in table below. Contractor to follow proper manufacturer's instructions for the mounting and installation of the new radome.

Equipment	Location
Sailor FBB 500 Radome w/Adapter Plate	Third Platform Main Mast where the old Inmarsat-B Radome was located above the X-Band Turning Unit
AC Outlet Box c/w Single Outlet	Nav. Bridge Radio Room under desk

3.1.16 Contractor shall supply and install the following cables listed in table below.

Cable Label	Cable Type	From	To	Signal	Length (m)
SAC_ANT	LMR-400	Nav. Bridge Radio Room	Third Platform Main Mast Above X-Band Turning Unit	RF	30
ELP1-28	Marine AC Power Cable	Panel ELP1-28 Nav. Bridge	Nav. Bridge Radio Room	AC Power	5
SAC-7	Belden 1300SB	Nav. Bridge Radio Room	Nav. Bridge Forward Upper Console	Cat5e	20

3.1.17 The contractor shall work in conjunction with a Coast Guard Electronic Technician to oversee the removal of the Inmarsat-B radome located on the Main Mast to ensure compliance with applicable Coast Guard standards. Re-terminations shall be completed by CCG technicians.

3.1.18 Contractor shall be responsible to place the radome back on board the vessel and properly secure it for transit.

3.1.19 Contractor shall provide and install a new rubber gasket with matching holes to replace the existing gasket between the Inmarsat-B radome and existing mounting plate.

3.1.20 Contractor shall be responsible for the priming and painting of any surfaces that were disturbed to match existing.

3.2 Location

3.2.1 Top of Wheelhouse, Main Mast

3.2.2 Navigation Bridge Deck

3.3 Interferences

- 3.3.1** Contractor is responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel. Representative interferences will be available for viewing prior to the bidder's conference.

Part: 4 PROOF OF PERFORMANCE:

4.1 Inspection

- 4.1.1** All work shall be subject to witness by the Chief Engineer of delegate and the attending surveyor.

4.2 Testing

- 4.2.1** Electronic equipment which has been removed for the performance of this specification item shall be returned to operational condition.
- 4.2.2** Contractor is responsible to ensure all relocated equipment is in proper working order witnessed and at the satisfactory of the Chief Engineer.
- 4.2.3** All cable testing shall be verified by a Coast Guard Technician.

4.3 Certification

N/A

Part: 5 DELIVERABLES:

5.1 Drawings/Reports

N/A

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

CCGS TELEOST	2017	VERSION 1
Spec item #: L -5	SPECIFICATION	TCMSB Field #: N/A
GPS / DGPS SYSTEM UPGRADE		

Part: 1 SCOPE:

- 1.1** The intent of this specification is to remove the existing Northstar 952X GPS system and replace with a new Dual Furuno GP-170D GPS/DGPS system.
- 1.2** This work shall be carried out in Conjunction with the following specifications:
- 1.2.1** Inmarsat-B Specification L-4
- 1.3** Contractor shall supply all materials, labor, equipment and parts required to perform the specified work unless otherwise stated.

Part: 2 REFERENCES:

2.1 Guidance Drawings and Documents

Drawing Number	Description	Electronic Number
Preliminary	CCGS Teleost Furuno GP-170D Block Diagram	
4192-6142	Teleost DGPS Configuration Drawing	
4192-3023	Teleost Antenna Arrangement	

2.2 Standards

- 2.2.1** Fleet Safety and Security Manual (DFO/5737)
- 2.2.2** TP127E – Ships Electrical Standards
- 2.2.3** IEEE 45:2002 – Recommended Practice for Electrical Installations on Ships
- 2.2.4** Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-JA-001)
- 2.2.5** General Information for the Rules and Regulations for the Classification of Ships.
- 2.2.6** CWB, Welding Procedures
- 2.2.7** ISM hotwork, Confined Space entry, and fall protection procedures are to be strictly enforced.
- 2.2.8** CCG Lockout Procedures shall be followed.

2.3 Regulations

- 2.3.1** Canada Shipping Act, 2001

2.4 Owner Furnished Equipment

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

Part: 3 TECHNICAL DESCRIPTION

3.1 General

- 3.1.1** The contractor shall supply all equipment, enclosures, ventilation, staging, chain falls, carnage, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as to being, or a safe working load for the expected duties. Any brackets, mounts, or any other welded attachments required in the performance of this specification shall be welded into place by certified welders.
- 3.1.2** Prior to any hotwork taking place, the contractor shall ensure that the area of work and all equipment, wiring, transits, etc. have been sufficiently protected from any sparks or metal filings.
- 3.1.3** All cabling, once installed, shall be marked with a stamped stainless steel metal tag for all outside cabling and an appropriate label type for all inside cabling. The labels are to be securely affixed to the cable at each end and through any deck, deck heads, and/or gland penetrations with the designation for each cable as provided in this specification.
- 3.1.4** Contractor responsible for the temporary removal and reinstallation of any deck heads, bulkheads, paneling, insulation, and any items that is deemed to be interfering to the running of any cables and mounting of any equipment.
- 3.1.5** All cabling shall follow existing cable trays throughout the vessel where fitted. Once installed, all cabling shall be secured as per TP127.
- 3.1.6** The contractor shall be responsible to ensure that all areas have been cleaned and free of any debris resulting from the performance of this specification item.
- 3.1.7** Prior to the commencement of any electrical work, the contractor shall ensure that all electrical supplies feeding the systems have been isolated at the source following an established lockout/tag out procedure. Contractor shall ensure that Chief Engineer or Senior Electrical Officer is notified of any lockout/tag out completed.
- 3.1.8** Electrical Isolations for AC and DC power are as follows:
- 3.1.8.1** ELP1-20 (115 VAC) Nav. Bridge (DGPS B)
- 3.1.8.2** DC1-8 (24 VDC) Nav. Bridge (DGPS A)

3.1.9 Upon final installation, testing shall be carried out as per Section 4.2 of this specification item.

3.1.10 The contractor shall work in conjunction with a Coast Guard Electronic Technician to oversee the installation of the new GMDSS system to ensure compliance with applicable Coast Guard standards. Terminations of all equipment shall be completed by CCG technicians with the exception of those for electrical supply which shall be the contractor's responsibility as well as any grounding requirements.

3.1.11 Contractor shall disconnect and remove the following equipment listed in table below.

3.1.12 Equipment Removal

Equipment	Location
Northstar Antenna #1	Wheelhouse Top Aft Rail
Northstar Antenna #2	Wheelhouse Top Aft

3.1.13 Contractor shall be responsible for the removal of the following cables listed in table below. Contractor take note that cable removal start from the equipment end.

3.1.14 Cable Removal

Cable Label	From	To
30M	Northstar 952X A Nav. Bridge Starboard Side Chart Table	Northstar Antenna #1 Wheelhouse Top AFT
30M	Northstar 941X B Nav. Bridge Starboard Side Chart Table	Northstar Antenna #2 Wheelhouse Top AFT

3.1.15 Contractor shall be responsible for all AC Power terminations in panels.

3.1.16 Contractor shall supply and install the following cables listed in table below.

3.1.17 Cable List

Cable Label	Cable Type	From	To	Signal	Length (m)
GPS1-ANT	LMR-400	Nav. Bridge Chart Table Starboard Side	Wheelhouse Top AFT	RF	30
GPS2-ANT	LMR-400	Nav. Bridge Chart Table Starboard Side	Wheelhouse Top AFT	RF	30

3.2 Location

3.2.1 Navigation Bridge Deck

3.2.2 Wheelhouse Top, Main Mast

3.3 Interferences

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

Part: 4 PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1 All work shall be subject to witness by the Chief Engineer or delegate and the attending surveyor.

4.2 Testing

4.2.1 All cables are to be checked for continuity after installation to ensure operational capability. Should any cable run fail to pass testing, the cable shall be replaced at the contractor's expense.

4.2.2 All cable testing shall be verified by a Coast Guard Technician.

4.2.3 New AC/DC circuits shall be proven operational.

4.2.4 Electronic equipment which has been removed for the performance of this specification item shall be returned to operational condition as it will be used as spares for similar equipment used in CCG fleet.

4.3 Certification

4.3.1 All original Class approval certificates for all system components shall be submitted to the owner prior to acceptance of this item.

Part: 5 DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The contractor shall provide the Chief Engineer with a typewritten report of the contractors work in both electronic and hardcopy formats outlining the details of the inspections and any alterations / repairs to the acceptance of this item.

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals
N/A