

# CCGS Sir Wilfred Grenfell Drydocking Refit 2017 Version 4



## Contents

Preamble .....	4
HD-01 Production Chart .....	11
HD-02 Dry-docking .....	13
HD-03 Services .....	16
HD-04 Hull Coating and Inspection .....	20
HD-05 Hull Butts and Seams .....	25
HD-06 Hull Sacrificial Anodes .....	27
HD-07 Kort Nozzle Testing .....	29
HD-08 Water Ballast Tank Inspections and Cleaning .....	31
HD-09 Freshwater Tank Cleaning and Maintenance .....	37
HD-10 Anchors and Chains, Chain Lockers Inspection .....	42
HD-11 Steel Remediation Port / Stbd Side Shell Plating .....	45
HD-12 Porthole Replacement .....	52
HD-13 Seabays, Seachests, Grids and Strainers .....	55
HD-14 Ship Underwater De-Icing Valve Inspection and Replacement .....	59
HD-15 Sea Connections Inspection .....	62
HD-16 Storm Valve Inspection and Associated De-Icing Valves .....	66
H-17 Escape Hatch Replacements .....	69
H-18 Exterior Door Replacements .....	72
H-19 Chief Officer Washroom Refurbishment .....	75
H-20 Deck Covering Replacement .....	79
H-21 Hospital Washroom Refurbishment .....	85
H-22 Steel Remediation Aux Machinery Space .....	89
H-23 Steel Remediation Bulkhead/Door coaming- stbd side main deck. ....	95
H-24 Steel Remediation HVAC Room Deck / Weathertight Door .....	99
H-25 MCR Door Replacements .....	108
H-26 Steel Remediation and Floor Coverings Bridge Wing .....	111
H-27 #11 F/O Tank top Powertool and Coating .....	118
H-28 STBD Engine Room Stack Coating Repairs .....	121
H-29 Exhaust Casing Maintenance .....	124
H-30 Port and Stbd Deck Crane Quadrennials .....	127
H-31 Accommodation Space Ventilation Trunking Cleaning .....	131
H-32 Galley Exhaust Fan Trunking Cleaning .....	134
ED-01 Port Propeller, Tailshaft and Stern Tube .....	136
ED-02 Starboard Propeller, Tailshaft and Stern Tube .....	140
ED-03 Port and Starboard Rudder Stock Inspections .....	144
ED-04 Port and Starboard Rudder Actuators & Steering Gear Pumps .....	147
ED-05 Stern Thruster Survey .....	149
ED-06 Fuel oil, Ballast water and Fresh water Pneumatic Valve Replacement .....	153
E-07 Fuel Oil, Lube Oil and Waste Tank Cleaning and Inspection .....	157
E-08- Roust About Replacements .....	159
E-09 RWO OWS Installation .....	162
E-10 Anchor Windlass Inspection and Survey .....	168
E-11 Miscellaneous Piping Replacements .....	172
E-12 Refrigeration Plant Replacement .....	183

<b>E-13 HVAC Units Replacement .....</b>	<b>187</b>
<b>E-14 Wartsila SI Main Engine Idler Pin Repairs .....</b>	<b>191</b>
<b>E-15 Deck Fuelling Pump Installation .....</b>	<b>195</b>
<b>E-16 Tow Winch Overhaul .....</b>	<b>199</b>
<b>E-17 Main Air Receiver Survey.....</b>	<b>201</b>
<b>L-01 Kongsberg - Pneumatic Valve Replacements.....</b>	<b>204</b>
<b>L-02 Kongsberg Tank Level Transducers.....</b>	<b>207</b>
<b>L-03 Port and STBD Engine Room Supply Fans Refurbishment.....</b>	<b>209</b>
<b>L-04 Steering Gear Controls Upgrade Rolls Royce.....</b>	<b>217</b>
<b>L-05 Tow Winch Controls / Tensioner Upgrade RR.....</b>	<b>221</b>
<b>L-06 Bow Thruster Breaker and Controls Installation.....</b>	<b>226</b>
<b>L-07 GMDSS Replacement .....</b>	<b>228</b>
<b>L-08 Autopilot Replacement .....</b>	<b>245</b>
<b>ANNEX A .....</b>	<b>251</b>
<b>ANNEX B.....</b>	<b>253</b>

Item #: N/A	<b>SPECIFICATION</b>	TCMS Field #: N/A
<b>Preamble</b>		

**1. Intent**

These specifications are supplied to the shipbuilder or ship repairer, hereinafter referred to as the Contractor for the purpose of outlining the objectives, performance, standards and basic engineering requirements for the refit, including dry-docking, of the CCGS Sir Wilfred Grenfell for the Canadian Coast Guard, Department of Fisheries and Oceans for the entire refit period scheduled from Feb 06- Mar 31, 2017.

The intention is to provide sufficient information such that the Contractor, with this guidance and his own experience and knowledge of good marine practice, shall complete the work items herein by carrying out the engineering and production work, while conforming to the requirements of all applicable regulatory bodies.

The intent of this specification shall describe the necessary work involved in carrying out the ship's Annual Refit. 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 TCMS Surveyor. Unless otherwise specifically stated, the Owner's Representative is the Chief Engineer.

**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. The surface preparation, ambient limitations and coating applications shall be as per the manufacturer's instructions and specifications

**3. TESTING AND RECORDS**

All test results, calibrations, measurements and readings are to be recorded. All tests are to be witnessed by the Inspection Authority, Technical Authority and where required, Transport Canada Marine Safety. The Contractor is responsible for contacting TC-MS when their presence is required for inspections or testing. The Contractor shall advise the Technical Authority in every case when Marine Safety arrives onsite for inspection of vessel's equipments or structure. The recorded test results, calibrations, measurements and readings from the entire refit specification shall be provided in 3 typewritten binded reports on 8.5" X 11" paper. The binded reports shall be tabbed as per table of contents in the refit specification. The binded reports shall be provided to the Chief Engineer prior to the end of refit. The Contractor is to provide an electronic copy of all tests and records

## Preamble

The Contractor shall also provide reports/measurements/readings per individual specification item within the timeline indicated to the Chief Engineer.

### **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 shall include all of the necessary labor and equipment required for the erection of access staging, rigging, lighting, tugs, pilotage, necessary crange and line handling.

### **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.

### **7. REMOVALS**

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

### **8. 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.

### **9. 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 a safe working condition by the contractor and removed upon the completion of work.

### **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

## Preamble

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 refit work detailed in this specification.

### **11. ASBESTOS**

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

### **12. ENTRY INTO ENCLOSED SPACES**

The contractor shall abide by the Coast Guard Enclosed Space Entry Policy. The policy is listed in the Coast Guard's Safety Management System, section 7.D.9 and section 7.D.9 (N). Entry certificates shall clearly state the type of work permitted and shall be renewed as required by the regulations. Additional copies of these certificates shall be posted in conspicuous locations for the information of ship and contractor personnel. Contractor shall be responsible to ensure the safety of Contractor's personnel, including any subcontractors, inspection personal, TC Surveyor, Chief Engineer and Technical Authority Representative.

A fire zone shall be established and naked lights shall not be used within this zone until "gas-free" certification has been issued.

The Contractor is to ensure that any work carried out in confined spaces as defined by the Canada Labor Code Part II and complies fully with all provisions of the code.

A number of spaces onboard the vessel are designated as Enclosed Spaces; these spaces are to be entered only under safe and controlled circumstances. The Contractor shall have in place an Enclosed Space Entry Permit system, equal to or better than the procedure contained in the Coast Guard's Safety Management System, section 7.D.9. Ship's breathing apparatus and EEBD's are not to be used except in an emergency.

### **13. 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 are satisfied that the agreed upon procedures are in place and being conformed to.

### **14. HOTWORK**

Any item of work involving the use of heat 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 hotwork. 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

## Preamble

extinguishers and a fire watch during any such heating and until the work has cooled. Ship's extinguishers shall not be used except in an emergency. The Contractor shall abide by the Coast Guard Hotwork Policy. The policy is listed in the Coast Guard's Safety Management System, section 7.D.11 and section 7.D.11 (N). The contractor shall be responsible to ensure the contractor's personnel including any subcontractors shall follow the policy.

## **15. LOCKOUT AND TAGOUT PROCEDURES**

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

- electrical currents
- hydraulic
- pneumatic
- gas or steam pressure and vacuum
- high temperatures
- cryogenic temperatures
- radio frequency emissions
- potentially reactive chemicals
- stored mechanical energy
- equipment actuation

2. The contractor, under the supervision of the Chief Engineer and or the Electrical Officer, shall be responsible for the Lockout and Tagout of equipment and systems listed in the specification.

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

4. 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 steelwork that will not be on the underwater wetted surface of the ship's hull is to be protected with two coats of Contractor supplied primer. Unless otherwise stated in the individual specification item, the primer is to be International Paints, Interplate Zinc Silicate NQA262/NQA026 red. The paint is to be applied as per the manufacturer's instructions on their respective product data sheets. Finish coats are described in individual specification items.

## **17. WELDING**

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

## Preamble

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 shipyard personnel will be working. The contractor shall inform shipyard workers of this policy and ensure that it is complied with.

### **19. RESTRICTED AREAS**

The following areas are out of bounds to shipyard 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.

Sign off and acceptance of jobs will not occur until any and all drawings are updated to the satisfaction of the Owner's representative.

### **22. TRANSDUCERS**

## Preamble

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

### **23. OWNER'S REPRESENTATIVE**

Throughout this document, there is made reference to the Owner's Representative. For the purpose of this document, the Owner's representative is defined as the Chief Engineer of the Vessel.

### **24. 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 and for ensuring the work is credited by the regulatory authority in the Chief Engineer's 'Hull and Machinery Survey Book'.

The contractor shall ensure the Chief Engineer is informed when the regulating authority is onsite such that the Chief Engineer can witness the inspections by the regulating authority.

Notwithstanding any errors, omissions, discrepancies, duplication or lack of clarity in these project requirements, it shall be the responsibility of the Contractor to ensure that the execution of the work specified herein is to the satisfaction of the Technical Authority and the Inspection Authority. Inspection of any item by the Technical Authority does not substitute for any required inspection by Transport Canada Marine Safety (TC-MS) or by the Inspection Authority.

### **25. WASTE OIL PRODUCTS**

Disposal of waste oil products shall be carried out by the Contractor, or subcontractor, who has been licensed by provincial authorities for the disposal of petroleum products. Copies of certificates must be produced upon request. This must be in accordance with the Coast Guard Policy for Handling Fuel, Oil, and Waste Oil Products, which is part of the Fleet Safety Manual, section 7.C.3. a copy of which is in the attached safety annex.

### **26. 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 when these WHMIS – controlled products are onboard the vessel

### **27. SAFETY ANNEX**

The Contractor shall follow the Coast Guard Policies as outlined in the attached Safety Annex. This Annex contains excerpts from the Fisheries and Oceans Canada, Canadian Coast Guard Fleet Safety Manual (DFO 5737) and deals with contractor responsibilities for items such as Hot Work, Confined Space Entry, Diving, Diving Operations and Dry-docking.

An electronic copy of the Fleet Safety Manual (Adobe Acrobat .PDF version) can be found at

[http://142.130.14.20/fleet-flotte/Safety/main\\_e.htm](http://142.130.14.20/fleet-flotte/Safety/main_e.htm)

## Preamble

The following is a list of applicable work instructions

- 7. B.2 FALL PROTECTION
- 7. D.9 ENTRY INTO ENCLOSED SPACES
- 7. D.9 (N) ENTRY INTO ENCLOSED SPACES-WORK INSTRUCTION
- 7. D.10 DRYDOCKING
- 7. D.11 HOTWORK
- 7. D.11 (N) HOTWORK – WORK INSTRUCTIONS
- 7. F.1 HANDLING FUEL, OIL AND WASTE OIL PRODUCTS
- 7. F.6 HANDLING STORAGE AND DISPOSAL OF HAZARDOUS MAT'LS
- 7. F.9 PAINT AND OTHER COATINGS
- 7. D.19 LOCKOUT AND TAGOUT

### **28. CONTRACTOR SAFETY AND SECURITY**

A valid minimum security screening at the Reliability Status level is required for any contractor to be granted unescorted access to a workplace controlled by the CCG. DFO Departmental Policy requires that a Security Requirement Check List (SRCL) be completed.

#### Safety Familiarization

The Contractors Basic Safety Familiarization shall be completed for all contractors working on CCG vessels. It will verify that a basic safety briefing has been given, understood and acknowledged by the contractor. All contractors shall follow applicable OHS regulations in accordance with CCG safety/security/environmental requirements, fire alarm protocol and conduct to follow in case of fire or other emergency situations, familiarization of restricted areas and spaces, known risks and hazards encountered at the worksite ( ie asbestos, fire fighting systems,hazardous materials, flammables etc).

### **29. SHIP'S PARTICULARS**

- Length O.A. 68.48 Meters
- Breadth Mld. 15.00 Meters
- Depth Mld. 7.25 Meters
- Displacement at S.L.W.L. 3753 Tons
- Lightship weight 2065 Tons
- Gross Tonnage 2404 Tons
- Net Tonnage 664 Tons
- Summer Load Draft 5.424 Meters
- Year built 1985

Item #: HD-01	<b>SPECIFICATION</b>	TCMS Field #: N/A
<b>HD-01 Production Chart</b>		

**Part 1: Scope:**

**1.1** The intent of this specification shall be to develop a production chart using MS Project encompassing all work specifications detailed in this project.

**1.2** All refit specification items and shall be updated by the contractor prior to all production meetings.

**Part 2: References:**

**2.1 Guidance Drawings/Nameplate Data:**

**2.2 Standards:**

**2.3 Regulations:**

**2.4 Owner Furnished Equipment:**

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

**Part 3: Technical Description:**

**General**

**3.1** The successful contractor shall supply three hard copies and forward one electronic copy to the vessel's Project Engineer [darrin.hancock@dfo-mpo.gc.ca](mailto:darrin.hancock@dfo-mpo.gc.ca)

The contractor shall forward a copy of the Production Chart to the Contracting Authority

**3.2** The chart shall show for each specification item, the start date, the duration, and the completion date.

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

## HD-01 Production Chart

**3.4** If work arises that affects the critical path, it shall be immediately brought to the attention of the Chief Engineer, Project Engineer and PWGSC. Every effort shall be made to prevent completion delay.

### **Part 4: Proof of Performance**

**4.1** The Production Charts shall be done to the satisfaction of the Chief Engineer and PWGSC.

### **Part 5: Deliverables:**

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

**5.2** 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 Production Meeting.

**5.3** 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 PWGSC 1379 action and indicate how the additional work will impact the completion schedule for the vessel.

## HD-02 Dry-docking

Item #: HD-02	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>HD-02 Dry-docking</b>		

### Part 1: Scope:

**1.1** The intent of this specification shall be to have the vessel docked and undocked with necessary lay days required to carry out the specified work with reasonable time allowance to deal with any work arising.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

**2.1.1** Docking Plan: # NJC-10-106

#### 2.2 Standards

**2.2.1** N/A

#### 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, and parts required to perform the specified work unless otherwise stated.

### Part 3: Technical Description:

#### 3.1 General

**3.1.1** The contractor shall perform crankshaft deflections on all four main engines before and after the dry docking. The engines will be at pre-heat temperature. Readings shall be taken in the presence of the Chief Engineer or designate, recorded in the Ship Condition Report and a copy given to the Chief Engineer following each before and after set.

**3.1.2** The contractor shall supply the services of a diver to confirm that the vessel settles 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 accessible. 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. A minimum of 4 feet 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 alternate arrangements to drain tanks and/or move blocks to gain access to areas of specified work.

**3.1.3** The contractor shall quote on the total lay day cost and unit lay day cost. Quote shall

## HD-02 Dry-docking

include any tug or pilot service cost.

**3.1.4** The available deck crew is responsible for handling ship's lines but may require additional personnel (contractor supply) as required. The contractor shall quote on the services of four persons for line handling. The contractor shall discuss with the Commanding Officer prior to moving the vessel.

**3.1.5** The overhanging transom shall be shored by the Contractor in way of Frame 5 approximately 4.5 m off the centerline, Port and Starboard immediately after vessel is dry docked for duration of the dry docking with removal only for periods when necessary for specified work.

**3.1.6** Prior to dry-docking, all tanks on the vessel shall be sounded and contents recorded in the vessel's Ship Condition Report. Copy shall be signed by the ship's Captain, Chief Engineer and the Contractor's Docking Master.

**3.1.7** 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.

**3.1.8** Following the dry 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.

**3.1.9** Following dry-docking, the underwater hull shall be cleaned by high pressure fresh water washing 2000 psi minimum to remove all marine growth and allow preliminary inspection.

**3.1.10** Prior to commencing hydro-blasting, all hull mounted equipment and openings shall be fully protected.

**3.1.11** The contractor shall then remove and mark the following docking plugs and give to the Chief Engineer.

- # 1 WB Port and Starboard – 1 each
- #5 WB Port and Starboard – 1 each
- # 17 FW Center – 1 each
- # 16 FW Port and Starboard – 1 each
- # 20 WB Center – 1 each

All tanks emptied shall be recorded in the Ship Condition Report. Copies shall be held by the Contractor, ship's Captain and Chief Engineer.

**3.1.12** The Contractor shall not remove or transfer any tank contents without first discussing same with the ship's Captain and Chief Engineer.

**3.1.13** For any Hydrostatic testing of tanks, the testing shall be carried out uniformly so that excess local strain shall not ensue. Not more than one (1) tank at a time shall be filled without

## HD-02 Dry-docking

symmetrical compensation on the opposite side of the ship. Additional shoring for testing deep tanks shall be fitted as/when required.

**3.1.14** At undocking, all sea valves shall be shut prior to undocking and checked for water tightness during the undocking period by the Contractor. All tanks shall be filled to obtain the same Drafts and Trim as at docking and the condition agreed by the ship's Captain, Chief Engineer and Contractor's Docking Master.

### **3.2 Location**

**3.2.1** N/A

### **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 completed 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** All reports 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

### **5.4 Manuals**

**5.4.1** N/A

Item #: HD-03	<b>SPECIFICATION</b>	TCMS Field #: N/A
<b>HD-03 Services</b>		

**Part 1: Scope:**

**1.1** The intent of this specification shall be to supply and connect the following services to the vessel during the dry dock period as applicable and disconnected when leaving. The Contractor shall supply all material and labor to the point of onboard connection. The Contractor’s quote shall include all crane / scaffolding required for connection and disconnection. The Contractor’s bid price shall be broken down by item.

**Part 2: References:**

**2.1 Guidance Drawings/Name plate 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** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

**Part 3: Technical Description:**

**3.1 General**

**3.1.1.** Metered electrical service 600 VAC, 3 phase, 60 Hz, 440A continuous shall be supplied and maintained. Quote on supplying 300,000 kWh to be adjusted up or down by 1379 action. Quote shall also include the unit cost per kWh for adjustment purposes. A ground cable shall be solidly attached to ship’s hull. The contractor shall supply and install the electrical cable and kilowatt hour meter. The vessel’s electrical cable shall not be cut. The ship’s shore power cable and plugs shall not to be disconnected or opened. The 300,000 kWh quoted above shall be for the vessel’s own use. Meter readings shall be taken and recorded by the Contractor and ship’s Electrical Officer at time of connection and disconnection. The contractor shall supply this electrical service from the starting date to the completion date of the contract. The Contractor shall supply separate electrical service for contractor items in this specification.

- 3.1.2.** Water connections shall be supplied and connected to the ship's fire main at 80 psi with a 2 inch diameter hose. Pressure shall be maintained to the vessel at all times continuous 24 hours per day. The Contractor shall supply a pressure reducing valve with a pressure gauge which shall be fitted before the connection onboard the ship. The connection shall be such that when fully opened 2 hydrants on the vessel shall result in no noticeable decrease in the flow of water. The contractor shall be responsible for ensuring the water line does not freeze by providing a bleed connection led to the dock bottom. #17 potable water tank shall not be drained until fresh water is connected and supplied to the vessel.
- 3.1.3.** The Potable Fresh Water connection to ship's domestic system, minimum 60 psi shall be connected to the shore connection Port Foc'sle Deck through a Contractor supplied / installed pressure reducing valve and gauge. The contractor shall be responsible for ensuring a continuous supply and that the water line does not freeze by providing a bleed connection led to the dock bottom. The Contractor shall supply this Potable Fresh Water until the fresh water system onboard is put back in service. The Contractor is to supply any fresh water used for cleaning, testing or flushing of tanks as required by the specification. Estimated consumption is 3m<sup>3</sup> per day.
- 3.1.4.** The Contractor shall make connection of one (1) 3 inch sewage discharge line fitted to the ship's overboard discharge opening at ship's shell and lead to the Contractor's sewage outlet.
- 3.1.5.** The Contractor shall make connection of six (6) 3 inch grey water discharge lines fitted to the ship's overboard discharge openings at ship's shell and lead to the Contractor's sewage outlet.
- 3.1.6.** The Contractor shall supply labour and services for the rigging of two (2) separate and independent boarding gangways complete with safety nets and two handrails. The gangways (Contractor supplied) shall be suitably illuminated for use at night. The Contractor shall arrange these two (2) gangways as to provide two (2) separate and distinctive fire escape routes.
- 3.1.7.** The Contractor shall supply suitable Refuse containers 6 square meters on the after deck. Refuse shall be removed from the ship when container is 80% full. The contractor shall be responsible for provision of suitable containers and any costs associated with waste disposal including crane, transportation and regulations that may be in place. This shall include hazardous materials and recyclables. The contractor shall advise the owner's representative of any such regulations or practices at the pre-refit meeting. The container is to be approximately 6 m<sup>3</sup>; the Contractor shall quote on six dumps
- 3.1.8.** The contractor shall provide labour and equipment (crane) to erect, as necessary, scaffolding and staging and temporary lighting to facilitate the specified exterior work. The scaffolding and staging and temporary lighting shall be removed when the work is

complete by said Contractor.

- 3.1.9.** The Contractor shall quote on 15 hours and provide an hourly rate for crane usage for the vessel's purpose and not for Contractor work. The cost shall be adjusted by 1379 action.
- 3.1.10.** During the entire refit, the Contractor shall maintain in a state of good order and cleanliness all walkways, gangways and places where work is ongoing.
- 3.1.11.** Parking spaces for three ship's personnel shall be provided for the duration of the contract.
- 3.1.12.** The Contractor shall quote on removing from ship's bilges 12 cubic meters of oil/water mixture. Quotation shall include crane, pumping, trucking and disposal of waste mixture. Contractor to provide identity of firm(s) licensed for pumping and disposal of waste oil. The Contractor shall quote a unit price per cubic meter to be adjusted up or down by 1379 action.
- 3.1.13.** Dock and Sea Trials: On completion of all specification items, dock trials and sea trials will be carried out as a functional test of the ships propulsion system and maneuvering systems. Dock trials will last a minimum of one (1) hour. Sea trials will last a minimum of four (4) hours. Trials will include ahead and astern movements at various power levels. Trials will be carried out to the satisfaction of the Chief Engineer .The contractor is to have sufficient supervisory staff on board during these trials to witness the operation of machinery and systems that were worked on during the refit.
- 3.1.14.** Contractor shall provide sufficient heater onboard the vessel where there is no heat as a result of the HVAC replacement in order to maintain 15-18 degrees Celcius ambient temperature. Heating electrical costs would be reflected (captured) in 3.1.1. Contractor shall have thermometers located throughout the vessel for visual confirmation of space temperatures.

## **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 shall be to the satisfaction of the Chief Engineer.

### **4.2 Testing**

HD-03 Services

**4.2.1 N/A**

**4.3 Certification**

**4.3.1 N/A**

**Part 5: Deliverables:**

**5.1 Drawings/Reports**

**5.1.1** All reports from the work specified shall be given to the Chief Engineer.

Spec item #: HD-04	<b>SPECIFICATION</b>	TCMS Field #: N/A
<b>HD-04 Hull Coating and Inspection</b>		

**Part 1: Scope:**

**1.1** The intent of this item shall be to clean, repair coating, and inspect the hull of the vessel. The entire underwater area of the ship's hull is coated with abrasion resistant coating products.

**1.2** For purposes of clarity this specification item shall be dealt with in two sections.

- 1.2.1.** The underwater portion of the hull
- 1.2.2.** The above waterline portion of the hull

**1.3** This work shall be carried out in conjunction with the following:

- HD- 06 Hull Anodes Replacement.
- HD-08 Ballast Tank Testing and Coating.

**Part 2: References:**

**2.1 Guidance Drawings/Nameplate Data**

**2.1.1** Shell and Framing Expansion NJC-11-100

**2.2 Standards**

**2.2.1** Ships ISM Hot-Work, Confined Space, Fall Protection Lockout Procedures

**2.2.2** Steel Structures Painting Council Standard (SSPC)

**2.3 Regulations**

**2.3.1** N/A

**2.4 Owner Furnished Equipment**

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

**Part 3: Technical Description:**

**3.1 General**

**Underwater Hull**

**3.1.1** This shall include rudders, propellers, nozzles and thruster tunnels. The cleaning shall be done immediately after the vessel is dry-docked. The entire underwater area of the ship from the keel to the top of the bulwarks shall be hydro blasted and cleaned of all marine growth and chlorides.

## HD-04 Hull Coating and Inspection

**3.1.2** The entire underwater hull shall then be inspected by the Chief Engineer and attending TCMS and NACE inspectors. The Contractor shall supply and erect staging/scaffolding as required for the inspection.

**3.1.3** The contractor shall make repairs to areas where the hull coating is missing as directed by the Chief Engineer.

**3.1.4** In order to avoid any confusion as to the total area to be repaired, the Contractor shall assign a representative, who along with the owner's representative to view the ship as it sits on the blocks subsequent to cleaning but prior to coating repairs. The two representatives shall view the ship and agree upon the total area of the hull that shall be repaired and coated.

**3.1.5** The Contractor shall plug deck scuppers and discharges as well as take other measures necessary to prevent any liquids from contaminating areas being prepared or coated. The contractor shall also take measures to ensure that no damage, unnecessary cleaning, or any repairs result from either the hull preparation process or coating application. Measures shall be taken to ensure that surfaces and equipment, other than those specified, are not coated and that the coating shall not block any inlets or discharges in the shell. Deck machinery and other gear shall be protected from damage by grit and coatings.

**3.1.6** All traces of grit used for blast cleaning, shall be removed by the Contractor. The Contractor shall be responsible and liable for ensuring that the hull is clear and clean prior to, during and immediately after the coating application.

**3.1.7** Abrasive blast material shall not be permitted to enter any part of the vessel. The Contractor shall ensure that every opening into the vessel where grit may gain entry is covered.

**3.1.8** The contractor shall quote on making repairs to approximately 1000 square meters of hull coating. The repairs shall include surface preparation, epoxy coating to damaged areas. The quote shall include the unit cost per square meter and shall be used to adjust the total area for the work up or down by PWGSC 1379 action. The total area is 1500 square metres.

**3.1.9** Suitable storage facilities shall be provided close to the work site for the necessary materials and equipment and they must be maintained at the recommended temperature of the coating manufacturer to ensure ease of preparation and application.

**3.1.10** The mixing and spraying equipment shall be kept heated and protected as necessary, while in use, to ensure that the coating is maintained and the recommended temperature.

**NOTE:** The equipment used to apply the coating shall meet the specifications of the coating manufacturer.

### **Surface Preparation**

**3.1.11** Abrasive Blast all bare and rusted areas to SSPC-SP-10 Near White Metal. All edges of intact epoxy coating shall be feathered back to accept new coating. "Sweep Blast" the remaining entire hull intact coating to create a profile to accept new coating.

**Primer - Touchup**

**3.1.12** Apply one touch up coat of Amercoat 238 Abrasion Resistant Epoxy to bare blasted areas only. Apply @ 10 mils DFT.

**Intermediate Coat**

**3.1.13** Apply one full coat of Amercoat 238 Abrasion Resistant Epoxy to entire underwater hull area. Apply @ 10 mils DFT. Colour Red Oxide.

**Topcoat**

**3.1.14** Apply one full coat of Amercoat 339 Low Friction Hull Coating to entire underwater hull area. Apply @ 8 mils DFT. Colour Black.

**3.1.15** Sea-bay grids shall be protected during application of the coating and orifices shall be proven original diameter before undocking. The transducers shall be protected as well.

**3.1.16** Zinc anodes shall be protected from coating and the protection shall be removed prior to undocking. All new anodes shall be installed prior to coating.

**3.1.17** The Contractor shall perform the work in strict accordance with Ameron's application instructions for each applicable coating.

**3.2 Anchor Pockets**

**3.2.1** The anchor pockets shall be completely abrasive blasted to SSPC-SP10 to achieve an anchor profile of 2 -3 mils. The Contractor shall quote on 4 square meters for each pocket.

**3.2.2** The contractor shall apply two coats of Amercoat 238 Abrasion Resistant Epoxy at 10 mils DFT per coat with sufficient feathering. The final coat of Amercoat 238 shall be followed by one coat of Amercoat 339 Low Friction Hull Coating at 8 mils DFT.

**Above Waterline Hull**

**Surface Preparation**

**3.3.1** Abrasive Blast 100 % to SSPC-SP-10 Near White Metal. The contractor shall quote cost per square meter and shall be used to adjust up or down by PWGSC 1379 action the total area for the work. The total area is 450 square meters. Final area confirmation shall be determined and adjusted accordingly.

**Primer**

**3.3.2** Apply two touch up coats of Amercoat 5105 Primer to all blasted areas. Apply @ 2 to 3 mils DFT.

**Topcoat**

**3.3.3** Apply two full coats of Amercoat 5450 Topcoat to entire area. Apply @ 2 to 3 mils DFT. Colour Coast Guard Red (509-102).

**3.3.4** The waterline shall be cut in and the shell of the ship from the lightship waterline and up

## HD-04 Hull Coating and Inspection

one foot shall be given one coat of anti-corrosive paint. Bare areas of the hull shall be given one coat of Contractor supplied primer and then the entire hull area above the underwater body given one coat of owner supplied red paint.

**3.3.5** All draft marks, load lines, thruster symbols and hull symbols shall be painted with two coats using Contractor supplied white paint as per ship's painting schedule.

**3.3.6** The thickness determination of the new coating shall be verified and recorded at three positions on each repair area. Measuring points shall be as indicated by the Owner's representative.

**3.3.7** The hull markings including the load line, draft marks, thruster symbols, ship's name, Port of Registry, white slash with black trim, Coast Guard service title, Fisheries and Oceans departmental signature shall be painted on as directed by Chief Officer. The vessel shall supply templates for the Coast Guard service title and Fisheries and Oceans departmental signature.

**3.3.8** The areas of the ship's hull as designated by the Chief Officer for Port and Starboard sides shall have the white paint "RESCUE ZONE" stenciling renewed. (Located between Fr. 35 and 48) Stenciling and white paint shall be owner supplied (Amercoat 400).

**3.3.9** The Contractor shall perform the work in strict accordance with Ameron's application instructions for each applicable coating.

**3.3.10** All work shall be done to the satisfaction of the Chief Engineer and Chief Officer.

### **3.3 Location**

**3.3.1** Exterior Hull

### **3.4 Interferences**

**3.4.1** The 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, Chief Officer and NACE Inspector.

### **4.2 Testing**

**4.2.1** The contractor shall prove to the owners the DFT measurements at areas where the coating was completely missing.

### **4.3 Certification**

**4.3.1** The Contractor shall supply documentation of coatings applied.

## **Part 5: Deliverables:**

## HD-04 Hull Coating and Inspection

### **5.1 Drawings/Reports**

**5.1.1** The thickness determination DFT of the new coatings applied shall be verified and recorded. Reports shall be given to Chief Engineer.

**5.1.2** All reports from the work specified shall be given to the Chief Engineer.

Spec item #: HD-05	<b>SPECIFICATION</b>	TCMS Field #: 3LL040
<b>HD-05 Hull Butts and Seams</b>		

**Part 1: Scope:**

**1.1** The intent of this item shall be to inspect the hull plate welding of butts and seams and to repair where deemed necessary.

1.2 This work shall be completed in conjunction with:

**1.2.1.** HD-02 Dry-Docking.

**1.2.2.** HD-07 Kort Nozzle Testing.

**1.2.3.** HD-08 Sea-Bays, Sea-Chest and Strainer Cleaning and Painting.

**1.2.4.** HD-06 Hull Sacrificial Anodes.

**1.2.5.** HD-04 Hull Coating and Inspection.

**1.2.6.** HD-08 Water ballast Tank Surveys and Cleaning / Coating.

**Part 2: References:**

**2.1 Guidance Drawings / Name Plate 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** 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, labour 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 will be determined at the time of the Hull Survey by the TCMS and the 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** The Contractor shall quote on 1,000 feet of gouging and 4,000 bead feet of weld. The

## HD-05 Hull Butts and Seams

Contractor shall quote per bead foot for adjustment purposes up or down by PWGSC 1379 action.

**3.1.4** Any butts and seams falling in way of fuel tanks that require gas freeing and certification for hot work will be recovered 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.

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

### **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 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** TCMS Inspectors 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** All reports 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

Spec item #: HD-06	<b>SPECIFICATION</b>	TCMS Field #: N/A
<b>HD-06 Hull Sacrificial Anodes</b>		

**Part 1: Scope:**

**1.1** The intent shall be to replace all wasted anodes located on the underwater areas of the vessel's hull. New anodes shall be installed in the same positions as existing unless otherwise instructed by the Chief Engineer.

**1.2** This work shall be carried out in Conjunction with the following:

**1.2.1** HD-04 Hull Coating and Inspection.

**1.2.2** HD-08 Sea Bay, Sea Chest Cleaning.

**Part 2: References:**

**2.1 Guidance Drawings/Nameplate Data**

**2.1.1** N/A.

**2.2 Standards**

**2.2.1** Ships ISM Hot-Work, Confined Space, Fall Protection & Lockout Procedures.

**2.3 Regulations**

**2.3.1** N/A.

**2.4 Owner Furnished Equipment**

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

**Part 3: Technical Description:**

**3.1 General**

**3.1.1** All zinc anodes on the hull, propeller, nozzles, rudders, thruster tunnels, sea bays and sea chest shall be inspected for wastage. The Contractor shall bid on supplying and installing (98) ninety eight 10 kilogram zinc anodes as directed by the Chief Engineer. The quote shall include the cost for each anode and shall be used to adjust up or down by PWGSC 1379 action the total anodes replaced. The quote shall be for the removal and installation of each anode.

**3.1.2** The old mounting straps shall be removed and the welds for same ground flush prior to hull coating.

**3.1.3** All new anodes shall be affixed prior to hull coating. The anodes shall be protected during hull painting and the protection shall be removed prior to ship re-floating.

**3.1.4** All work shall be to the satisfaction of the Chief Engineer and TCMS Inspector.

### **3.2 Location**

- 3.2.1** Port Kort Nozzle 8 + 1 on Kort Nozzle Strut + 1 on Keel total of (10)
- 3.2.2** Starboard Kort Nozzle 8 + 1 on Kort Nozzle Strut + 1 on Keel total of (10)
- 3.2.3** Port Stern Tube (7)
- 3.2.4** Starboard Stern Tube (8)
- 3.2.5** Port Rudder (4)
- 3.2.6** Starboard Rudder (4)
- 3.2.7** Stern Thruster Tunnel (3)
- 3.2.8** Port Seabay Aft section (5)
- 3.2.9** Port Seabay Forward Section (4)
- 3.2.10** Starboard Seabay forward section (2)
- 3.2.11** Starboard Seabay aft section (4)
- 3.2.12** Bowthruster Tunnel (8)
- 3.2.13** Emerg. Fire Pump Seabay (4)
- 3.2.14** Port FIFI Suction 4 on Aft Section and 4 on Forward section Total (8)
- 3.2.15** Starboard FIFI Suction 3 on Forward section and 4 on Aft section Total of (7)
- 3.2.16** No Anodes in the Sea Strainer Boxes.
- 3.2.17** Sea Chest 5 Port and 5 Starboard Total of 10
  - All the above add up to A Total of 98 Anodes

### **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 completed to the satisfaction of the Chief Engineer and TCMS Inspector.

### **4.2 Testing**

- 4.2.1** The Chief Engineer shall verify before undocking.

### **4.3 Certification**

- 4.3.1** Documentation of the anodes materials.
- 4.3.2** Welding certification as per specification preamble.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

- 5.1.1** Documentation of anode material.
- 5.1.1** All reports from the work specified shall be given to the Chief Engineer.

Spec item #: HD-07	<b>SPECIFICATION</b>	TC Field #: 3H057-58
<b>HD-07 Kort Nozzle Testing</b>		

**Part 1: Scope:**

**1.1** The intent of this item shall be to inspect and air test Port and Starboard Kort Nozzles for TCMS and to obtain a five year credit for the survey.

**1.2** This work shall be carried out in Conjunction with:

- 1.2.1** HD-04 Coating and Inspection
- 1.2.2** HD-06 Hull Sacrificial Anodes
- 1.2.3** HD-08 Water Ballast Inspections and Cleaning

**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).

**2.3 Regulations**

**2.3.1** CSA Hull and Construction Regulation.

**2.3.2** Ships ISM Safety Procedures.

**2.4 Owner Furnished Equipment**

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

**Part 3: Technical Description:**

**3.1 General**

**3.1.1.** The Port and Starboard Kort Nozzles shall have their drain plugs removed then be air tested to a maximum of 3 psi and shall be checked for leakage. Prior to removal of drain plugs the Contractor shall notify the Chief Engineer to witness the presence of any leakage.

**3.1.2.** After filling to 3 psi, the air filling lines shall be disconnected from the nozzles. The pressure shall be observed for a minimum of 30 minutes. Soapy water solution to be used in conjunction with air test.

**3.1.3.** The Contractor shall have TCMS Inspector and Chief Engineer to witness the test.

**3.1.4.** The contractor shall supply all the parts, materials, equipment and labour for the test.

## HD-07 Kort Nozzle Testing

Contractor shall quote cost per unit test. New seals shall be Contractor supply

- 3.1.5. Upon completion of all work and testing the nozzles shall have all plugs, complete with new seals and fixtures reinstalled in good order.
- 3.1.6. Contractor shall quote cost of 100 bead feet of Kort Nozzle welding, and the unit cost of per bead foot of additional welding which shall be adjusted up or down by PWGSC 1379 action.
- 3.1.7. All work shall be to the satisfaction of the Chief Engineer and TCMS Inspector.

### **3.2 Location**

3.2.1 Aft Hull around Port and Starboard Propellers.

### **3.3 Interferences**

3.3.1 The contractor will 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 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 TCMS Inspector and Chief Engineer shall witness the air test.

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

### **4.2 Testing**

4.2.1 After completion of work system, TCMS Inspector and Chief Engineer shall check the air test.

### **4.3 Certification**

4.3.1 If any new welding is necessary, the Contractor shall have full documentation of the type of welding completed and the welding procedure.

4.3.2 Welding certification as per specification preamble.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

5.1.1 All reports from the work specified shall be given to the Chief Engineer.

## HD-08 Water Ballast Tank Inspections and Cleaning

Spec item #: HD-08	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>HD-08 Water Ballast Tank Inspections and Cleaning</b>		

### Part 1: Scope:

**1.1** The intent of this item shall be to have the following tanks opened up for cleaning abrasive blasting, coating repairs, inspection and hydrostatic pressure testing for TCMS and Chief Engineer

**1.2** This work shall be carried out in Conjunction with the following:

**1.2.1** HD-04 Hull Coating and Inspection

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

**2.1.1** Shell Expansion.

**2.1.2** Docking Plan.

**2.1.3** Tank Capacity Plan.

**2.1.4** Wasser Moisture Cured Urethane Product Data/Application Instructions.

#### 2.2 Standards

**2.2.1** Ships ISM Hot-Work, Confined Space, Fall Protection & Lockout Procedures.

**2.2.2** Steel Structures Painting Council Standard (SSPC).

#### 2.3 Regulations

**2.3.1** CSA - Hull Construction 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 following tanks shall be opened up for cleaning, inspection by Transport Canada Marine Safety, abrasive blasting, coating repairs, and pressure testing. The Canadian Coast Guard will have a NACE inspector on site for the surface preparation and coating procedure.

<u>Tank</u>	<u>Location</u>	<u>Volume</u>	<u>Area</u>
#1 Port Water Ballast tank	FR. 0-11	61.4 m <sup>3</sup>	Combined area of #1 port and #1 starboard is 816.5 square metres
#1 Starboard Water Ballast tank	FR. 0-13	67.5 m <sup>3</sup>	See above

## HD-08 Water Ballast Tank Inspections and Cleaning

#20 WB tank	FR. 0-13	39.9 m <sup>3</sup>	104 square meters
#5 Port Water Ballast Tank	FR. 34-41	61.4 m <sup>3</sup>	160 square meters
#5 Stbd Water Ballast tank	FR. 34-41	67.5 m <sup>3</sup>	175 square meters

**3.1.2** The ship's crew shall pump tanks down to suction level. The contractor shall remove and dispose of the remaining liquid. Manhole covers shall be removed, one from each tank. The docking plugs shall be removed from tanks where applicable, marked and given to the Chief Engineer for safekeeping.

**3.1.3** The contractor shall provide each tank with effective mechanical systems to meet environmental conditions for the surface preparation and coating application. The Contractor shall prove the tanks are safe for personnel to enter prior to commencing work in each tank. Copy of tank safe entry certificate to be given to chief engineer. Contractor shall have rescue team on site as per FSM-Confined Space Entry Requirements for all inspections carried out. Contractor shall have unit cost per tank entry inspection required outside the SOW.

**3.1.4** The Contractor shall ensure all residue and debris shall be removed from the tanks after cleaning and before coating is applied in each case if applicable.

**3.1.5** For purposes of clarity the tanks will be dealt with separately.

### **3.2 #1 Port & Stbd Water Ballast Tanks**

**3.2.1** Manhole cover accesses are located on the after bulkhead in Steering Flat. These tanks are presently coated with remnants of Amercoat 235 Epoxy. These tanks are fitted with docking plugs. The Contractor shall quote unit cost per 10kg zinc anode removal and installation. The new anode locations shall be directed by the Chief Engineer prior to installation.

**3.2.2** The Contractor shall cut two additional access holes in each tank for ease of completing the work. The holes shall be on the tank top (main deck) and below the water line in the forward area of the tanks. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work. Following the specified work the holes shall be re-plated with compatible size and grade steel that was removed. The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.

### **Surface Preparation**

**3.2.3** The Contractor shall quote on 100% grit blasting and coating of the area of #1 port and # 1 starboard water ballast tanks .The entire combined area of # 1 port and starboard tanks combined is 816.5 square meters. Any discrepancy with this surface area will be adjusted up or down by 1379 action after consultation with the Chief Engineer. Quote unit cost per square meter blasting and coating # 1 ballast tanks.

## **HD-08 Water Ballast Tank Inspections and Cleaning**

The Contractor shall pressure wash the tank internals using fresh water and Chloride remover (Holdtight 102 or equal) to remove all contaminants and chlorides. The contractor shall remove all water and debris from the tanks.

**3.2.4** The contractor shall Abrasive Blast the required internal surfaces to SSPC-SP-07 Brush off Blast Cleaning. The contractor shall remove all debris from the tanks prior to coating.

**3.2.5** The contractor shall then notify TCMS, the Chief Engineer and the NACE Inspector for inspection.

### **Coating System Inspection and Testing**

**3.2.6** The contractor shall apply full Primer coat of Wasser M/C Miozinc (Moisture Cured Urethane) or equal to the entire tank surface @ 3 mils, Second Coat of Wasser M/C Tar Oxide Red @ 6 mils, and Topcoat of Wasser M/C Ballast Coat Beige @ 4 mils, Dry Film Thickness coat. Total DFT shall be 11 to 13 mils. The contractor shall perform the work in accordance with product application instructions with particular attention to the environmental conditions.

**3.2.7** Following the coating and recommended drying time the contractor to inform Chief Engineer for an inspection of tank. Upon approval from Chief Engineer the contractor shall perform hydrostatic test on the tanks. The vent heads shall be removed for this procedure and replaced when completed with new ¼” neoprene gasket. Tank vent shall be inspected for foreign debris prior to installation. Tank covers are to have new ¼” neoprene gaskets installed. TCMS shall witness the test. It is the Contractor’s responsibility to notify TCMS. Contractor to include in bid the cost of replacing 20 cover studs and nuts to be adjusted up or down by 1379 action.

### **3.3 #5 Port & Stbd Water Ballast Tanks**

**3.3.1** Manhole cover accesses are located Foam Room Port and Stbd fr 37. These tanks are presently coated with remnants of Amercoat 235 Epoxy. These tanks are fitted with docking plugs. The Contractor shall quote unit cost per 10kg zinc anode removal and installation. The new anode locations shall be directed by the Chief Engineer prior to installation.

**3.3.2** The Contractor shall cut two additional access holes in each tank for ease of completing the work. The holes shall be on the tank top (main deck) and below the water line in the forward area of the tanks. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work. Following the specified work the holes shall be re-plated with compatible size and grade steel that was removed. The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.

### **Surface Preparation**

## **HD-08 Water Ballast Tank Inspections and Cleaning**

- 3.3.3** The Contractor shall quote on 100% grit blasting and coating of the area of #5 port and # 5 starboard water ballast tanks .The entire combined area of # 5 port and starboard tanks combined is 335 square meters. Any discrepancy with this surface area will be adjusted up or down by 1379 action after consultation with the Chief Engineer. Quote unit cost per square meter blasting and coating # 5 ballast tanks. The Contractor shall pressure wash the tank internals using fresh water and Chloride remover (Holdtighht 102 or equal) to remove all contaminants and chlorides. The contractor shall remove all water and debris from the tanks.
- 3.3.4** The contractor shall Abrasive Blast the required internal surfaces to SSPC-SP-07 Brush off Blast Cleaning. The contractor shall remove all debris from the tanks prior to coating.
- 3.3.5** The contractor shall then notify TCMS, the Chief Engineer and the NACE Inspector for inspection.

## **Coating System Inspection and Testing**

- 3.3.6** The contractor shall apply full Primer coat of Wasser M/C Miozinc (Moisture Cured Urethane) or equal to the entire tank surface @ 3 mils, Second Coat of Wasser M/C Tar Oxide Red @ 6 mils, and Topcoat of Wasser M/C Ballast Coat Beige @ 4 mils, Dry Film Thickness coat. Total DFT shall be 11 to 13 mils. The contractor shall perform the work in accordance with product application instructions with particular attention to the environmental conditions.
- 3.3.7** Following the coating and recommended drying time the contractor to inform Chief Engineer for an inspection of tank. Upon approval from Chief Engineer the contractor shall perform hydrostatic test on the tanks. The vent heads shall be removed for this procedure and replaced when completed with new ¼” neoprene gasket. Tank vent shall be inspected for foreign debris prior to installation. Tank covers are to have new ¼” neoprene gaskets installed. TCMS shall witness the test. It is the Contractor’s responsibility to notify TCMS. Contractor to include in bid the cost of replacing 20 cover studs and nuts to be adjusted up or down by 1379 action.

## **3.4 # 20 Water Ballast Tank**

- 3.4.1** Manhole cover is located Steering Flat Tank top fwd. This tank is coated with Amercoat 235. Tank is fitted with a docking plug.
- 3.4.2** The Contractor shall quote unit cost per 10kg zinc anode removal and installation. The new anode locations shall be directed by the Chief Engineer prior to installation.

## **Surface Preparation**

- 3.4.3** The Contractor shall quote on 100% grit blasting and coating of the area of #20 Water Tank .The entire area of # 20 Ballast tank is 104 square metres. Any discrepancy with this surface area will be adjusted up or down by 1379 action after consultation with the

## **HD-08 Water Ballast Tank Inspections and Cleaning**

Chief Engineer. Quote unit cost per square meter blasting and coating # 20 ballast tank. The Contractor shall pressure wash the tank internals using fresh water and Chloride remover (Holdtighht 102 or equal) to remove all contaminants and chlorides. The contractor shall remove all water and debris from the tanks.

- 3.4.4** The contractor shall Abrasive Blast the required internal surfaces to SSPC-SP-07 Brush off Blast Cleaning. The contractor shall remove all debris from the tanks prior to coating.
- 3.4.5** The contractor shall then have the tank internally inspected by TCMS and the Chief Engineer.

### **Coating System Inspection and Testing**

- 3.4.6** The contractor shall apply full Primer coat of Wasser M/C Miozinc (Moisture Cured Urethane) or equal to the entire tank surface @ 3 mils, Second Coat of Wasser M/C Tar Oxide Red @ 6 mils, and Topcoat of Wasser M/C Ballast Coat Beige @ 4 mils, Dry Film Thickness coat. Total DFT shall be 11 to 13 mils. The contractor shall perform the work in accordance with product application instructions with particular attention to the environmental conditions.
- 3.4.7** Following the coating and curing time the Contractor shall notify the Chief engineer to inspect the tank. Upon approval from Chief Engineer the contractor is to button up tank and perform hydrostatic test on the tanks. Tank covers are to have new 1/4" neoprene gaskets installed. The vent heads shall be removed for this procedure and replaced when completed with new 1/4" neoprene gasket. Tank vent shall be inspected for foreign debris prior to installation. TCMS shall witness the test. It is the Contractor's responsibility to notify TCMS. **Note:** Contractor to include in bid the cost of replacing 20 cover studs and nuts to be adjusted up or down by 1379 action.

## **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 NACE Inspector.
- 4.1.2** Tank vents shall be inspected for foreign debris prior to installation.

### **4.2 Testing**

- 4.2.1** The Contractor shall prove to the owners the DFT measurements at areas where the coating was completely missing.
- 4.2.2** The Contractor shall perform hydrostatic test on the tanks to be witnessed by TCMS and Chief Engineer.

### **4.3 Certification**

- 4.3.1** The Contractor shall supply documentation of coating applied.

## **HD-08 Water Ballast Tank Inspections and Cleaning**

### **Part 5: Deliverables:**

#### **5.1 Drawings/Reports**

**5.1.1** The thickness determination DFT of the new coatings applied shall be verified and recorded. Reports shall be given to Chief Engineer.

**5.1.2** All reports from the work specified shall be given to the Chief Engineer.

**5.1.3** The contractor shall supply copies of all paint coating MSDS and technical data sheets.

## HD-09 Freshwater Tank Cleaning and Maintenance

Item #: HD-09	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>HD-09 Freshwater Tank Cleaning and Maintenance</b>		

### Part 1: SCOPE:

- 1.1 The intent of this item shall be to clean, repair coating, inspection and testing by TCMS as per annual maintenance procedures. Each tank has a section of sounding pipe which is to be replaced with new from the main decks' penetration to the exterior deck penetrations'. These tanks contain potable fresh water and are considered enclosed spaces. The Canadian Coast Guard will have a NACE Inspector on site for the surface preparation and coating procedure.
- 1.2 Tank surface preparation and coating suitable for these freshwater Tanks should be completed under the supervision of a NACE inspector, and Paint Manufacturer's Recommendations.
- 1.3 This work shall be carried out in Conjunction with:
  - L-02 Kongsberg Tank Level Sensor replacement.
  - HD-12 Porthole Replacements.

### Part 2: REFERENCES:

#### 2.1 Nameplate Data

- 2.1.1 Tank Capacity Plan NJC-10-105

#### 2.2 Standards

2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection Lockout Procedures. The contractor will be responsible for completion of the lockout/tag out log sheets. The contractor is to demonstrate how the lockout/tag out procedure meets the requirements before work begins. For audit purposes the completed lockout/tag out log sheets are to be delivered to the Chief Engineer when completed.

2.2.2 Fleet Safety Manual 7.F.12 Potable Water Quality.

2.2.3 Confined Space Entry. The Contractor shall Gas Free all tanks "Safe for Personnel". Certificate given to the Chief Engineer and copies posted by manhole cover of the tank to be entered and also at ships gangway.

#### 2.3 Regulations

- 2.3.1 Canadian Drinking Water Quality Guidelines.

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

## HD-09 Freshwater Tank Cleaning and Maintenance

### 3.1 General

- 3.1.1 The ship's crew will pump the three tanks to the suction levels  
The manhole covers shall be removed, one from each tank. Tank # 17 contains many structural members internally and a thruster tunnel therefore making access difficult.
- 3.1.2 Tank 17 center is normally lined with ice approximately 6 inches, during the winter months so inspection will prove difficult.
- 3.1.3 Contractor shall crop both sections of sounding pipe and prepare ends for welding of new. Each pipe section is 10 feet long and consists of schedule 160, 50mm black iron pipe. All Piping repairs to be flushed clean with water before tank internals are cleaned.
- 3.1.4 The tanks shall be water blasted and chemically cleaned with a chemical capable of removing rust discoloration. Care shall be taken to protect tank sounding transducers for the duration of all work in the tanks. The chemical used shall be approved by the Provincial Health Services for its intended application. Proof of such approval shall be furnished to the Chief Officer before work begins.
- 3.1.5 Approximate surface area of the tanks:  
**Tank Surface Area m<sup>2</sup> ea.**  
16 P & S 240 m<sup>2</sup>  
17 Center 75 m<sup>2</sup>
- 3.1.6 Any chemical residue or debris is then to be completely cleaned from the tanks. Upon completion of all cleaning, the Chief Engineer, TCMS, and Chief Officer shall thoroughly inspect the tank internals. The Contractor shall schedule all inspections and Inspectors.
- 3.1.7 Any rust areas and/or bare areas in the tanks shall be noted and cleaned where possible. Surface repair shall be carried out during the vessel's next dry-docking period.
- 3.1.8 The contractor shall prove the tanks are gas free "safe for personnel" to enter prior to commencing work in each tank. Copy of tank safe entry certificate to be given to Chief Engineer, copies posted at tank entrance (manhole) and also at ship's gangway. Contractor shall have rescue team on site as per FSM-Confined Space Entry Requirements for all inspections carried out. Contractor shall have unit cost per tank entry inspection required outside the SOW. The contractor shall provide each tank with a mechanical ventilation system vented to the outside of the ship. Good ventilation must be provided continuously and any blowers/extractors must ensure good air movement and solvent vapour removal from the lowest point in the tanks for a period as long as personnel have to enter tanks for job completion.

### 3.2 Surface Preparation

- 3.2.1 Power Tool Clean all bare and rusted areas after tanks have been grit blasted to SSPC-SP-11 (power tool clean to bare metal). Feather back all "intact" existing coating. The

## **HD-09 Freshwater Tank Cleaning and Maintenance**

Contractor shall remove and dispose of all debris, sediment and material from tank preparation to their own facility.

### **3.3 Coating**

- 3.3.1 Apply one coat of Amercoat 133 100% Solids Epoxy Tank Coating to bare areas. Apply @ 8 to 10 mils Dry Film Thickness.
- 3.3.2 The contractor shall quote on repairing 150 m<sup>2</sup> of coating. Quote shall include unit cost per m<sup>2</sup> for the repair and shall be used for adjustment up and down by 1379 action for the total area to be repaired. The above quote shall include surface preparation and coating. Before coating begins the Contractor, Chief Engineer and/or Nace Inspector will inspect the tanks to agree on the total area involved.
- 3.3.3 Following cleaning and inspection of the tanks and full cure of coating media, the manhole covers shall be replaced using new Contractor supplied ¼ inch neoprene gaskets. Any studs broken during the removal and replacement of manhole covers shall be renewed. The contractor is to allow for replacement of five studs for bid purposes, and to give price for each additional stud, to be adjusted up or down by PWGSC 1379 action. After gasket and cover is in place, Anti-seizing compound shall be supplied and installed by the Contractor on the fastener threads.
- 3.3.4 Each tank shall be flushed in strict accordance with FSM 7.D.12 (3.6.7) Disinfection. The chlorine will be contractor supply. The neutralizing agent for the super-chlorinated solution will be contractor supplied sodium sulphite. Sounding pipes, suction pipes and vents shall be proven clear prior to filling the tank with water. Contractor shall bid on 4 fills and 3 flushes. Upon completion, the Contractor shall remove the vent cap from the vent pipe of each tank and hydrostatically test each tank with clean fresh water to the top of the vent pipes. The Chief Engineer and TCMS Inspector shall witness the Hydrostatic test.
- 3.3.5 All work should commence and be completed within the first week of refit, and test results returned to the vessel (Positive) prior to the tanks being taken back into service. Contractor shall allow for individual testing on all three tanks as well as down-stream testing as specified by the FSM. 28 parameters determined by Chief Officer.
- 3.3.6 The Contractor shall arrange Health Canada recognized facility to take and complete the sampling.

### **3.4 Interferences**

- 3.4.1 The sounding pipe sections are between the exterior side shell and the internal bulkhead of the Cook and Bosun Cabin. The paneling and insulation will be removed in conjunction with the Porthole replacement in the above mentioned cabins.
- 3.4.2 The Contractor shall be responsible for replacement of paneling and insulation.
- 3.4.3 The Contractor shall be responsible for identification of interference items, their

## **HD-09 Freshwater Tank Cleaning and Maintenance**

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 Chief Officer, TCMS.

#### **4.2 Testing**

4.2.1 The tank shall be allowed to remain stagnant for 48 hours before samples are taken.

4.2.2 Two (2) water samples shall be collected from inside the tank.

4.2.3 Two (2) air samples shall be collected from inside the tank.

4.2.4 One (1) blank air sample shall be collected from somewhere outside the tank.

4.2.5 Once samples have been taken, the tank shall be purged and left empty until results are received.

4.2.6 The air and water samples listed above shall be sent to an accredited laboratory for analysis.

4.2.7 The Contractor shall have the air samples identified above tested for VOCs.

4.2.8 The Contractor shall have the water samples identified above tested for:

4.2.8.1 All parameters identified in paragraph 3.6.7 section 7.F.12 of the Fleet Safety Manual.

4.2.8.2 1-2-4 Trimethylbenzene – 0 ug/L limit.

4.2.8.3 Diglycidyl ether – 0 ug/L limit.

4.2.8.4 Epoxypropyl ether – 0 ug/L limit.

4.2.8.5 Other identified chemicals of concern, based on the MSD sheets.

4.2.9 Following completion of cleaning and flushing ref. FSM 7.F.12 (Disinfection), water testing shall be carried out in accordance with FSM 7.F.12, and 7.F.12(N) Potable Water Testing (3.6) and test. In St. John's test samples to be delivered to STANTEC for testing. Copies of the test results shall be given to the Commanding Officer immediately. All parameters tested shall be within acceptable limits in accordance with "Canada Drinking Water Quality Guidelines" Prior to acceptance of work.

#### **4.3 Certification**

4.3.1 Certificate from Dept of Health.

4.3.2 Equipment and component inspection certificates including all test reports supporting the

## **HD-09 Freshwater Tank Cleaning and Maintenance**

certifications.

4.3.3 Material test certificates including all test reports support the certifications.

4.3.4 System installation inspection certificates including proof of compliance.

4.3.5 Equipment and component inspection certificates including all test reports supporting the certifications.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

5.1.1 Report of water analysis from laboratory shall be given to the Chief Engineer.

5.1.2 Certificate from Dept of Health.

5.1.3 Equipment and component inspection certificates including all test reports supporting the certifications.

5.1.4 Material test certificates including all test reports support the certifications.

5.1.5 System installation inspection certificates including proof of compliance.

5.1.6 Equipment and component inspection certificates including all test reports supporting the certifications.

5.1.7 Certificates of the air and water samples sent for testing to an accredited laboratory for analysis.

5.1.8 All Gas free Certificates for all tanks.

5.1.9 All reports from the work specified shall be given to the Chief Engineer.

Item #: HD-10	<b>SPECIFICATION</b>	TCMS Field #: 3LL120 & 3LL140
<b>HD-10 Anchors and Chains, Chain Lockers Inspection</b>		

**Part 1: SCOPE:**

1.1 The Contractor shall remove both Port and Starboard anchors and anchor chains and prepare the chains and anchors for inspection by Transport Canada Marine Safety (TCMS)

1.2 The Contractor shall crop and replace the eyes and pins on both Port and Starboard Anchors.

**Part 2: REFERENCES:**

**2.1 Guidance Drawings/Nameplate Data**

2.1.1 Guidance Drawings:

2.1.2 AS Fitted Drawings:

**2.2 Standards**

2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout/tag out log sheets. The contractor is to demonstrate how the lockout/tag out procedure meets the requirements before work begins. For audit purposes the completed lockout/tag out log sheets are to be delivered to the Chief Engineer when completed.

**Part 3: TECHNICAL DESCRIPTION:**

**3.1 General**

3.1.1 The Contractor shall remove the Port and Starboard anchors and anchor chains from the vessel and lower from ship to wharf by contractor supplied crane. The Contractor shall flake out the chains on the wharf or dock to allow for the work required and inspection by TCMS.

3.1.2 The Contractor shall disconnect the “bitter end” of each anchor chain in the chain lockers and flake the Port and Stbd Anchor chains on the dock/wharf for cleaning and inspection. Each Anchor weighs 1800 kg and each anchor chain is 15 shots of 40mm diameter forged stud link chain.

## HD-10 Anchors and Chains, Chain Lockers Inspection

- 3.1.3 The Contractor shall remove all scale and rust from both anchors and anchor chains using abrasive blasting. After blasting, the anchors and chains shall be inspected by TCMS and the Owner's Representative.
- 3.1.4 The Contractor shall crop and replace the eyes and fabricate new pins for each of the anchors as directed by TCMS.
- 3.1.5 Any defects found in the anchors or chain shall be immediately brought to the attention of the Owner's Representative. Random links of chain shall be measured at the throat to check amount of wastage/wear. Original diameter of chain is 40 mm. A typewritten copy of measurements is to be given to the Owner's Representative.
- 3.1.6 The Contractor shall move the first shot of chain on each anchor to the end of their respective chains and chain reconnected to the anchor.
- 3.1.7 The Contractor shall paint the Anchors and Chains with 2 coats of Amercoat 238 Epoxy. Each coat is to be 3.5 mils to achieve a DFT of 3.0 mils. Each anchor is to have 2 coats of Amercoat 238 Epoxy. Each coat to be 3.5 mils to achieve a 3.0 mil DFT.
- 3.1.8 The Contractor shall paint the Joining shackles red. The appropriate number of links corresponding to the "shot number"; on either side of the joining shackle shall be painted white. The marked link, furthest from the joining shackle shall have 10 wraps of stainless wire on the lug to identify the shot – this shall be applied on both sides from the joining shackle. Items to be painted shall receive 2 coats of the appropriate colour at 3.5 mils to achieve a 3.0 mil DFT. Shots shall be numbered starting at the anchor.
- 3.1.9 The Chain Locker deck plating, ladders, false floor and suction pocket grids shall be removed. All water, mud, loose rust and scale shall be removed from the spaces and the bottom plating, suction pockets and pocket grids shall be thoroughly cleaned.
- 3.1.10 The Contractor shall prepare the chain lockers for TCMS Inspection.
- 3.1.11 Power Tool Clean all bare/rusted areas to SSPC-SP-11 (power tool clean to bare metal). Feather back all "intact" existing coating. Residue or debris shall be completely cleaned from the Chain Lockers.
- 3.1.12 Bare areas shall be coated with two (2) coats of Amercoat 238 Epoxy to bare areas with sufficient feathering. Apply @ 8 - 10 mils Dry Film Thickness per coat. Total DFT shall be 16 to 20 mils.
- 3.1.13 The Contractor shall ensure that all bilge suction lines from the chain locker are proven clear and pump proven operational.
- 3.1.14 The Contractor shall reinstall the false bottoms in the chain locker and reinstall the anchor chains using a new owner supplied joining shackles for each chain

## HD-10 Anchors and Chains, Chain Lockers Inspection

- 3.1.15 Use of shipboard equipment to store anchor is to be carried out by Ship's Crew only. Contractor is to contact Owner's Representative when anchors are to be lifted aboard.

### **3.2 Interferences**

- 3.2.1 The 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 is to be to the satisfaction of the Owner's Representative and TCMS Inspector

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 The contractor shall insure that the Anchors, chains and chain lockers are inspected by TCMS and that the TCMS inspector records the inspection in the vessel's Hull and Machinery Survey Record Book.

- 5.1.2 The contractor shall supply 3 copies of the certificates for the bitter end shackles.

## HD-11 Steel Remediation Port / Stbd Side Shell Plating

Item #: HD-11	<b>SPECIFICATION</b>	TCMS Field #:
<b>HD-11 Steel Remediation Port / Stbd Side Shell Plating</b>		

### Part 1: SCOPE:

- 1.1 The **Steel Remediation Port / Stbd Side Shell Plating** has indentations that are below the allowable requirements of TCMS and requires replacement. This plating is to be cropped and renewed.

### Part 2: REFERENCES:

#### 2.1 Drawings

Decks and Stringers

Eastern Technical Services - UT Report No. 16-449, dated 17 June 2016

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.1 Scope of Coating for Steel:

- 3.1.1 All steel is to be blasted and primed with a weldable primer before fabrication.
- 3.1.2 Once installed, all welded and heat affected areas are to be hand tooled and coated with primer.
- 3.1.3 The new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.1.4 After priming, the area is to have two top coats of marine epoxy. The interior and exterior coating is to match the current vessel paint type and color.

#### 3.2 Side Shell

The following areas of side shell are to be cropped and renewed as follows:

## HD-11 Steel Remediation Port / Stbd Side Shell Plating

### 3.2.1 Port Side

Based on visual inspection and readings taken, an area of the side shell plate is to be cropped and renewed. Utilize existing weld seams where possible.

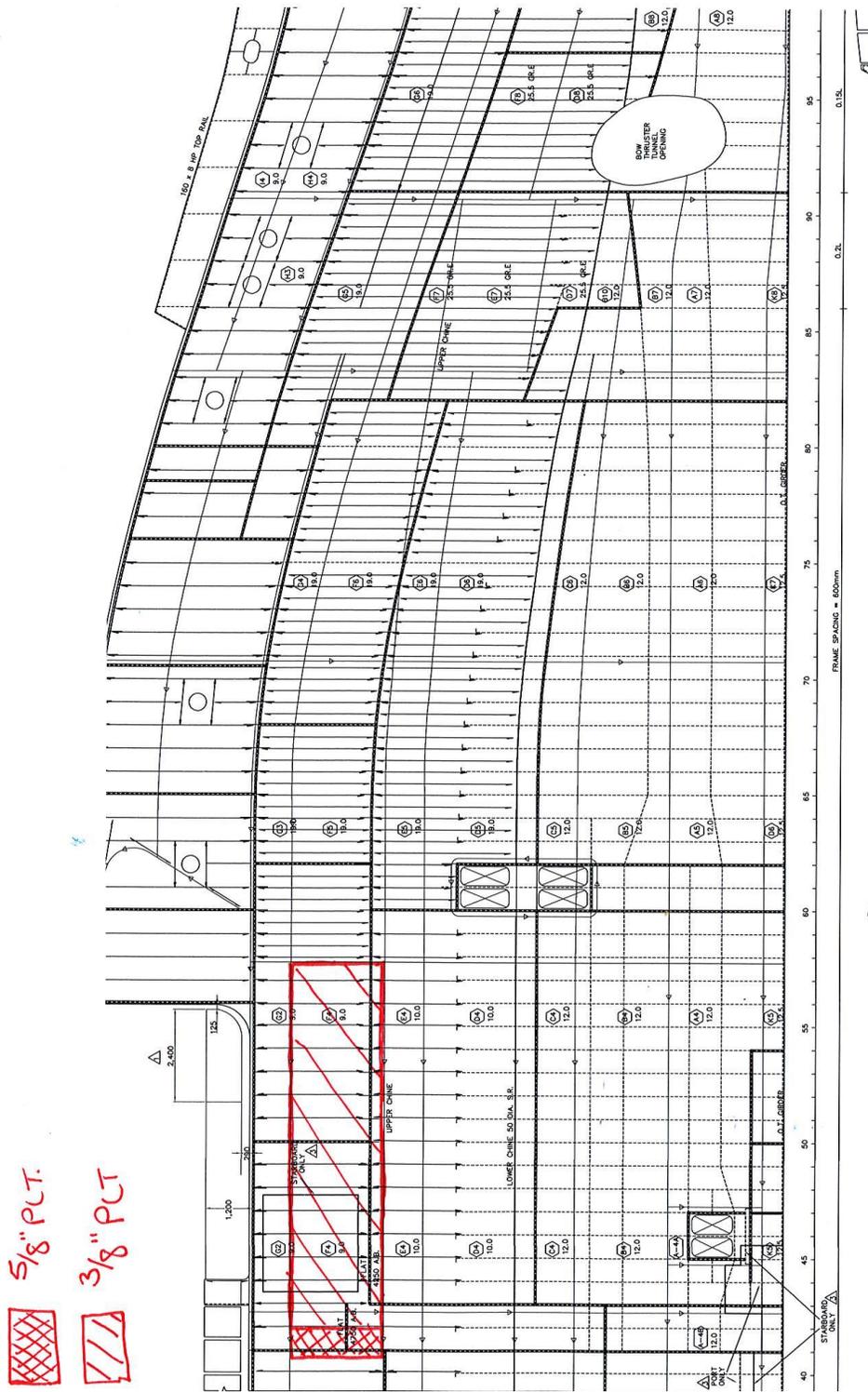
	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. Fr. 40.5-57.5	Side shell port side	Sketch #4 Photo #10	21m <sup>2</sup> & 2.5m <sup>2</sup>	3/8" & 5/8"
b.	Contractor to allow for crop and renewal of load line mark				

### 3.2.2 Starboard Side

Based on visual inspection and readings taken, an area of the side shell plate is to be cropped and renewed. Utilize existing weld seams where possible.

	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. Fr. 44.5-53.5	Side shell starboard side	Sketch #5 Photo #10	12m <sup>2</sup>	3/8"
b.	Contractor to allow for crop and renewal of load line mark				

# HD-11 Steel Remediation Port / Stbd Side Shell Plating





## HD-11 Steel Remediation Port / Stbd Side Shell Plating



Photograph #10: General view of side shell renewal area. Port side shown, stbd. similar.

**3.2.2 During the completion of hot work, the Contractor shall:**

## HD-11 Steel Remediation Port / Stbd Side Shell Plating

- supply fire watch while hot work is ongoing, with appropriate class portable fire extinguisher and charged fire hose ready for use.
- utilize existing seams/butts as practical when completing plate renewals. Where no butts/seams are present in the vicinity of new steel, corners to have a minimum of 100mm radius. Steel renewals are to follow good ship repair practices generally in accordance with IACS 47.
- subject work to inspection as coordinated with TCMS and CCG personnel.
- Steelwork on both sides will involve the vessel's Load Line markings. Contractor shall measure and re-mark the Load Line as per vessel specification.

### 3.2.3 Following the completion of hot work, the Contractor shall:

- have qualified person(s) complete ND testing, 100% visual and 100% UT of butts welds or as otherwise agreed with TCMS, and subject work to final inspections by CCG and TCMS.
- clean affected spaces and remove debris from vessel.
- clean and apply primer to welded seams and other disturbed areas. Apply internal and external coatings as directed by CCG personnel.

**3.2.4** The spaces to be protected with fire retardant cloth and a fire watch maintained at all times during hot work.

**3.2.5** New plating shall be provided with mill certification to Grade 44W, or an equivalent as approved by the attending TCMS surveyor.

### 3.2.6 Interference

**3.2.6.1** All tanks in affected area shall be opened up and gas freed.

**3.2.6.2** The contractor shall allow for removal of 1000 liters from each of the tanks listed in the table. Unit cost per 1000 liters for adjustment up or down.

### 3.2.6.3

Port Side Shell (Fr 40.5-57.5)	Tanks with steel renewals	Stbd Side Shell (Fr 44.5-53.5)	Tanks with steel renewals
Fr 52-64	Port day tank (13)	Fr 50-62	Stbd day tank (13)
Fr 50-52	Hydraulic oil tank		
Fr 48-50	Gear oil tank		

## 3.3 Location

3.3.1 Port and Stbd side shell

## **HD-11 Steel Remediation Port / Stbd Side Shell Plating**

Port Side Shell (Fr 40.5-57.5), Stbd Side Shell (Fr 44.5-53.5)

### **3.4 Interferences**

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

### **Part 4: PROOF OF PERFORMANCE:**

#### **4.1 Weld Inspection and Testing**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.
- 4.1.3 There is to be a 10% MPI testing completed on the deck welds by approved testing personnel.
- 4.1.4 This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact Transport Canada for all inspections.
- 4.1.5 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.
- 4.1.6 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.
- 4.1.7 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.

#### **4.2 Certification:**

- 4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

- 5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## HD-12 Porthole Replacement

Item #: HD-12	<b>SPECIFICATION</b>	TCMS Field #:
<b>HD-12 Porthole Replacement</b>		

### Part 1: SCOPE:

- 1.1 Contractor shall replace the following eight (8) Portholes with owner-supplied new.
- 1.2 This work shall be carried out in Conjunction with:
  - H-16 Deck Covering Replacement
  - HD-09 Fresh Water Tank Cleaning and Maintenance
  - HD-04 Hull Coatings and Inspection

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

Joiner Porthole Replacement Drawing  
IBH-024 EN Welding of steel windows and side shutters

#### 2.2 Reference Drawings

Insulation Plan (H60) 37-109-R  
Window Arrangement and List (H65) 37-120-R  
Window Plan and List (H125) 37-07120

#### 2.3 Standards

- 2.3.1 Coast Guards ISM hotwork, Confined Space entry, Lockout, and fall protection procedures are to be strictly enforced.
- 2.3.2 A valid hotwork permit must be obtained from vessel's Chief Engineer before any type of hot work is performed.
- 2.3.3 The following standards shall be used, as required, in carrying out this work.
  - Current edition of documents, at time of contract implementation, shall be used.
  - 2.3.3.1 Lloyd's Register – Rules and Regulations for the Classification of Ships.
  - 2.3.3.2 Safety of Life at Sea – SOLAS.

#### 2.4 Regulations

- 2.4.1 CSA – Hull Construction Regulations.
- 2.4.2 CSA – Load line Regulations (Sea).

#### 2.5 Owner Furnished Equipment

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

## **HD-12 Porthole Replacement**

### **Part 3: TECHNICAL DESCRIPTION:**

#### **3.1 General**

**3.1.1** Work is located in/near bulkheads/deck heads with insulation. Bulkhead panels will have to be removed for adequate Fire Watch observation, as well as furniture including settees, desks, dressers, bunks, ceiling panels and bulkhead panels c/w electrical receptacles and connections.

**3.1.2** After completion of work the bulkhead and furniture will be re-installed in the original position and condition with the exception of furniture and bulkheads removed and disposed of as directed by the Chief Engineer. Such removals shall be replaced with owner-supplied new.

**3.1.3** The spigots on the forward house are 190 mm deep and modified by welded in fill on the bottom.

**3.1.4** The Contractor shall lay down protective material to prevent damage to the cabin decking and furnishings during this repair. The Contractor shall be responsible to replace any part of cabin outfit or furnishings damaged as a result of the work in this item. The Contractor shall remove and dispose of the protective material and any dirt and debris resulting from this item following all work.

**3.1.5** The Contractor to remove all insulation around the porthole work area. This insulation is to be replaced with new when work is complete.

**3.1.6** Existing Portholes are to be cropped according to specified opening requirements in supplied drawing. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work.

**3.1.7** Contractor to remove old Portholes from the vessel and dispose of in an approved manner.

#### **3.2 New Porthole Installations:**

**3.2.1** The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.

**3.2.2** All cropped edges shall be ground clean.

**3.2.3** New Portholes are to be installed as directed by the attending TCMS Inspector.

**3.2.4** Upon completion of welding, all Portholes are to be subjected to a hose test for integrity and fitting to the satisfaction of the attending TCMS Inspector.

## **HD-12 Porthole Replacement**

- 3.2.5 The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.2.6 After priming, the interior and exterior bulkheads are to have two top coats of marine epoxy. The exterior coating is to match the current vessel paint type and color
- 3.2.7 Applicable areas around the interior of doors to be re-insulated with new material and trim and paneling re-installed as per original.

### **3.3 Location**

- 3.3.1 Chief Cook Cabin, Main deck Port.
- 3.3.2 Steward Cabin, Main Deck, Port.
- 3.3.3 Fisheries Officer Cabin, Main Deck, Port.
- 3.3.4 Boson's Cabin, Main Deck Starboard.
- 3.3.5 Leading Seaman's Cabin Upper Starboard Main Deck.
- 3.3.6 Leading Seaman's Cabin Upper Starboard Main Deck.
- 3.3.7 Oiler's Cabin Forward lower port.
- 3.3.8 Oiler's Cabin aft lower Port.

### **3.4 Interferences**

- 3.4.1 Contractor shall be responsible for 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 shall be completed to the satisfaction TCMS and the Chief Engineer.

### **4.2 Testing**

- 4.2.1 All Portholes shall be hose tested at 60 PSI in the presence of TCMS and the Chief Engineer.

### **4.3 Certification**

- 4.3.1 **Welding Certification as per Specification Preamble.**

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 All reports from the work specified shall be given to the Chief Engineer.

## HD-13 Seabays, Seachests, Grids, and Strainers

Spec item #: HD-13	<b>SPECIFICATION</b>	TC Field #: 3L039
<b>HD-13 Seabays, Seachests, Grids and Strainers</b>		

### Part 1: Scope:

**1.1** The intent of this item is for the contractor to clean and paint the internal surfaces of the sea bay and the sea chests of the vessel, in preparation for replacement of the sacrificial anodes in these spaces.

#### Description

Port Sea Bay Frame 60-62 (Low)

Stbd Sea Bay Frame 60-62 (High)

Port Fi-Fi Sea Bay Frame 45-47

Stbd Fi-Fi Sea Bay Frame 46-47

Fwd Sea Bay Frame 96-97

Sea Chest Frame 60-62

Port Sea Strainer Box Frame 60-62

Stbd Sea Strainer Box Frame 60-62

#### Size

Approx Size 2m X 1m

Approx Size 2m X 1m

Approx Size 1m X 1m

Approx Size 1m X 1m

Approx Size 0.5m X 1.5m

Approx. Size 10m x 1.2m x 1m

Approx Size 0.5m x 0.5m x 0.75m

Approx Size 0.5m x 0.5m x 0.75m

### Part 2: References:

#### **2.1 Guidance Drawings/Nameplate Data**

**2.1.1** SW Circulating Arrangement

#### **2.2 Standards**

**2.2.1** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E).

#### **2.3 Regulations**

**2.3.1** CSA Hull and Construction Regulation.

**2.3.2** Ships ISM Safety Procedures.

#### **2.4 Owner Furnished Equipment**

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

### Part 3: Technical Description:

#### **3.1 General**

##### **3.1.1. Sea Bays**

**3.1.2.** Each of the five (5) above sea bays shall have their strainer grids removed and the grid holes cleaned as well as drilled or reamed as required to return them to their original size. These areas shall be hydro blasted, and inspected by the Chief Engineer. The sea chest and sea strainer boxes shall be dealt with in a different manner. Any areas where epoxy coating is found damaged shall be repaired as follows.

**3.1.3.** The Port and Starboard Main Seabays shall be 100% grit blasted.

## **HD-13 Seabays, Seachests, Grids, and Strainers**

**3.1.4.** The contractor shall provide sea bay with effective mechanical systems to meet environmental conditions for the surface preparation and coating application. The Contractor shall prove the seabay safe for personnel to enter prior to commencing work. Copy of safe entry certificate to be given to chief engineer. Contractor shall have rescue team on site as per FSM-Confined Space Entry Requirements for all inspections carried out. Contractor shall have unit cost per entry inspection required outside the SOW.

### **3.1.5. Surface Preparation**

**3.1.6.** Abrasive Grit Blast all bare and rusted areas to SSPC-SP-10 Near White Metal. All edges of intact epoxy coating to be feather back to accept new coating. "Sweep Blast" the remaining area of intact coating to create a profile to accept new coating.

### **3.1.7. Primer - Touchup**

**3.1.8.** Apply one touch up coat of Amercoat 238 Abrasion Resistant Epoxy to bare blasted areas only. Apply @ 10 mils DFT.

### **3.1.9. Intermediate Coat**

**3.1.10.** Apply one full coat of Amercoat 238 Abrasion Resistant Epoxy to entire area. Apply @ 10 mils DFT. Colour Red Oxide.

### **3.1.11. Topcoat**

**3.1.12.** Apply one full coat of Amercoat 339 Low Friction Hull Coating to entire area. Apply @ 8 mils DFT. Colour Black.

**3.1.13.** The Contractor shall quote on repairing 20 square meters of the coating. Quote shall include unit cost of each square meter and shall be used to adjust total area of damaged coating.

**3.1.14.** All anodes shall be replaced, as determined by the Owner's Representative.

**3.1.15.** The seabays shall be closed up in good order with grids properly secured. The Contractor shall quote on the existing arrangement as being tack welded.

**3.1.16.** The Contractor shall quote a separate cost on removing a section of the bow and stern thruster grids to gain access to the thruster tunnels for the replacement of the wasted anodes if required. The quote shall include the replacement of the sections and coating as per under water hull coating specifications.

**3.1.17.** It will be necessary to remove a section of 4 inch re-circulation line in the starboard sea bay to gain access to seabay interior for cleaning and painting. This section of re-circulation line shall be replaced in good order upon completion of the work.

### **3.1.18. Sea Chest and Sea Strainer Boxes**

**3.1.19.** The sea chest will be pumped down to suction level by the ship's engineers. The manhole cover shall be removed, and any remaining water disposed of. The chest internals shall be wiped dry. A mechanical ventilation system vented to the outside of the ship shall be

## **HD-13 Seabays, Seachests, Grids, and Strainers**

provided to ensure good air movement in the sea chest.

**3.1.20.** The internals shall be 100% Grit Blasted. All debris shall be removed ashore and the chest internals thoroughly dried out such that no moisture remains.

**3.1.21.** The Contractor shall quote a separate cost on removing the Port and Stbd Sea Strainer boxes from the vessel for grit blasting and coating. Strainers shall be re-installed and boxes closed using new gasket material on the covers and anti-seizing compound on the fastener threads.

**3.1.22.** Contractor to remove interference piping on the Strainer Boxes as well as a section of 8 inch fuel line that runs adjacent to each strainer box that may impede removal of the lower flange bolts. This pipe section will be already partially removed to accommodate the Pneumatic Valve Replacements.

**3.1.23.** Upon completion of cleaning and prior to coating, the strainer boxes and seabay internals shall be inspected by Owner's Representative and attending TCMS Surveyor. At this time wasted anodes shall be replaced as per zinc anode specification item.

**3.1.24.** Areas where epoxy coating is found damaged shall be dealt with as follows.

### **3.1.25. Surface Preparation**

**3.1.26.** Grit blast all bare/rusted areas to SSPC-SP-11 (power tool clean to bare metal).

### **3.1.27. Coating System**

**3.1.28.** Sea Chest and Sea Bays shall be coated with two (2) coats of Amercoat 235 Epoxy to bare areas. Apply @ 5 to 6 mils Dry Film Thickness per coat. Total DFT shall be 10 to 12 mils. The contractor shall perform the work in accordance with product application instructions with particular attention to the environmental conditions.

**3.1.29.** The contractor shall quote on repairing 48 square metres of the coating and include unit cost of each square meter which shall be used to adjust the total area of damaged coating.

**3.1.30.** The vents shall be proven clear and low level alarm tested. Upon completion the sea chest shall be closed up in good order using new gasket material on the covers and anti-seizing compound on the fastener threads.

**3.1.31.** All work shall be to the satisfaction of the Chief Engineer and attending TCMS Surveyor.

## **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 contractor shall prove to the owners the DFT measurements at areas where the

## **HD-13 Seabays, Seachests, Grids, and Strainers**

coating was completely missing.

### **4.3 Certification**

**4.3.1** The Contractor shall supply documentation of coatings applied.

### **Part 5: Deliverables:**

#### **5.1 Drawings/Reports**

**5.1.1.** The thickness determination DFT of the new coatings applied shall be verified and recorded. Reports shall be given to Chief Engineer.

**5.1.2.** All reports from the work specified shall be given to the Chief Engineer.

**5.1.3.** The contractor shall supply copies of all paint coating MSDS and technical data sheets.

## HD-14 Ship Underwater De-Icing Valve Inspection and Replacement

Spec item #: HD-14	<b>SPECIFICATION</b>	TCMS Field #: 3LL110
<b>HD-14 Ship Underwater De-Icing Valve Inspection and Replacement</b>		

### Part 1: Scope:

1.1 The intent of this Item is to inspect all de-icing valves to receive Credit from TCMS.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

#### 2.2 Standards

2.2.1 Coast Guards ISM hotwork, Confined Space entry, Lockout, and fall protection procedures are to be strictly enforced.

2.2.2 A valid hotwork permit must be obtained from vessel's Chief Engineer before any type of hot work is performed.

#### 2.3 Regulations

2.3.1 CSA – Load Line 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 intent of this item shall be to inspect fifteen (15) de-icing valves as described in valve list and to obtain a survey credit by TCMS. The contractor shall be responsible for notifying TCMS for all inspections.

3.1.2 The air supply will be isolated and locked out and entered into the ships ISM Lockout book by Ship's Crew and Contractor prior to commencing work.

3.1.3 After the Contractor has removed the old valve, the air supply pipe shall be blanked because this pipe is used for other air supplies.

3.1.4 All the valves shall be installed using new good quality bolts, nuts, and lock washers using anti-seize compound. All flanges sealing surfaces shall be cleaned to bare metal.

3.1.5 All valves shall be inspected by Chief Engineer and TCMS Inspectors before installation.

3.1.6 The Contractor shall supply all material, parts, equipment and labour to perform the specified work.

## HD-14 Ship Underwater De-Icing Valve Inspection and Replacement

3.1.7 The contractor shall test all valves for tightness during the re-float and be responsible for the repairs if necessary. This test shall be witnessed by TCMS inspector and Chief Engineer.

### 3.2 Location

Identification	Location	Type
Port Main Engines Overboard	Frame 64 Port engine room	6"
Starboard Main Engines Overboard	Frame 64 Starboard engine room	6"
CPP and Gearbox Coolers Overboard	Frame 50 Port escape pump room	3"
Ships Service Generators Overboard	Frame 77 Port engine room	3"
Windlass Hydraulic Bilge Overboard	Frame 104 Port forward hydraulic	2"
Refrigeration and HVAC Overboard	Frame 87 Starboard forward stock room	2.5"
Sewage Overboard	Frame 78 Port engine room	3"
Bilge Overboard (INSPECT de-icing valve)	Frame 12 Port Steering Gear	2"
Laundry Drains Pump	Overboard Frame 87 Port Auxiliary Machinery	2"
General Service Pumps Overboard	Frame 64 Port engine room	6"
Oily Water Separator Overboard	Frame 67 Starboard engine room	1"
Ballast Pump Overboard	Frame 64 Starboard engine room	6"
Port Vent Seachest	Frame 60 Engine room port	4" Butterfly
Stbd Vent Seachest	Frame 60 Engine room port	4" Butterfly
Scupper Drain Check	Frame 59 Engine Room Port	2 1/2" Swing

### 3.3 Interferences

3.3.1 The Contractor shall be responsible for 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 TCMS and the Chief Engineer.

## **HD-14 Ship Underwater De-Icing Valve Inspection and Replacement**

### **4.2 Testing**

4.2.1 TCMS and Chief Engineer to inspect and witness the installation of the valves and leak test during undocking of ship.

4.2.2 Valves to be watched closely for leaks when ship is refloated by the Contractor and repaired as needed.

### **4.3 Certification**

4.3.1 TCMS Inspector to do all the inspections before and after the installation, and make the necessary remarks and corrections in the Ships Hull and Machinery Record Book.

4.3.2 All the valve Certifications documentation shall be given to the Chief Engineer.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

5.1.1 All reports 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

## HD-15 Sea Connections Inspection

Spec item #: HD-15	<b>SPECIFICATION</b>	TC Field #: 3LL110
<b>HD-15 Sea Connections Inspection</b>		

### Part 1: Scope:

**1.1** The intent of this item shall be to open the above valves for inspection and to obtain a survey credit by TCMS. The contractor shall be responsible for notifying TCMS for all inspections.

### 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).

#### 2.3 Regulations

**2.3.1** CSA Hull and Construction Regulation.

**2.3.2** Ships ISM Safety Procedures.

#### 2.4 Owner Furnished Equipment

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

### Part 3: Technical Description:

#### 3.1 General

**3.1.1.** The 20" FiFi valves shall be inspected externally from inside seabay, in conjunction with the removal of FiFi seabay grids. Valve seats and discs shall be thoroughly cleaned and inspected for defects and unusual wear. Valves are operated by extended spindle and reduction gearbox. Gearboxes shall be opened up for inspection and repacked with new grease upon completion.

**3.1.2.** To gain access to the 14" Main Seabay valves it shall be necessary to remove the inlet sea strainer box on both port and starboard sea bays. The 14" butterfly valves shall be unbolted for the removal of the sea strainers. Valves shall be removed and thoroughly cleaned. Cleaning agent shall be compatible with the rubber seats. Valve operating gearboxes shall be opened up, thoroughly cleaned and inspected for wear and defects. Valve operating gearboxes shall be packed with new grease and boxed up following inspection. All strainer box flanges and pipe flanges shall be cleaned to bare metal. Upon completion, strainer boxes shall be replaced in good order as per original. Valves shall be replaced as originally found.

**3.1.3.** The other butterfly valves shall be removed and thoroughly cleaned. Cleaning agent shall be compatible with the rubber seats. Valve operating gearboxes shall be opened up,

## HD-15 Sea Connections Inspection

thoroughly cleaned and inspected for wear and defects. Valve operating gearboxes shall be packed with new grease and boxed up following inspection. Valves shall be replaced as originally found. The valves shall be installed in their original position.

**3.1.4.** All globe valves shall have the valve bonnets removed to perform the work. Valves shall be dismantled, spindles removed, old packing removed and parts laid out for inspection by TCMS. Valve internals and valve parts shall be thoroughly cleaned. Discs and seats shall be lapped in to provide a tight seal when closed. Valve body internals shall be thoroughly inspected for corrosion and hammer tested for soundness. All valves shall be reassembled using new packing and neoprene gaskets.

**3.1.5.** The ½” De-Icing valves servicing the above valves shall be dealt with in the same manner as the globe valve work description. Air supply will be isolated by Ship’s Crew prior to commencing work.

**3.1.6.** All threaded fasteners shall be cleaned with a wire wheel and re-used applying anti-seize compound.

**3.1.7.** The contractor shall supply all parts and material to perform the specified work.

### 3.2 Location

#### Main Seabay / Seachest

Identification	Location	Type
Port Seabay Vent and De-ice	Frame 60 Engine room port	4” Butterfly
Port Seabay Vent	Frame 60 Engine room port	6” Butterfly
Port Seabay to Sea Strainer Inlet	Frame 60 Engine room port	14” Butterfly
Port Sea Strainer Outlet to Seachest	Frame 60 Engine room port	14” Butterfly
Port Engines Re-circ to Port Seabay	Frame 60 Engine room port	6” Butterfly
Port Engines Re-circ to Seachest	Frame 60 Engine room port	6” Butterfly
Port Vent Seachest	Frame 60 Engine room port	4” Butterfly
Starboard Vent Seachest	Frame 60 Engine room port	4” Butterfly
Starboard Seabay Vent and De-ice	Frame 60 Engine room starboard	4” Butterfly
Starboard Seabay Vent	Frame 60 Engine room starboard	6” Butterfly
Starboard Seabay to Sea Strainer Inlet	Frame 60 Engine room starboard	14” Butterfly
Starboard Sea Strainer Outlet to	Frame 60 Engine room starboard	14” Butterfly

## HD-15 Sea Connections Inspection

Seachest		
Starboard Engines Re-circ to Stbd Seabay	Frame 60 Engine room starboard	6" Butterfly
Starboard Engines Re-circ to Seachest	Frame 60 Engine room starboard	6" Butterfly

### Fi-Fi Seabays Port and Starboard

Identification	Location	Type
Port Fi-Fi Pump Inlet	Frame 48 Engine room port	20" Butterfly
Port Fi-Fi Seabay Vent and De-ice	Frame 48 Engine room port	2" Angle Globe
Port Fi-Fi Seabay (System Drain)	Frame 48 Engine room port	2 ½" Globe
Starboard Fi-Fi Pump Inlet	Frame 48 Engine room starboard	20" Butterfly
Starboard Fi-Fi Seabay Vent and De-ice	Frame 48 Engine room starboard	2" Angle Globe
Starboard Fi-Fi Seabay (System Drain)	Frame 48 Engine room starboard	2 ½" Globe

### Emergency Fire Pump Seabay

Identification	Location	Type
Fire Pump Inlet	Frame 91 Bow Thruster Compt	3" Globe
Fire Seabay vent	Frame 91 Bow Thruster Compt	2 ½" Butterfly

### Other Sea Connections, various locations

Identification	Location	Type
Port Main Engines Overboard	Frame 64 Port engine room	6"
Starboard Main Engines Overboard	Frame 64 Starboard engine room	6"
CPP and Gearbox Coolers Overboard	Frame 50 Port escape pump room	3"
Ships Service Generators Overboard	Frame 77 Port engine room	3"
Windlass Hydraulic Bilge Overboard	Frame 104 Port forward hydraulic	2"
Refrigeration and HVAC Overboard	Frame 87 Starboard forward stock room	2.5"

## HD-15 Sea Connections Inspection

Sewage Overboard	Frame 78 Port engine room	3"
Bilge Overboard	Frame 12 Port Steering Gear	2"
Laundry Drains Pump	Overboard Frame 87 Port Auxiliary Machinery	2"
General Service Pumps Overboard	Frame 64 Port engine room	6"
Oily Water Separator Overboard	Frame 67 Starboard engine room	1"
Ballast Pump Overboard	Frame 64 Starboard engine room	6"

### 3.3 Interferences

3.3.1 The Contractor shall be responsible for 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 valves shall be inspected by Chief Engineer and TCMS Inspector before reassembly.

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

### 4.2 Testing

4.2.1 The contractor shall test all valves for tightness during the re-float and be responsible for the repairs if necessary.

### 4.3 Certification

4.3.1 If any machining is necessary or new valves required, the Contractor shall have full documentation of work performed and / or new valve certificates.

## Part 5: Deliverables:

### 5.1 Drawings/Reports

5.1.1. All reports from the work specified shall be given to the Chief Engineer.

5.1.2. Certificates for new valves shall be given to the Chief Engineer.

## HD-16 Storm Valve Inspection and Associated De-Icing Valves

Spec item #: HD-16	<b>SPECIFICATION</b>	TC Field #: 3LL090
<b>HD-16 Storm Valve Inspection and Associated De-Icing Valves</b>		

### Part 1: Scope:

**1.1** The intent of this item shall be to open the above noted storm valves and associated De-Icing Valves valves for inspection and to obtain a survey credit by TCMS. The contractor shall be responsible for notifying TCMS for all inspections.

### 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).

#### **2.3 Regulations**

**2.3.1** CSA Hull and Construction Regulation.

**2.3.2** Ships ISM Safety Procedures.

#### **2.4 Owner Furnished Equipment**

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

### Part 3: Technical Description:

#### **3.1 General**

**3.1.1.** The Contractor shall note that the affected cabins and spaces will be occupied while this work is ongoing. The contractor shall install blanks over access covers while the work is in progress.

**3.1.2.** The noted valves shall be opened up for cleaning and inspection. The contractor shall be responsible for the removal and replacement of panels in the cabins to provide access to the valves as required. The valve flappers shall be removed and new leathers installed. The valve internals and sealing areas shall be thoroughly cleaned and hammer tested.

**3.1.3.** The ½” de-Icing valves servicing each of the noted valves shall be disassembled for service, inspection, and cleaning. Valves shall have the valve bonnets removed to perform the work. Valves shall be dismantled, spindles removed, old packing removed and parts laid out for inspection. Valve internals and valve parts shall be thoroughly cleaned. Discs and seats shall be lapped in to provide a tight seal when closed. Valve body internals shall be

## HD-16 Storm Valve Inspection and Associated De-Icing Valves

thoroughly inspected for corrosion and hammer tested for soundness. All valves shall be reassembled using new packing and neoprene gaskets. Air supply will be isolated by Ship's Crew prior to commencing work.

**3.1.4.** All threaded fasteners shall be cleaned with a wire wheel and re-used applying anti-seize compound. All sealing surfaces shall be cleaned to bare metal.

**3.1.5.** The contractor shall supply all material to perform the specified work.

### 3.1 Location

Identification	Location	Type
Scupper Drain Check	Frame 67 #2 Oiler Cabin Port 2 of	2 1/2" Swing
Scupper Drain Check	Frame 81 #1 Oiler Cabin Port	3" Swing
Scupper Drain Check	Frame 81 #3 Seaman Cabin Stbd	3" Swing
Scupper Drain Check	Frame 91 Clerk Cabin Port	2 1/2" Swing
Scupper Drain Check	Frame 91 Clerk Cabin Port	3" Swing
Scupper Drain Check	Frame 59 Engine Room Port(assoc de-icing valve to be replaced as per HD-09)	2 1/2" Swing
Scupper Drain Check	Frame 76 Engine Room Port	2 1/2" Swing
Scupper Drain Check	Frame 91 Aux Mach. Room Port	3" Swing

### 3.3 Interferences

3.3.1 The Contractor shall be responsible for 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 storm valves and de-icing valves shall be inspected by Chief Engineer and TCMS Inspector before reassembly.

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

### 4.2 Testing

**4.2.1** The contractor shall test all valves for tightness during the re-float and be responsible for the repairs if necessary.

### 4.3 Certification

**4.3.1** If any machining is necessary or new valves required, the Contractor shall have full documentation of work performed and / or new valve certificates.

## Part 5: Deliverables:

### 5.1 Drawings/Reports

## **HD-16 Storm Valve Inspection and Associated De-Icing Valves**

**5.1.1** All reports from the work specified shall be given to the Chief Engineer.

## H-17 Escape Hatch Replacements

Item #: H-17	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-17 Escape Hatch Replacements</b>		

### Part 1: SCOPE:

- 1.1 The intent of this item shall be to have the three (3) existing Escape Hatches replaced with owner-supplied new.
- 1.2 This work shall be carried out in Conjunction with:
  - 1.2.1 HD-11 Steel Renewals Port and Stbd Side shell.

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

Guidance Drawings 160358-001 Joiner Systems Drawing

#### 2.2 Reference Drawings

n/a

#### 2.3 Standards

2.3.1 Coast Guards ISM hotwork, Confined Space entry, Lockout, and fall protection procedures are to be strictly enforced.

2.3.2 A valid hotwork permit must be obtained from vessel's Chief Engineer before any type of hot work is performed.

2.3.3 The following standards shall be used, as required, in carrying out this work.

Current edition of documents, at time of contract implementation, shall be used.

2.3.3.1 Lloyd's Register – Rules and Regulations for the Classification of Ships.

2.3.3.2 Safety of Life at Sea – SOLAS.

#### 2.4 Regulations

2.4.1 CSA – Hull Construction Regulations.

2.4.2 CSA – Load line Regulations (Sea).

#### 2.5 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### 3.1 General

3.1.1 Work is located in/near bulkheads/deck heads with insulation. Contractor shall remove any insulation that will obstruct the work area. Contractor shall install new Insulation when work is completed.

## **H-17 Escape Hatch Replacements**

**3.1.2** The Contractor shall lay down protective material to prevent damage to the surrounding areas as a result of the work. Contractor shall remove and dispose of the protective material and any dirt and debris resulting from this item following all work.

**3.1.3** Existing Hatches are to be cropped according to specified Opening requirements in supplied drawings. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work.

**3.1.4** Contractor to remove old hatches from the vessel and dispose of in an approved manner.

### **3.2 New Hatch Installations:**

**3.2.1** The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.

**3.2.2** All cropped edges shall be ground clean.

**3.2.3** New Hatches are to be installed as directed by the attending TCMS Inspector.

**3.2.4** Upon completion of welding, all hatches are to be subjected to a hose test for integrity and fitting to the satisfaction of the attending TCMS Inspector.

**3.2.5** The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.

**3.2.6** After priming, the exterior bulkheads are to have two top coats of marine epoxy. The exterior coating is to match the current vessel paint type and color

**3.2.7** Applicable areas around the interior of hatches to be re-insulated with new material and trim and paneling re-installed as per original.

**3.2.8** Contractor shall follow welding procedure as laid down by Joiner Systems installation drawings and TCMS.

### **3.3 Location**

**3.3.1** Towing Deck Port Side to Pump Room.

**3.3.2** Towing Deck Starboard Side to Engine Room

**3.3.3** Towing Deck Aft, Port Side to Steering Flat

### **3.4 Interferences**

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

## **H-17 Escape Hatch Replacements**

### **Part 4: PROOF OF PERFORMANCE:**

#### **4.1 Inspection**

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

#### **4.2 Testing**

**4.2.1** All Portholes shall be water tested at 60 PSI with TCMS and Chief Engineer.

**4.2.2** All welds shall be 100% NDT as directed by TCMS.

#### **4.3 Certification**

**4.3.1** Welding Certification as per Specification Preamble.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

**5.1.1** All reports 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.

#### **5.4 Manuals**

**5.4.1** N/A.

## H-18 Exterior Door Replacements

Item #: H-18	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-18 Exterior Door Replacements</b>		

### Part 1: SCOPE:

- 1.1 To replace 9 existing exterior weather-tight doors on the foc'sle, main, boat, and lower bridge decks with owner supplied new ones.
- 1.2 The Doors to be replaced are as follows;
  - 1.2.1 Stbd side Foc'sle deck accommodations door.
  - 1.2.2 Port side Foc'sle deck accommodations door.
  - 1.2.3 H-Vac room door Foc'sle deck
  - 1.2.4 Stbd side boat deck accommodations door forward.
  - 1.2.5 Stbd side boat deck accommodations door aft.
  - 1.2.6 Port side boat deck accommodations door.
  - 1.2.7 Gun locker door Foc'sle deck.
  - 1.2.8 Stbd double door main deck.
  - 1.2.9 Paint locker door Foc'sle deck.
  - 1.2.10 Emergency generator room door lower bridge deck
  - 1.2.11 Electronic equipment room door lower bridge deck.

### Part 2: REFERENCES:

#### 2.1 Drawings

- 2.1.1 Joiner Systems Drawings

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.2 Removal of existing Doors:

- 3.2.1 All insulation, trim and paneling in the affected area to be removed. Paneling and trim to be stored for re-installation when work is completed.

## **H-18 Exterior Door Replacements**

- 3.2.2 The adjacent spaces to be protected with fire retardant cloth and fire-proof covering placed on the interior deck covering where applicable. A fire watch is to be maintained at all times during hot work.
- 3.2.3 The contractor shall arrange to erect temporary shelters around each of doorways in way of each installation. The shelter shall be erected to provide suitable shelter from rain, snow and wind in way of the specific area under construction.
- 3.2.4 The contractor shall provide lighting and ventilation inside the temporary shelters. The materials in the temporary shelter are to be non-combustible.
- 3.2.5 The contractor will be responsible for erecting, moving, reassembling and disassembling the shelters as the work progresses to a new area.
- 3.2.6 Existing doors are to be cropped according to specified Opening requirements in supplied drawings. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work.
- 3.2.7 Contractor to remove old doors from the vessel and dispose of in an approved manner.

### **3.3 New Door Installations:**

- 3.3.1 The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.
- 3.3.2 All cropped edges shall be ground clean.
- 3.3.3 New doors are to be installed as per supplied Joiner drawings and as directed by the attending TCMS Inspector.
- 3.3.4 Upon completion of welding, all doors are to be subjected to a hose test for integrity and fitting to the satisfaction of the attending TCMS Inspector.
- 3.3.5 The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.3.6 After priming, the exterior bulkheads are to have two top coats of marine epoxy. The exterior coating is to match the current vessel paint type and color
- 3.3.7 Applicable areas around the interior of doors to be re-insulated with new material and trim and paneling re-installed as per original.

### **3.4 Interferences**

- 3.4.1 The Contractor is responsible for identification of interference items, their temporary

## **H-18 Exterior Door Replacements**

removal, storage, and refitting to the vessel. .

### **Part 4: PROOF OF PERFORMANCE:**

#### **4.1 Weld Inspection and Testing**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.
- 4.1.3 There is to be NDT testing completed on the welds by approved testing personnel as directed by the attending TCMS Inspector.
- 4.1.4 After completion each installation shall be water hose tested for leaks.
- 4.1.5 This testing is to be carried out in the presence of the attending TCMS Inspector and Chief Engineer. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact TCMS for all inspections.
- 4.1.6 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.
- 4.1.7 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.
- 4.1.8 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.

#### **4.2 Certification:**

- 4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

- 5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## H-19 Chief Officer Washroom Refurbishment

Spec item #: H-19	<b>SPECIFICATION</b>	TCMSB Field #:
<b>H-19 Chief Officer Washroom Refurbishment</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification is to outline the work required in refurbishing the Chief Officer's washroom. Measure deck plate thickness and repair if necessary.
- 1.2 To assess the extent of steel replacement necessary and to plan and schedule this replacement, deck coverings shall be removed from affected areas and ultrasonic testing performed within 5-days of contract commencement.
- 1.3 This work shall be carried out in Conjunction with the following:  
N/A

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Scuppers & Drains Diagram # 37-04239 Sh. 1 of 2
- 2.1.2 General Arrangement NJC-10-100

#### 2.2 Standards

- 2.2.1 Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.2 Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.3 ISM hot work, Confined Space entry, and fall protection procedures are to be strictly enforced.
- 2.2.4 All welding shall be as per specification preamble.
- 2.2.5 CG Lockout Procedure.

#### 2.3 Regulations

- 2.3.1 All deck covering materials shall be non-combustible, approved by TCMS for its intended usage, and shall comply with the requirements of hull construction Regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C.

#### 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

## H-19 Chief Officer Washroom Refurbishment

### Existing Configuration:

3.1.1 The washroom is equipped with one toilet and shower stall, one sink and mirror. The washroom deck measures approximately 54 inches by 74 inches. The total deck area is 27.75 square feet.

### 3.2 Deck

- 3.2.1. The Contractor shall remove all the ceramic tile flooring from the deck of the washroom including the raised combing around the perimeter of the washroom. The existing wash room tiles are on the deck, and go up the perimeter of the lower section of the bulkheads, and are a distance of 4 inches from the deck forming a border or a ceramic tile baseboard. The surface shall be cleaned of all grout, Dex-O-Text, and cement to bare metal.
- 3.2.2. In preparation for ultrasonic shots and the application of new deck paint covering, the areas of steel deck plating, bottom section of bulkhead, that were exposed by the deck covering, shall be thoroughly cleaned free of scale, rust, glue, high spots, and debris.
- 3.2.3. The contractor shall have an ultrasonic NDT technician take 12 ultrasonic shots on the exposed steel to establish the amount of deck plating if any to be replaced. The Chief Engineer in consultation with the NDT technician will decide the best locations for the ultrasonic shots. Before testing, the Contractor shall at each identified test location grind the surface coating to bare metal while ensuring that any dishing of the metal is prevented. Contractor shall prepare and supply a report on the findings and amount of plating to be replaced to Chief Engineer immediately after the testing is complete. This Survey report shall include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any to be replaced.
- 3.2.4. Before any more remedial work on this item is commenced; the contractor shall invite TCMS Hull inspector to inspect the deck to ascertain if additional testing/repairs are required and so that proper notes for future vessel hull surveys can be made. Contractor shall also quote on unit cost per additional ultrasonic shot and shall be adjusted up or down by PWGSC 1379 action.
- 3.2.5. The Contractor shall crop out, dispose of and replace any deteriorated deck plating as determined by Chief Engineer, with new plating in accordance with good marine practice with attention paid to minimum plate amounts, proper plate corner radius etc. The new plating must also have the proper mill certification; copy of same shall be given to Chief Engineer and TCMS inspectors.
- 3.2.6. The Contractor shall bid on replacing 5 Square feet of 3/8 inch deck plating in the Wash room. Contractor shall also quote on unit price per square foot of deck plate replacement. Deck Plating required shall be adjusted up or down by PWGSC 1379 action.
- 3.2.7. After completion of steel deck repairs, the complete new and old steel deck plating, bottom section of bulkheads, which were originally under the old cement, shall be coated

## **H-19 Chief Officer Washroom Refurbishment**

in accordance with manufacturers' specifications in preparation of the Seamless Epoxy Floor System.

- 3.2.8. The contractor shall install a Seamless Epoxy deck system in accordance with manufacturers' specifications.
- 3.2.9. The Contractor shall replace the existing shower scupper with new and connect it to the existing pipework.

### **3.3 Shower Stall**

- 3.3.1 Shower stall base shall be removed and a new base incorporated into the new seamless flooring system.
- 3.3.2 Contractor shall remove Joiner panels on fwd exterior bulkhead to permit removal of flooring. These panels will be re-used when work is complete. New contractor supplied tracking to remount panels will be needed.  
Contractor shall remove deckhead paneling in Washroom. New owner-supplied panels shall be installed.
- 3.3.3 The Contractor shall install stainless sheeting on the 2 bulkheads of the shower stall as per Chief Engineer's washroom shower. A stainless steel enclosure is to cover piping and mixing shower valve. This is to be completed by a qualified sheet-metal tradesperson.
- 3.3.4 A new contractor supplied shower curtain rail shall be installed.

### **3.5 Toilet**

- 3.5.1 The toilet shall be removed from the seating, toilet shall be reused. The deck underneath shall be cleaned to bare metal. This shall be done prior to taking ultrasonic shots. New toilet securing studs shall be stainless steel. The toilet shall be installed on a Teflon pad (Contractor supplied); rework of ABS pipe in the toilet area required shall be dealt with by 1379.
- 3.5.2 All work and materials shall be to the satisfaction of Chief Engineer.
- 3.5.3 The Contractor shall dispose of the removals to the Contractor's facilities.

### **3.6 Location**

- 3.6.1 Chief Officer Cabin, Boat Deck.

### **3.7 Interferences**

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

## **H-19 Chief Officer Washroom Refurbishment**

3.7.2 The affected areas under washroom will be Galley.

### **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 Water to be poured down the new scupper pipe and shower drain with Chief Engineer or his delegate present to check in the galley for leaks. If leaks are present the contractor shall repair these leaks.

#### **4.3 Certification**

4.3.1 All welding shall be as per specification preamble.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

5.1.1 The Contractor shall prepare and supply a report on the ultrasonic shots. This Survey report shall include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any, to be replaced.

5.1.2 All reports 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

#### **5.4 Manuals**

5.4.1 N/A

## H-20 Deck Covering Replacement

Spec item #: H-20	<b>SPECIFICATION</b>	TCMSB Field #:
<b>H-20 Deck Covering Replacement</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification shall be to replace the deck Underlayment and vinyl covering, clean steel deck to near white metal, and inspect and test the condition of the steel deck. Replace steel deck where wastage is beyond acceptable limits to the below noted deck areas.

The locations and areas of deck are as follows;

1. Starboard Quartermaster Station – 108 ft2. (Engine room is below) A60 Deck underlayment.
  2. Starboard alleyway main deck – 125 ft2 (Engine room is below) A60 Deck underlayment.
  3. Seaman’s 1 Cabin – 70 ft2 (Engine room, Day tank, M/E L/O tank are below) A60 Deck underlayment.
  4. Seaman’s 2 Cabin – 70 ft2 (Engine room, Sett tank, M/E L/O tank are below) A60 Deck underlayment.
  5. Leading Seaman’s 1 Cabin– 70 ft2 (Cool room and Laundry room are below)
  6. Leading Seaman’s 1 Cabin– 70 ft2(Cool room and Laundry room are below)
  7. Upper Alleyway of Main Deck –415ft2 From top of stairs from Lower Main Deck Port side to Stairs on Starboard side.
  8. Third Officer’s Cabin – 72 ft2 (Crews wash room and stbd alleyway are below)
- 1.2 To replace the underlayment and vinyl coverings in locations 1-8 with new.
- 1.3 This work shall be carried out in Conjunction with:  
H-20 Steel remediation bulk head/door coaming in way of stbd side main deck.  
HD-12 Porthole Replacements

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 # 37-109-R Insulation Plan H60
- 2.1.2 # 37-113-R Deck Coverings H64
- 2.1.3 H57 Joiner Bulkheads and linings
- 2.1.4 Marine fire classifications on Gislaved Quality 1320
- 2.1.5 Eastern Tech Report 16-725

Furniture Installer Contact-  
Spurrell’s Cabinetry  
Portugal Cove, St. Phillip’s, NI  
(709) 685-7344

## H-20 Deck Covering Replacement

### 2.2 Standards

- 2.2.1. Lloyd's register Rules and Regulations for the Classification of Ships
- 2.2.2. Ships ISM Lockout/ Hotwork/ Confined Space Entry Procedures.
- 2.2.3. **All deck covering and underlayment materials shall be non-combustible, approved by TCMS for its intended usage, and shall comply with the requirements of hull construction regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C.**

### 2.3 Regulations

- 2.3.1 **All materials shall be approved by TCMS for its intended usage, and shall comply with the requirements of Hull Construction 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. Contractor shall install temporary dust curtains around the perimeter of work area, sufficient to prevent contamination of adjacent bulkheads, decks, and equipment, with dust and residues produced as a result of the work.
- 3.1.2. The Contractor shall supply a suitable sized container for the storage of ceiling and bulkhead paneling from the cabins being worked on. This container to be placed on the aft Tow Deck until fully loaded and returned after work is completed.
- 3.1.3. Contractor shall remove the Joiner bulkhead and deckhead paneling in areas mentioned in 1.1. The removed paneling is to be stored in the Contractor supplied Container on the Aft deck. All paneling shall be re-installed with the exception of ones designated by the Chief Engineer. The bulkhead paneling shall be re-covered with owner-supplied Joiner Systems (Gislaved) covering as directed by the manufacturer. This covering shall be done by a qualified coverings installation Technician.
- 3.1.4. On completion of work, contractor shall ensure all areas/equipment affected by the work to be cleaned of dust and residues.
- 3.1.5. Prior to commencement of restoration work the Contractor shall remove any interference items attached to the deck. Each of the 5 named cabins have a settee, locker and bunk.
- 3.1.6. The contractor shall remove 875 ft<sup>2</sup> of vinyl flooring in total and underlay from the deck in the areas listed in Section 1.2. Numbers 1 to 6.
- 3.1.7. Location Number 7; Upper Main Deck Alleyway Port and Starboard sides.  
The underlay will only be removed starting at aft end forward to crossway next to Cooks

## H-20 Deck Covering Replacement

and Bosun Cabin. There is a 2' x 3' section of Deck plate in this area that is to be replaced as identified by Eastern Tech Report 16-725 -UT Testing. The extent and direction of such replacement is to be determined by the TCMS attending Inspector.



Area of Steelwork adjacent to Escape and as far as piping.

The contractor is responsible for the proper disposal of all removals.

- 3.1.8. In preparation for the new flooring, Steel bulkhead areas exposed by the removal work, the entire steel deck in the areas listed in Section 1.2 shall be Power Tooled Cleaned to Bare Metal SSPC-SP.
- 3.1.9. Contractor to obtain services of (NDT) Technician to complete UT as directed by the attending TCMS Inspector and the Chief Engineer.
- 3.1.10. Contractor to allow for 125 UT shots on areas of steel deck showing corrosion and quote cost per shot. Extra to be adjusted up or down by PWGSC 1379 action.  
Contractor to allow for 50 square feet of 10mm thick main deck steel to be replaced.  
Contractor shall also quote on unit price per square foot of deck plate replacement. Deck Plating required shall be adjusted up or down by PWGSC 1379 action.
- 3.1.11. The whole of the steel deck in the areas listed in Section 1.2 are to be painted with 2 coats of Amercoat 83HS epoxy primer following paint manufacturer application procedures, and time required between Coats.
- 3.1.12. If new deck plating is to be installed it must be installed in accordance with good marine practice with attention paid to proper plate corner radius, the new plating if any and the complete area of the exposed steel deck shall be thoroughly cleaned free of scale, rust,

## H-20 Deck Covering Replacement

and debris.

- 3.1.13. Before testing, Contractor shall at each identified test location grind the surface coating to bare metal while ensuring that any dishing of the metal is prevented. Contractor shall prepare and supply a report on the findings and amount of plating to be replaced to Chief Engineer immediately after the testing is complete. This Survey Report shall include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any to be replaced.
- 3.1.14. Before any more remedial work on this item is commenced; Chief engineer shall invite TCMS Hull inspector to inspect the deck to ascertain if planned remedial work is sufficient or if he/she requires further testing/repairs and so that proper notes for vessel hull surveys can be made.
- 3.1.15. Contractor shall crop out, dispose of and replace any deteriorated deck plating (as determined by TCMS Inspector and Chief Engineer, with new plating in accordance with good marine practice and attention paid to proper plate corner radius and minimum plate sizes, this is important. **Note:** The contractor is responsible for protecting all affected equipment and spaces during any necessary hot work.
- 3.1.16. After installation of any steel deck inserts Contractor shall have a NDT technician to do MPI test on the welding.

### 3.2 New Underlayment and coverings Scheme:

3.2.1. The Contractor shall install TCMS approved Underlayment over the areas at a thickness specified by the manufacturer for the following.

3.2.1.1 Locations 1 to 4 require TCMS approved A60 Sound insulating underlayment.

3.2.1.2 Locations 5 to 8 require an above normal application of Dexotex underlayment to match the existing height of the existing flooring.

3.2.2. In the recessed aft area of both, Starboard and Port Upper Alleyway (Location 7), the Contractor shall build up the area of deck underlayment (2 inches) to match the height of the existing deck going forward.

## H-20 Deck Covering Replacement



Recessed Area in 3.2.2

- 3.2.3. The new sheet vinyl flooring shall match the existing vinyl floor in color and in thickness and be install in a manner that it is level in all areas, and with lest amount of joining seams as possible. Installation and sealing of vinyl decking shall be completed by professional installer.
- 3.2.4. After completion of repairs, all the items that were removed are to be re-installed and secured in their original positions with the exception of items identified by the Chief Engineer to be replaced with owner-supplied new.
- 3.2.5. The contractor shall arrange for Spurrell’s Cabinetry –Dave Spurrell to install new owner supplied furniture in the 5 cabins listed in section 1.1.
- 3.2.6. A four inch vinyl border shall be applied to all furniture, bulkheads, equipment, and cabinetry.

### 3.3 Location

3.3.1 Work areas are on Main Deck and Foc’sle deck.

### 3.4 Interferences

- 3.4.1 Removals as specified in work description.
- 3.4.2 Below deck is the Main Engine Room, Laundry Room, Central Stores #1
- 3.4.3 Contractor is responsible for 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 shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

## **H-20 Deck Covering Replacement**

### **4.2 Testing**

**4.2.1** Contractor shall perform MPI test on all welding of new plate. Copies of reports shall be given to the Chief Engineer.

### **4.3 Certification**

**4.3.1** New steel material test certificates shall be given to the Chief engineer.

**4.3.2** Classification and/or Transport Canada Approval Certificates of underlayment and vinyl floor covering for Marine use shall be given to the Chief Engineer.

**4.3.3** Welding Certification as per Specification Preamble.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

**5.1.1** All reports 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

### **5.4 Manuals**

**5.4** N/A

## H-21 Hospital Washroom Refurbishment

Spec item #: H-21	SPECIFICATION	TCMSB Field #:
<b>H-21 Hospital Washroom Refurbishment</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification is to outline the work required in refurbishing the Hospital washroom.
- 1.2 Contractor shall replace 4 square feet of steel deck plating as determined in the Eastern Tech UT Report 16-725 and direction of TCMS Inspector.
- 1.3 This work shall be carried out in Conjunction with the following:  
N/A

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Scuppers & Drains Diagram # 37-04239 Sh. 1 of 2
- 2.1.2 General Arrangement NJC-10-100
- 2.1.3 Eastern Tech Report 16-725

#### 2.2 Standards

- 2.2.1 Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.2 Coast Guard ISM Confined Space Entry 7.D.9
- 2.2.3 ISM hotwork, Confined Space entry, and fall protection
- 2.2.4 All welding shall be as per specification preamble.
- 2.2.5 CG Lockout Procedure.

#### 2.3 Regulations

- 2.3.1 All deck covering materials shall be non-combustible, approved by TCMS for its intended usage, and shall comply with the requirements of hull construction regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C.

#### 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

##### Existing Configuration:

## **H-21 Hospital Washroom Refurbishment**

3.1.1 The washroom is equipped with one toilet and shower stall, one sink and mirror. The washroom total area is 52.8 square feet.

3.1.2 The contractor shall remove the existing shower stall, toilet, sink, and mirror, as well the wooden storage box attached to the shower stall.

### **3.2 Deck**

3.2.1 The Contractor shall remove the ceramic flooring from the deck of the washroom including the raised coaming around the perimeter of the entire washroom. The surface shall be cleaned of all grout, Dex-O-Text, and cement to bare metal.

3.2.2 Before any more remedial work on this item is commenced; Chief engineer shall invite TCMS Hull inspector to inspect the deck to ascertain if additional testing/repairs are required and so that proper notes for future vessel hull surveys can be made. Contractor shall also quote on unit cost per additional U/T shot and shall be adjusted up or down by PWGSC 1379 action.

3.2.3 The plate section to be replaced is above the machinery control room. The contractor shall be responsible for removing deckhead panels, and insulation below the plate in the control room. The contractor shall also use the appropriate drop cloths and protective barriers to prevent and damage to the equipment in the control room.

3.2.4 The Contractor shall replace the existing deck scupper and sink drain penetration with new and connect it to the existing pipework.

3.2.5 The Contractor shall crop out, dispose of and replace any deteriorated deck plating, as determined by the UT Report, with new plating in accordance with good marine practice with attention paid to minimum plate amounts, proper plate corner radius etc. The new plating must also have the proper mill certification; copy of same shall be given to Chief Engineer and TCMS inspectors.

3.2.6 The Contractor shall bid on replacing 4 Square feet of 3/8 inch deck plating in the Wash room. Contractor shall also quote on unit price per square foot of deck plate to be replaced. Deck Plating required shall be adjusted up or down by PWGSC 1379 action.

3.2.8 The contractor shall install a Seamless Epoxy deck system in accordance with manufacturers' specifications.

### **3.3 Shower Stall**

3.3.1 Shower control valves and piping shall be concealed in a Contractor supplied stainless steel enclosure. The shower stall itself shall be replaced with fabricated stainless steel shower stall of the same dimensions as the existing stall.

3.3.2 All piping and valves shall be re-oriented to fit in enclosure and re-connected. Original

## **H-21 Hospital Washroom Refurbishment**

shower control valve shall be installed.

### **3.4 Sinks and Mirrors**

- 3.4.1 The Contractor shall disconnect and remove existing sink, mirror, light fixture and backing board.
- 3.4.2 All piping and drain connection shall re-oriented to fit and re-connected.
- 3.4.3 The contractor shall install owner supplied vanity, sink and mirror. The Contractor shall plumb in the sink after it is installed with owner supplied fittings.

### **3.5 Toilet**

- 3.5.1 Toilet shall be removed from the seating. The wooden and Teflon toilet seating and studs shall be removed from the deck. New toilet securing studs shall be stainless steel. The new owner supplied toilet shall be installed on a Teflon pad; rework of ABS pipe in the toilet area required shall be dealt with by 1379.
- 3.5.2 All work and materials shall be to the satisfaction of Chief Engineer.
- 3.5.3 The Contractor shall dispose of the removals to the contractor's facilities.

### **3.6 Location**

- 3.6.1 Hospital, Aft Main Deck.

### **3.7 Interferences**

- 3.7.1 The Contractor shall be responsible for the identification of all interference items, their temporary removal, and storage and refitting to vessel.
- 3.7.2 Affected areas under washroom will be the MCR. The Contractor shall ensure that all equipment in the MCR is protected from dust and debris from steelwork.

## **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 Water to be poured down the new scupper pipe with Chief Engineer or delicate present to check in MCR for leaks.

### **4.3 Certification**

- 4.3.1 All welding shall be as per specification preamble.

## **H-21 Hospital Washroom Refurbishment**

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

5.1.1 The Contractor shall prepare and supply a report on the ultrasonic shots. This Survey report shall include the metal thickness measurements; and diagram of deck showing the test points and plating, to be replaced.

5.1.2 All reports 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

#### **5.4 Manuals**

5.4.1 N/A

## H-22 Steel Remediation Aux Machinery Space

Item #: H-22	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-22 Steel Remediation Aux Machinery Space</b>		

### Part 1: SCOPE:

- 1.1 The Auxiliary Machinery Space has areas that are below the wastage specified by U/T shots taken by Eastern Technical and requires replacement. This plating is to be cropped and renewed.

### Part 2: REFERENCES:

#### 2.1 Drawings

Decks and Stringers

Eastern Technical Services - UT Report No. 16-449, dated 17 June 2016

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.1 Scope of Coating for Steel:

- 3.1.1 All steel is to be blasted and primed with a weldable primer before fabrication.
- 3.1.2 Once installed, all welded and heat affected areas are to be hand tooled and coated with primer.
- 3.1.3 The new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.1.4 After priming, the area is to have two top coats of marine epoxy. The interior and exterior coating is to match the current vessel paint type and color.

#### 3.2 Aux Machinery Room

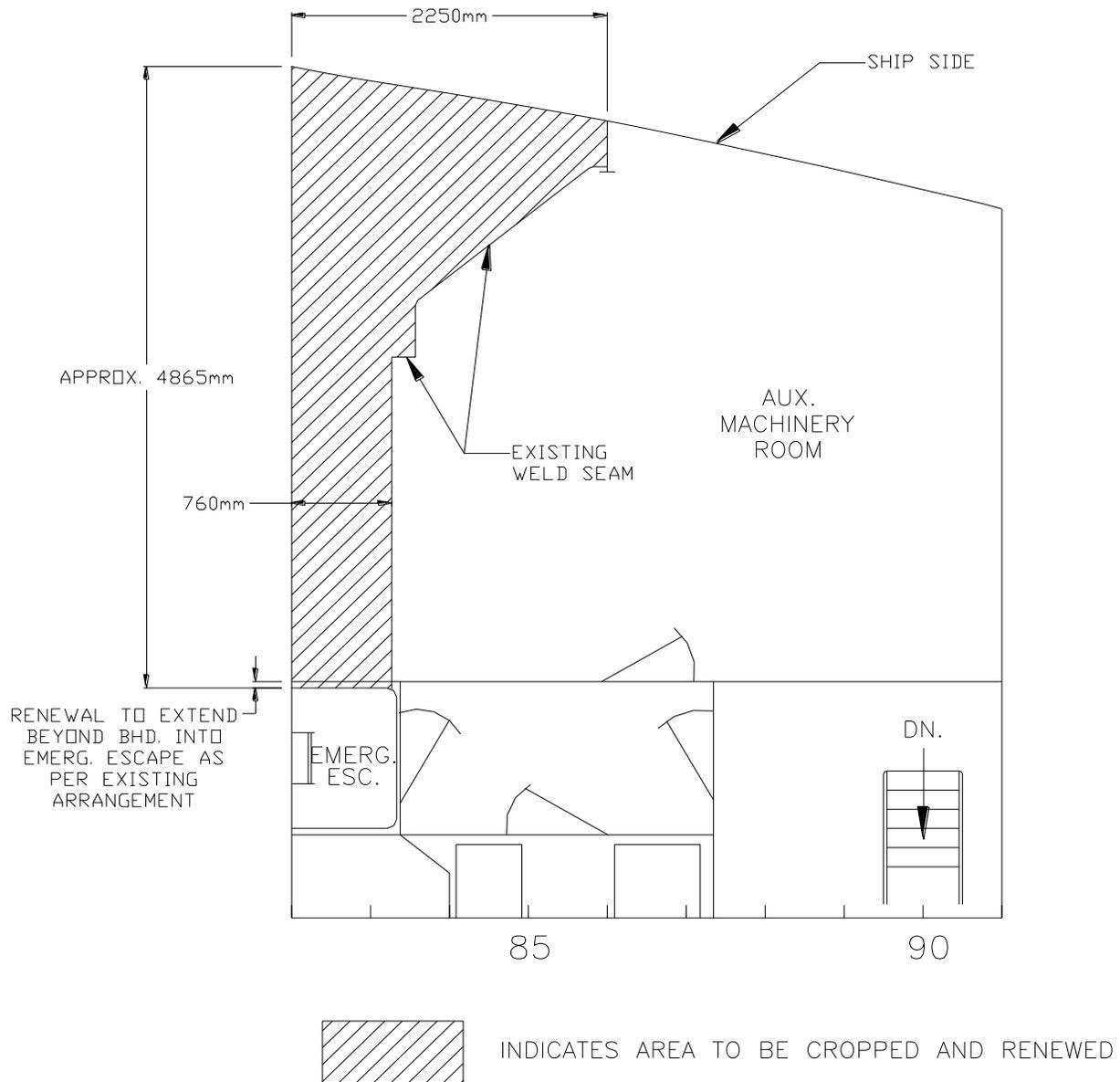
The following item is to be completed in way of the Aux. Machinery Room

## H-22 Steel Remediation Aux Machinery Space

### 3.2.1 Deck Plate

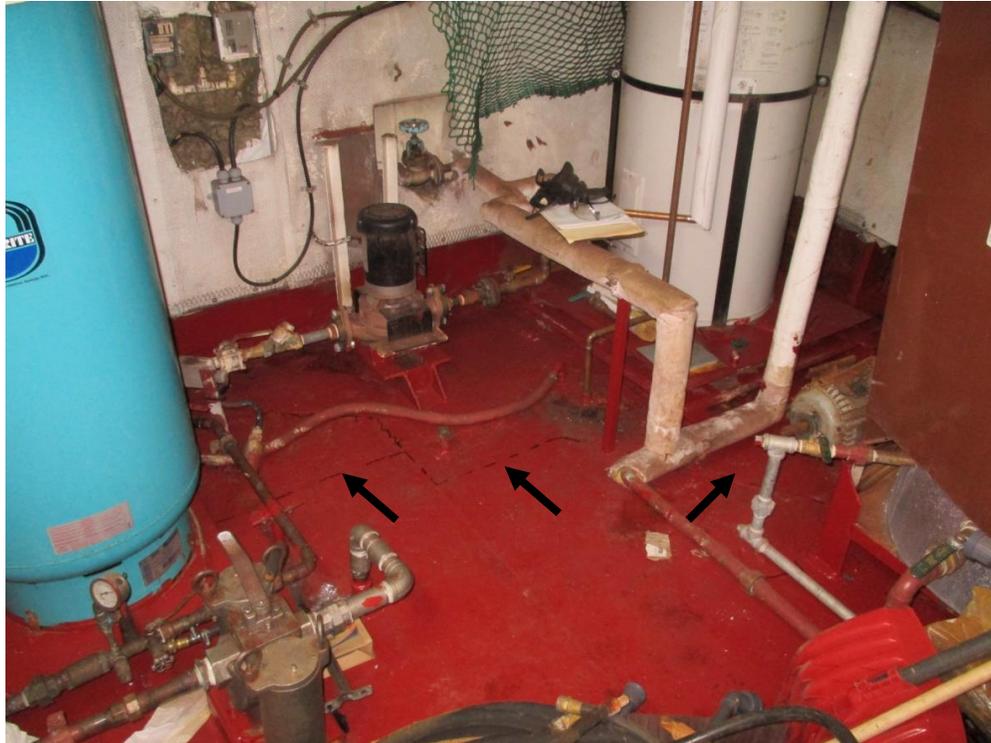
A portion of deck plating is to be cropped and renewed as per sketch and photograph attached. Area has been marked to utilize existing weld seams where possible.

	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. Fr. 82-86	Ship side inboard to emergency escape trunking	Sketch #3 Photos #5-8	5.5m <sup>2</sup>	3/8"



SKETCH #3: AUX. MACHINERY ROOM

## H-22 Steel Remediation Aux Machinery Space



Photograph #5: General view of Aux. Machinery Room - Note interference items. Arrows indicate cut lines



Photograph #6: General view of Aux. Machinery Room - Note interference items.

## H-22 Steel Remediation Aux Machinery Space



Photograph #7: General view of Aux. Machinery Room - Note interference items. Arrows indicate cut lines



Photograph #8: General view of Aux. Machinery Room - Note interference items.

## **H-22 Steel Remediation Aux Machinery Space**

### **3.2.2 During the completion of hot work, the Contractor shall:**

- 3.2.2.1 supply fire watch while hot work is ongoing, with appropriate class portable fire extinguisher and charged fire hose ready for use.
- 3.2.2.2 utilize existing seams/butts as practical when completing plate renewals. Where no butts/seams are present in the vicinity of new steel, corners to have a minimum of 100mm radius. Steel renewals are to follow good ship repair practices generally in accordance with IACS 47.
- 3.2.2.3 subject work to inspection as coordinated with TCMS and CCG personnel.

### **3.2.3 Following the completion of hot work, the Contractor shall:**

- 3.2.3.1 have qualified person(s) complete ND testing, 100% visual and 100% UT of butts welds or as otherwise agreed with TCMS, and subject work to final inspections by CCG and TCMS.
  - 3.2.3.2 clean affected spaces and remove debris from vessel.
  - 3.2.3.3 clean and apply primer to welded seams and other disturbed areas. Apply internal and external coatings as directed by CCG personnel.
- 3.2.4** The spaces to be protected with fire retardant cloth and a fire watch maintained at all times during hot work.
- 3.2.5** New plating shall be provided with mill certification to Grade 44W, or an equivalent as approved by the attending TCMS surveyor.

### **3.3 Location**

- 3.3.1 Boat Deck Port side

### **3.4 Interferences**

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

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Weld Inspection and Testing**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.

## **H-22 Steel Remediation Aux Machinery Space**

- 4.1.3 There is to be a 10% MPI testing completed on the deck welds by approved testing personnel.
- 4.1.4 This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact Transport Canada for all inspections.
- 4.1.5 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.
- 4.1.6 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.
- 4.1.7 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.

### **4.2 Certification:**

- 4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## H-23 Steel Remediation Bulkhead /Door coaming- stbd side main deck.

Item #: H-23	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-23 Steel Remediation Bulkhead/Door coaming- stbd side main deck.</b>		

### Part 1: SCOPE:

- 1.1 The **Bulkhead /Door coaming-in way of stbd side exterior door on main deck** has areas that are below the wastage specified by U/T shots taken by Eastern Technical and requires replacement. This plating is to be cropped and renewed.

### Part 2: REFERENCES:

#### 2.1 Drawings

Decks and Stringers

Eastern Technical Services - UT Report No. 16-449, dated 17 June 2016

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.1 Scope of Coating for Steel:

- 3.1.1 All steel is to be blasted and primed with a weldable primer before fabrication.
- 3.1.2 Once installed, all welded and heat affected areas are to be hand tooled and coated with primer.
- 3.1.3 The new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.1.4 After priming, the area is to have two top coats of marine epoxy. The interior and exterior coating is to match the current vessel paint type and color.

#### 3.2 Door Coaming - Main Deck Stbd. Side

## H-23 Steel Remediation Bulkhead /Door coaming- stbd side main deck.

The following item is to be completed in way of the starboard side door to the accommodation.

### 3.2.1 Door Coaming Plate

Based on visual inspection and UT readings a portion of the bulkhead forming the door coaming is to be cropped and renewed as per photograph attached. Utilize existing weld seams where possible.

	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. Fr. 44	Winch room longitudinal bulkhead outboard to accommodation longitudinal bulkhead	Photo #9	1.1m <sup>2</sup>	1/4"



Photograph #9: View of starboard door looking forward.

Note area to be renewed marked in red.

## **H-23 Steel Remediation Bulkhead /Door coaming- stbd side main deck.**

### **3.2.2 Temporary Shelter over Deck**

3.2.2.1 The contractor shall arrange to erect a temporary shelter around the Main Deck in way of the steel work. The shelter shall be erected to provide suitable shelter from rain, snow and wind in way of the specific area under construction.

3.2.2.2 The contractor shall provide lighting and ventilation inside the temporary shelters. The materials in the temporary shelter are to be non-combustible.

3.2.2.3 The contractor will be responsible for erecting, moving, reassembling and disassembling the shelters as the work progresses to a new area.

### **3.2.3 During the completion of hot work, the Contractor shall:**

3.2.3.1 supply fire watch while hot work is ongoing, with appropriate class portable fire extinguisher and charged fire hose ready for use.

3.2.3.2 utilize existing seams/butts as practical when completing plate renewals. Where no butts/seams are present in the vicinity of new steel, corners to have a minimum of 100mm radius. Steel renewals are to follow good ship repair practices generally in accordance with IACS 47.

3.2.3.3 subject work to inspection as coordinated with TCMS and CCG personnel.

### **3.2.4 Following the completion of hot work, the Contractor shall:**

3.2.4.1 Have qualified person(s) complete ND testing, 100% visual and 100% UT of butts welds or as otherwise agreed with TCMS, and subject work to final inspections by CCG and TCMS.

3.2.4.2 Clean affected spaces and remove debris from vessel.

3.2.4.3 Clean and apply primer to welded seams and other disturbed areas. Apply internal and external coatings as directed by CCG personnel.

3.2.4.4 The spaces to be protected with fire retardant cloth and a fire watch maintained at all times during hot work.

3.2.4.5 New plating shall be provided with mill certification to Grade 44W, or an equivalent as approved by the attending TCMS surveyor.

### **3.3 Location**

3.3.1 Main Deck Stbd side

### **3.4 Interferences**

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

## **H-23 Steel Remediation Bulkhead /Door coaming- stbd side main deck.**

### **Part 4: PROOF OF PERFORMANCE:**

#### **4.1 Weld Inspection and Testing**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.
- 4.1.3 There is to be a 10% MPI testing completed on the deck welds by approved testing personnel.
- 4.1.4 This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact Transport Canada for all inspections.
- 4.1.5 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.
- 4.1.6 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.
- 4.1.7 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.

#### **4.2 Certification:**

- 4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

- 5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## H-24 Steel Remediation HVAC Room Deck / Weathertight Door

Item #: H-24	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-24 Steel Remediation HVAC Room Deck / Weathertight Door</b>		

### Part 1: SCOPE:

- 1.1 The HVAC Room has areas that are below the wastage specified by U/T shots taken by Eastern Technical and requires replacement. This plating is to be cropped and renewed.

### Part 2: REFERENCES:

#### 2.1 Drawings

Decks and Stringers

Eastern Technical Services - UT Report No. 16-449, dated 17 June 2016

Joiner Systems drawing no. 150329-006rD.

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.1 Scope of Coating for Steel:

- 3.1.1 All new steel is to be blasted and primed with a weldable primer before fabrication.
- 3.1.2 Once installed, all welded and heat affected areas are to be hand tooled and coated with primer.
- 3.1.3 The complete HVAC Room interior, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.1.4 After priming, the area is to have two top coats of marine epoxy. The interior and exterior coating is to match the current vessel paint type and color.

## H-24 Steel Remediation HVAC Room Deck / Weathertight Door

### 3.2 HVAC Deck Plate Renewal: HVAC Room

The following items are to be completed in way of the HVAC room:

#### 3.2.1 Deck Plate

A portion of deck plating is to be cropped and renewed as per sketch and photograph attached.

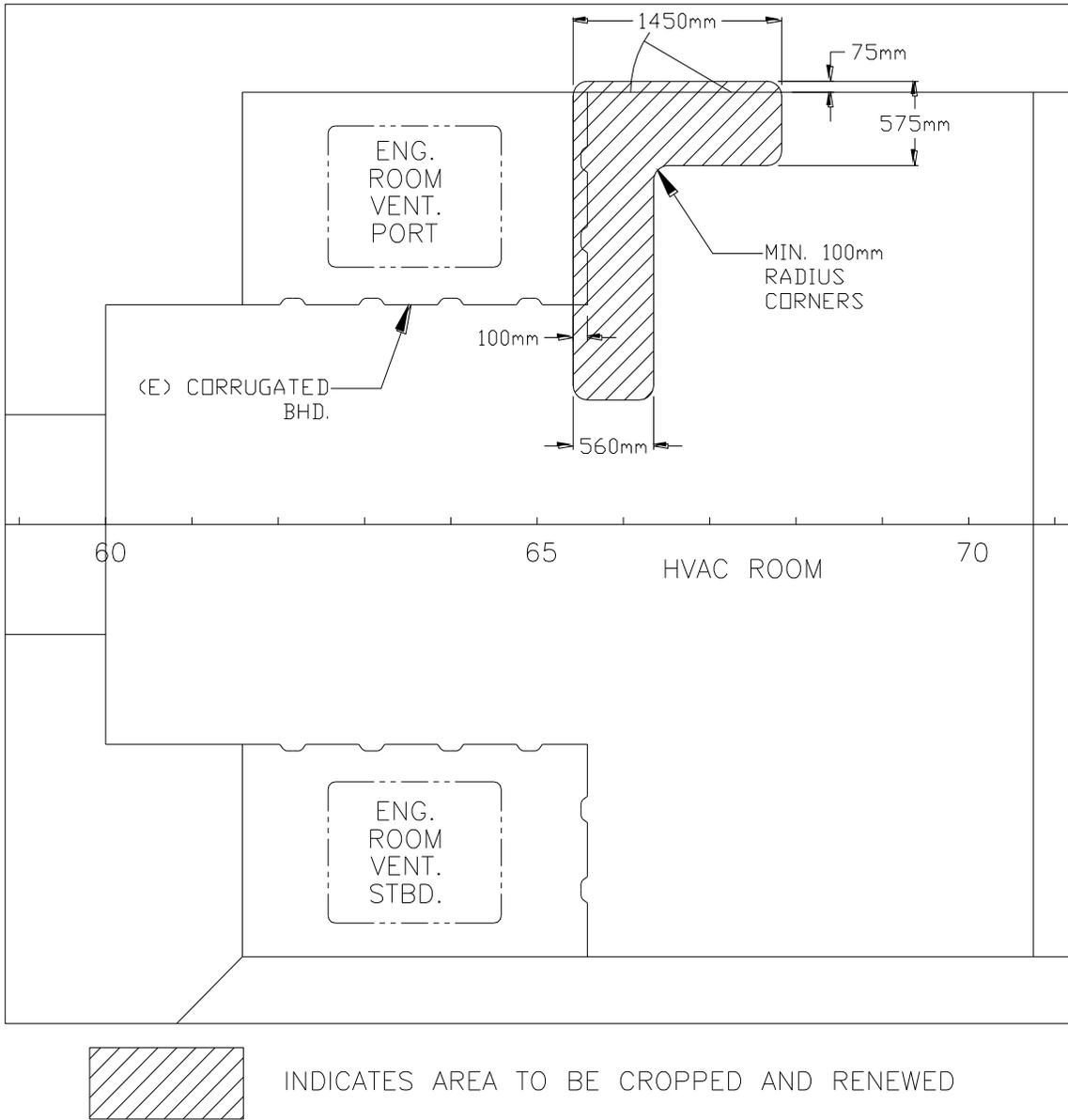
	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. Fr. 65.5-67.5 From HVAC room and extends aft 100mm into the ER vent trunking	From HVAC room and extends 3" outboard of the longitudinal bhd.	Sketch #1 Photo #1	1.75m <sup>2</sup>	5/16"

#### 3.2.2 Engine Room Vent Casing Bulkhead

A small portion of the vent casing bulkhead within the HVAC room is to be cropped and renewed as per photograph attached.

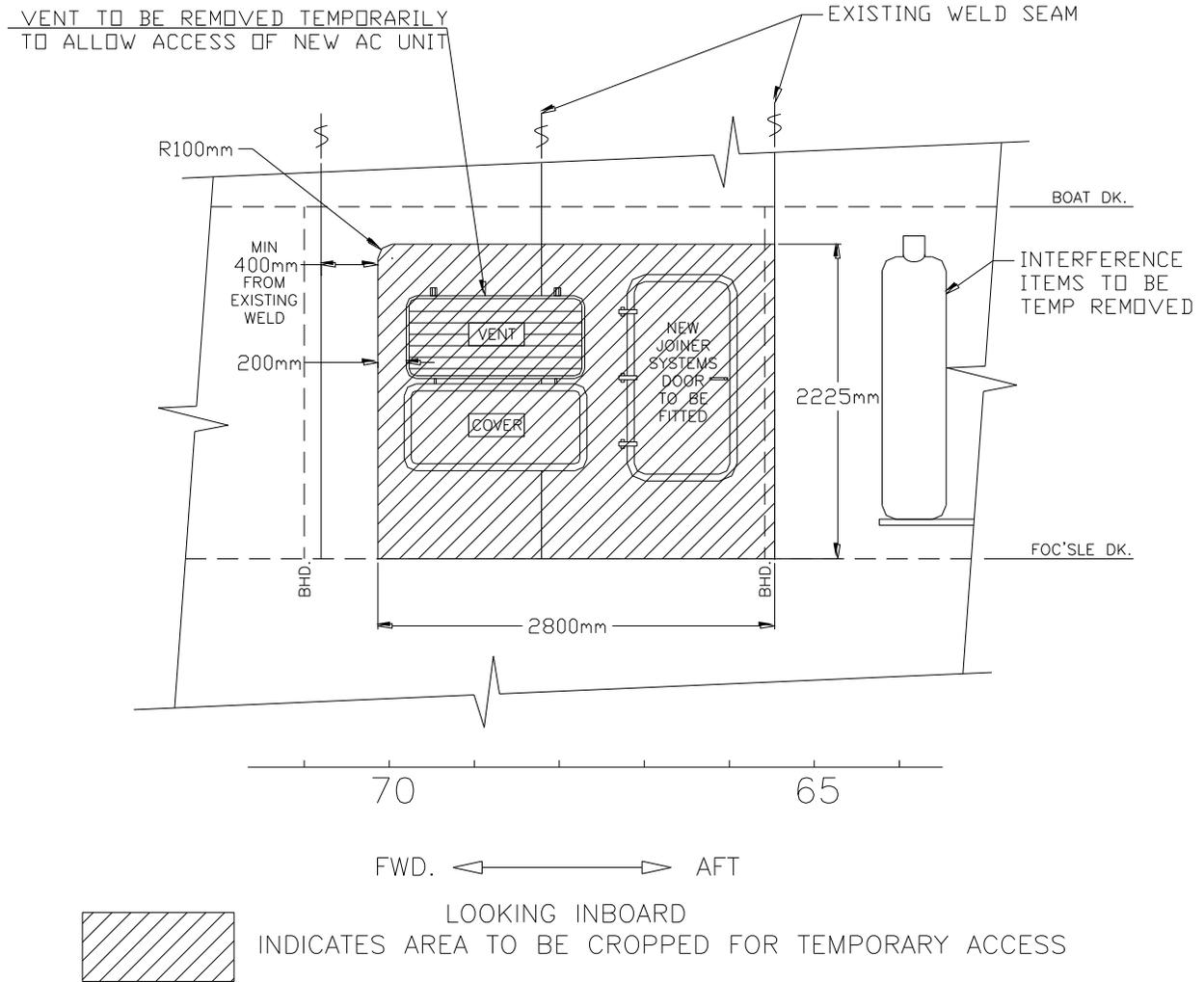
	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Transverse bulkhead approx. Fr. 65.5	Outboard portion of transverse bulkhead	Photo #2	0.21m <sup>2</sup>	1/4"

# H-24 Steel Remediation HVAC Room Deck / Weathertight Door



SKETCH #1: HVAC ROOM – DECK PLATE RENEWALS

# H-24 Steel Remediation HVAC Room Deck / Weathertight Door



SKETCH #2: BULKHEAD ACCESS FOR NEW AC UNIT

## H-24 Steel Remediation HVAC Room Deck / Weathertight Door



Photograph #1: View of HVAC room looking outboard. Area to be renewed as indicated.



Photograph #2: View of transverse bhd. in HVAC room. Area to be renewed as indicated.

## H-24 Steel Remediation HVAC Room Deck / Weathertight Door

### 3.2.3 Access Hole in Longitudinal Bulkhead (HVAC Room)

Contractor to cut a hole in the port side longitudinal bulkhead of the HVAC room sufficient to allow removal of the existing HVAC units and installation of new units which is to be completed by others. Area to be cropped and renewed as per sketch and photograph attached. Contractor to allow for temporary removal and reinstalling any interference items such as but not limited to shelving, bottles, brackets, rain visor, electrical etc.

	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. Fr 64-70	Port side longitudinal bulkhead approx. 2950mm off center	Sketch #2 Photo #3&4	6.3m <sup>2</sup>	1/4"

### 3.2.4 Weather Tight Door

Contractor to remove existing weather tight door and install new Joiner Systems weather tight door (supplied by CCG) in the port side longitudinal bulkhead of the HVAC room. Installation to be as per Joiner Systems drawing no. 150329-006rD. Contractor to ensure door coaming height above deck is equal to existing and in compliance with Transport Canada Load Line regulations. Also see photograph attached.

	Longitudinal Extent	Transverse Extent	Reference	Approx. Area	New Plate Thickness
a.	Approx. frame 66-67	Port side longitudinal bulkhead approx. 2950mm off center	Annex D Sketch #2 Photo #3&4	NA	NA

## H-24 Steel Remediation HVAC Room Deck / Weathertight Door



Photograph #3: View of longitudinal bulkhead in way of HVAC room (looking fwd.)

### 3.2.5 **During the completion of hot work, the Contractor shall:**

3.2.5.1 Supply fire watch while hot work is ongoing, with appropriate class portable fire extinguisher and charged fire hose ready for use.

3.2.5.2 Utilize existing seams/butts as practical when completing plate renewals. Where no butts/seams are present in the vicinity of new steel, corners to have a minimum of 100mm radius. Steel renewals are to follow good ship repair practices generally in accordance with IACS 47.

3.2.5.3 Subject work to inspection as coordinated with TCMS and CCG personnel.

### 3.2.6 **Following the completion of hot work, the Contractor shall:**

3.2.6.1 Have qualified person(s) complete ND testing, 100% visual and 100% UT of butts welds or as otherwise agreed with TCMS, and subject work to final inspections by CCG and TCMS.

3.2.6.2 Clean affected spaces and remove debris from vessel.

3.2.6.3 Clean and apply primer to welded seams and other disturbed areas. Apply internal and external coatings as directed by CCG personnel.

3.2.6.4 The spaces to be protected with fire retardant cloth and a fire watch maintained at all

## **H-24 Steel Remediation HVAC Room Deck / Weathertight Door**

times during hot work.

- 3.2.7 New plating shall be provided with mill certification to Grade 44W, or an equivalent as approved by the attending TCMS surveyor.

### **3.3 Temporary Shelter**

- 3.3.1 The contractor shall arrange to erect a temporary shelter around the HVAC Room in way of the steel work. The shelter shall be erected to provide suitable shelter from rain, snow and wind in way of the specific area under construction.

- 3.3.2 The contractor shall provide lighting and ventilation inside the temporary shelters. The materials in the temporary shelter are to be non-combustible.

- 3.3.3 The contractor will be responsible for erecting, moving, reassembling and disassembling the shelters as the work progresses to a new area.

### **3.4 Location**

- 3.4.1 Boat Deck Port side

### **3.5 Interferences**

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

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Weld Inspection and Testing**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.
- 4.1.3 There is to be a 10% MPI testing completed on the deck welds by approved testing personnel.
- 4.1.4 This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact Transport Canada for all inspections.
- 4.1.5 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.
- 4.1.6 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.

## **H-24 Steel Remediation HVAC Room Deck / Weathertight Door**

4.1.7 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.

### **4.2 Certification:**

4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## H-25 MCR Door Replacements

Item #: H-25	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-25 MCR Door Replacements</b>		

### Part 1: SCOPE:

- 1.1 To replace 2 existing Interior A-60 doors in the MCR and Workshop with owner supplied new one.
- 1.2 The Doors to be replaced are as follows;
  - 1.2.1 Port side MCR.
  - 1.2.2 Workshop to E/R.

### Part 2: REFERENCES:

#### 2.1 Drawings

- 2.1.1 Joiner Systems Drawings

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.1 Removal of existing Doors:

- 3.1.1 All insulation, trim and paneling in the affected area to be removed. Paneling and trim to be stored for re-installation when work is completed.
- 3.1.2 The adjacent spaces to be protected with fire retardant cloth and fire-proof covering placed on the interior deck covering where applicable. A fire watch is to be maintained at all times during hot work.
- 3.1.3 The contractor shall arrange to erect temporary shelters around the doorway in way of installation. The shelter shall be erected to protect electrical equipment in the MCR from dust and dirt.
- 3.1.4 The contractor shall provide lighting and ventilation inside the temporary shelters if

## **H-25 MCR Door Replacements**

necessary. The materials in the temporary shelter are to be non-combustible.

- 3.1.5 The contractor will be responsible for erecting, moving, reassembling and disassembling the shelters as the work progresses to a new area.
- 3.1.6 Existing door to be cropped according to specified Opening requirements in supplied drawings. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work.
- 3.1.7 Contractor to remove old door from the vessel and dispose of in an approved manner.

### **3.2 New Door Installation:**

- 3.2.1 The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.
- 3.2.2 All cropped edges shall be ground clean.
- 3.2.3 The Contractor will be required to install a 6 inch combing at the bottom existing steel cut opening to accept the new door installation.
- 3.2.4 New door is to be installed as directed in the supplied weld procedure and by the attending TCMS Inspector.
- 3.2.5 The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.
- 3.2.6 Applicable areas around the interior of door to be re-insulated with new material and trim and paneling re-installed as per original.

### **3.3 Interferences**

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

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Weld Inspection and Testing**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.
- 4.1.3 There is to be a 10% MPI testing completed on the welds by approved testing personnel.

## **H-25 MCR Door Replacements**

- 4.1.4 This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact Transport Canada for all inspections.
  - 4.1.5 The contractor shall issue and post hot work permits and shall maintain a fire watch.
  - 4.1.6 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.
  - 4.1.7 After acceptance of the steel work, the contractor may commence to reinstall insulation and outfit.
- 4.2 Certification:**
- 4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## H-26 Steel Remediation and Floor Coverings Bridge Wing

Item #: H-26	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-26 Steel Remediation and Floor Coverings Bridge Wing</b>		

### Part 1: Scope:

- 1.1 The outermost area of the Port side Bridge Wing decking and adjacent exterior bulkhead has an area that requires UT testing. If testing deems this plating is beyond spec it will be cropped and renewed.
- 1.2 Contractor shall replace underlayment and vinyl coverings on the Upper and Lower Bridge Decks with TCMS approved new.
- 1.2 This work shall be carried out in Conjunction with the following:

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Wheelhouse Structure Modifications # 37-500R.

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection & Lockout Procedures. The Contractor will be responsible for completion of the Lock-out/ Tag-out log sheets. The Contractor is to demonstrate how the said procedures meet the requirements before the work begins. For Audit purposes, the completed said Log Sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations.

#### 2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all materials, parts, equipment, labor and tools required to perform the specified work unless otherwise stated.
- 2.4.2 **All deck covering and underlayment materials shall be non-combustible, approved by TCMS for its intended usage, and shall comply with the requirements of hull construction regulations – Part X “Fire protection for cargo ships of 500 Tons Gross Tonnage or more” Method 1C.**

### Part 3: Technical Description:

#### 3.1 General – Scope of Coating for Steel

- 3.1.1 All new steel is to be blasted and primed with a weldable primer before fabrication.

## H-26 Steel Remediation and Floor Coverings Bridge Wing

3.1.2 Once installed, all welded and heat affected areas are to be hand tooled and coated with primer.

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



Area of Steelwork - Port Wing bulkhead and deck

**H-26 Steel Remediation and Floor Coverings Bridge Wing**



**LIPPS Panel - Port Bridge Wing.**

## H-26 Steel Remediation and Floor Coverings Bridge Wing



**Chart Table - Port Bridge Wing.**

### **3.2 General - Steel Remediation**

- 3.2.1 Contractor to allow for 40 UT shots on areas of steel deck adjacent to the Port bulkhead showing corrosion. The contractor shall allow for 4 square meters of 9 mm thick main deck steel to be replaced. Contractor shall quote cost per TM shot and square meter of steel replacement to be adjusted up or down by PWGSC 1379 action.
- 3.2.2 Before any more remedial work on this item is commenced the Contractor shall invite TCMS Hull inspector to inspect the deck to ascertain if planned remedial work is sufficient or if he/she require further testing/repairs and so that proper notes for vessel hull surveys can be made.
- 3.2.3 Staging or use of a manlift will be required to access the underside and the outermost edges of the Bridge Wing if steelwork is needed. The Contractor is responsible for all staging or manlift required to complete the required work. Contractor to remove steel sheeting and insulation to access the underside of the Bridge Wing if steel replacement is required.

## **H-26 Steel Remediation and Floor Coverings Bridge Wing**

- 3.2.4 Contractor shall crop out, dispose of and replace any deteriorated deck plating (as determined by TCMS Inspector and Chief Engineer, with new plating in accordance with good marine practice and attention paid to proper plate corner radius and minimum plate sizes, this is important.
- 3.2.5 After installation of any steel deck inserts Contractor shall have a NDT technician to test the welding as directed by TCMS.
- 3.2.6 The completed external area, new and heat affected steel is then to be coated with 2 coats of Amercoat 83HS epoxy primer following paint manufacturer application procedures and time required between coats.

### **3.3 General – Deck Covering.**

- 3.3.1 Contractor shall install temporary dust curtains around the perimeter of work area, sufficient to prevent contamination of adjacent bulkheads, decks, and equipment, with dust and residues produced as a result of the work.
- 3.3.2 On completion of work, contractor shall ensure all areas/equipment affected by the work to be cleaned of dust and residues.
- 3.3.3 Prior to commencement of restoration work the Contractor shall remove any interference items in the work area. There is a LIPPS control console and a Mapping Table in the location. These items will be disconnected by SEW Technicians and the Contractor to remove remaining bulkhead panels and insulation where required in the scope of work.
- 3.3.4 The contractor shall remove 900 square feet of vinyl flooring and Dex O Tex underlay from the deck. Contractor shall quote cost per square ft of Dex o tex and flooring replacement to be adjusted up or down by PWGSC 1379 action. The contractor is responsible for the proper disposal of all removals.
- 3.3.5 In preparation for the new flooring, steel bulkhead areas exposed by the removal work, the entire steel deck shall be power tooled cleaned to bare metal SSPC-SP.
- 3.3.6 The Contractor shall have a professional Flooring Contractor perform all deck covering installations.
- 3.3.7 The replacement covering will be 10mm dex-o-tex covered with TCMS approved vinyl safety flooring. The vinyl and underlay is to be installed by a professional Flooring Contractor.
- 3.3.8 After completion of repairs, all the items that were removed are to be re-installed secured in their original position. Any disturbed insulation on the exterior bulkheads to be replaced with new.

## **H-26 Steel Remediation and Floor Coverings Bridge Wing**

3.3.9 A four inch vinyl border shall be applied to all furniture, bulkheads and equipment, and cabinetry.

### **3.4 General – Bulkhead Panelling**

3.4.1 Contractor to remove Joiner paneling around the perimeter of the Upper and Lower Bridge decks to allow for deck covering replacement. This panelling shall be reinstalled when work is completed with the exception of sections, as determined by the Chief Engineer, to be replaced with owner-supplied new.

3.4.2 Contractor to cut Joiner panels to fit.

3.4.3 All work shall be to the satisfaction of the Chief Engineer.

### **3.5 Location**

3.5.1 Port side Bridge Wing.  
Upper Bridge Deck  
Lower Bridge Deck

### **3.6 Interferences**

3.6.1 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 completed to the satisfaction of the Chief Engineer and TCMS Inspector.

### **4.2 Testing**

4.2.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.

4.2.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.

4.2.3 There is to be 10% MPI testing completed on the deck welds by approved testing personnel.

4.2.4 This testing is to be carried out in the presence of the attending TCMS Inspector and the Owner's Representative. All costs incurred in the inspection is to be included in the Contractors price for known steel work. The Contractor is to be responsible to contact TCMS for all inspections.

4.2.5 The Contractor shall issue Hot Work Permits and maintain a fire watch.

## **H-26 Steel Remediation and Floor Coverings Bridge Wing**

4.2.6 After acceptance of the steel work the Contractor may commence with deck covering installation and outfit.

### **4.3 Certification**

4.3.1 The Contractor shall obtain and provide to the Technical Authority, all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

4.3.2 Classification and/or Transport Canada Approval Certificates of underlayment and vinyl floor covering for Marine use shall be given to the Chief Engineer.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

5.1.1 Contractor shall provide copies of all NDT and Hot Work Permits to the Chief Engineer.

## H-27 #11 F/O Tank top Powertool and Coating

Item #: H-27	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-27 #11 F/O Tank top Powertool and Coating</b>		

### Part 1: SCOPE:

1.1 The intent of this specification shall be to power-tool and coat the tank tops of #11 Port and Starboard Fuel tanks.

1.2 The areas of tanktop are as follows;

1.2.1 Engine Room Storeroom, Lower Engine Room –190ft<sup>2</sup>.

1.2.2 Sewage Compartment, Lower Engine Room –190ft<sup>2</sup>

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

N/A

#### 2.2 Standards

2.2.1 Lloyd's register Rules and Regulations for the Classification of Ships

2.2.2 Ships ISM Lockout/ Hotwork/ Confined Space Entry Procedures.

#### 2.3 Regulations

2.3.1 All materials shall be approved by TCMS for its intended usage, and shall comply with the requirements of Hull Construction 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 Contractor shall set up sufficient extraction fans in both compartments to extricate the dust while power-tooling.

3.1.2 The Contractor shall ensure that all equipment is covered to protect it from dust and debris.

3.1.3 On completion of work, contractor shall ensure all areas/equipment affected by the work to be cleaned of dust and residues.

3.1.4 The entire steel Tank-tops in the areas listed in Section 1.2 shall be Power Tooled cleaned to bare metal SSPC-SP.

3.1.5 Contractor to obtain services of (NDT) Technician to take ultrasonic shots as directed by

## **H-27 #11 F/O Tank top Powertool and Coating**

TCMS and the Chief Engineer. Contractor to allow for UT on areas of steel deck showing corrosion (allow 100 shots) and allow for 20 square feet of 10mm thick main deck steel to be replaced, Contractor shall also quote on unit price per square foot of deck plate replacement. Deck Plating required shall be adjusted up or down by PWGSC 1379 action.

- 3.1.6 The whole of the steel deck in the areas listed in Section 1.2 are to be painted with 1 coat of “Conquest” or similar rust-proofing product following the manufacturer application procedures, and time required between Coats.
- 3.1.7 The whole of the steel deck in the areas listed in Section 1.2 are to be painted with 2 coats of Amercoat 83HS epoxy primer following paint manufacturer application procedures, and time required between Coats.
- 3.1.8 If new steel plating is to be installed it must be done in accordance with good marine practice with attention paid to proper plate corner radius, the new plating if any and the complete area of the exposed steel deck shall be thoroughly cleaned free of scale, rust, and debris.
- 3.1.9 Before testing, Contractor shall at each identified test location grind the surface coating to bare metal while ensuring that any dishing of the metal is prevented. Contractor shall prepare and supply a report on the findings and amount of plating to be replaced to Chief Engineer immediately after the testing is complete. This Survey Report shall include the metal thickness measurements; and diagram(s) of the deck showing the test points and plating, if any to be replaced.
- 3.1.10 Before any more remedial work on this item is commenced; Chief engineer shall invite TCMS Hull inspector and PWGSC Inspector to inspect the deck to ascertain if planned remedial work is sufficient or if he/she requires further testing/repairs and so that proper notes for vessel hull surveys can be made.
- 3.1.11 Contractor shall crop out, dispose of and replace any deteriorated deck plating (as determined by TCMS Inspector and Chief Engineer, with new plating in accordance with good marine practice and attention paid to proper plate corner radius and minimum plate sizes, this is important.
- 3.1.12 After installation of any steel inserts Contractor shall have a NDT technician to do MPI test on the welding as directed by the attending TCMS Inspector.

### **3.2 Location**

- 3.2.1 Fort Knox Storeroom, Lower Engine Room.
- 3.2.2 Sewage Compartment, Lower Engine Room.

### **3.3 Interferences**

- 3.3.1 Removals as specified in work description.

## **H-27 #11 F/O Tank top Powertool and Coating**

3.3.2 Contractor is responsible for 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 shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.

#### **4.2 Testing**

4.2.1 Contractor shall perform MPI test on all welding of new plate. Copies of reports shall be given to the Chief Engineer.

#### **4.3 Certification**

4.3.1 New steel material test certificates shall be given to the Chief engineer.

4.3.2 Classification and/or Transport Canada Approval Certificates of underlayment and vinyl floor covering for Marine use shall be given to the Chief Engineer.

4.3.3 Welding Certification as per Specification Preamble.

### **Part 5: DELIVERABLES:**

#### **5.1 Drawings/Reports**

5.1.1 All reports 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

#### **5.4 Manuals**

5.4 N/A

## H-28 STBD Engine Room Stack Coating Repairs

Item #: H-28	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-28 STBD Engine Room Stack Coating Repairs</b>		

### Part 1: SCOPE:

1.1 The intent of this item shall be to clean, repair coating, and inspect stbd engine room stack from the boat deck to the top of the starboard stack and around the adjacent side window on the forward section of the each aft wheel house wing.

### Part 2: REFERENCES:

#### 2.1 Drawings

2.1.1

#### 2.2 Standards

2.2.1 Ships ISM, Fall Protection and Lockout Procedures.

2.2.2 Steel Structures Painting Council Standard (SSPC)

#### 2.3 Regulations

2.3.1

#### 2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply all materials, parts, equipment, staging, lifts, labour and tools required to perform the specified work. The Coatings (Amercoat Red Oxide Primer 5105 (AX9708) and Amercoat White 5450 (AX9736) and Amercoat Black 5450 (AX8930) shall be Coast Guard supplied.

### Part 3: TECHNICAL DESCRIPTION:

#### 3.1 General

3.1.1. The contractor shall make repairs to areas where the coating is missing or damaged as directed by the Chief Engineer.

3.1.2. The contractor shall take twelve ultrasonic test shots on each stack in locations marked out by the Chief Engineer. (A total of 24 shots).

3.1.3. In order to avoid any confusion as to the total area to be repaired, the Contractor shall assign a representative, who along with the Chief Engineer to view the ships stack prior to coating repairs. The two representatives shall view the stack and agree upon the total area of the stack that shall be repaired and coated. The contractor shall supply the lifts or staging required to complete this inspection.

3.1.4. The contractor shall take measures to ensure that no damage, unnecessary cleaning, or

## H-28 STBD Engine Room Stack Coating Repairs

any repairs result from either the preparation process or coating application. Measures shall be taken to ensure that surfaces and equipment, other than those specified, are not coated. Deck machinery and other gear shall be protected from damage by grit and coatings.

- 3.1.5. All traces of grit from power tooling shall be removed by the Contractor. The Contractor shall be responsible and liable for ensuring that the stacks are clear and clean prior to, during and immediately after the coating application.
- 3.1.6. Power tooled material shall not be permitted to enter any part of the vessel. The Contractor shall ensure that every opening into the vessel where grit may gain entry is covered.
- 3.1.7. The contractor shall quote on making repairs to approximately 36 square meters of damaged coating. The repairs shall include surface preparation, coating (primer and intermediate coat) to damaged areas. The quote shall include the unit cost per square meter to adjust the total area for the work up or down by PWGSC 1379 action. The total area of stack is approximately 85 square metres for final topcoat and this shall be quoted per unit square meter for adjustment purposes.
- 3.1.8. Suitable storage facilities shall be provided close to the work site for the necessary materials and equipment and they must be maintained at the recommended temperature of the coating manufacturer to ensure ease of preparation and application.
- 3.1.9. Coating shall be applied with brush and roller. No Spraying will be permitted. **NOTE:** The equipment used to apply the coating shall meet the specifications of the coating manufacturer.

### Surface Preparation

- 3.1.10. Power tool all bare and rusted areas to SSPC-SP10. All edges of the Coating shall be feathered back to accept new coating.

### Primer – Touch up

- 3.1.11. Apply two coats of Amercoat Red Oxide Primer 5105 (AX9708) to bare areas only. Apply @ 10 mils DFT, per coat.

### Intermediate Coat

- 3.1.12. Apply one full coat of Amercoat White 5450 (AX9736). Apply @ 8 mils DFT.

### Topcoat

- 3.1.13. Apply one full coat of Amercoat White 5450 (AX9736) area. Apply @ 8 mils DFT.
- 3.1.14. The stack top black shall be cut in and the stack top coated with two coats of Amercoat Black 5450 (AX8930) as existing. (The top couple of feet of the stacks are black)
- 3.1.15. The stack has a maple leaf painted on it and the contractor shall paint the maple leaf with

## **H-28 STBD Engine Room Stack Coating Repairs**

two coats of ship supplied Amercoat red as per ship's paint schedule.

3.1.16. The Contractor shall perform the work in strict accordance with Ameron's application instructions for each applicable coating.

3.1.17. The thickness determination of the new coating shall be verified and recorded at three positions on each repair area. Measuring points shall be as indicated by the Chief Engineer or his representative.

3.1.18. All work shall be done to the satisfaction of the Chief Engineer and Chief Officer.

### **3.2 Location**

**3.2.1** Exterior Stack: Between frames 75 and 80.

### **3.3 Interferences**

**3.3.1** The Contractor is responsible for the identification of all interference items, their temporary removal, and 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 Chief Officer.

### **4.2 Testing**

**4.2.1** The contractor shall prove to the Chief Engineer or his representative the DFT measurements at areas where the coating was completely missing.

### **4.3 Certification**

**4.3.1**

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

**5.1.1** The thickness determination DFT of the new coatings applied shall be verified and recorded. Reports shall be given to Chief Engineer.

**5.1.2** All reports from the work specified shall be given to the Chief Engineer.

## H-29 Exhaust Casing Maintenance

Item #: H-29	<b>SPECIFICATION</b>	TCMS Field #:
<b>H-29 Exhaust Casing Maintenance</b>		

### Part 1: SCOPE:

- 1.1** The intent of this specification shall be to clean and paint the internal structure, exhaust piping, including ventilation fans, duct work and piping contained in the spaces. To repair damaged exhaust pipe insulation and inspect exhaust pipe hanger arrangement and supports. The work area extends from the main deck to the funnel top.
- 1.2** This work shall be carried out in Conjunction with the following:  
-NA

### Part 2: REFERENCES:

- 2.1 Guidance Drawings/Nameplate Data**
- 2.1.1.** M-18 Exhaust Uptake Arrangement # 37-04209
  - 2.1.2.** H-42 Funnels, Port & Stb #37-01031
  - 2.1.3.** Exhaust Uptakes Port Casing – two main engines, one diesel generator, and one diesel driven air compressor.
  - 2.1.4.** Exhaust uptakes starboard casing – two main engines, one diesel generator.
  - 2.1.5.** Area of Casing Structure – 170M<sup>2</sup> for each casing
  - 2.1.6.** Insulation Thickness Main Engine Exhaust Pipe – 100mm
  - 2.1.7.** Insulation Thickness Diesel Generator Exhaust Pipe – 50mm
  - 2.1.8.** Insulation Thickness Diesel Air Comp. Exhaust Pipe – 25mm
- 2.2 Standards**
- 2.2.1** The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
  - 2.2.2** Canadian Coast Guard Fleet Safety Manual (DFO 5737)
  - 2.2.3** Coast Guard ISM Confined Space Entry 7.D.9
  - 2.2.4** Coast Guard ISM Hotwork procedures
  - 2.2.5** Coast Guard ISM Fall Protection procedures
  - 2.2.6** Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
  - 2.2.7** CWB CSA 47.1 latest revision Division I, II or III
  - 2.2.8** SSPC-SPT
- 2.3 Regulations**
- 2.3.1.**
- 2.4 Owner Furnished Equipment**
- 2.4.1.** The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

## H-29 Exhaust Casing Maintenance

### Part 3: TECHNICAL DESCRIPTION:

#### 3.1 General

- 3.1.1. Each Funnel Casing at the Engine Room uptake opening measures 2m wide x 3m long. The structure rises approximately 17m to the Funnel top, measuring 1.5m wide x 2m long.
- 3.1.2. All electrical boxes, motor junction boxes, lighting, FM 200 fire suppression system and nozzles shall be covered to prevent the ingress of water. The protective covering is not limited to the above. The Chief Engineer shall inspect the areas prior to cleaning to ensure all equipment is covered. The engine room area under the port and starboard casing shall be sealed off and water from the cleaning shall be contained and cleaned up continuously during the cleaning process of the work.
- 3.1.3. Scaffolding and or staging shall be erected to gain access for the specified work. Access to the funnel and casing areas are limited and very confined. Limited access is from the main deck engine room entrances and manhole covers located on the Lifeboat Deck. The Contractor will have to cut access holes to gain access to certain areas of the casings. The casing area narrows in at the 10 meter height above the main deck from 3.25 meters x 5 meters to 1.6 meters x 3.5 meters. The latter area continues to the funnel top at 20 meters above the main deck.
- 3.1.4. Mechanical ventilation shall be provided to exhaust fumes to the exterior of the vessel and shall remain operational for the duration of the work.
- 3.1.5. All heavy debris that is lodged on stringers, ledges and structure shall be removed from the spaces and discarded.
- 3.1.6. The casing is extremely dirty with black soot build up over the years. The areas shall require extensive cleaning. The port and starboard casing areas extending from the main deck level to the funnel top shall be power washed with high pressure water at 3000 psi and strong degreaser agent. The surfaces shall be brushed with (Turks head style brush) following the application of the degreaser to loosen the dirt and then power washed with water. The areas shall include all bulkheads, stiffeners, support framing, and ventilation ducting.
- 3.1.7. The lagging on the exhaust pipes shall be cleaned with dry methods i.e. vacuum or brooms.
- 3.1.8. Inspection of all exhaust gas pipe and silencer hanger mounts shall be carried out by a qualified technician. Four digital pictures shall be taken at each support and the location noted.
- 3.1.9. All exhaust pipe insulation shall be inspected and damaged areas shall be repaired. All insulation work shall be performed by qualified insulators. Quote on repairing 10 M<sup>2</sup> of damaged insulation and lagging. Include in the quote the unit

## **H-29 Exhaust Casing Maintenance**

cost of repairing 1 M<sup>2</sup> of insulation and used for adjustment purposes by 1379. Repairing the damaged areas shall include removing old insulation and lagging and replacing with new. The insulation is a solid chalk style material and covered with soft lagging. The installation of the insulation system shall be the same as the existing.

**3.1.10.** All debris resulting from the repair work shall be removed and discarded.

**3.1.11.** The entire spaces including structural members, exhaust piping, miscellaneous piping, ventilation ducting shall have two coats of International Interlac 660 HFB000 White applied. Each coat shall be 45 microns DFT. Application of the coating shall be in accordance with manufacture's specifications. The Chief Engineer shall inspect the spaces after each coat is applied. The areas shall be sealed off from the vessel and the spaces ventilated.

### **3.2 Location**

3.2.1. Engine Room Uptake Casing from Main Deck Level to the Funnel Top. Port Engine Room.

### **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**

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

### **4.2 Testing**

N/A

### **4.3 Certification**

N/A

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

**5.1.1** Digital Pictures of Exhaust mounts and their respective location..

## H-30 Port and Stbd Deck Crane Quadrennials

Spec item #: H-30	<b>SPECIFICATION</b>	TCMSB Field #:
<b>H-30 Port and Stbd Deck Crane Quadrennials</b>		

### Part 1: SCOPE

- 1.1 The intent of this item shall be to carry out quadrennials as per manufacturer's recommendations and load test cranes for TCMS. All references to the contractor in within H-27 refer to the hydraulics contractor.
- 1.2 The contractor shall arrange the services of a certified hydraulics contractor to carry out the following work. CCG required certification for hydraulics contractor is as follows; Hydraulic Systems Technician, Instrumentation and Control Technician. Industrial Mechanic (millwright). Specific levels of hydraulic certification; Consolidated Fluid Power Certification (levels 1 through 4).

### Part 2: REFERENCES:

#### 2.1 Nameplate Data

##### 2.1.1 SBG Hydraulic Technical Manual (available from Chief Engineer)

Port Crane

Make: SBG  
Model: EHSC 25-3-7F  
Serial Number: CA 8708 08068  
Static/ Dynamic Test: 3750 Kg  
SWL: 3 ton

Stbd. Crane

Make: SBG  
Model: EHSC 25-3-7F  
Serial Number: CA 8708 08067  
Static/ Dynamic Test: 3750 Kg  
SWL: 3 ton

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA - Fire Regulations.

## **H-30 Port and Stbd Deck Crane Quadrennials**

### **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 supply all equipment, staging, chain falls, crantage, 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, of an adequate safe working load for the expected duties.
- 3.1.2 The contractor shall provide the weights and all material to perform the load test. TCMS surveyor shall witness the test.
- 3.1.3 The Contractor, with the assistance of the ship's electrical officer, shall lock out both cranes prior to commencement of work. The electrical breakers for both cranes shall be locked out by contractor to prevent accidental starting.
- 3.1.4 The contractor shall pump out the hydraulic reservoirs and dispose of oil. The reservoir shall be cleaned with lint free rags and inspected by the Chief Engineer prior to boxing up. The contractor shall refill the reservoir with new Hydrex MV 22 Hydraulic oil through 3 micron filtration system. The contractor shall provide a sample of oil from each crane prior to commencement of work for Wearcheck analysis.
- 3.1.5 The contractor shall de-rig both cranes and rig the cranes with new owner supplied wires upon completion of all work prior to testing.
- 3.1.6 The contractor shall obtain the services of a Authorized Hydraulic Service Company to remove the control valves, winch, lift cylinder, sheave block and hoses on both cranes and conduct all work outlined below.
- 3.1.7 The contractor shall strip the cylinder for inspection by TCMS and the Chief Engineer. The contractor shall replace seals and spherical bearings, all parts shall be contractor supplied. Honing or polishing of cylinders shall be action by 1379.
- 3.1.8 The contractor shall strip the gearbox for inspection by TCMS and the Chief Engineer. The contractor shall replace bearings and seals as per manufacturers' recommendations. The gearbox shall be refilled with 3.5 liters new Castrol 80W90 Gear oil upon completion of all work.
- 3.1.9 The valve assemblies shall be overhauled using new contractor supplied seals. The units shall be reinstalled as per original. The control valves are three lever units in tandem. Valve Data: Hamworthy – Hydreco # SVBP 10333 NNN.

## H-30 Port and Stbd Deck Crane Quadrennials

3.1.10 The contractor shall strip the winch motor for inspection by TCMS and the Chief Engineer. Contractor shall replace the shaft seals with new contractor supplied.

3.1.11 The contractor shall remove the following hoses and replace with new hoses the same as existing on both cranes. All fitting shall be wrapped tightly with Denso Tape to resist corrosion.

Winch – Drain	3/8” x 2 meters (Low pressure)	Ea 2
Winch – Brake	1/4” x 0.5 meters (High Pressure)	Ea 2
Slew Gear – Drain	1/4” x 0.75 meters (Low Pressure)	Ea 2
Maneuver – Winch Up	3/4” x 3 meters (High pressure)	Ea 2
Maneuver – Winch Dn.	3/4” x 3.5 meters (High Pressure)	Ea 2
Maneuver – Top Up	1/2” x 1.3 meters (High Pressure)	Ea 2
Maneuver – Top Dn.	1/2” x 1.2 meters (High Pressure)	Ea 2
Maneuver – Slew Gear	1/2” x 1.8 meters (High Pressure)	Ea 2
Maneuver – Slew Gear	1/2” x 2.5 meters (High Pressure)	Ea 2
Slew Gear – Brake	1/4” x 0.75 meters (High pressure)	Ea 2
Slew Gear – Brake	1/4” x 0.5 meters (High Pressure)	Ea 2
Inside House – Pump	3/4” x 1.2 meters (High Pressure)	Ea 2

3.1.12 The contractor shall lay out the sheave block and pin for inspection by TCMS and the Chief Engineer.

3.1.13 The contractor shall remove the base of both cranes for inspection of the slewing ring gear. All gear teeth shall be inspected for cracks or excessive wear. The slewing ring shall be repositioned upon completion of all inspections and work as per manufacturer’s instructions.

3.1.14 All components shall be reinstalled upon completion of inspections and repairs. Both cranes shall be pressure tested and function tested for hydraulic leaks prior to installing Denso tape over fittings and hoses.

3.1.15 The contractor shall load test both cranes to 1.25 times in presence of the TCMS and Chief Engineer.

3.1.16 All work shall be to the satisfaction of the Chief Engineer.

### 3.2 Location

3.2.1 Aft Deck

### 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.

## Part 4: PROOF OF PERFORMANCE:

## **H-30 Port and Stbd Deck Crane Quadrennials**

### **4.1 Inspection**

- 4.1.1 This specification is to be carried out in order to obtain TCMS survey credit. The Contractor shall be responsible for contacting the TCMS surveyor when items are ready for the inspections.
- 4.1.2 All work shall be completed to the satisfaction of the Chief Engineer.

### **4.2 Testing**

- 4.2.1 The contractor shall test all function of the crane to ensure no leaks are apparent as a result of the work.
- 4.2.2 Both cranes shall be load tested to 1.25 times load.

### **4.3 Certification**

- 4.3.1 All service reports and inspection certificates from the work specified shall be provided to the Chief Engineer.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 Three typed copies of all reports from the work specified shall be provided to the Chief Engineer.

## H-31 Accommodation Space Ventilation Trunking Cleaning

Spec item #: H-31	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>H-31 Accommodation Space Ventilation Trunking Cleaning</b>		

### Part 1: Scope:

1.1 The intent of this item shall be to clean the HVAC ducting and registers and diffusers as required for health reasons.

1.3 Before the Contractor commences any work, the HVAC refrigeration compressors and the fans for the spaces are to be locked out, and entered in Ships Lockout procedures Log book.

1.3 This work shall be scheduled near the end of refit and after the completion of grit blasting.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

2.1.1 HVAC Drawing: NJC - 70 - 200

#### 2.2 Standards

2.2.1 Coast Guards ISM hotwork, Confined Space entry, Lockout, and fall protection procedures are to be strictly enforced.

2.2.2 A valid hotwork permit must be obtained from vessel's Chief Engineer before any type of hot work is performed.

#### 2.3 Regulations

2.3.1 N/A

#### 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 mechanically clean the accommodation space ventilation trunking and remove all debris ashore as per generally accepted industry practice. The trunking to be cleaned is all that HVAC systems supply to all cabins, common spaces, galley, and storerooms. The deckhead diffusers shall be taken down in each compartment and the trunking cleaned as far as practical and the diffusers replaced in good order.

Metal plugs are to be used for access points, if any plastic plugs are found they shall be replaced with metal plugs. All plugs shall be sealed with foil tape.

## H-31 Accommodation Space Ventilation Trunking Cleaning

3.1.2 The Contractor shall supply and install a protective covering over furniture and all outfit in all cabins where this work is performed.

3.1.3 Total amount of registers/diffusers = 64 as per the following cabin and compartments:

Bridge	Boat Deck	Foc'sle Deck	Main deck
Bridge = 12	Captain's Cabin = 2 C/E's Cabin = 2 Chief Officer's cabin = 1 Sen. Engineer's cabin = 1 B/D by Sr engr. cabin = 1 Elect. officer's cabin = 1 Sec. Engineer's cabin = 1 Third engineer's cabin = 1 Second officer's cabin = 1	Fisheries officer port = 1 Fisheries officer starboard = 1 Officer's lounge = 2 Galley = 3 Off. Mess = 2 Crew lounge = 2 Crew Mess = 2 Starboard Foc'sle deck aft = 1	Oiler = 1 Oiler = 1 Port Main deck aft = 1 Hospital, triage & ships office = 9 Oiler = 1 Steward = 1 Store keeper = 1 Cook = 1 Bosun = 1 Leading Seaman = 1 Leading Seaman = 1 Leading Seaman = 1 Starboard main deck = 1 Starboard main deck By stairs = 1 Seaman = 1 Seaman = 1 LAN room = 1 Female washroom = 1 Laundry Room in staircase area = 1

3.1.4 All Materials used shall be to the most recent standards of that used for Air Duct Cleaning.

3.1.5 After completion of work, the Contactor shall ensure all areas/equipment affected by the work shall be cleaned of dust and residues. All the protective coverings shall be removed.

### 3.2 Location

3.2.1 Accommodation ducting is found on the following decks;

- Bridge Deck
- Lower Bridge Deck
- Boat Deck
- Forecastle Deck
- Main Deck
- Below Main Deck

## **H-31 Accommodation Space Ventilation Trunking Cleaning**

### **3.3 Interferences**

3.3.1 The Contractor shall be responsible for 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 Upon completion of all work, the contractor shall test the system by operating all the ventilation fans.

4.2.2 The Contractor and Chief Engineer to check for air leakage through duct joints and Plenum doors. Etc.

### **4.3 Certification**

4.3.1 The contractor shall obtain and provide documentation to the Chief Engineer all required technical certification as specified in the applicable rules and codes.

4.3.2 Equipment and component inspection certificates including all test reports supporting the certifications shall be given to the Chief Engineer.

4.3.3 Copies of MSDS of any chemicals used for the work shall be given to the Chief Officer.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

5.1.1 Equipment and component inspection certificates including all test reports supporting the certifications shall be given to the Chief Engineer.

### **5.2 Spares**

5.2.1 N/A

### **5.3 Training**

5.3.1 N/A

### **5.4 Manuals**

5.4.1 N/A

## H-32 Galley Exhaust Fan Trunking Cleaning

Spec item #: H-32	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>H-32 Galley Exhaust Fan Trunking Cleaning</b>		

### Part 1: Scope:

1.1 The intent of this item shall be to clean the galley exhaust ventilation of build up of grease and for the prevention of possible fires.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

2.1.1 N/A

#### 2.2 Standards

2.2.1 Coast Guards ISM hotwork, Confined Space entry, and fall protection procedures are to be strictly enforced.

#### 2.3 Regulations

2.3.1 CSA - Fire 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 Trunking Length is 30 feet of 18 inches x 8 inches rectangular duct.

3.1.2 The contractor shall dismount and clean the galley range exhaust fan and use the access so created to mechanically and chemically clean the trunking. A portion of the trunking can be disconnected at the lower Bridge Deck exterior to assist in the cleaning.

3.1.3 The Contractor supplied chemicals used shall be non-flammable and low vapour. The galley surfaces shall be protected from residues, run-offs and debris. All residues and debris shall be removed ashore by the contractor. The exhaust fan shall be remounted on completion of satisfactory inspection of the trunking by the Chief Engineer.

3.1.5 The contractor shall note that the vessel will be crewed and the galley in use during the time this work will be performed. The work shall take place outside of normal galley hours that are 0600 – 1800 hours daily. The galley shall be left in a clean and tidy condition for 0600 each day with any materials and debris removed.

3.1.6 On completion of work, contractor shall ensure all areas/equipment affected by the work to be clean of dust and residues, and that all fittings removed are re- installed in their

## **H-32 Galley Exhaust Fan Trunking Cleaning**

original positions.

3.1.7 All work shall be to the satisfaction of the Chief Engineer.

### **3.2 Location**

3.2.1 Galley Port Aft

3.2.2 Lower Bridge Deck

### **3.3 Interferences**

3.3.1 The contractor will 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 Work is to be arranged with Chief Engineer, so it will have the least interference on the Contractor or Crew especially the Galley crew.

3.3.4 The 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 The Chief Engineer shall check cleanliness of the Duct before it is boxed up.

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

### **4.2 Testing**

4.2.1 After completion of work, the system shall be started up with Chief Engineer present, motor to be turning properly etc.

### **4.3 Certification**

4.3.1 All reports from the work specified shall be given to the Chief Engineer.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

5.1.1 All reports 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

### **5.4 Manuals**

5.4.1 N/A.

## ED-01 Port Propeller, Tailshaft and Stern Tube

Spec item #: ED-01	<b>SPECIFICATION</b>	TCMSB Field #:3FF010,3F060
<b>ED-01 Port Propeller, Tailshaft and Stern Tube</b>		

### Part 1: Scope:

- 1.1** The intent of this work is to open up the port propeller, port tailshaft and port stern tube for TCMS inspection and credit.
- 1.2** The Contractor shall allow \$50,000.00 to be adjusted up or down by 1379 action on proof of invoices for services and expenses for a LIPS FSR. This allowance encompasses the FSR services in required in ED-01 and ED-02.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data:

Manufacturer: WAUKESHA-LIPS  
Propeller mass: 7070 Kilograms  
Propeller dia.: 3.4 Metres  
SKF sleeve coupling mass: 710 kilograms

Stern tube Seals: WAUKESHA-LIPS B.V.  
Aft size: 400-MK2 (ea 3)  
Fwd size: 380-MK2 (ea 2)

#### 2.2 Standards:

#### 2.3 Regulations:

#### 2.4 Owner Furnished Equipment:

The Contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Canadian Coast Guard will supply OEM parts and system oils. The contractor shall supply all other parts required for the specified work.

### Part 3: Technical Description:

#### 3.1 General

- 3.1.1.** The Contractor shall provide the services of a WAUKESHA-LIPS service representative during the removal and replacement of the shafting and propellers, inspection of shaft bearings and stern tube, as well as the installation of the new stern tube seals. The Contractor shall quote the cost of these technical services and include this cost in the overall quote.

## **ED-01 Port Propeller, Tailshaft and Stern Tube**

- 3.1.2.** Removal, disassembly, assembly and reinstallation of the propeller and tailshaft shall be carried out in strict accordance with the manufacturer's procedures and recommendations and under the directions of manufacturer's representative. Drawings to be supplied to the contractor for use during survey, as required.
- 3.1.3.** A special guide tool is available from the vessel to assist in the removal and installation of the tailshaft from the stern tube.
- 3.1.4.** The tailshaft and propeller assembly shall be withdrawn for inspections and surveys which shall be carried out by the manufacturer's representative, Chief Engineer and attending TCMS Surveyor.
- 3.1.5.** Scaffolding shall be erected in way of propeller to allow access for the above inspections and removed upon completion of all work.
- 3.1.6.** The rope guard to be removed and reinstalled upon completion of work described below.
- 3.1.7.** Prior to withdrawing the tailshaft, the contractor shall drain off the stern tube oil and forward seal housing oil (600 litres total) and dispose of the oil ashore. Note that this oil can only be drained internally at the three-way cock beneath the forward seal in the Shaft Tunnel compartment.
- 3.1.8.** All oil (375 litres) shall be drained from the CPP system and disposed of by the Contractor.
- 3.1.9.** The Contractor shall take sterntube wear-down readings prior to drawing the propeller and shafting, using the Owner-supplied wear-down gauges. Upon completion of all work, a second set of wear-down readings shall be taken and recorded. Copies of both sets of readings shall be given to the Chief Engineer.
- 3.1.10.** The Contractor shall also measure and record the run-out on the forward seal housing bushing prior to withdrawing the propeller shaft.
- 3.1.11.** The drive for the feedback potentiometers, located on the OD box, shall be properly marked and then disconnected prior to any pitching of the blades or removals. The potentiometer drive shall be reconnected to its original timing marks upon completion of reassembly. This shall be done by the service representative.
- 3.1.12.** The propeller shaft is coupled to the intermediate shaft through an SKF sleeve coupling. The areas of shafting adjacent to the SKF coupling shall be thoroughly cleaned prior to removal of the coupling.
- 3.1.13.** The owner shall supply the high-pressure oil injection equipment necessary for withdrawal and installation of the coupling. The contractor shall release the SKF sleeve coupling, strictly following the manufacturer's procedures. The pressure required for release of the coupling halves shall be recorded. The coupling shall be thoroughly cleaned and

## **ED-01 Port Propeller, Tailshaft and Stern Tube**

prepared for reinstallation as per the manufacturer's procedures prior to replacement. The coupling shall also be protected against the ingress of dirt and moisture while off the shaft.

- 3.1.14. NOTE:** While separating any two sections of shafting, care must be taken not to put undue stress on the central oil supply pipe. Also care must be taken in way of the oil supply pipe seal at each coupling.
- 3.1.15.** The tailshaft and propeller shall be withdrawn as a unit and transported to the Contractor's shop for position marking and removal of the stern tube seal liners. The after stern tube seal liner shall be renewed (owner supplied OEM spare). The forward seal liner shall be cleaned and re-installed in original position or as directed by LIPS Field Service Technician. The tailshaft and propeller shall be supported properly at all times. The tailshaft shall be thoroughly cleaned and readied for inspection. While removed from the ship, the tailshaft/propeller assembly shall be protected from mechanical damage and the unit shall be covered and protected as required. The stern tube shall be sealed to prevent the ingress of foreign material during the removal of the tailshaft.
- 3.1.16.** The propeller blades shall be removed from the hub to gain access to the propeller operating system. The internals shall be thoroughly cleaned and laid out for inspection. The hub is filled with 75 litres of Petro Canada OG grease. TCMS shall inspect the internals of the hub. The blade assembly shall be reassembled using new seals and refilled with new grease. The grease shall be pumped in the hub. The Canadian Coast Guard have lifting gear for removing the blades. The blades will be polished and crack tested with dye penetrant.
- 3.1.17.** The contractor shall remove any remaining oil in the stern tube and clean the stern tube of any sludge and dirt that may be present. The forward and aft stern tube bearings shall be cleaned for inspection by the attending TCMS Surveyor. Measurements shall be taken on the bore of each stern tube bearing in the vertical and horizontal direction at four equal points along the length of the bearing. The diameter of the tailshaft IWO bearings shall be measured in the same manner as the stern tube. These readings shall be recorded and given to the Chief Engineer.
- 3.1.18.** The existing spacer from the stern tube boss to the after seal is a tapered spacer as part of a past modification, this shall remain intact.
- 3.1.19.** New Owner-supplied seals shall be installed in the forward end of the stern tube as well as the aft end of the stern tube as per Lips procedure. Upon reinstallation of the propeller shaft, the Contractor shall take the run-out on the forward seal housing bushing once again. The Chief Engineer shall witness the readings and receive copies. The Contractor shall note that a shaft turning gear is not fitted.
- 3.1.20.** Upon completion of all work the tailshaft and the propeller shall be installed in good order with all fasteners being torqued and locked as per manufacturer's specifications.
- 3.1.21.** The tailshaft/intermediate shaft coupling shall be measured for correct alignment. Care shall be taken to ensure that the central oil feed pipe in both sections of shafting shall be lined

## **ED-01 Port Propeller, Tailshaft and Stern Tube**

up properly. The Shaft/SKF Coupling seating Areas shall be thoroughly cleaned to satisfaction of attending FSR. The SKF coupling shall be reinstalled in good order up to the original marks. The hydraulic pressure for the final fitting to be recorded. All threaded holes in the coupling shall be cleaned sealed and protected. The ends of all couplings shall be thoroughly cleaned and wrapped with a water and oil resistant tape to prevent the ingress of dirt and moisture during service.

**3.1.22.** Upon completion of above noted work, the stern tube header tank and the seal oil tank shall be filled with new oil (Owner Supply) and subject to an eight hour static head pressure test as per manufacturer's requirements. Any leaks shall be made good. The stern tube and seal oil tank shall then to be topped up to their operational level.

**3.1.23.** The CPP hydraulic system shall be refilled with owner supplied oil. The system shall be tested for leaks.

**3.1.24.** Any piping, fixtures, wiring, etc. removed or disturbed during the shaft survey shall be replaced in good order.

**3.1.25.** The LIPS representative shall test all functions that could be affected by the work and to be set to the as found condition. A sea trial shall be required for acceptance of this item.

### **3.2 Location**

**3.2.1** N/A

### **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**

### **4.1.1. Inspection**

All work shall be completed to the satisfaction of the Chief Engineer. WAUKESHA-LIPS representative and attending TCMS Surveyor.

### **4.1.2. Certification**

TCMS shall make the necessary updating in the Ships Hull and Machinery Record Book.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

**5.1.1** The Contractor shall record readings and three typewritten copies shall be given to the Chief Engineer.

## ED-02 Starboard Propeller, Tailshaft and Stern Tube

Spec item #: ED-02	<b>SPECIFICATION</b>	TCMSB Field #: 3FF030,3F080
<b>ED-02 Starboard Propeller, Tailshaft and Stern Tube</b>		

### Part 1: Scope:

1.1 The intent of this work is to open up the starboard propeller, starboard tailshaft and starboard stern tube for TCMS inspection and credit.

1.2 Allowance as per ED-01.

### Part 2: References:

Manufacturer: WAUKESHA-LIPS  
Propeller mass: 7070 Kilograms  
Propeller dia.: 3.4 Metres  
SKF sleeve coupling mass: 710 kilograms

Stern tube Seals: WAUKESHA-LIPS B.V.  
Aft size: 400-MK2 (ea 3)  
Fwd size: 380-MK2 (ea 2)

### 2.2 Standards:

### 2.3 Regulations:

### 2.4 Owner Furnished Equipment:

The Contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated. The Canadian Coast Guard will supply OEM parts and system oils. The contractor shall supply all other parts required for the specified work.

### Part 3: Technical Description:

#### 3.1 General

3.1.1. The Contractor shall provide the services of a WAUKESHA-LIPS service representative during the removal and replacement of the shafting and propellers, inspection of shaft bearings and stern tube, as well as the installation of the new stern tube seals. The contractor shall quote the cost of these technical services and include this cost in the overall quote.

3.1.2. Removal, disassembly, assembly and reinstallation of the propeller and tailshaft shall be carried out in strict accordance with the manufacturer's procedures and recommendations and under the directions of manufacturer's representative. Drawings to be supplied to the contractor for use during survey, as required.

## **ED-02 Starboard Propeller, Tailshaft and Stern Tube**

- 3.1.3.** A special guide tool is available from the vessel to assist in the removal and installation of the tailshaft from the stern tube.
- 3.1.4.** The tailshaft and propeller assembly shall be withdrawn for inspections and surveys which shall be carried out by the manufacturer's representative, Chief Engineer and attending TCMS Surveyor.
- 3.1.5.** Scaffolding shall be erected in way of propeller to allow access for the above inspections and removed upon completion of all work.
- 3.1.6.** The rope guard to be removed and reinstalled upon completion of work described below.
- 3.1.7.** Prior to withdrawing the tailshaft, the contractor shall drain off the stern tube oil and forward seal housing oil (600 litres total) and dispose of the oil ashore. Note that this oil can only be drained internally at the three-way cock beneath the forward seal in the Shaft Tunnel compartment.
- 3.1.8.** All oil (375 litres) shall be drained from the CPP system and disposed of by the contractor.
- 3.1.9.** The Contractor shall take sterntube wear-down readings prior to drawing the propeller and shafting, using the Owner-supplied wear-down gauges. Upon completion of all work, a second set of wear-down readings shall be taken and recorded. Copies of both sets of readings shall be given to the Chief Engineer.
- 3.1.10.** The Contractor shall also measure and record the run-out on the forward seal housing bushing prior to withdrawing the propeller shaft.
- 3.1.11.** The drive for the feedback potentiometers, located on the OD box, shall be properly marked and then disconnected prior to any pitching of the blades or removals. The potentiometer drive shall be reconnected to its original timing marks upon completion of reassembly. This shall be done by the service representative.
- 3.1.12.** The propeller shaft is coupled to the intermediate shaft through an SKF sleeve coupling. The areas of shafting adjacent to the SKF coupling shall be thoroughly cleaned prior to removal of the coupling.
- 3.1.13.** The owner shall supply the high-pressure oil injection equipment necessary for withdrawal and installation of the coupling. The contractor shall release the SKF sleeve coupling, strictly following the manufacturer's procedures. The pressure required for release of the coupling halves shall be recorded. The coupling shall be thoroughly cleaned and prepared for reinstallation as per the manufacturer's procedures prior to replacement. The coupling shall also be protected against the ingress of dirt and moisture while off the shaft.
- 3.1.14. NOTE:** While separating any two sections of shafting, care must be taken not to put

## **ED-02 Starboard Propeller, Tailshaft and Stern Tube**

undue stress on the central oil supply pipe. Also care must be taken in way of the oil supply pipe seal at each coupling.

- 3.1.15.** The tailshaft and propeller shall be withdrawn as a unit and transported to the Contractor's shop for position marking and removal of the stern tube seal liners. The after sterntube seal liner shall be renewed (owner supplied OEM spare). The forward seal liner shall be cleaned and re-installed in original position or as directed by LIPS Field Service Technician. The tailshaft and propeller shall be supported properly at all times. The tailshaft shall be thoroughly cleaned and readied for inspection. While removed from the ship, the tailshaft/propeller assembly shall be protected from mechanical damage and the unit shall be covered and protected as required. The stern tube shall be sealed to prevent the ingress of foreign material during the removal of the tailshaft.
- 3.1.16.** The propeller blades shall be removed from the hub to gain access to the propeller operating system. The internals shall be thoroughly cleaned and laid out for inspection. The hub is filled with 75 litres of Petro Canada OG grease. TCMSB shall inspect the internals of the hub. The blade assembly shall be reassembled using new seals and refilled with new grease. The grease shall be pumped in the hub. The Canadian Coast Guard have lifting gear for removing the blades. The blades will be polished and crack tested with dye penetrant.
- 3.1.17.** The contractor shall remove any remaining oil in the stern tube and clean the stern tube of any sludge and dirt that may be present. The forward and aft stern tube bearings shall be cleaned for inspection by the attending TCSS Surveyor. Measurements shall be taken on the bore of each stern tube bearing in the vertical and horizontal direction at four equal points along the length of the bearing. The diameter of the tailshaft IWO bearings shall be measured in the same manner as the stern tube. These readings shall be recorded and given to the Chief Engineer.
- 3.1.18.** The existing spacer from the stern tube boss to the after seal is a tapered spacer as part of a past modification, this shall remain intact.
- 3.1.19.** New Owner-supplied seals shall be installed in the forward end of the stern tube as well as the aft end of the stern tube as per Lips procedure. Upon reinstallation of the propeller shaft, the Contractor shall take the run-out on the forward seal housing bushing once again. The Chief Engineer shall witness the readings and receive copies. The Contractor shall note that a shaft turning gear is not fitted.
- 3.1.20.** Upon completion of all work the tailshaft and the propeller shall be installed in good order with all fasteners being torqued and locked as per manufacturer's specifications.
- 3.1.21.** The tailshaft/intermediate shaft coupling shall be measured for correct alignment. Care shall be taken to ensure that the central oil feed pipe in both sections of shafting shall be lined up properly. The Shaft/SKF Coupling seating Areas shall be thoroughly cleaned to satisfaction of attending FSR. The SKF coupling shall be reinstalled in good order up to the original marks. The hydraulic pressure for the final fitting to be recorded. All threaded holes in the coupling shall be cleaned sealed and protected. The ends of all couplings shall be thoroughly cleaned and wrapped with a water and oil resistant tape to prevent the ingress of

## **ED-02 Starboard Propeller, Tailshaft and Stern Tube**

dirt and moisture during service.

- 3.1.22.** Upon completion of above noted work, the stern tube header tank and the seal oil tank shall be filled with new oil (Owner Supply) and subject to an eight hour static head pressure test as per manufacturer's requirements. Any leaks shall be made good. The stern tube and seal oil tank shall then to be topped up to their operational level.
- 3.1.23.** The CPP hydraulic system shall be refilled with owner supplied oil. The system shall be tested for leaks.
- 3.1.24.** Any piping, fixtures, wiring, etc. removed or disturbed during the shaft survey shall be replaced in good order.
- 3.1.25.** The LIPS representative shall test all functions that could be affected by the work and to be set to the as found condition. A sea trial shall be required for acceptance of this item.

### **Part 4: Proof of Performance**

#### **4.1 Inspection**

All work shall be completed to the satisfaction of the Chief Engineer. WAUKESHA-LIPS representative and attending TCMS Surveyor.

#### **4.2 Certification**

TCMS shall make the necessary updating in the Ships Hull and Machinery Record Book.

### **Part 5: Deliverables:**

#### **5.1 Drawings/Reports**

**5.1.1** The Contractor shall record readings and three typewritten copies shall be given to the Chief Engineer.

## ED-03 Port and Starboard Rudder Stock Inspections

Spec item #: ED-03	<b>SPECIFICATION</b>	TCMSB Field #: 3H049, 3H053
<b>ED-03 Port and Starboard Rudder Stock Inspections</b>		

### Part 1: Scope:

- 1.1 The intent of this item shall be to measure the rudder stock bearing clearances of the port and stbd rudders and to remove the rudder/rudderstock assemblies to enable the removal of the tail shafts. A survey credit from TCMS shall be obtained for the rudder systems.
- 1.2 Rudderstock bearing clearances on both rudders shall be measured fore and aft and athwart ships with typewritten copies of the readings given to the Chief Engineer.
- 1.3 The contractor shall provide the services of a TENJFORD service representative (available through Rolls Royce Canada) to supervise the removal and re-installation of the rudder stock from the steering gear and to record all readings specified in this spec item. The contractor shall quote the cost of these technical services and include this cost in the overall quote. The contractor shall allow \$20,000.00 to be adjusted up or down by 1379 action on proof of invoices for transportation, meals and lodging for the service representative.

### Part 2: References:

- 2.1 **Note:** Max. Allowable rudderstock clearance: 0.110". THORDON bushings require renewal when this clearance is exceeded.
- 2.2 Contractor shall remove jumping collars. Jumping collars shall be replaced in good order with clearances between collar and bushing housing not to exceed 1 mm. This clearance shall be recorded and included with the above clearances. Jumping collar securing bolts and nuts shall be locked by tack welding.

### Part 3: Technical Description:

#### General 3.1

- 3.1.1. Drain plugs shall be removed from the both rudders to check for leakage. Upon completion of inspection the plugs shall be replaced in good order using new seals. Owner's representative to be present for inspection.
- 3.1.2. Both steering gear assemblies shall be opened up for completion of ED-04 Steering Gear Actuator Overhaul and Survey. Dismantling and reassembly shall be as per TENJFORD instructions and specifications.
- 3.1.3. Prior to lowering each rudder and rudderstock, alignment readings shall be taken between the stock and steering gear housing. All readings shall be recorded and passed to the Chief Engineer. Readings shall be taken in the fore and aft and athwartships directions. The date,

## **ED-03 Port and Starboard Rudder Stock Inspections**

time, title and name(s) of personnel taking the readings shall be legibly recorded. The jumping collar clearances shall be measured and the jumping collars shall be dismantled.

- 3.1.4.** Rudder stocks shall be supported within the steering gear compartment. Expansion rings (locking rings) and adjusting screws shall be removed, with each rudder and stock lowered sufficiently to clear the rudder bushing bore and subsequently transported to a safe and clean storage in Contractor's premises.
- 3.1.5.** Rudder stock stainless steel liners in way of sea water seals shall be cleaned and polished. The remaining rudder stock areas shall be cleaned to the surface to allow inspection by TCMS.
- 3.1.6.** Each rudder and stock assembly shall be transported back to vessel on completion of re-installation of propeller and tailshaft assembly and re-installed in perfect alignment under the guidance and with the assistance of the Tenfjord Field Service Technician.
- 3.1.7.** Note that the alignment of the rudderstock within the bore shall be expedited with the use of a hydraulic jack beneath the rudder taking the brunt of the weight of the assembly. Alignment shall be proven and recorded after torqueing of each expansion ring.
- 3.1.8.** The rudder stock seawater seal sets shall be replaced with new Owner supplied sea water seals. The new sea water seal set securing is not to be carried out until the rudder stock is raised back into position.
- 3.1.9. NOTE:** The alignment of the rudder stock within the steering gear housing shall be made good prior to torqueing the locking rings. Upon completion of torqueing all locking rings, but prior to securing the new seawater seals, the clearances shall be taken once again. This shall confirm the alignment. Chief Engineer shall witness the alignment readings upon completion of torqueing the locking rings and prior to securing the seawater seals. Seawater seals shall then to be secured. The jumping collar shall be replaced in good order. Jumping collar clearance shall be measured and recorded; clearance must be less than one millimetre.
- 3.1.10.** Rudders shall be inspected to the satisfaction of Chief Engineer and TCMS. The contractor is responsible for arranging all inspections.
- 3.1.11.** Any lifting lugs installed by the contractor are to be removed after completion of repairs. Any areas of the hull disturbed by the work, including areas such as for installation and removal of lifting lugs, shall be given 3 coats of paint as follows:
- 3.1.11.1 Base Coat**  
Apply one touch up coat of Amercoat 238 Abrasion Resistant Epoxy to bare blasted areas only. Apply @ 10 mils DFT.
- 3.1.11.2 Intermediate Coat**  
Apply one full coat of Amercoat 238 Abrasion Resistant Epoxy to entire underwater hull area. Apply @ 10 mils DFT. Colour Red Oxide.

## **ED-03 Port and Starboard Rudder Stock Inspections**

### **3.1.11.3 Topcoat**

Apply one full coat of Amercoat 339 Low Friction Hull Coating to entire underwater hull area.  
Apply @ 8 mils DFT. Colour Black.

## **Part 4: Proof of Performance**

### **4.1 Inspection**

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

### **4.2 Testing**

**4.2.1** N/A

### **4.3 Certification**

**4.3.1** TCMS to make the necessary updating in the Ships Hull and Machinery Record Book.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

**5.1.1** All reports 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

## ED-04 Port and Starboard Rudder Actuators & Steering Gear Pumps

Spec item #: ED-04	<b>SPECIFICATION</b>	TCMSB Field #: 3H046-48, 3H050-53
<b>ED-04 Port and Starboard Rudder Actuators &amp; Steering Gear Pumps</b>		

### Part 1: Scope:

- 1.1 The intent of this item is to open up both port and stbd (Rolls Royce) Tenfjord Steering Gear actuators, port #1 and #2 pumps and stbd #1 and #2 pumps.
- 1.2 The Contractor shall arrange the services of a Rolls Royce (Tenfjord) FSR carry out a survey of the port and stbd actuators and all 4 steering gear pumps for TCMS Credit.
- 1.3 The Contractor shall make an allowance of \$30,000.00 for these services. The final amount shall be adjusted up or down by 1379 action. The final costs will be based on all sub-contractor's invoicing.
- 1.4 The Contractor shall quote 200 hours labour to assist the Rolls Royce FSR. The contractor shall maintain a record of the hours used for this SOW.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Tenfjord Type 12M260/2GM435-FU

#### 2.2 Standards

- 2.2.1 N/A

#### 2.3 Regulations

- 2.3.1 N/A

#### 2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all 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 arrange RR (Tenfjord) Representative to open up both rudder actuators and all 4 steering gear pumps for TCMS inspection and credit.
- 3.1.2 The contractor shall lockout all steering gear pumps and isolate system. Record all lock outs in ships lock out book.
- 3.1.3 The contractor shall quote on 200 liter of AV60 Hydraulic oil. Oil shall be filtered to ISO 17/14 count prior to filling the system tanks.

#### 3.2 Location

## **ED-04 Port and Starboard Rudder Actuators & Steering Gear Pumps**

### **3.2.1. Steering Flat**

### **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 completed to the satisfaction of the Chief Engineer.

### **4.2 Testing**

**4.2.1** Dock trials and sea trials to be carried out to verify the operation of all 4 steering gear pumps and the steering gear system. This will coincide with other spec items requiring trials.

### **4.3 Certification**

**4.3.1** N/A

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

**5.1.1** All reports 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.

### **5.4 Manuals**

**5.4.1** N/A.

## ED-05 Stern Thruster Survey

Spec item #: ED-05	<b>SPECIFICATION</b>	TCMSB Field #: 3H054
<b>ED-05 Stern Thruster Survey</b>		

### Part 1: Scope:

**1.1** The intent of this item shall be to overhaul the bow thruster for survey by TCMS under the supervision of a service representative (Rolls Royce FSR) from Ulstein Thruster.

**1.2** The Contractor shall include in the bid an allowance of \$32,000.00 for manufacturer's field technician services (FSR) expenses; to be adjusted up or down by PWGS 1379 action on proof of invoice. The manufacturer's field technician will supervise the work. The Contractor shall open up the Stern Thruster for Inspection and survey.

**1.3** Before any work begins the Contractor shall arrange for vibration readings to be taken on the stern thruster. Following completion of all work vibration readings shall be taken. The 2 sets of readings will be compared. These vibration readings will form part of the acceptance criteria for this item. This can only be carried out with the vessel afloat and propulsion on-line.

**1.4** This work shall be carried out in Conjunction with the following:

**1.4.1** HD-04 Hull Coating and Inspection

**1.4.2** HD-06 Anode Replacement

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

2.1.1 Stern Thruster Data: ULSTEIN Type: 150 TV-A

2.1.2 Rolls Royce Parts Quote Jo1007001

#### 2.2 Standards

**2.2.1** Canadian Coast Guard Fleet Safety Manual (DFO 5737)

**2.2.2** Coast Guard ISM Confined Space Entry 7.D.9

**2.2.3** Ships ISM Lockout, Hotwork, Fall Prevention, Confined Space Entry, permits are required to be completed for commencement of work.

#### 2.3 Regulations

**2.3.1** CSA Marine Machinery Regulations.

#### 2.4 Owner Furnished Equipment

**2.4.1** Owner shall supply the Thruster parts for the complete overhaul.

**2.4.2** The contractor shall supply all other materials, equipment, labour and tools that are required to perform the specified work.

## ED-05 Stern Thruster Survey

### Part 3: Technical Description:

#### 3.1 General

- 3.1.1.** The Contractor shall supply all equipment, staging, chain falls, crantage, 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, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2). Proof of certification must be provided to both the Chief Engineer prior to commencement of steel work. Prior to any hot work taking place the Contractor shall ensure the area of work is gas freed suitable for hot work and the appropriate gas free certificates issued and posted as per the requirements of CCG Fleet Safety Manual.
- 3.1.2.** The Starboard stern thruster tube grid shall be removed for access to the propeller and shall be re-welded in place upon completion of the work below. The Contractor shall supply and erect all scaffolding required.
- 3.1.3.** The thruster shall be inspected for defects and leaks by the Contractor, Chief Engineer and TCMS.
- 3.1.4.** The contractor shall drain the gearbox and reservoir of approximately 200 litres of Petro Canada Ultima EP-150 oil. The contractor shall disassemble the Stern Thruster gearbox to the extent necessary under the guidance of the attending Ulstein Field Service.
- 3.1.5.** The contractor shall dispose of all the Oil or sludge to their premises ashore.
- 3.1.6.** The Contractor shall quote on 200 liters of oil; the invoice amount will be adjusted up or down upon proof of invoice by PWGSC 1379 action. The Contractor shall collect a sample of the draining oil in a clean one liter container and hand same to Chief Engineer.
- 3.1.7.** It will be necessary for the Contractor to uncouple the thruster motor. At this time it will also be necessary to remove the maneuvering unit, oil pipes, and the pitch control lever. The electric motor shall have its associated wiring disconnected and shall be uncoupled and lifted clear of the thruster housing. The motor shall be adequately supported while out of operating position.
- 3.1.8.** The contractor shall remove the end housings of the electric motor and replace the bearings for the drive end and non-drive end. Motor shall then be re-assembled as original. The contractor shall supply the bearings for the motor. Bearings and housings shall be pack with grease. Allow \$1000.00 for each bearing and shall be adjusted up or down by PWGSC 1379 upon receipt of invoice. There are 2 bearings in the motor. The motor shall be meggered.
- 3.1.9.** The gearbox and propeller shall be removed ashore for opening up, cleaning, and inspection by the Chief Engineer and the attending TCMS Surveyor. Prior to removing the

## ED-05 Stern Thruster Survey

gearbox ashore, the tooth flank clearance on the periphery of the gearwheel shall be measured and recorded. This will require partial disassembly in the thruster tunnel.

- 3.1.10.** The contractor shall disassemble the propeller and clean all parts for inspection by the Chief Engineer and TCMS. Upon completion of the inspection, the propeller unit shall be assembled in good order using new seals and o-rings contractor supplied as per RR parts list Annex B. All fasteners shall be torqued as required and all locking devices shall be replaced. The blades will be polished and crack tested with dye penetrant.
- 3.1.11.** In conjunction with the propeller inspection the Contractor shall draw the servo piston and shaft for disassembly and cleaning. Upon completion of inspection by the Chief Engineer and TCMS the servo unit shall be assembled with all new seals and o-rings contractor supplied. All fasteners shall be torqued as required and all locking devices replaced.
- 3.1.12.** Upon completion of installation of the gearbox, the Contractor shall install the electric motor back in place and couple it up with the alignment being made good. The contractor shall clean all mounting flanges between motor and thruster unit. The contractor shall adjust the coupling as required to give the correct clearances as laid out in the manufacturer's specification sheet, Owner supplied. All electrical connections shall be reconnected and all piping replaced. The maneuvering unit and pitch control lever shall be reinstalled.
- 3.1.13.** On Contractor completion of repairs and re-assembly, the contractor shall refill the system through an off-line filtration system using 5 micron filters. Existing grease to be removed from propeller hub and hub to be refilled with new Petro Canada OG 2 hub grease supplied by the Contractor, and to temporarily connect a 440 Volt supply to be applied to the servo pump and the unit to be pitched for two hours to verify free of air locks and to check for leaks.
- 3.1.14.** The Stern thruster hydraulic system shall be tested by the ship's personnel for leaks and correct operation on dock. Any leaks found shall be Contractor repaired. The Contractor shall mount the propeller shaft assembly, complete with new lip seal and bearing housing back into the gear housing according to standard procedure. Correct tooth pattern and end play shall be confirmed.
- 3.1.15.** The gearbox unit shall be reassembled and re-installed by the Contractor. Upon installing the gearbox in the thruster tunnel, the contractor shall "blue" the teeth of the gearwheel and check that the correct contact picture is obtained as outlined by the manufacturer. The gearwheel shall be adjusted as required to obtain the correct contact picture. Also the tooth flank clearance on the periphery shall be measured and should be in the range of 0.30 - 0.40 mm.
- 3.1.16.** The thruster unit shall be tested for operation on undocking.
- 3.1.17.** The thruster tunnel grid shall be replaced upon completion of all work. Any other fixtures or steelwork disturbed as a result of the above work shall be returned to its original state. All disturbed steel work shall be wire brushed and given 2 coats of primer and 2 coats finish

## **ED-05 Stern Thruster Survey**

paint as per ship's painting schedule.

### **3.2 Location**

**3.2.1** Stern Hull, and Stern Thruster Compartment Frames 15 to 19

### **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 Ulstein FSR, TCMS Surveyor and the Chief Engineer.

### **4.2 Testing**

**4.2.1** A four (4) hour dock trial shall be performed and witnessed by the Chief Engineer, TCMS and the FSR for Ulstein. In conjunction with this test trial the FSR shall set the controls for the unit, Maximum Pitch Port and Starboard, zero pitch, adjust meters to correspond, and stability.

**4.2.2** At this time vibration readings shall be taken and compared with the readings that were taken prior to the overhaul.

### **4.3 Certification**

**4.3.1** TCMS to make the necessary updating in the Ships Hull and Machinery Record Book.

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

**5.1.1** A detail report from the Ulstein FSR for the work that was done during the overhaul shall be given to the Chief Engineer. This shall include all measurements clearances, readings, invoicing, etc.

**5.1.2** The Contractor shall provide a Quality Assurance (QA) report indicating that all areas as defined in this specification have been inspected by the Contractor's QA Department and all areas of defects established by this survey have been identified for remedial action.

### **5.2 Spares**

**5.2.1** N/A

### **5.3 Training**

**5.3.1** N/A

## ED-06 Fuel oil, Ballast water and Fresh water Pneumatic Valve Replacement

Spec item #: ED-06	<b>SPECIFICATION</b>	TCMSB Field #:
<b>ED-06 Fuel oil, Ballast water and Fresh water Pneumatic Valve Replacement</b>		

### Part 1: Scope:

- 1.1 The intent of this item shall be change out the existing Fuel Oil, ballast water and fresh water 6", 8" and 10" Keystone Valves with new owner supplied Triac Pneumatic Valves as directed by the Chief Engineer. (there have been some ballast valves changed out already) There are a total of 19 fuel oil system valves, 7 fresh water system valves and 5 ballast water valves to be changed out.
- 1.2 The Contractor shall include in the bid an allowance of \$15000.00 for Pennecon Hydraulic Systems FSR services to be adjusted up or down by PWGSC 1379 action on proof of invoicing. The FSR will supervise the work and oversee commissioning of the valves to maintain warranty. The Contractor shall supply labour to remove old and install new valves.
- 1.3 Pennecon Hydraulic Contact Eddy Knox (709) 782-5575

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 All fasteners and piping are metric.

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection Lockout Procedures

#### 2.3 Regulations N/A

#### 2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all materials, Parts, equipment, labor and Tools required to complete the specified work.

#### 2.5 Related specifications.

##### Work will be done in conjunction with:

- L-01 Kongsberg Pneumatic Valve Replacement
- HD-09 Freshwater tank cleaning and maintenance
- E-07 Fuel Oil, Lube oil and Waste tank cleaning and inspection.
- E-15 Deck fuelling Pump Installation
- HD-02 Dry-docking. (Ballast valves to be completed while ship is on dock)

### Part 3: Technical Description:

#### 3.1 General

- 3.1.1 The Contractor shall supply all equipment, staging, chain falls, craneage, 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, of an adequate safe working load for the expected

## **ED-06 Fuel oil, Ballast water and Fresh water Pneumatic Valve Replacement**

duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2). Proof of certification must be provided to the Chief Engineer prior to commencement of steel work. Prior to any hot work taking place the Contractor shall ensure the area of work is gas freed suitable for hot work and the appropriate gas free certificates issued and placed as per the requirements of CCG Fleet Safety Manual. **NOTE:** The Fuel oil valves and adjacent piping may contain fuel oil or fuel oil residue.

- 3.1.2 The Contractor shall isolate and lockout fuel oil, ballast and fresh water pumps associated with this system, lockouts are to be entered into the ships lockout record book and lockouts shall be removed and entered into lockout book after completion of repairs.

### **3.2 Pre Removal**

- 3.2.1 The contractor shall ensure that all faces of the associated flanges and spacer plates are properly "proof" marked for subsequent re-assembly and correct orientation.
- 3.2.2 The contractor shall ensure there is no head pressure from existing fluids in associate pipe work on the valves prior to removal of the valves.

### **3.3 Removal, disassembly and reassembly**

- 3.3.1 The contractor shall remove the existing listed valves and replace with the new owner supplied valves. (**Note:** a hydraulic flange spreader was required to carry out previous valve replacement)
- 3.3.2 The contractor shall prove the newly installed valves operational and leak free.
- 3.3.3 The contractor shall include in the bid the supply of 20 feet of new copper tubing to replace the existing pneumatic copper tubing that may be damaged during the removal of the old valves. The contractor shall quote on a unit per foot of tubing for adjustment on the 1379.
- 3.3.4 The contractor shall include in the bid the supply of 20 feet of new copper wire to replace the wire that that may be damaged during the removal of the old valves. The contractor shall quote on a unit per foot of wire for adjustment on the 1379. This wire shall meet TCMS regulations for this application.

### **3.4 Interferences**

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

### **3.5 Location**

Fuel oil existing KEYSTONE VALVES

**ED-06 Fuel oil, Ballast water and Fresh water Pneumatic Valve Replacement**

<b>Valve</b>	<b>V.C.U.</b>	<b>Tank</b>	<b>Valve Location</b>	<b>Frame #</b>
FO-1	11-2	<b>3P</b>	AFT Lathe Room-Shafts	25
FO-2	20-2	<b>3S</b>	AFT Lathe Room-Shafts	26
FO-3	11-1	<b>6P</b>	Shaft Tunnel	34
FO-4	20-1	<b>6S</b>	Shaft Tunnel	39
FO-5	18-3		Pump Rm. Stbd (Suction)	38
FO-6	18-4		Pump Rm. Stbd (Suction)	38
FO-10	9-1	<b>8P</b>	Engine Room Aft.	44
FO-11	9-2	<b>8S</b>	Engine Room Aft.	44
FO-12	9-3	<b>9P</b>	E/R-Beside Gearbox	44
FO-13	9-4	<b>9S</b>	E/R-Beside Gearbox	44
FO-14	6-4	<b>10P</b>	Near Port Seabay (Outer Valve)	62
FO-15	4-3	<b>10S</b>	Near Stbd Seabay (Outer Valve)	62
FO-16	6-5	<b>11P</b>	Near Port Seabay (Inner Valve)	62
FO-17	4-4	<b>11S</b>	Near Stbd Seabay (Inner Valve)	62
FO-18	18-2		Pump Rm. Stbd (Discharge)	38
FO-19	18-1		Pump Rm. Stbd (Discharge)	38
FO-20	13-1		Pump Room Overhead	40
FO-21	14-5		Pump Room Overhead	40
FO-27	14-3		Pump Room FWD	42

**Location of Fresh water valves**

<b>Valve</b>	<b>V.C.U.</b>	<b>Tank</b>	<b>Valve Location</b>	<b>Frame #</b>
FW-01		<b>17</b>	AFT of bow-thruster compartment door	95
FW-02p			E/R upper level Stbd.	57
Fw-03p			E/R upper level port.	57
Fw-04			E/R next to F/W cargo pump.	65
Fw-05			E/R next to F/W cargo pump.	65
Fw-o6		<b>16P</b>	Bonded stores under deck	94
Fw-07		<b>16S</b>	Bottom of stairs by central stores forward	95

**Location of ballast valves.**

<b>Valve</b>	<b>V.C.U.</b>	<b>Tank</b>	<b>Valve Location</b>	<b>Frame #</b>
DB-1		<b>1P</b>	Steering flat	7
DB-2		<b>1S</b>	Steering flat	7
DB-3		<b>20C</b>	Steering flat	15
DB-24			E/R next to ballast pump	65
DB-25			E/R next to ballast pump	65

## **ED-06 Fuel oil, Ballast water and Fresh water Pneumatic Valve Replacement**

### **Part 4: Proof of Performance**

#### **4.1 Inspection**

**4.1.1** All work and materials used shall be to satisfaction of Chief Engineer.

#### **4.2 Testing**

**4.2.1** Upon completion of all work, the valves shall be tested for correct operation to the satisfaction of the Chief Engineer. These valves must be proven leak free when the system is operated.

#### **4.3 Certification**

**4.3.1** N/A

### **Part 5: Deliverables:**

#### **5.1 Drawings/Reports**

**5.1.1**

#### **5.2 Spares**

**5.2.1** N/A

#### **5.3 Training**

**5.3.1** N/A

#### **5.4 Manuals**

**5.4.1** N/A

## E-07 Fuel Oil, Lube Oil and Waste Tank Cleaning and Inspection

Spec item #: E-07	<b>SPECIFICATION</b>	TCMSB Field #: 3L005, 3L006, 3L015, 3L016, 3L019, 3L020
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### E-07 Fuel Oil, Lube Oil and Waste Tank Cleaning and Inspection

#### Part 1: Scope:

1.1 The intent of this item shall be to clean, inspect and pressure test the following tanks for TCMS survey.

#### Part 2: References:

##### 2.1 Guidance Drawings/Nameplate Data

TANK	LOCATION	CAPACITY m <sup>3</sup>	TCMS #
#3 Port Fuel	FR. 13-24	85.2	3L005
#3 Stbd Fuel	FR. 13-24	85.2	3L006
#8 Port Fuel	FR. 43-60	65.6	3L015
#8 Stbd Fuel	FR. 43-60	65.6	3L016
#10 Port Fuel	FR. 60-82	78.2	3L019
#10 Stbd Fuel	FR. 60-82	78.2	3L020

#### Part 3: Technical Description:

3.1.1. Ship's personnel shall pump/drain the tanks to suction level.

3.1.2. The contractor shall dispose of any remaining fuel or sludge ashore. Quote on removal of 1000 litres per tank; to be adjusted up or down as required by 1379. The total estimated amount of fuel removal is 9000 litres; this amount will be adjusted by 1379 action.

3.1.3. Tanks shall be certified gas free and safe for men to enter, by a certified chemist. One copy of each gas free certificate shall be posted outside of subject tank, near manhole, and one copy of each certificate shall be given to the Chief Engineer prior to men entering the tank. Each tank interior is then to be washed with high pressure water/degreaser mixture, and remnants disposed of. Tanks are then to be wiped dry.

3.1.4. The contractor shall prove the tanks are gas free "safe for personnel" to enter prior to commencing work in each tank. Copy of tank safe entry certificate to be given to Chief Engineer, copies posted at tank entrance (manhole) and also at ship's gangway. Contractor shall have rescue team on site as per FSM-Confined Space Entry Requirements for all inspections carried out. Contractor shall have unit cost per tank entry inspection required outside the SOW. The contractor shall provide each tank with a mechanical ventilation

## **E-07 Fuel Oil, Lube Oil and Waste Tank Cleaning and Inspection**

system vented to the outside of the ship. Good ventilation must be provided continuously and any blowers/extractors must ensure good air movement and solvent vapour removal from the lowest point in the tanks for a period as long as personnel have to enter tanks for job completion.

**3.1.5.** Tank internals are then to be inspected by the Chief Engineer and attending TCMS Surveyor.

**3.1.6.** Tank vent heads shall be removed (one per tank) to prepare for an air test using a manometer on each tank. Each tank shall then be air tested to the satisfaction of attending TCMS surveyor.

**3.1.7.** Upon completion each tank shall be drained and internals wiped dry. Owner's representative shall inspect each tank prior to final closing. Vent pipe valve bodies shall be replaced using new gaskets. Manhole covers and docking plugs shall be replaced as per original using new 1/4" Buna-N gaskets on manholes.

**3.1.8.** The contractor shall supply all material to perform the specified work.

### **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**

Each tank shall then be air tested to the satisfaction of attending TCMS surveyor

#### **4.3 Certification**

**4.3.1** The contractor shall obtain and provide documentation to the Chief Engineer all required technical certification as specified in the applicable rules and codes.

**4.3.2** Equipment and component inspection certificates including all test reports supporting the certifications shall be given to the Chief Engineer.

### **Part 5: Deliverables:**

#### **5.1 Drawings/Reports**

5.1.1 Equipment and component inspection certificates including all test reports supporting the certifications shall be given to the Chief Engineer.

#### **5.2 Spares**

**5.2.1** N/A

#### **5.3 Training**

**5.3.1** N/A

#### **5.4 Manuals**

**5.4.1** N/A

## E-08- Roust About Replacements

Item #: E-08	<b>SPECIFICATION</b>	TCMS Field #:
<b>E-08- Roust About Replacements</b>		

### Part 1: SCOPE:

- 1.1 To replace the listed scupper drains Roustabouts, and associated depleted piping with flanged fittings or other Transport Canada approved fittings.
- 1.2 The Roustabouts and piping to be replaced are as follows;
- 1.2.1 **Stbd Miranda Davit Drain line (located frame 59 – 66)**
- 2 Roustabouts with approx. 15 feet of 2" pipe to replace
  - 1- 1 ½" Roustabout.
- 1.2.2 **Stbd Winch Space drain line (located frame 51)**
- Four roustabouts with approx. 15 feet of 2" pipe to replace.
- 1.2.3 **Port Winch Space drain line (located frame 51)**
- 3 roustabouts and approx. 6 feet of 2" pipe
  - 5 roustabouts and approx. 25 feet of 2 ½" to replace.
- 1.2.4 **Hospital scupper and shower drain pipe (Located in fwd port e/r)**
- 2 - 2 ½ roustabouts.

### Part 2: REFERENCES:

#### 2.1 Drawings

2.1.1

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

## **E-08- Roust About Replacements**

### **3.1 Removal of existing Roustabouts:**

- 3.1.1 The adjacent spaces and equipment shall be protected with fire retardant cloth and fire-proof covering where applicable. A fire watch is to be maintained at all times during hot work.
- 3.1.2 The contractor shall remove the existing roustabouts and crop out the required depleted existing piping as directed by the Chief Engineer or his representative. The Contractor shall consult TCMS on the crop and weld procedure prior to commencing this work.
- 3.1.3 The work in Locations 1.2.1 to 1.2.3 are above the Main Engines at a height of approximately 25 feet. Access to the piping will require scaffolding. Contractor is responsible for the supply, erection and dismantling of said scaffolding.
- 3.1.4 Contractor to remove the old pipe from the vessel and dispose of in an approved manner. The removed Roustabouts shall be given to the Senior Engineer.

### **3.2 Flange Installations:**

- 3.2.1 The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer.
- 3.2.2 All cropped edges shall be ground clean.
- 3.2.3 New flanges shall be installed as directed by the Chief Engineer and with the approval of the attending TCMS Inspector. In certain areas where it is difficult to fit flanges in the place of the roustabouts substitution of an approved pipe union or coupling may be approved by the Chief Engineer and the attending TCMS inspector.
- 3.2.4 The contractor shall replace the adjacent depleted piping as directed by the Chief Engineer. The contractor shall quote per foot of piping replacement for 1379 adjustment purposes. To Quote 2 ½ inch and 2 inch piping (Schedule 40).
- 3.2.5 Upon completion of welding, all piping shall be subjected to a hose test for integrity and fitting to the satisfaction of the attending TCMS Inspector.
- 3.2.6 The complete area, new steel and heat effected steel is then to be coated with one complete coat of primer. This process is to ensure that all steel in the repair area is completely primed.

### **3.3 Interferences**

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

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Weld Inspection and Testing**

## **E-08- Roust About Replacements**

- 4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.
- 4.1.2 The steel work is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer. The completed steel work is to be visually inspected after welding is completed.
- 4.1.3 There is to be a 100% MPI testing completed on the welds by approved testing personnel.
- 4.1.4 This testing is to be carried out in the presence of the attending TCMS surveyor and owner's representative. All costs associated with the inspection to be included in the contractor's price for known steel work. The contractor is to be responsible to contact Transport Canada for all inspections.
- 4.1.5 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.
- 4.1.6 After acceptance of the test on the weld seams by the TCMS and owner's representatives, the area is to be inspected to ensure all debris has been removed.

### **4.2 Certification:**

- 4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## E-09 RWO OWS Installation

Item #: E-09	<b>SPECIFICATION</b>	TCMS Field #:
<b>E-09 RWO OWS Installation</b>		

### Part 1: Scope

- 1.1 The intent of this specification is to install and commission new CG supplied RWO Oily Water Separator.
- 1.2 This work shall be carried out in-conjunction with:

### Part 2: Reference

#### **Guidance Drawings/Nameplate data**

- 2.1.1 72-405 Capacity Plan
- 2.1.2 72-751 Bilge and Ballast Diagram
- 2.1.3 RWO Veolia Separating System Manual

#### **Field Service Representative**

- 2.1.4 Hermont Marine Inc  
Franz Seebacher  
fseebacher@hermont.com  
Office phone: 514-856-1212

8080 Rte Transcanadienne  
St-Laurent, Qc  
H4S 1M5

### 2.2 Standards

- 2.2.1 The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
- 2.2.2 Canadian Coast Guard Fleet Safety Manual (DFO 5737)
- 2.2.3 Coast Guard ISM Confined Space Entry (7.B.3)
- 2.2.4 Coast Guard ISM Hotwork Procedures (7.B.4)
- 2.2.5 Coast Guard ISM Fall Protection Procedures (7.B.2)
- 2.2.6 Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)
- 2.2.7 CWB CSA 47.1 Latest Revision
- 2.2.8 SSPC-SPT

### 2.3 Regulations

- 2.3.1 NA

### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION

## **E-09 RWO OWS Installation**

- 3.1 Contractor shall install new RWO OWS in the Lower Engine Room in location of the existing OWS footprint.
- 3.2 Contractor shall provide all ancillary services to effect repairs noted in the work scope for duration of the work. These include but are not limited to strip out, craneage, staging, cleaning, debris removal, lighting, ventilation, shore power etc.
- 3.3 Contractor shall complete CG Hotwork permits and notify Chief Engineer prior to start of work as per Coast Guard Safety Management System. Any cleaning and protection of affected spaces required by the Contractor to complete hotwork shall be their responsibility.
- 3.4 Contractor shall be responsible for identification of all interference items and shall take care to protect adjacent spaces/equipment from any debris generated in the course of completing work scope.
- 3.5 Contractor shall remove the existing OWS, remove from the vessel and dispose of same in an approved manner.
- 3.6 Contractor to crop 6 inches from the height of the existing thwart ship support channels including the existing steel mount plate atop of the supports.
- 3.7 Contractor shall powertool clean all damaged coating, bare and rusted areas to bare metal SSPC-SP-3, Power Tool Clean Standard. Intent is to recoat area prior to installation of new OWS. Area shall encompass aft of Oily Bilge pump seat to existing OWS / Bilge Pump pipe manifold(s) including existing OWS seat. For bidding purposes Contractor shall allow for 32 square feet. Contractor shall apply two coats of Amercoat 5105 – Alkyd Primer (Red Oxide) or equivalent at 2-3 mils DFT per coat and two complete top coats of Amercoat 5450 Alkyd Marine Enamel (Grey) or equivalent at 2 mils DFT per coat as per Manufacturer's instructions.
- 3.8 Contractor shall supply and install a new ½” steel plate upon completion of coating applications atop of the 2 existing thwart ship support channels. The new plate shall be wire wheeled and coated as per above paint scheme. The plate shall be sized to match the RWO OWS footprint and shall be welded in-place atop of the 2 support channels by stitch weld. The OWS shall be stitch welded in place atop of the new ½” plate. Any disturbed coatings shall be repaired.
- 3.9 Access for transport of OWS onboard vessel is through soft patch in Upper Main Engine Room. OWS shall be rigged into position. All interference items would be the Contractor's

## **E-09 RWO OWS Installation**

responsibility to remove and replace upon completion. Contractor shall be responsible for all rigging equipment including straps, chainfalls, cranes, etc. RWO weight is approx. 290 kg.

- 3.10 Dimensions of RWO OWS can be seen on attachment 'RWO OWS Dimensions'.
- 3.11 Contractor shall mount OWS with gravity / coalescence Stage 1 located inboard and the downstream Polisher Stage fitted outboard in a thwart ship orientation. The main control panel is mounted on the Gravity / Coalescence Stage 1 on the inboard side.
- 3.12 Contractor shall make connections as per drawing 'RWO OWS Layout and Connections' showing location / size of connections required. Contractor is responsible for supplying fittings / pipe to connect / install new RWO OWS.
- 3.13 Contractor shall have a material allowance of \$5,000 for all fittings, pipe / tube, gauges and valves required for connecting new OWS to existing piping. Contractor shall be responsible for all labor costs. Actual amount shall be adjusted up or down upon proof of invoice.
- 3.14 New FW and compressed air lines shall be fitted from existing connection to OWS.
- 3.15 Contractor shall fit a new FW line to the OWS for backwashing of the coalescer stage and flushing water for 15 ppm alarm device. Contractor shall supply and fit new bronze ball valve for isolation from tee connection and check valve to prevent backflow. A pressure regulating valve shall be supplied and installed to set maximum pressure to 1-1.5 bar. A pressure gauge shall be fitted downstream to monitor actual pressure. Contractor shall make new FW connections to OWS as required.
- 3.16 Contractor shall fit a new 8mm tube compressed air supply line to OWS from existing compressed air line. Contractor shall supply pressure regulating valve to set pressure 4-8 bar and fit pressure gauge downstream to monitor actual pressure.
- 3.17 New pipe sections shall be seamless ASTM A53 GR A, SCH 40 galvanized. New flanges shall be 150 lb flanges. New pipe sections shall be assembled to be dismountable to allow for maintenance and removals as required. They shall be adequately bracketed / supported. All connections shall be by socket weld.
- 3.18 Contractor shall supply new suction inlet piping from inlet manifold to OWS suction.
- 3.19 Contractor shall connect OWS discharge from polishing filter to the existing overboard / discharge piping including the installation of new CG supplied solenoid operated valves for OB discharge and recirc back to Dirty Oil Tank.

## E-09 RWO OWS Installation

- 3.20 Contractor shall supply and fit new drain lines from OWS and polishing filter to OWS tank existing ¾" discharge in tank-top on discharge manifold. Contractor shall supply and install new isolation ball valves on each drain connections. Some minor discharge piping adjustments may be necessary due to the change in the height of the ship support channels.
- 3.21 Contractor shall fit new sample line from overboard discharge piping to oil sampling meter.
- 3.22 Contractor shall connect existing 440 V/60Hz/3Ph power supply to RWO OWS in through bottom of control box.
- 3.23 Contractor shall arrange Hermont Marine Inc FSR for commissioning / training of new OWS. Contractor shall have personnel on site during scheduled commissioning to inspect for leaks and confirm workmanship. Contractor will be responsible to break overboard connection to bilge to allow for dockside run-ups. Upon completion of commissioning / training Contractor shall re-connect overboard discharge.



Existing OWS

## E-09 RWO OWS Installation



Piping to be modified.



Support Channels

### 3.2 Location

#### 3.2.1 Lower Engine Rm

### 3.3 Interferences

3.3.1 The Contractor shall be responsible for identification of interference items, their temporary removal, storage and refitting to the vessel in the scope of completing this specification.

## Part 4: PROOF OF PERFORMANCE

## **E-09 RWO OWS Installation**

### **4.1 Inspection, Testing & Certification**

- 4.1.1. All work shall be completed to the satisfaction of the Chief Engineer within the scope of the specification.
- 4.1.2. Contractor shall arrange FSR Hermont Marine Inc for commissioning of the new OWS and training. Note: Commissioning / Training costs by Hermont were included with supply of new RWO so Contractor shall not include this in their bid.

### **Part 5: Deliverables**

#### **Reports, Drawings, Manuals, Spares & Training**

- 5.1.1. NA

## E-10 Anchor Windlass Inspection and Survey

Spec item #: E-10	<b>SPECIFICATION</b>	TCMSB Field #:
<b>E-10 Anchor Windlass Inspection and Survey</b>		

### Part 1: SCOPE:

- 1.1 The intent of this item shall be to open the anchor for inspection by TCMS Inspector.
- 1.2 The Contractor shall include in the bid an allowance of \$20,000.00 for Brattvaag manufacturer's field technician services (Rolls Royce FSR) expenses; to be adjusted up or down by PWGS 1379 action on proof of invoice. The manufacturer's field technician will supervise the work.

This work shall be carried out in Conjunction with the following:

### **HD-10 Anchors and Chains, Chain Locker Inspection**

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Anchor windlass: Hydraulik Brattvaag Type: B12-40
- 2.1.2 Reference Drawing in Brattvaag Manual DRG. # 27237, 23927 & 111-042(hydraulic motor) Ref .Drwg # 23927

#### 2.2 Standards

- 2.2.1 Canadian Coast Guard Fleet Safety Manual (DFO 5737)

#### 2.3 Regulations

- 2.3.1 CSA Marine Machinery Regulations.

#### 2.4 Owner Furnished Equipment

- 2.4.1 Owner to supply the Bearing oil
- 2.4.2 The contractor shall supply all other materials, Parts, equipment, Tools and labor required to perform the specified work.

### Part 3: TECHNICAL DESCRIPTION:

#### 3.1 General

The Contractor shall supply all equipment, staging, chain falls, crantage, 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, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2). Proof of

## **E-10 Anchor Windlass Inspection and Survey**

certification must be provided to both the PWGSC Inspection Authority and the DFO/CCG Technical Authority prior to commencement of steel work. Prior to any Hot work taking place, the Contractor shall ensure the area of work is gas freed suitable for hot work and the appropriate gas free certificates issued as per the requirements of CCG Fleet Safety Manual.

### **Pre-Disassembly**

- 3.1.1.** The anchors and chain will already be removed as per HD-10.
- 3.1.2.** Drain and isolate hydraulic power pack oil system in preparation for motor removal.

### **Disassembly**

- 3.2.1.** The contractor shall perform the following work. Remove the port and stbd anchor chains from the anchor windlass chain lifters (chain wheels). Remove the windlass guards. Disassemble the band brake assemblies including all linkages. Measure and record the gear backlashes. Remove the cable lifters/brake drums to allow access to the cable lifter shaft bearings. Open up the four cable lifter bearings and two outer rotor shaft bearings. Disassemble the warping drum clutch assemblies (claw couplings) including the operating handles and linkages. The warping drums shall be removed for the replacement of the bushings.
- 3.2.2.** The Contractor shall have a qualified FSR open up the Hydraulic motor and inspect the internals. The vanes and pins are to be measured for wear.

### **Cleaning and Inspection**

**The contractor shall perform the following work in this section.**

- 3.3.1.** Clean gear train guards of all old grease.
- 3.3.2.** Remove and renew band brake material with new owner supplied material. Clean rust and scale from band brake surface. Clean and inspect the band brake linkage assemblies for wear and/or defects.
- 3.3.3.** Clean and inspect for defects the warping drum clutch assemblies (claw couplings) including the operating handles and linkages.
- 3.3.4.** Clean and inspect the six main bearings. Clean and inspect the bearing bores. Measure the internal diameter of the bearing bores checking for out of round, and record. Replace the shafts with owner supplied new.
- 3.3.5.** Clean and examine for defects the warping drum bores and shaft areas in way of the warping drums.
- 3.3.6.** Clean and examine the cable lifters and shafts for wear and defects.
- 3.3.7.** Clean all windlass gearing and inspect for wear pattern and defects. Prove all grease passages are clear and replace all grease fittings with new contractor supply.
- 3.3.8.** The contractor shall Abrasive Blast all external surfaces to SSPC-SP-10 Near White Metal to achieve an anchor profile of 2.0 to 3.0 mils. The Contractor shall paint the

## **E-10 Anchor Windlass Inspection and Survey**

Windlass with 1 coat marine primer at 2-3 mils DFT. The contractor shall apply 2 coats of Epoxy coating at 3.5 mils to achieve a DFT of 3.0 mils.

- 3.3.9.** Following all coating and cleaning, the windlass and assemblies shall be inspected by the Chief Engineer and/or Chief Officer and attending TCMSB Surveyor.
- 3.3.10.** If wear tolerances are exceeded in the Hydraulic Motor, disconnect and remove the motor from the Windlass and vessel, transport to the FSRs shop for overhaul using owner supplied parts.
- 3.3.11.** The contractor is responsible for arranging for the attendance of the TCMSB Surveyor.

### **Re-Assembly**

- 3.4.1.** Reinstall all removals and reassemble the windlass assembly in good order. All fasteners shall be torqued as per manufacturer's recommendations. Chapter 3 Maintenance Manual.
- 3.4.2.** Thoroughly coat all gear teeth with new owner supplied water resistant open gear grease. Grease the brake linkage assemblies during re-assembly. Coat all brake linkage assembly fasteners with anti-seizing compound.
- 3.4.3.** Contractor to clean Power-pack Hydraulic tank internals and refill with Contractor supplied Hydrex AW 68. This oil is to be filtered before entering tank. The Chief Engineer is to inspect the tank internals before the tank is refilled.
- 3.4.4.** Unit to be test run without fitting of anchor chains to prove free operation under no load. Clutches and capstans are to be proven free running. The anchor chains and guards and any other remaining removals are then to be re-installed.

### **Post-Assembly**

- 3.5.1.** Adjust and test brake band assemblies as directed by the Chief Officer. The contractor shall operate the windlass for testing purposes to the satisfaction of the Chief Engineer, Brattvaag FSR and attending TCMSB Surveyor in attendance.
- 3.5.2.** The Contractor shall remove all lifting equipment, staging, chain falls, crantage, slings and shackles necessary to perform the work.
- 3.5.3.** The contractor is responsible for arranging for the attendance of the TCMSB Surveyor.

### **Acceptance**

- 3.6.1.** Following completion of all work and testing to the satisfaction of the Chief Engineer and/or Chief Officer, attending TCMS Surveyor.
- 3.6.2.** Receipt by the owner of a typewritten copy off all measurements.

## **E-10 Anchor Windlass Inspection and Survey**

**3.6.3.** The Contractor shall remove all lifting equipment, staging, chain falls, craneage, slings and shackles necessary to perform the work.

### **3.7 Location**

3.7.1 Fore Deck

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Inspection**

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

### **4.2 Testing**

4.2.1 Four (4) hour Alongside, 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 record readings and copies shall be given to the Chief Engineer.

### **5.2 Spares**

5.2.1 N/A

### **5.3 Training**

5.3.1 N/A

### **5.4 Manuals**

5.4.1 N/A

## E-11 Miscellaneous Piping Replacements

Spec item #: E-11	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>E-11 Miscellaneous Piping Replacements</b>		

### Part 1: Scope:

- 1.1 The intent of this specification shall be to have all the listed piping replaced with new. All renewed piping will be hot dipped galvanized.
- 1.2 The Contractor shall remove, fabricate and install new piping for the following:
  - 1.2.1. Grey water vent pipe.
  - 1.2.2. The CPP Overboard sea water discharge pipe.
  - 1.2.3. Sewage vent pipe.
  - 1.2.4. Port & Starboard Settling Tank overflow sight glasses.
  - 1.2.5. Vent Head Replacements
  - 1.2.6. Port & Stb Crane Handrail/Ladders.
  - 1.2.7. Scupper Drain line.
  - 1.2.8. HVAC Cooling Lines.
  - 1.2.9. #16 Port FW Tank Sounding Plug.
  - 1.2.10. Suction Valve and line for #17 FW Tank.

### Part 2: REFERENCES:

- 2.1 **Guidance Drawings/Nameplate Data: N/A**

#### Related specifications

HD-9 Freshwater Tank Cleaning & Maintenance.

HD-11 Sideshell Renewals.

H-18 Exterior Door Replacements.

E-13 HVAC Unit Replacements.

L-02 Kongsberg – Tank Level Transducers.

#### 2.2 Standards:

- 2.2.1 Ships ISM Hot-Work, and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log and hot work sheets are to be delivered to the Chief Engineer when completed.

## E-11 Miscellaneous Piping Replacements

### 2.3 Regulations

CSA Fire regulations

### 2.4 Owner Furnished Equipment:

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

## Part 3: Technical Description:

### General 3.1

- 3.1.1 The systems associated with these particular pipes shall be locked out and tagged out in consultation with the Chief Engineer.
- 3.1.2 The contractor shall remove and renew the following pipes, complete with flanges, bulk head fittings and Roustabouts. The renewed pipes shall be hot dipped galvanized and then reinstalled using new stainless steel bolts and nuts. The gaskets shall be replaced with contractor supplied as fitted gaskets. All weld shall be TCMS approved for its location and purpose.
- 3.1.2.1 **Grey water discharge pipe Port side.** This line consists of two sections, one 6 foot section of 2 ½ inch pipe flanged on each end and one 18 inch section of 2 ½ inch pipe flanged on each end. (Schedule 40).

**Location:** This pipe is at frames 73 to 74 on the port side. These sections run from the port ship side check valve to a globe valve. (Note: This is under the ship's water line).

Please see arrows to each section of pipe. (Pipe runs behind exhaust pipe for emergency air compressor).

## E-11 Miscellaneous Piping Replacements



**3.1.2.2 The CPP Overboard sea water discharge pipe.** This line consists of Schedule 80, 4 inch diameter galvanized pipe, approximately 12 inches in length. The pipe is flange on one side and is welded directly into the ship sideshell. There is an approximately 4 inch long one inch pipe welded into the side of the pipe on one side and flange on the other side. (this is flange to an air supply de-icing valve. The pipe and weld to the ships sideshell shall be TCMS approved. The contractor shall arrange for a TCMS inspector to inspect and approve the weld procedure prior to the pipe installation and to inspect the pipe after installation. All welds shall have 100percent NDT.

**Location:** Port side at Frame 50. (Down through port escape hatch 5 frames forward of ladder)

**E-11 Miscellaneous Piping Replacements**



**3.1.2.3 The Sewage treatment tank vent pipe.**

## E-11 Miscellaneous Piping Replacements



**Sewage vent pipe extending from roust about to port sewage Compartment bulkhead**



**Sewage vent pipe in port engine room extending from roust about to port sewage compartment bulkhead**

**Sewage vent pipe.** This line is a 4 inch Schedule 40 pipe. There is 67 ¼ inches in the sewage compartment from the welded bulk head fitting to the Roust About. The pipe is 39 ½ inches long from the bulk head welded fitting to the next steel frame fitting. The pipe then goes from this frame fitting into a 90 degree to a Roust About. This section is 17 inches in total.

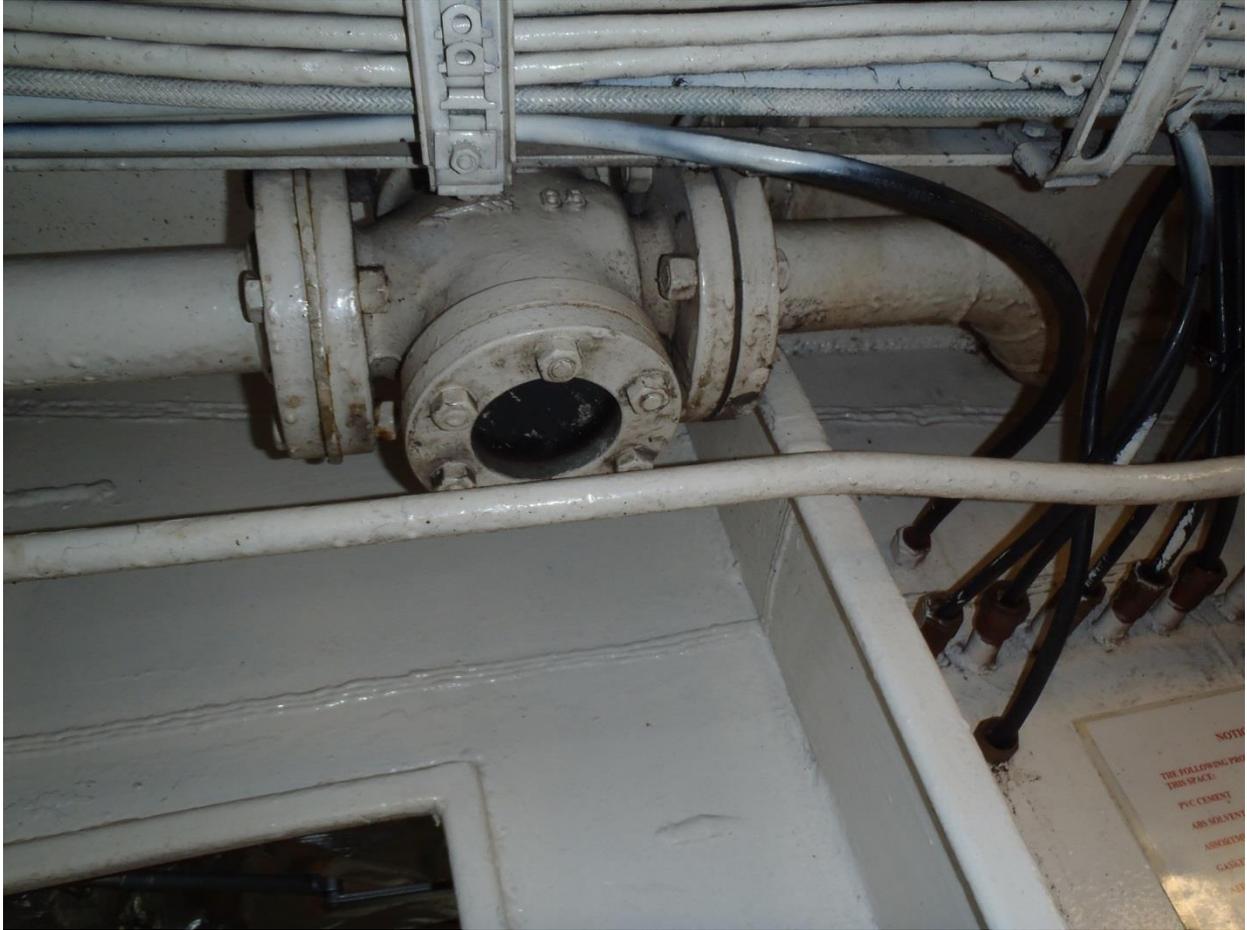
## E-11 Miscellaneous Piping Replacements

**3.1.2.4 Settling Tank overflow sight glasses.** There are currently sight glasses mounted horizontally in both overflow lines on Port and Starboard Settling Tanks. These sight glasses are to be relocated to a vertical position in the line as directed by the Chief Engineer. Both lines are schedule 40, 2.5 inch pipe. The pipe sections involved are welded to a deck coupling at one end, roust-a-bout at the other and are approximately 6 feet in length. The present sight glass locations are to be replaced with a fabricated section, flanged at both ends, approximately 6 inches in length. The relocation of the sight glasses will involve installing bolted flanges in the pipe section to accept the sight glasses. Each of the completed sections are to be installed using new bolts/nuts and Roust-a-bouts.



**Relocation of sight glass to pipe section**

## E-11 Miscellaneous Piping Replacements



**Sightglass to be removed and flanged section installed.**

## E-11 Miscellaneous Piping Replacements

**3.1.2.5 Vent Head Replacements.** Contractor shall replace existing 3 vent pipes and heads on Foam Room Supply, Exhaust and Gear Oil Tank with new Owner-supplied Wintab Vent Heads. Contractor to crop existing pipes at the deck penetration and install new piping, flanged, to match bolt pattern of new vent heads. The Foam Room vents consist of 8 inch, schedule 80 vent pipe protruding inches out of the Deck. The Gear Oil Tank Vent consists of 3 inch schedule 80 pipe protruding inches out of the Deck.



**3.1.2.6 Hand Rail/Ladders for Stb & Port Crane.** Contractor to replace 2 sections of lower handrail in the Stb/ Port Crane Operators baskets and upper ladders to each basket. Each rail consists of 1 ½" inch square tubing and is 22 inches in length. The Contractor shall install a hose support as existing on each rail section.



## E-11 Miscellaneous Piping Replacements

Each upper access Ladder consists of 1 ½” steel Flat bar side rails and ¾” square steel stock for rungs. Each ladder is 60” length and 16” width.

**3.1.2.7 Scupper Drain Line.** Contractor to crop and replace 4 ft section of 1 ¼” scupper line adjacent to Boat Deck aft Door. This line runs from the deck above inside the bulkhead below with an exit to the external Boat deck. The interference bulkhead paneling and insulation will be removed and re-installed as part of the Exterior Door Replacements.



Scupper outlet from interior bulkhead on Exterior Deck

**3.1.2.8 HVAC Cooling Lines.** Contractor to replace sections of HVAC supply and discharge lines from deck penetrations in HVAC Room to bulkhead penetration into Crews Washroom. These lines are 2” schedule 40 pipe, each approximately 30 feet in length, flanged at both ends. These 2 pipes are located approximately 15 feet up into the deckhead above the Hospital Deck. Scaffolding will be needed to access the work area.

**3.1.2.9 #16 Port FW Tank Sounding Plug.** Contractor shall crop and replace top section of sounding piping and install new Contractor supplied sounding plug and receiver as per existing.

## E-11 Miscellaneous Piping Replacements



- 3.1.2.10 Fresh Water Suction valve and pipe.** Contractor shall replace existing 1 ½” globe screw down valve at #17 C FW tank penetration with Contractor supplied new. Contractor shall crop and replace 6 foot section of 1 ½” suction line inside the tank.



- 3.2 Location**
- 3.2.1.** Grey water vent pipe. (Forward engine room port Frame 73 to 74)
  - 3.2.2.** The CPP Overboard sea water discharge pipe. (Port ship side frame 50)
  - 3.2.3.** Port engine room forward into sewage compartment. (Frame 74)
  - 3.2.4.** Port and Starboard sides, Engine Room

## **E-11 Miscellaneous Piping Replacements**

- 3.2.5.** Port Side Tow Deck.
- 3.2.6.** Starboard and Port Crane Operator Platforms.
- 3.2.7.** Boat Deck, Stb side Aft Doorway.
- 3.2.8.** Hospital Deckhead area.
- 3.2.9.** Bow Thruster Compartment.
- 3.2.10.** Forward Port side Focsle Deck

### **3.3 Interferences**

The Contractor is responsible for identification of interference items, their temporary removal, storage, and refitting to the 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 attending TCMS Inspector.

### **4.2 Testing**

- 4.2.1** The systems are to be operationally tested in consultation with the Chief Engineer.
- 4.2.2** Designated Welds to have MPI completed as directed by attending TCMS Inspector.

### **4.3 Certification**

- 4.3.1** N/A

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

- 5.1.1** All reports 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

### **5.4 Manuals**

- 5.4.1** N/A

## E-12 Refrigeration Plant Replacement

Spec item #: E-12	<b>SPECIFICATION</b>	TCMSB Field #:
<b>E-12 Refrigeration Plant Replacement</b>		

### Part 1: SCOPE:

1.1 The intent of this specification shall be to replace the two existing sea water cooled Refrigeration skid units -Dunham Bush of Canada and Stork Werkspoor Canada with new Owner supplied seawater cooled EP-HVAC condensing unit for R407 and locate in the same compartment.

### Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

EP-DWG-5787-EVA-001-0

EP-DWG-5787-HGA-001-0

EP-DWG-5787-PID-001-0

EP-DWG-5787-WCCU-001-0

2.1 Standards

- 

2.2 Regulations

- CANADA SHIPPING ACT- Marine Machinery Regulations

2.3 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

3.1 Existing Configuration

3.1.1 The vessel is currently fitted with two (2) Model Refrigeration Systems -Dunham Bush of Canada and Stork Werkspoor Canada. The compressors are 440v and fed from 15 amp breaker.

3.1.2 The refrigeration system is alarmed, monitored and controlled for low oil level, high temperature and high/low pressure start/stop.

3.1.3 Currently one refrigeration skid services the vegetable and cold room while the second services the cool room. The intention is to replace with a single refrigeration skid.

3.2 Replacement / Installation

## **E-12 Refrigeration Plant Replacement**

- 3.2.1 The Contractor shall recover all refrigerant from the existing refrigeration system prior to undertaking any removals. The 4 systems are currently charged with a total of 28 kg of MO99 refrigerant.
- 3.2.2 The Contractor shall ensure that all suction and discharge valves for the sea water cooling pumps are closed and secured using the established lock-out / tagout procedure.
- 3.2.3 The Contractor shall remove both refrigeration skid units complete with the refrigeration control panels. The Contractor shall remove the evaporators and controls from the Vegetable Room, Cold Room and Cool Room.
- 3.2.4 The Contractor shall be responsible to land the refrigeration skids, evaporators, and associated equipment on the dock beside the ship.
- 3.2.5 The Contractor shall remove the sea water cooling lines back to the isolation valves for each system on both the supply and discharge piping. The existing sea water piping will be reused to this point and necessary modifications will be made upon installation of the plant from this connection. The contractor shall allow for \$1000.00 for replacement copper pipe and fittings to be adjusted up or down by proof of invoice.
- 3.2.6 The Contractor shall remove the refrigeration suction and discharge lines for each system back to the bulkhead connection / penetrations. The existing refrigerant piping from the existing evaporators shall be reused to this point and necessary modifications will be made upon installation of the new unit from a common connection. The contractor shall allow for \$2000.00 for replacement copper tubing and fittings to be adjusted up or down by proof of invoice.
- 3.2.7 The Contractor shall cut access hole in ships side shell for the removal of existing units and installation of the new owner supplied unit as per Poseidon Marine Consultant's SOW annex B. Position orientation of the new unit shall be determined by the Chief Engineer. The contractor shall follow the Poseidon SOW for re-installation of the side shell plating and frames. All disturbed insulation and wire mess shall be replaced with new.
- 3.2.8 The contractor shall allow for \$2000.00 for fabrication of new bedding. The contractor shall submit bedding drawing to Chief Engineer for approval prior to fabricating. The Contractor shall fabricate a suitable mounting arrangement to have the skid fully secured to it.
- 3.2.9 The Contractor shall remount the control panel to the condensing unit frame of the refrigeration plant. All existing cableways shall be utilized for the running of all supply and control wiring as per the original installation. The contractor shall allow \$5000.00 of additional cable installation to be adjusted up or down by proof of invoice. The contractor shall allow 80 hours for Electrical contractor to make changes to original wiring.

## **E-12 Refrigeration Plant Replacement**

3.2.10 The contractor shall remove the three existing evaporators along with their piping and controls back to within 6 inches of their respective bulkhead penetrations. The contractor shall utilize existing brackets for mounting the new evaporators in their respective locations.

### 3.3 Electrical requirements

3.3.1 Main power is supplied through the Amp 460 v breaker, circuit on Panel D-4.  
Existing defrost circuit is 120 v located at L7

### 3.4 Interferences

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

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

### 4.2 Testing

4.2.1 The contractor shall provide services of EP HVAC Technician perform function tests as per the manufacturer's recommendations for commissioning. The system tests will demonstrate:

- 4.2.1.1 Operation of both units
- 4.2.1.2 Operation of alarm and safety devices
- 4.2.1.3 Operation of defrost on evaporators

4.2.2 Each unit will be operated for a minimum of 8 hours. The following readings will be taken:

- 4.2.2.1 Ambient cooling water temperature
- 4.2.2.2 Time to pull rooms down to operating temperature
- 4.2.2.3 Compressor discharge/suction pressure
- 4.2.2.4 Compressor motor current
- 4.2.2.5 Unit cooler and defrost heater currents

4.2.3 All alarm and shut down features of the compressors, auto start and stop, shall be proven operational.

4.2.4 The performance of the Refrigeration Plant shall be ascertained to coincide with the manufacturer's data.

### 4.3 Certification

All alarm and shut down features shall be witnessed by Chief Engineer and T A.

## **Part 5: DELIVERABLES:**

### 5.1 Drawings/Reports

5.1.1 The Refrigeration system shall be supplied with three (3) type written copies of all readings taken during the commissioning *I* testing of the new system.

## **E-12 Refrigeration Plant Replacement**

### 5.2 Spares

N/A

### 5.3 Training

The contractor shall provide 8 hours of training in the controls and operating features of the New Refrigeration Plant by EP HVAC Technician.

### 5.4 Manuals

N/A

## E-13 HVAC Units Replacement

Spec item #: E-13	<b>SPECIFICATION</b>	TCMSB Field #:
<b>E-13 HVAC Units Replacement</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification shall be to replace the two existing sea water cooled HVAC skid units - Berg Chiller Model MCR-20-C with new Owner supplied seawater cooled Bronswerk HVAC unit for R407 and locate in the same compartment.

### Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

Bronswerk HVAC 4309-1 Installation manual

HVAC Dwgs 4309-030-001 rev C

Nortec Humidifer Installation manual

2.2 Standards

2.2.1 Canadian Coast Guard Fleet Safety Manual (DFO 5737)

2.2.2 Ships ISM Lockout, Hot work, permits are required to be completed for commencement of work.

2.3 Regulations

- CANADA SHIPPING ACT- Marine Machinery Regulations

2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

3.1 Existing Configuration

**3.1.1** The vessel is currently fitted with two (2) HVAC Systems - Berg Chiller Model MCR-20-C. The HVAC Units are 440v and fed from 2- 70 amp breakers located in the HVAC Room.

**3.1.2** There is currently 1 humidifier fitted to the forward unit supplied power from 1- 15 amp breaker located in the HVAC space. This unit shall be replaced with A New owner supplied Nortec Unit. A new owner supplied Nortec Unit will also be incorporated into the aft HVAC System.

3.2 Replacement / Installation

## **E-13 HVAC Units Replacement**

- 3.2.1 The Contractor shall recover all refrigerant from the existing HVAC systems prior to undertaking any removals. The 2 systems are currently charged with a total of 18.5 kg of MO99 refrigerant in each AC Unit.
- 3.2.2 The Contractor shall remove both HVAC skid units complete with their respective control panels.
- 3.2.3 The Contractor shall be responsible to land the HVAC skids and control panel along with associated equipment into the opening of the HVAC Room (Port side Boat Deck) made available with Steel Remediation for H-21.
- 3.2.4 The Contractor shall remove the sea water cooling lines back to the isolation valves for each system on both the supply and discharge piping. The existing sea water piping will be reused to this point and necessary modifications will be made upon installation of the plant from this connection. The contractor shall allow for \$1000.00 for replacement copper pipe and fittings to be adjusted up or down by proof of invoice.
- 3.2.5 The Contractor shall remove the refrigeration suction and discharge lines for each system back to the bulkhead connection / penetrations. The existing refrigerant piping from the existing evaporators shall be reused to this point and necessary modifications will be made upon installation of the new unit from a common connection. The contractor shall allow for \$2000.00 for replacement copper tubing and fittings to be adjusted up or down by proof of invoice.
- 3.2.6 Positioning orientation of the new unit shall be determined by the Chief Engineer.
- 3.2.7 The contractor shall allow for \$2000.00 for fabrication of new bedding. The contractor shall submit bedding drawing to Chief Engineer for approval prior to fabricating. The Contractor shall fabricate a suitable mounting arrangement to have the skid fully secured to it.
- 3.2.8 The contractor shall install the new HVAC Skids in accordance with Bronswerk HVAC 4309-1 Installation manual.
- 3.2.9 The contractor shall disconnect and remove the old control panels from the ship.
- 3.2.10 The Contractor shall mount the new control panels in the space as directed by the Chief Engineer. All existing cableways shall be utilized for the running of all supply and control wiring as per the original installation. The contractor shall allow \$5000.00 of additional cable installation to be adjusted up or down by proof of invoice. The contractor shall allow 80 hours for Electrical contractor to make changes to original wiring. Electrical hours to be adjusted up or down via 1379.
- 3.2.11 The contractor shall allow provide the services of certified sheet metal facility to connect the existing duct work into the HVAC units. The contractor shall allow for \$5000 for changes to the existing ductwork to be adjusted up or down by 1379.

## **E-13 HVAC Units Replacement**

3.2.12 The contractor shall arrange for Bronswerk Marine Service Engineer to finalize all terminal connections and commission the new units.

### **3.3 Electrical requirements**

3.3.1 Main power is supplied through the 440v and fed from 2- 70 amp breakers located in the HVAC Room.

3.3.2 There is currently 1 humidifier fitted to the forward unit supplied power from 1- 15 amp breaker located in the HVAC space. A spare 15 amp breaker is located in the space.

### **3.4 Interferences**

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**

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

### **4.2 Testing**

4.2.1 The contractor shall provide services of Bronswerk Technician perform function tests as per the manufacturer's recommendations for commissioning. The cost of commissioning was built into the purchase contract and does not require an allowance. The system tests will demonstrate:

4.1.7.1 Operation of both units

4.1.7.2 Operation of alarm and safety devices

4.2.2 Each unit will be operated for a minimum of 8 hours. The following readings will be taken:

4.2.2.1 Ambient cooling water temperature

4.2.2.2 Compressor discharge/suction pressure

4.2.2.3 Compressor motor current

4.2.3 All alarm and shut down features of the compressors, auto start and stop, shall be proven operational.

4.2.4 The performance of the HVAC Units shall be ascertained to coincide with the manufacturer's data.

### **4.3 Certification**

All alarm and shut down features shall be witnessed by Chief Engineer and T A.

## **Part 5: DELIVERABLES:**

5.1 Drawings/Reports

## **E-13 HVAC Units Replacement**

5.1.1 The HVAC Units shall be supplied with three (3) type written copies of all readings taken during the commissioning *I* testing of the new system.

## E-14 Wartsila SI Main Engine Idler Pin Repairs

Spec item #: E-14	<b>SPECIFICATION</b>	TCMSB Field #:
<b>E-14 Wartsila SI Main Engine Idler Pin Repairs</b>		

### Part 1: Scope:

- 1.1 The intent of this item shall be to assist Wartsila with carrying out repairs to the SI Main Engine Idler Pin oil leak.
- 1.2 The Contractor shall arrange for Wartsila Canada Senior Service Engineers (two Engineers) to carry out work outlined below in order to rectify oil leakage at the SI Main Engine Idler Pin.
- 1.3 The Contractor shall make an allowance of \$80,000.00 for these services. The final amount shall be adjusted up or down by 1379 action. The final costs will be based on all sub-contractor's invoicing.
- 1.4 The contractor shall provide 1 millwright for the 18 days required to assist Wartsila with the work outlined. The 18 days will be adjusted up or down by 1379. (This may be more or less than 18 day).

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

##### 2.1.1 Clutch data:

Lohmann+Stolterfoht

Type: Pneumaflex KA

Model: KAA 280

Mass: 1180 KG

All fasteners and piping are metric.

##### 2.1.2 Diesel Engine: Duetz, Model SBV16M628

#### 2.2 Standards

2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection Lockout Procedures. The contractor will be responsible for completion of the lockout/tagout log sheets. The contractor is to demonstrate how the lockout/tagout procedure meets the requirements before work begins. For audit purposes the completed lockout/tagout log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

##### 2.3.1 N/A

#### 2.4 Owner Furnished Equipment

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

## **E-14 Wartsila SI Main Engine Idler Pin Repairs**

### **Part 3: Technical Description:**

#### **3.1 General**

- 3.1.1 The Contractor shall arrange for Wartsila Canada Senior Service Engineers (two Engineers) to carry out work outlined below in order to rectify oil leakage at the SI Main Engine Idler Pin.
- 3.1.2 The contractor shall remove the SI Main Engine Clutch and all its associated guard and air lines.
  - 3.1.2.1 The Contractor shall supply all equipment, staging, chain falls, crange, 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, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place by CWB-certified welders certified to welding Std. W47.1, Div. 1 and 2). Proof of certification must be provided to the Chief Engineer prior to commencement of steel work. Prior to any hot work taking place the Contractor shall ensure the area of work is gas freed suitable for hot work and the appropriate gas free certificates issued and placed as per the requirements of CCG Fleet Safety Manual.
  - 3.1.2.2 The Contractor shall isolate and lockout both main engine associated with this clutch, lockout are to be entered into the ships lockout record book and lockouts shall be removed and entered into lockout book after completion of repairs.
  - 3.1.2.3 The contractor shall remove the clutch guard surrounding the clutch as well as any necessary piping, wiring, etc to facilitate the removal of the clutch assembly.
  - 3.1.2.4 The contractor shall measure and record the clutch drum travel in the ahead and astern positions as per the manufacturers' specifications.
  - 3.1.2.5 Copies of the above readings shall be given to the Chief Engineer prior to continuing removal of the clutch.
  - 3.1.2.6 The contractor shall ensure that all faces of the associated flanges and spacer plates are properly "proof" marked for subsequent re-assembly and correct orientation.
  - 3.1.2.7 Remove the clutch to an area suitable supported in the machinery space or the contractor's facility.
- 3.1.3 The contractor shall provide 1 millwright for the 18 days required and assist Wartsila with the work outlined. To be quoted on a daily rate for 1379 adjustment purposes.
  - 3.1.3.1 All timing gear covers removed.

## **E-14 Wartsila SI Main Engine Idler Pin Repairs**

3.1.3.2 Remove the idler pin and gear assembly for the leak in question.

3.1.3.3 If the pin and its housing bore are not worn out of manufacturer's specification then the pin and gear can be installed with new o-seal. If the bushing in the gear is worn beyond spec. it will need to be removed and replaced with new.

3.1.4 The contractor shall re-install the SI Main Engine Clutch and all its associated guard and air lines.

3.1.4.1 The contractor shall transport the clutch assembly back to the ship if moved ashore and re-install it in good order ensuring correct orientation of associated flanges and spacer rings using the proof marks. All proof mark locations shall be verified. All fasteners shall be properly torqued.

3.1.4.2 The contractor shall advise the Chief Engineer when the clutch is ready to be tested .

3.1.4.3 The ship's crew will manually operate the clutch to check for correct operation and air leaks after installation with the contractor's personnel in attendance.

3.1.4.4 The contractor shall record the clutch travel readings and present them to the Chief Engineer at this time.

3.1.4.5 The contractor shall replace all guards, disturbed piping, wiring, and other removals in good order on completion of the above work.

3.1.4.6 The engine to be started and test run under load.

### **3.2 Location**

**3.2.2.** Lower Machinery Space

### **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 completed to the satisfaction of the Chief Engineer.

### **4.2 Testing**

**4.2.1** Contractor shall allow for 4 hours of each Dock trials and Sea trials to be carried out to verify the operation of the main engine and clutch.

### **4.3 Certification**

**4.3.1** N/A

## **Part 5: Deliverables:**

## **E-14 Wartsila SI Main Engine Idler Pin Repairs**

### **5.1 Drawings/Reports**

**5.1.1** All reports 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

### **5.4 Manuals**

**5.4.1** N/A

## E-15 Deck Fuelling Pump Installation

Item #: E-15	<b>SPECIFICATION</b>	TCMS Field #:
<b>E-15 Deck Fuelling Pump Installation</b>		

### Part 1: SCOPE:

- 1.1 To replace the existing Deck Fuelling Pump.
- 1.2 Change existing 2 inch fuel pump piping size to 3 inch.

### Part 2: REFERENCES:

#### 2.1 Drawings

- 2.1.1 Fuel Oil Transfer System

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout / tag out log sheets. The contractor is to demonstrate how the lockout / tag out procedure meet the requirements before work begins. For audit purposes the completed lockout / tag out log sheets are to be delivered to the Chief Engineer when completed.

#### 2.3 Regulations

- 2.3.1 CSA Fire Regulations

#### 2.4 Owner Furnished Equipment

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

### Part 3: TECHNICAL DESCRIPTION:

#### General

#### 3.1 Removal of existing Pump and Piping:

- 3.1.1 Before pump and piping removals begin Contractor to ensure that all residual fuel has been removed from the piping.
- 3.1.2 The adjacent spaces and equipment to be protected with fire retardant cloth. A fire watch is to be maintained at all times during hot work.
- 3.1.3 The contractor shall provide extraction fans while burning or cutting.
- 3.1.4 Contractor to remove Pump, Control Panel and piping from the vessel and dispose of in an approved manner.
- 3.1.5 All open flanges in the piping in way of removals shall be blanked.

## E-15 Deck Fuelling Pump Installation

### 3.2 New Pump Installation:

- 3.2.1 The welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer. The welds shall be coated internally and externally as per coating of that particular area. The NDT method shall be ultrasonic testing.
- 3.2.2 Contractor to fabricate a new support stand and weld in place of existing stand in order to mount the new pump unit skid.
- 3.2.3 Contractor to replace existing pump starter panel with owner-supplied new.



Present Piping arrangement

### 3.3 Piping Installation:

- 3.3.1 The pipe welds shall be 100 % NDT tested for integrity and a copy of the report given to the Chief Engineer.
- 3.3.2 The Contractor shall remove a flanged eight foot section of 10 inch schedule 30 fuel manifold piping and replace the existing 2 inch welded nipple with a 3 inch nipple to connect to the suction side of the new pump.
- 3.3.3 The Contractor shall remove a flanged 3 foot section of 6 inch schedule 30 fuel manifold piping and replace the existing 2 inch welded nipple with a 3 inch nipple to connect to the discharge side of the new pump.
- 3.3.4 The Contractor shall run approximately 30 feet of 3 inch, schedule 40, black iron pipe to connect the suction side of the pump to the 10 inch fuel manifold.

## E-15 Deck Fuelling Pump Installation

- 3.3.5 The Contractor shall run approximately 20 feet of 3 inch, schedule 40, black iron pipe to connect the discharge side of the pump to the 6 inch fuel manifold.
- 3.3.6 The Contractor shall incorporate an owner-supplied fuel meter into the discharge piping as directed by the Chief Engineer.
- 3.3.7 Contractor to incorporate 2 - 1/4" NPT gauge line connections into the suction and discharge piping as directed by the Chief Engineer.
- 3.3.8 Contractor to supply and install 7 - 3 inch ball valves as directed by Chief Engineer.
- 3.3.9 Contractor to modify existing pipe bracket supports to accommodate the larger 3 inch piping.
- 3.3.10 All disturbed and flange gaskets to be cut from Buna N rubber.



2" Connection to 6" discharge piping

## E-15 Deck Fuelling Pump Installation



2" Connection to 10" suction piping.

### **3.4 Interferences**

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

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Weld Inspection and Testing**

4.1.1 The Contractor shall perform tests to verify that all requirements of the Specification are met.

4.1.2 The piping is to be completed to the satisfaction of the attending TCMS Inspector and Chief Engineer.

4.1.3 The contractor is responsible for all air quality testing to ensure hot work and entry is permitted. The contractor shall issue and post hot work permits and shall maintain a fire watch.

### **4.2 Certification:**

4.2.1 The Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Standards.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

5.1.1 Contactor shall provide copies of all NDT and hot work permits to the Chief Engineer upon completion of work.

## E-16 Tow Winch Overhaul

Spec item #: E-16	<b>SPECIFICATION</b>	TCMSB Field #:
<b>E-16 Tow Winch Overhaul</b>		

### Part 1: Scope:

- 1.1 The intent of this item shall be to have Rolls Royce Brattvaag Winch FSR complete overhaul of the Main Winch.
- 1.2 The Contractor shall arrange the services of a Rolls Royce Brattvaag FSR to carry out inspection and overhaul.
- 1.3 The Contractor shall make an allowance of \$30,000.00 for the inspection and overhaul. The final amounts shall be adjusted up or down by 1379 action. The final costs will be based on all sub-contractor's invoicing.
- 1.4 The Contractor shall quote 80 hours labour to assist the Rolls Royce FSR with the winch and motor removals.

### Part 2: References:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Brattvaag Winch System A06282

#### 2.2 Standards

- 2.2.1 N/A

#### 2.3 Regulations

- 2.3.1 N/A

#### 2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all 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 assist the RR Brattvaag Winch Representatives with raising the winch drum enough to be able to access the bearing housings for removal and inspect the shafts, then replace the pillow block bearing or overhaul them.
- 3.1.2 Then the pump for the electric motor to be lowered down to install and aligned into place.
- 3.1.3 From there the M6300 motor to be carefully lowered and chain fallen into place.

## **E-16 Tow Winch Overhaul**

- 3.1.4 The gears are then too have the backlash set and the motor bolted into place.
- 3.1.5 The E12 control valve to be lowered and chain fallen into place and bolted up to the motor with all new owner supplied o-rings.
- 3.1.6 The contractor shall assist with install of all small valves and tubing and then the pipe work to be bolted together with all new o-rings-owner supplied.
- 3.1.7 The contractor shall then then fill the system with new contractor supplied hydraulic oil and then flushed using contractor supplied filter socks (part # 401-633-01) before the new motor is spun.
  - 3.1.7.1 Assembly of winch motor and control valve using OWNER supplied spare parts.

### **3.2 Location**

- 3.2.1 Tow Winch Room aft

### **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 completed to the satisfaction of the Chief Engineer.

### **4.2 Testing**

- 4.2.1 the contractor shall assist FSR with installation and run up of winch motor and control valve.

### **4.3 Certification**

- 4.3.1 N/A

## **Part 5: Deliverables:**

### **5.1 Drawings/Reports**

- 5.1.1 All reports 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.

### **5.4 Manuals**

- 5.4.1 N/A.

## E-17 Main Air Receiver Survey

Spec item #: E-17	<b>SPECIFICATION</b>	TCMSB Field #:
<b>E-17 Main Air Receiver Survey</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification is to outline the work required to survey and test the four main air receivers. These air receivers are due for survey and testing by TCMS.

### Part 2: REFERENCES:

#### 2.1 Nameplate Data

- 2.1.1 Vertical Air receivers (Four):250 litre capacity, 30 bar working pressure  
Location -Main Engine room Flat Port Aft.

#### 2.2 Standards

- 2.2.1 Ships ISM Hot-Work, Confined Space, Fall Protection and Lockout Procedures. The contractor will be responsible for completion of the lockout/tag out log sheets. The contractor is to demonstrate how the lockout/tag out procedure meets the requirements before work begins. For audit purposes the completed lockout/tag out log sheets are to be delivered to the Chief Engineer when completed.

### Part 3: TECHNICAL DESCRIPTION:

#### 3.1 Pre-Disassembly

All air receivers being worked on shall be isolated, locked out and tagged out from all air compressors.

#### 3.2 Disassembly

- 3.2.1 The piping attached to the air receivers shall be let go for the removal of the valve heads. The valve head shall be removed from each receiver and disassembled. The safety valve shall be removed from head assembly.
- 3.2.2 Each valve head consists of four internal valves, two small valves and two larger ones. The drain valve shall be removed from the receiver.

#### 3.3 Cleaning and Inspection

- 3.3.1 All valves in each head and drain valve shall be disassembled, cleaned, and lapped in with grinding paste. The internals of the valve heads shall be thoroughly cleaned with accepted cleaning agents. The contractor shall provide the Chief Engineer with a MSDS for the cleaning agent to be used.
- 3.3.2 The safety valves shall be disassembled and cleaned.
- 3.3.3 The internals of the air receivers shall be thoroughly cleaned using an accepted contractor supplied cleaning agent. The contractor shall make allowance that these air receivers are very dirty, therefore extensive cleaning shall be required. The contractor shall provide the Chief Engineer with MSDS for cleaning agent to be used to clean insides of air receivers

## **E-17 Main Air Receiver Survey**

of scale and residue.

- 3.3.4 Flaws in the tanks interior epoxy coating shall be made good by the contractor. The contractor shall quote for grinding and epoxy re-surfacing one square metre and include unit cost per square metre for additional area of grinding and resurfacing.
- 3.3.5 Following cleaning and grinding the Chief Engineer and TCMS Surveyor will inspect the receivers and disassembled valve assemblies.
- 3.3.6 **Note:** The contractor shall be responsible for ensuring attendance of the TCMS Surveyor.
- 3.3.7 The contractor shall supply and fit a blank complete with filling and vent line in place of the valve head assembly. Plug the drain valve opening and fill the air receivers with fresh water and vent all air.
- 3.3.8 The air receivers shall be hydrostatically tested to 45 bar pressure by the contractor. The Chief Engineer and TCMS Surveyor shall witness the hydrostatic test.
- 3.3.9 **Note:** The contractor shall be responsible for ensuring attendance of the TCMS Surveyor.
- 3.3.10 Following the above testing the air receivers shall be drained of all water and thoroughly dried.
- 3.3.11 The safety valves shall be set and tested at the pressure that is stamped on the valve. Valves are stamped 34 bar.
- 3.3.12 The four pressure gauges on the air receivers shall be calibrated by an approved test facility. The calibration certificates shall be given to the Chief Engineer. The contractor is to bid based on re-calibration or replacement, with gauges of similar quality and proper certified rating.

### **3.4 Re-assembly**

- 3.4.1 The valve heads shall be reassembled using all new seals and stem seals. The valve heads and drain valves shall be installed on the air receivers.
- 3.4.2 The contractor shall supply all material for the specified work.

### **3.5 Post Assembly Testing**

- 3.5.1 The ship's crew will fill the air receivers to working pressure with the contractor's personnel in attendance to check for air leaks.
- 3.5.2 The ship's crew will increase the pressure to test the relief valve settings as per the TCMS Surveyor's requirements. The contractor's personnel shall be in attendance.

## **E-17 Main Air Receiver Survey**

### **Part 4: PROOF OF PERFORMANCE:**

- 4.1.1 All work shall be to the satisfaction of the Chief Engineer and attending TCMS surveyor.
- 4.1.2 Following completion of all work above to the satisfaction of the Chief Engineer, attending TCMS Surveyor, the following shall be completed.
- The air receivers and assemblies proven leak free.
  - Air receiver safety valves proven
  - Deliver the blank used for testing to the Chief Engineer

### **Part 5: DELIVERABLES**

- 5.1.1 Following completion of the above work to the satisfaction of the attending TCMS Surveyor and Chief Engineer, three typewritten copies of the service report and all certificates shall be submitted to the Chief Engineer.
- 5.1.2 The contractor shall provide the Chief Engineer with MSDS sheets for cleaning agents to be used.

## L-01 Kongsberg - Pneumatic Valve Replacements

Spec item #: L-01	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-01 Kongsberg - Pneumatic Valve Replacements</b>		

### Part 1: SCOPE:

- 1.1 The intent of this item shall to connect the newly installed fuel, ballast water, and fresh water Pneumatic Valves with the Kongsberg Alarm and Control System.
- 1.2 Calibrate other previously fitted tank level transducers as needed.
- 1.3 The contractor shall include in the bid an allowance of \$15000.00 for a Kongsberg FSR services to be adjusted up or down by PWGSC 1379 action on proof of invoicing.

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 K-Chief 500 Alarm Control System

#### 2.2 Standards

- 2.2.1 TP-127E Electrical Rules/Regulations, and Canadian Electrical Code
- 2.2.2 TCMS survey requirements for electrical machinery.
- 2.2.3 Ships ISM Lockout

#### 2.3 Regulations

- 2.3.1 Approved by TCMS

#### 2.4 Owner Furnished Equipment

- 2.4.1 N/A

### Related specifications

**ED-06 Pneumatic Valve Replacement**

**HD-09 Freshwater tank cleaning and Maintenance**

**E-07 Fuel Oil, Lube Oil and Waste Tanks Cleaning and Inspection**

**HD-02 Dry-docking. (ballast valves to be completed while ship is on dock)**

### Part 3: TECHNICAL DESCRIPTION:

#### Scope of Work

- 3.1.1 Contractor to procure the services of Certified Kongsberg FSR to connect the newly installed Fuel and Fresh Water Pneumatic Valves with the Kongsberg Alarm and Control System. Also, calibrate other previously fitted tank level transducers as directed by the Chief Engineer.

### Acceptance

## L-01 Kongsberg - Pneumatic Valve Replacements

3.1.2 Following completion of all work and viewing to the satisfaction of the Chief Engineer, and TCMS Surveyor.

### Location of Fuel oil valves

Valve	V.C.U.	Tank	Valve Location	Frame #
FO-1	11-2	3P	AFT Lathe Room-Shafts	25
FO-2	20-2	3S	AFT Lathe Room-Shafts	26
FO-3	11-1	6P	Shaft Tunnel	34
FO-4	20-1	6S	Shaft Tunnel	39
FO-5	18-3		Pump Rm. Stbd (Suction)	38
FO-6	18-4		Pump Rm. Stbd (Suction)	38
FO-10	9-1	8P	Engine Room Aft.	44
FO-11	9-2	8S	Engine Room Aft.	44
FO-12	9-3	9P	E/R-Beside Gearbox	44
FO-13	9-4	9S	E/R-Beside Gearbox	44
FO-14	6-4	10P	Near Port Seabay (Outer Valve)	62
FO-15	4-3	10S	Near Stbd Seabay (Outer Valve)	62
FO-16	6-5	11P	Near Port Seabay (Inner Valve)	62
FO-17	4-4	11S	Near Stbd Seabay (Inner Valve)	62
FO-18	18-2		Pump Rm. Stbd (Discharge)	38
FO-19	18-1		Pump Rm. Stbd (Discharge)	38
FO-20	13-1		Pump Room Overhead	40
FO-21	14-5		Pump Room Overhead	40
FO-27	14-3		Pump Room FWD	42

### Location of Fresh water valves

Valve	V.C.U.	Tank	Valve Location	Frame #
FW-01		17	AFT of bow-thruster compartment door	95
FW-02p			E/R upper level Stbd.	57
Fw-03p			E/R upper level port.	57
Fw-04			E/R next to F/W cargo pump.	65

## L-01 Kongsberg - Pneumatic Valve Replacements

<b>Fw-05</b>			<b>E/R next to F/W cargo pump.</b>	<b>65</b>
<b>Fw-06</b>		<b>16P</b>	<b>Bonded stores under deck</b>	<b>94</b>
<b>Fw-07</b>		<b>16S</b>	<b>Bottom of stairs by central stores forward</b>	<b>95</b>

### Location of ballast water valves

<b>Valve</b>	<b>V.C.U.</b>	<b>Tank</b>	<b>Valve Location</b>	<b>Frame #</b>
<b>DB-1</b>		<b>1P</b>	<b>Steering flat</b>	<b>7</b>
<b>DB-2</b>		<b>1S</b>	<b>Steering flat</b>	<b>7</b>
<b>DB-3</b>		<b>20C</b>	<b>Steering flat</b>	<b>15</b>
<b>DB-24</b>			<b>E/R next to ballast pump</b>	<b>65</b>
<b>DB-25</b>			<b>E/R next to ballast pump</b>	<b>65</b>

### Interferences

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

### Part 4: PROOF OF PERFORMANCE:

#### 4.1 Inspection

4.1 Following completion of all work and viewing to the satisfaction of the Chief Engineer and attending TCMS Surveyor.

#### 4.2 Testing

4.2 The valves must be function tested to proof correct operation to the satisfaction of the Chief Engineer

### Part 5: DELIVERABLES:

#### 5.1 Drawings/Reports

5.1.1 The Contractor shall prepare and supply 3 copies of the typed report on the work that was carried out for distribution to Chief Engineer and attending TCMS inspector.

#### 5.2 Spares

5.2.1 N/A

#### 5.3 Training

5.3.1 N/A

#### 5.2 Manuals

## L-02 Kongsberg Tank Level Transducers

Spec item #: L-02	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-02 Kongsberg Tank Level Transducers</b>		

### Part 1: SCOPE:

- 1.1 The intent of this item shall be install SIXTEEN (16) new owner supply transducers and calibrate the newly installed level transducers.
- 1.2 The contractor shall make an allowance of \$10,000 to arrange the field service representation of Kongsberg to connect, commission and calibrate the installation of the 14 owner supplied transducers and for calibration of the three tanks on the tank gauging system.
- 1.3 Work will be done in conjunction with;
  - Fresh Water Tank Cleaning and Inspection.
  - Water Ballast Tank Cleaning and Inspection.
  - Fuel Oil Tank Cleaning and Inspection.
- 1.4 Work will entail removing existing welded supports, installing new owner supplied supports, running cable through existing conduits and bulkheads and connecting new transducers so FSR can calibrate system again. The Contractor shall quote on 10 hours labour per tank for a total of 160 hours.

### Part 2: REFERENCES:

#### 2.1 Nameplate Data

- 2.1.1 K-Chief System

#### 2.2 Standards

- 2.2.1 TP-127E Electrical Rules/Regulations, and Canadian Electrical Code
- 2.2.2 TCMS survey requirements for electrical machinery.
- 2.2.3 Ships ISM Lockout

#### 2.3 Regulations

- 2.3.1 Approved by TCMS

#### 2.4 Owner Furnished Equipment

- 2.4.1 The contractor shall supply all 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 be responsible for installation of all sensor brackets and sensors must be installed according to the official Kongsberg documentation.
- 3.1.2. Contractor to pump remaining fuel, clean and gas free #6 and #3 Fuel Port and Starboard

## **L-02 Kongsberg Tank Level Transducers**

Tanks for Hot-work.

**3.1.3.** Complete installation of connection wires to the DPU must be in place before Kongsberg Service Engineer is called to vessel. Kongsberg will connect to DPU, commission and calibrate the sensor for each tank.

**3.1.4.** Sensor brackets and sensors to be installed

### **3.2 Locations**

#### **3.2.1 Fuel Tanks;**

- #6 Port & Starboard Tanks.
- #3 Port & Starboard Tanks

#### **3.2.2 Ballast Tanks;**

- #2 Port & Starboard Tanks.
- #4 Port & Starboard Tanks.
- #7 Port & Starboard Tanks.
- #15 Port & Starboard Tanks.
- #18 Forepeak Tank.
- #19 Center Tank.

#### **3.2.3 Fresh Water Tanks;**

- #16 Starboard Fresh Water Tank.
- #17 Center Fresh Water Tank.

### **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 completed 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** All reports from the work specified shall be Given to the Chief Engineer.

### **5.2 Spares**

## L-03 Port and STBD Engine Room Supply Fans Refurbishment

Spec item #: L-03	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-03 Port and STBD Engine Room Supply Fans Refurbishment</b>		

### PART 1: SCOPE:

- 1.1 The intent of this item shall be to completely overhaul the Port and STBD engine room supply fan units and perform recorded testing before and after overhaul as part of our ongoing maintenance. Required recorded testing by the Contractor will follow in this specification
- 1.2 The port and starboard engine room Supply Fans and Motors are located in plenum casings on the Foc'sle Deck; (Port and starboard sides) access from after side of plenum casings. Contractor to cut plate on each side c/w two vertical stiffeners out for access – fire watch to access inside of plenums via manhole covers in HVAC Room. Hot Work Permit and precautions, Fall Protection, Confined Space precautions, rigging and shore crane will be required.

### PART 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- **Port and Starboard Supply Fans:**

ETATECH  
HP 50/12,  
Frame 365T Type NVB2-BEHWI  
60 Hz, 3 ph Class B, 460 Volts, S.F. 1.0 Amps 61/24  
RPM 1770/880  
Enclosure TEAO  
Data Fan and Motor assembly: Canadian Blower Fan  
Type 48B5 Adjustax arrangement 4  
Electric Motor ETATECH 47.3 BHP  
Frame 365T to IEEE 45 Marine 2 speed/2winding  
Variable Torque motor c/w long leads and remote conduit  
Box enclosure TEAO

#### 2.2 Standards

The following standards shall be used, as required, in carrying out this work. Current edition of documents, at time of contract implementation, shall be used.

- IEEE 45 Recommended practice for Electrical Installations on Shipboard
- Lloyd's Register – Rules and Regulations for the Classification of Ships
- TP 127 – Electrical Standards

## **L-03 Port and STBD Engine Room Supply Fans Refurbishment**

- TP 438 – Structural Fire Protection – List of Approved Products

For all hot work, enclosed space entry and work aloft the contractor shall follow the Canadian Coast Guard Fleet Safety Manual rules.

### **2.3 Regulations**

It is the responsibility of the contractor to ensure compliance with all municipal, provincial and federal regulations

- Canada Environment Protection Act (CEPA)
- TCMSB – Hull Construction Regulations

### **2.4 Owner Furnished Equipment**

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

### **Related specifications:**

- H-20 Steel renewals in the H-vac room.
- E- 13 Renewal of H-vac units.

## **PART 3: TECHNICAL DESCRIPTION:**

### **3.1 Supply Fan Overhaul**

- 3.1.1 The Contractor shall check the amperage ratings of each phase of the motors (both high and low speeds and the peak start up current) prior to disconnection and again after reconnection. These tests shall be witnessed by Chief Engineer or his designate. Prior to the disconnection and removal of the motors, the Contractor shall conduct and record dynamic balancing of the motor in situ (both high and low speeds), as a baseline, with the existing fan blades. After reinstallation and reconnection of the motors, the Contractor shall again conduct and record dynamic balancing. These tests shall be witnessed by Chief Engineer or his designate.
- 3.1.2 The Contractor shall be responsible for any corrections or adjustments required after refurbishment. A written record of readings before removal and after reinstallation shall be delivered to the Chief Engineer.
- 3.1.3 The Contractor shall megger and record the readings of the motors before removal and again prior to reconnection. Chief Engineer shall be given a copy of both readings.
- 3.1.4 The electrical supply to fan motor shall be locked out in Control Room. Contractor shall use his own locks and lockout tags, adhering to proper Lockout Procedures. Contractor shall sign the Engine Room Lockout Book when installing Lockouts and again when removing.
- 3.1.5 Prior to commencement of work, the following is to be checked and recorded:

## **L-03 Port and STBD Engine Room Supply Fans Refurbishment**

- 1) Motor rotational direction.
  - 2) The contractor shall conduct a functional vibration test to establish a vibration level datum and will deliver a copy of the report of each such test to the inspector.
- 3.1.6 The Contractor shall secure the fan blades from turning.
  - 3.1.7 Contractor shall unbolt and lay aside the manhole covers on the forward side of the plenums located inside the HVAC Room.
  - 3.1.8 Light fixture and loud hailer fitted to the after side of after plate on plenum beneath intake louvers shall be isolated, disconnected and dismantled. (One light and one hailer on each plenum).
  - 3.1.9 Aft closing plate from seam below intake louver casing shall be cut off following existing seams and laid aside.
  - 3.1.10 The Intake screen at Foc'sle deck level shall be unbolted and laid aside. Crop (for subsequent re-installation) the welded 6-vane guide ring above the fan and motor assembly.
  - 3.1.11 Disconnect the grease lines to the motor bearings.
  - 3.1.12 Record the shim pack thickness of the motor mounting feet.
  - 3.1.13 Contractor shall support and unbolt fan and motor assembly. And then the Contractor shall remove the motor and fan assembly.
  - 3.1.14 The Contractor shall transport the Fan and motor assembly ashore for cleaning, inspection, and renewal of all bearings, (contractor supply) and balancing.
  - 3.1.15 Contractor shall record bearing identifications and provide a copy of same to Chief Engineer. Contractor shall inform the Chief Engineer whether sealed or non-sealed bearings are installed.
  - 3.1.16 The contractor shall perform non-destructive testing to examine for cracks on the motor and fan housings.
  - 3.1.17 Motor exterior surfaces to be mechanically cleaned. All exterior surfaces of motor brackets, fan and axial tubes are to be grit blasted and mechanically cleaned to bare metal.
  - 3.1.18 The Contractor shall measure and record all clearances.
  - 3.1.19 The Contractor shall clean and test all electrical connections.
  - 3.1.20 The contractor shall perform an insulation resistance test on the windings of the motor. The tests shall be in accordance with TP127E and CSA standards.

## **L-03 Port and STBD Engine Room Supply Fans Refurbishment**

- 3.1.21 All parts requiring repair shall be reconditioned to manufacturer's specifications by the Contractor.
- 3.1.22 All replacement parts should be manufacturer's factory parts or equivalent. In the case of factory or equivalent parts being unavailable, the Contractor may fabricate new parts with the approval of the Chief Engineer. New parts manufactured by the Contractor shall conform to the manufacturer's design and fabrication standards, and shall be like in design, dimensions, tolerances and materials. Contractor manufactured parts shall be inspected and approved by the Chief Engineer prior to installation.
- 3.1.23 The Contractor shall install fan-motor unit with new bearings, springs, gaskets, o-rings, cotter pins and lock washers. The Contractor shall replace all fasteners which are damaged, defective or corroded with new ones that meet the manufacturer's specifications.
- 3.1.24 The Contractor shall assemble the complete fan-motor unit using the new and repaired parts in accordance with the manufacturer's specifications.
- 3.1.25 If the Contractor installs non-sealed bearings, then the grease line and fittings to the fan motor bearings shall be proven by the Contractor and witnessed by Chief Engineer or his designate. New non-sealed motor bearings shall be greased. Serviced and balanced assembly shall be transported back to vessel and re-installed, using new shims. New motor bearings shall be greased.
- 3.1.26 The Contractor shall check and record all critical clearances as recommended by the manufacturer.
- 3.1.27 The Contractor shall balance the fan-motor unit upon completion of reassembly. The Contractor shall clean and inspect all fan foundations for damage. All foundation repairs will be addressed by PWGSC 1379 action.
- 3.1.28 The Contractor shall clean and inspect all metal-to-metal joints prior to assembly for defects and irregularities. The Contractor shall repair these surfaces as necessary.
- 3.1.29 The Contractor shall rotate the fan-motor unit by hand prior to closing the casings to ensure freedom of rotation. The Contractor shall correct any deficiencies found.
- 3.1.30 The Chief Engineer shall be notified prior to the closing of the fan casings.
- 3.1.31 The Contractor shall submit an "as found" condition report to the Chief Engineer if any foundations are deteriorated or damaged.
- 3.1.32 The Contractor shall include all recommended repairs in the foundations' "as found" condition reports. The Chief Engineer shall approve all recommended repairs prior to commencing work.

## **L-03 Port and STBD Engine Room Supply Fans Refurbishment**

- 3.1.33 The Contractor shall check tightness of all foundation bolts and tighten the loose ones to the manufacturer's specifications. The Contractor shall replace all damaged or defective bolts with new ones.
- 3.1.34 The Contractor shall clean and inspect the disconnected flanges which mate with the fan-motor unit.
- 3.1.35 The Contractor shall connect the fan-motor unit to the ship's ducting with new gaskets and fasteners. The Contractor shall ensure a correct, strain-free alignment of the fan-motor unit with the ship's ducting.
- 3.1.36 Fan and motor assembly shall be re-connected and tested with amperage readings on each phase witnessed and recorded for High and Low speed operation.
- 3.1.37 Additional parts required and not specifically mentioned in this item shall be provided by the Contractor. Purchase of required replacement parts shall be subject to PWGSC 1379 action. However, the cost of labour to install these parts shall be included in this item.
- 3.1.38 The Contractor shall prepare and submit a service report to the Chief Engineer. The report shall include a list of parts replaced and repaired, a list of final clearances of the overhauled unit, verification of dynamic balance, condition of the fan-motor unit and any recommendations for future operation and maintenance of the unit.
- 3.1.39 While the fan and motor assembly is ashore the supply fan plenum shall be temporarily sealed at intake screen casing flange with protective sheet; manhole cover shall be re-installed and un-insulated areas of plenum shall be grit blasted clean and debris from same removed ashore.

### **3.2 Plenum Repairs**

- 3.2.1 Chief Engineer shall be advised when grit blasting is completed and the area is available for inspection and thickness testing.
- 3.2.2 The contractor shall bid on 16 UT thickness shots and quote a unit price for each shot for adjustment purposes. The Chief Engineer shall determine the locations for shots. The copy of thickness shot shall be given to the Chief Engineer so any steel plate renewals can occur before coatings are applied.
- 3.2.3 The contractor shall quote on cropping out and renewing 20 square feet of deteriorated plate on the plenum shell. And the contractor shall quote a per-square foot of steel replacement for adjustment purposes via 1379.
- 3.2.4 Surfaces so prepared shall be coated with one coat of primer (contractor supply) and one coat of contractor-supplied epoxy paint (coating specifications sheet and MSDS sheet to be provided to Owner's Representative prior to application of the protective-coating product). Estimated area affected 50 square meters for each plenum. (The contractor shall quote on a one unit meter unit for 1379 adjustment purposes). The coatings shall be

## L-03 Port and STBD Engine Room Supply Fans Refurbishment

applied according to the manufactures recommended optimum procedures and conditions.

- 3.2.5 Contractor shall supply and install replacement sealed thermal/acoustic insulation for the insulated areas of the plenum.
- 3.2.6 Contractor shall prepare and coat intake screens with one coat of primer (contractor supply) and one coat of contractor-supplied epoxy paint (coating specification sheet and MSDS sheet to be provided to Owner's Representative prior to application of the protective-coating product) and then install the intake screens.
- 3.2.7 Contractor shall supply, install, and seal replacement insulation.
- 3.2.8 Access hole edges shall be faired and access plate welded back in place as original. Light fixture shall be mounted and re-connected after access plate seams hose-tested. All welded and disturbed steel to receive one coat of primer and one coat of epoxy paint the same as is used for the plenum.



Intake screen port side. The fan and motor are directly below this screen.



Aft side of plenum from outside showing loud hailer and light.

## L-03 Port and STBD Engine Room Supply Fans Refurbishment



Inside of port plenum looking aft from man hole



Inside of plenum showing insulation on top and screen on bottom.

### 3.3 Location

Ventilation casing aft of H-Vac room on the Foc'sle deck. Fr. 64.

### 3.4 Interferences

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 The Contractor shall provide proof of performance with respect to all work. Proof of performance shall include all inspection check points specifically detailed below.

- Inspection of components and their installation.
- Verification of reliability and sufficiency under trials up to full power under normal working conditions for a suitable endurance period.
- Verification of correct balance of rotating components.
- All work shall be completed to the satisfaction of the Chief Engineer.

## **L-03 Port and STBD Engine Room Supply Fans Refurbishment**

### 4.2 Testing

- 4.2.1 The Contractor shall perform tests to verify that all requirements of the Specification are met. Prior to testing, the Contractor shall visually inspect all components for quality of workmanship, conformity to this specification and the intrinsic safety of equipment operation or testing apparatus.
- 4.2.2 If damage to any component or system occurs during or after testing and prior to delivery of vessel, the damage shall be repaired and the previously completed tests of the component or system shall be retested.
- 4.2.3 The Contractor shall provide a set of detailed instructions providing a tests and trials agenda including expected results for verification of all system changes.
- 4.2.4 As a minimum, the Contractor shall provide:
- a full and detailed test procedure
  - Instruments and services for testing and trials, instruments shall be in calibration.
  - demonstration of operational condition of emergency stops.
  - demonstration that systems are operable from all control locations

### 4.3 Certification

- 4.3.1 The Contractor shall obtain and provide to the Chief Engineer all required technical Certifications as specified in the applicable rules and codes. These shall include but not be limited to the following:
- 4.3.2 Equipment and Component inspection certificates including all test reports supporting the certifications.
- 4.3.3 Material test certificates including all test reports supporting the certifications.
- 4.3.4 System Installation inspection certificates including proof of compliance.

## **PART 5: DELIVERABLES:**

### 5.1 Drawings/Reports

- 5.1.1 Contractor shall supply 1 typed and 1 electronic copy of the service report.

## L-04 Steering Gear Controls Upgrade Rolls Royce

Spec item #: L-04	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-04 Steering Gear Controls Upgrade Rolls Royce</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification is to upgrade the existing Rolls Royce Marine Steering gear controls with new Rolls Royce Marine controls Type UTF010553. Contractor will be running all cabling and mounting of equipment as directed by Rolls Royce. Contractor responsible for all costs associated with Rolls Royce engineering, drawings, equipment and FSR installation and equipment.
- 1.2 The Contractor shall make an allowance of \$60,000.00 for the services of Rolls Royce Service Engineers. The final amount shall be adjusted up or down by 1379 action based on all sub-contractor's invoicing.
- 1.3 The Contractor shall provide 320 hours labour to assist the Rolls Royce FSR. This allowance will not include work covered as contractor requirement in the Technical Overview.
- 1.4 Contact for Rolls Royce representative  
Ted Gurr-Rolls-Royce Canada Ltd.  
Sales Manager - Eastern Canada  
Email: [ted.gurr@rolls-royce.com](mailto:ted.gurr@rolls-royce.com)  
Cell: (902) 488-4153

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Sir Wilfred Grenfell Technical Overview Steering Gear Controls Upgrade UTF010553Annex B.
- 2.1.2 Steering Control system cable list 004-6426
- 2.1.3 Steering Control system Terminal Diagram 004-6425
- 2.1.4 Steering Control system Cable Diagram 0004-6423
- 2.1.5 Steering Control system Circuit Diagram 0004-6424
- 2.1.6 Rauma Brattvaag 227-061 Guidelines for Electrical Installation.

#### 2.2 Standards

- 2.2.1 Fleet Safety and Security Manual (DFO/5737)
- 2.2.2 TP127 – Ship's Electrical Standard
- 2.2.3 IEEE 45:2002 – Recommended Practice for Electrical Installation on Ships

#### 2.3 Regulations

- 2.3.1 Canada Shipping Act 2001 – Marine Machinery Regulations.
- 2.3.2 If not specifically mentioned in the Rolls Royce Guidelines for Electrical Installation

## **L-04 Steering Gear Controls Upgrade Rolls Royce**

227-061, contractor to follow most recent revisions of TP-127E or IEEE-45.

### **2.4 Owner Furnished Equipment**

All equipment , wiring and materials responsibility of contractor unless otherwise noted.

### **Part 3: TECHNICAL DESCRIPTION:**

#### **3.1 General**

- 3.1.1 All electrical circuits associated with the steering controls to be isolated before any work is to proceed.
- 3.1.2 Contractor responsible for all costs associated with parts, materials and labour of Rolls Royce FSR's. All work performed will be under the direct supervision of Authorized Rolls Royce FSR and to the acceptance of the Chief Engineer and TCMS Inspector
- 3.1.3 All equipment locations and wiring detailed in Technical Specification UTF010553.
- 3.1.4 The existing Rolls Royce steering controls to be removed as directed by the FSR
- 3.1.5 Included provisional installation drawings are for guidance only. Actual connection drawing to be provided by FSR before any work is to begin.
- 3.1.6 All associated wiring is to be removed and replaced unless approved to remain after testing and agreement between FSR, Chief engineer and TCMS.
- 3.1.7 As per Guidelines for Electrical Installation, all signal, line supply and power cables to be routed away from each other as much as possible with a minimum clearance of 30cm.
- 3.1.8 Contractor to give price based on additional 25% length per cable run with listed.15 cable penetrations per cable. Contractor may run similar cables in one cable transit keeping in mind requirements in 3.1.7 above. Contractor to give a cable per meter cost and transit cost which is to be adjusted up or down for actual required run by 1379 action. Contractor responsible to contact FSR for actual cable requirements including construction, conductor numbers if not on the Steering Control system cable list 004-6426.
- 3.1.9 Cable Runs and # transits per run
  - 3.1.9.1 Steering Gear to Wheelhouse: 376 ft +25%. Number of transits (6). Space available.
  - 3.1.9.2 Steering Gear to MCR: 290 ft. +25%. Number of transits (4). Space available.
  - 3.1.9.3 MCR to Wheelhouse: 172 ft. +25%. Number of transits (4). Space available.
- 3.1.10 All new wiring, controls and cabinets to be installed under direction of Rolls Royce FSR.

## **L-04 Steering Gear Controls Upgrade Rolls Royce**

- 3.1.11 All labels that are to be replaced to reflect new equipment to be of similar type and securing arrangement to existing. Contractor responsible for the cost of fabrication and installation of all labels. All labels and installation locations to be approved by the chief engineer and attending TCMS Inspector.
- 3.1.12 Contractor responsible for retrofitting panels where equipment of different sizes or shapes to be mounted. Covering plates (Contractor responsibility) and mounting arrangements to be approved by the TA before installation. Any modifications to existing panel doors to be similar in standard, material, design, strength, mounting and coated with the same standard and color paint as per the existing access doors. All modifications shall be dealt with by 1379.
- 3.1.13 Existing transits and cable hangers may be reused on approval of chief engineer and TCMS inspector. Contractor responsible for any new cable hangers or transits needed. Contractor shall quote cost per new transit installation.
- 3.1.14 Contractor responsible for all new wiring, terminals, and enclosures as directed by Rolls Royce FSR.
- 3.1.15 All new and disturbed steelwork is to be protected with 2 coats of primer.
- 3.1.16 All cables shall be tagged with circuit identification at all points of connection and on both sides of bulkheads, decks and barriers. The tags will be metal, compatible with the cable sheath and shall have a circuit designation embossed thereon. Both ends of the tag shall be secured to the cable with metal tape or metal ty-raps. The wire Identification numbering philosophy for the new wiring shall be compatible with that utilized with the existing systems.
- 3.1.17 The contractor shall be responsible for arranging TCMS for all work outlined in the Technical Requirement.

### **3.2 Location**

- 3.2.1. Wheelhouse
- 3.2.2. Steering Gear compartment
- 3.2.3. Engine Control room

### **3.3 Interferences**

**3.3.1** Any interference items that need to be removed are the responsibility of the contractor. Contractor is responsible for the temporary removal, storage and refitting to vessel of all equipment previously identified. No Equipment/wiring or interference items to be removed without prior approval from TA.

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Inspection**

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

## **L-04 Steering Gear Controls Upgrade Rolls Royce**

- 4.1.2 All cabling and installations to be to the acceptance of attending TCMS inspector and Chief Engineer

### **4.2 Testing**

- 4.2.1 Rolls Royce FSR to test complete system to ensure proper operation of functions to the satisfaction of the Chief Engineer and attending TCMS inspector. This to include all combinations of control including emergency

### **4.3 Certification**

- 4.3.1 Proof of certification of authorized Rolls Royce FSR to be provide
- 4.3.2 Proof of proper certification / training of all other personnel to be made available on request

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

- 5.1.1 3 hard copies and 1 Electronic copy of the following  
As fitted drawings in electronic Cad format as well as hard copy

### **5.2 Spares** N/A

### **5.3 Training**

Contractor to allow services of FSR to provide for 2 - 8 hour days of training for ships crew for correct operation and maintenance of system.

## L-05 Tow Winch Controls / Tensioner Upgrade RR

Spec item #: L-05	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-05 Tow Winch Controls / Tensioner Upgrade RR</b>		

### Part 1: SCOPE:

- 1.1 The intent of this specification is to upgrade the existing Rolls Royce Tow Winch Elva controls with new Rolls Royce Hydcon RT controls. Contractor will be running all cabling and mounting of equipment as directed by Rolls Royce. Contractor responsible for all costs associated with Rolls Royce engineering, drawings, equipment and FSR installation and equipment.
- 1.2 The Contractor shall make an allowance of \$60,000 for the services of Rolls Royce Service Engineers. The final amount shall be adjusted up or down by 1379 action based on all sub-contractor's invoicing.
- 1.3 The Contractor shall provide 120 hours labour to assist the Rolls Royce FSR. This allowance will not include work covered as contractor requirement in the Technical Overview.
- 1.4 Contact for Rolls Royce representative  
Ted Gurr-Rolls-Royce Canada Ltd.  
Sales Manager - Eastern Canada  
Email: [ted.gurr@rolls-royce.com](mailto:ted.gurr@rolls-royce.com)  
Cell: (902) 488-4153

### Part 2: REFERENCES:

#### 2.1 Guidance Drawings/Nameplate Data

- 2.1.1 Sir Wilfred Grenfell Technical Overview Upgrade from Elva Monitoring to Hydcon RT monitoring System A06282
- 2.1.2 Tow Winch Controls Cable List 000237202
- 2.1.3 Tow Winch Controls Terminal Diagram 1 000237201 B
- 2.1.4 Tow Winch Controls Cable Diagram DMN000217307 A
- 2.1.5 Tow Winch Controls Cable Diagram 1 000237200 B
- 2.1.6 Rauma Brattvaag 227-061 Guidelines for Electrical Installation.

#### 2.2 Standards

- 2.2.1 Fleet Safety and Security Manual (DFO/5737)
- 2.2.2 TP127 – Ship's Electrical Standard
- 2.2.3 IEEE 45:2002 – Recommended Practice for Electrical Installation on Ships

#### 2.3 Regulations

- 2.3.1 Canada Shipping Act 2001 – Marine Machinery Regulations.

## L-05 Tow Winch Controls / Tensioner Upgrade RR

2.3.2 If not specifically mentioned in the Rolls Royce Guidelines for Electrical Installation 227-061, contractor to follow most recent revisions of TP-127E or IEEE-45.

### 2.4 Owner Furnished Equipment

All equipment , wiring and materials responsibility of contractor unless otherwise noted.

### Part 3: TECHNICAL DESCRIPTION:

#### 3.1 General

- 3.1.1 All electrical circuits associated with the steering controls to be isolated before any work is to proceed.
- 3.1.2 Contractor responsible for all costs associated with parts, materials and labour of Rolls Royce FSR's. All work performed will be under the direct supervision of Authorized Rolls Royce FSR and to the acceptance of the Chief Engineer and TCMS Inspector
- 3.1.3 All equipment locations and wiring detailed in Technical Specification A06282.
- 3.1.4 The existing Rolls Royce steering controls to be removed as directed by the FSR
- 3.1.5 Included provisional installation drawings are for guidance only. Actual connection drawing to be provided by FSR before any work is to begin.
- 3.1.6 All associated wiring is to be removed and replaced unless approved to remain after testing and agreement between FSR, Chief engineer and TCMS.
- 3.1.7 As per Guidelines for Electrical Installation, all signal, line supply and power cables to be routed away from each other as much as possible with a minimum clearance of 30cm.
- 3.1.8 Contractor to give price based on additional 25% length per cable run with listed.

Cable Label	Cable Type	From	To	Signal	Length (m)
W330	24 volts DC	Panel DC1 Breaker # 10,11 DC2 3 Lower aft bridge Stbd/ MCR Console	HYDCON interface Cabinet Winch Room	24 volts DC	20
W331	24 volts DC	Bridge System Interface Aft Console WH	HYDCON interface Cabinet Winch Room	24 volts DC	90
W332	Can Bus	Bridge System Interface Aft Console WH	HYDCON interface Cabinet Winch Room	Can Bus	90
W333	24 volts DC	HYDCON interface Cabinet Winch Room	Junction Box 0 Tow Drum	24 volts DC	15
W334	signal	HYDCON interface Cabinet Winch Room	Junction Box 0 Tow Drum	Signal	15
W335	24 volts DC	HYDCON interface Cabinet Winch Room	Temperature sensor	24 volts DC	15
W336	24 volts DC	HYDCON interface Cabinet Winch Room	Brake Feedback Tow Drum	24 volts DC	15
W337	signal	HYDCON interface Cabinet Winch Room	Encoder Tow Drum	Signal	15

## L-05 Tow Winch Controls / Tensioner Upgrade RR

W338	signal	HYDCON interface Cabinet Winch Room	Load cell Tow Drum	Signal	15
W339	24 volts DC	HYDCON interface Cabinet Winch Room	Panel Interface Bridge	24 volts DC	90
W340	signal	HYDCON interface Cabinet Winch Room	Panel Interface Bridge	Signal	90
W341	signal	HYDCON interface Cabinet Winch Room	Servo Unit 2	Signal	15
W342	24 volts DC	Servo Unit 1	Servo Unit 1	24 volts DC	15
W343	24 volts DC	Panel Interface	Servo Unit 2	24 volts DC	90
Wire 6	220	T1 #2 Panel Wheelhouse	Touch Supply	220 volt AC	6

- 3.1.9 Contractor may run similar cables in one cable transit keeping in mind requirements in 3.1.7 above. Contractor to give a cable per meter cost and transit cost which is to be adjusted up or down for actual required run by 1379 action. Contractor responsible to contact FSR for actual cable requirements including construction, conductor numbers if not on the Tow Winch Controls Cable List 000237202
- 3.1.10 All new wiring, controls and cabinets to be installed under direction of Rolls Royce FSR.
- 3.1.11 All labels that are to be replaced to reflect new equipment to be of similar type and securing arrangement to existing. Contractor responsible for the cost of fabrication and installation of all labels. All labels and installation locations to be approved by the chief engineer and attending TCMS Inspector.
- 3.1.12 Contractor responsible for retrofitting panels where equipment of different sizes or shapes to be mounted. Covering plates (Contractor responsibility) and mounting arrangements to be approved by the TA before installation. Any modifications to existing panel doors to be similar in standard, material, design, strength, mounting and coated with the same standard and color paint as per the existing access doors. All modifications shall be dealt with by 1379.
- 3.1.13 Existing transits and cable hangers may be reused on approval of chief engineer. Contractor responsible for any new cable hangers or transits needed. Contractor shall quote cost per new transit installation.
- 3.1.14 Contractor responsible for all new wiring, terminals, and enclosures as directed by Rolls Royce FSR.
- 3.1.15 All new and disturbed steelwork is to be protected with 2 coats of primer.
- 3.1.16 All cables shall be tagged with circuit identification at all points of connection and on both sides of bulkheads, decks and barriers. The tags will be metal, compatible with the cable sheath and shall have a circuit designation embossed thereon. Both ends of the tag shall be secured to the cable with metal tape or metal ty-raps. The wire Identification

## **L-05 Tow Winch Controls / Tensioner Upgrade RR**

numbering philosophy for the new wiring shall be compatible with that utilized with the existing systems.

### **3.2 Location**

3.2.1 Wheelhouse

3.2.2 Tow Winch Room

### **3.3 Interferences**

**3.3.1** Any interference items that need to be removed are the responsibility of the contractor. Contractor is responsible for the temporary removal, storage and refitting to vessel of all equipment previously identified. No Equipment/wiring or interference items to be removed without prior approval from TA.

## **Part 4: PROOF OF PERFORMANCE:**

### **4.1 Inspection**

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

**4.1.2** All cabling and installations to be to the acceptance of attending TCMS inspector and Chief Engineer

### **4.2 Testing**

**4.2.1** Rolls Royce FSR to test complete system to ensure proper operation of functions to the satisfaction of the Chief Engineer and attending TCMS inspector.

### **4.3 Certification**

**4.3.1** Proof of certification of authorized Rolls Royce FSR to be provide

**4.3.2** Proof of proper certification / training of all other personnel to be made available on request

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

**5.1.1** 3 hard copies and 1 Electronic copy of the following  
As fitted drawings in electronic Cad format as well as hard copy

### **5.2 Spares**

N/A

### **5.3 Training**

## **L-05 Tow Winch Controls / Tensioner Upgrade RR**

Contractor to allow services of FSR to provide for 2 - 8 hour days of training for ships crew for correct operation and maintenance of system.

## L-06 Bow Thruster Breaker and Controls Installation

Spec item #: L-06	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-06 Bow Thruster Breaker and Controls Installation</b>		

### Part 1: SCOPE:

- 1.1 The intent of this item shall be install the New Bow Thruster controls hardware and ABB Breaker.
- 1.2 The contractor shall make an allowance of \$25,000 to arrange the field service representation of Avalon Controls Limited (ACL) –ABB representative that began this work in Refit 2016 to carry out the replacements with new owner supplied components and hardware.
- 1.3 The Contractor shall quote on 60 hours to assist Avalon Controls Service Technician.

### Part 2: REFERENCES:

#### 2.1 Nameplate Data

2.1.1

#### 2.2 Standards

2.2.1 TP-127E Electrical Rules/Regulations, and Canadian Electrical Code

2.2.2 TCMS survey requirements for electrical machinery.

2.2.3 Ships ISM Lockout

#### 2.3 Regulations

2.3.1 Approved by TCMS

#### 2.4 Owner Furnished Equipment

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

### Part 3: Technical Description:

#### 3.1 General

- 3.1.1 The Service Technician shall be responsible for installation and commissioning of all components.
- 3.1.2 The ACL Technician shall oversee the existing controls demolition and new hardware installation including PLC, contactors and faulty control transformer replacement
- 3.1.3 The ACL Technician shall remove the old breaker and install new owner supplied ABB breaker with custom flexible copper bus. In addition, installation of custom Phonelic mounting base for retrofit to existing cabinet, Allen Bradley Safety Contactor C/W mounting materials and wiring. All components are owner supplied.
- 3.1.4 The ACL Technician shall perform system start up and commissioning plus power

## **L-06 Bow Thruster Breaker and Controls Installation**

analysis of motor operation.

### **3.2 Locations**

#### **3.2.1 Bow Thruster Compartment**

### **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 completed 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** All reports from the work specified shall be Given to the Chief Engineer.

### **5.2 Spares**

## L-07 GMDSS Replacement

Spec item #: L-07	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-07 GMDSS Replacement</b>		

### Part: 1 SCOPE:

**1.1** The intent of this specification is for the removal of the existing Sailor 2000 Series Global Maritime Distress and Safety System for A3 International and replace with new **owner supplied** Sailor 6000 series Global Maritime Distress and Safety System for Sea Area A3 International operation.

**1.2** Contractor shall supply all materials, and parts required to perform the specified work unless otherwise stated.

### Part: 2 REFERENCES:

#### 2.1 Guidance Drawings

<b>Drawing Number</b>	<b>Description</b>	<b>Electronic Number</b>
60102401	CCGS Sir Wilfred Grenfell Antenna Arrangement	
60109401	CCG Sir Wilfred Grenfell A3 Domestic GMDSS Overall Diagram	
60109301	CCG Sir Wilfred Grenfell A3 Domestic GMDSS Wiring Diagram	
60109201	CCG Sir Wilfred Grenfell A3 Domestic GMDSS VHF Wiring Diagram	
60102001	CCGS Sir Wilfred Grenfell Sailor VHF-FM Cabling Diagram	
Preliminary	CCGS Sir Wilfred Grenfell Sea Area A3 International	

## L-07 GMDSS Replacement

	GMDSS Block Diagram External Wiring	
Preliminary	CCGS Sir Wilfred Grenfell Sailor 6391 Navtex Block Diagram	
Preliminary	CCGS Sir Wilfred Grenfell Sailor 6222 VHF DSC Block Diagram	
	BGR Series 19” Gangable Enclosures	

### 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.

### 2.3 Regulations

- 2.3.1 Canada Shipping Act, 2001
- 2.3.2 Ship Station (Radio) Regulations 1999
- 2.3.3 Ship Station (Radio) Technical Regulations 1999

## 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.

## **L-07 GMDSS Replacement**

- 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** 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.
- 3.1.6** All cabling shall follow existing cable trays throughout the vessel where fitted. Once installed, all cabling shall be secured as per TP127. Contractor shall re-use existing cable penetrations and repack with LRS approved products. Any cable penetrations that are deemed not reusable by the contractor will be replaced and installed with new glands of an approved type and dealt with by a 1379.
- 3.1.7** The contractor shall dispose of all cables that have been identified for removal below and in the reference drawings attached. Contractor shall start the cable removal from the equipment side to eliminate any discrepancies from the antenna arrangement diagram.
- 3.1.8** 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/tagout procedure.
- 3.1.9** Electrical isolations for AC & DC power are as follows.
- 3.1.9.1** GMDSS Pony Panel Electronics Equipment Room Emergency Generator Room
- 3.1.9.2** DC4-2 Sailor VHF-FM (A)
- 3.1.9.3** DC4-5 Sailor VHF-FM (B)
- 3.1.10** Electrical isolation for DC power, contractor must disconnect directly from the GMDSS batteries located in the GMDSS Battery Box located on Wheelhouse Top and ensure it is properly isolated prior to commencing any work for this specification.
- 3.1.11** Upon final installation, testing shall be carried out as per Section 4.2 of this specification item.

## L-07 GMDSS Replacement

**3.1.12** Contractor shall disconnect and remove all of the existing equipment and cabling associated with the GMDSS system as detailed in reference drawings 60109401, 60109301, 60109201, and 60102001, and equipment accompanied in the tables below. It would be recommended to start the cable removal from the equipment side to eliminate any discrepancies from the antenna arrangement drawing.

### 3.1.13 Equipment Removal

<b>Equipment</b>	<b>Location</b>
N1674 Battery Charger	Electronics Equipment Room under Nav. Bridge Deck
H2096B Power Supply	Electronics Equipment Room under Nav. Bridge Deck
N2161 Power Supply for 250 Watt Transceiver	Electronics Equipment Room under Nav. Bridge Deck
T2130 250 Watt Transceiver	Electronics Equipment Room under Nav. Bridge Deck
AT2110 Antenna Tuning Unit	Lower Nav. Bridge Port Side in Deckhead
GMDSS Three (2) Bay Console	Upper Nav. Bridge Port Side
H1252B Printer	Upper Nav. Bridge Port Side
Monitor & Keyboard GMDSS Console	Upper Nav. Bridge Port Side
Inmarsat-C Antenna	Main Mast top yardarm starboard side
Skanti VHF Transceiver	Electronics Equipment Room under Nav. Bridge Deck
Skanti DU 3000 DSC Receiver	Upper Nav. Bridge Port Side
Skanti VHF Handset	Upper Nav. Bridge Port Side
Skanti Loudspeaker	Upper Nav. Bridge Port Side
Navtex Receiver	Lower Nav. Bridge Chart Table
Sailor N163 Power Supply "A"	Electronics Equipment Room under Nav. Bridge Deck
Sailor N163 Power Supply "B"	Electronics Equipment Room under Nav. Bridge Deck
Sailor RT-146 "A" VHF-FM Transceiver	Electronics Equipment Room under Nav. Bridge Deck
Sailor RT-146 "B" VHF-FM Transceiver	Electronics Equipment Room under Nav. Bridge Deck
Sailor C409 Control Unit #1 "A" & H410 Remote Control Unit	Electronics Equipment Room under Nav. Bridge Deck
Sailor C409 Control Unit #1 "B" & H410 Remote Control Unit	Electronics Equipment Room under Nav. Bridge Deck
Sailor C409 Control Unit #2 "A" & H410 Remote Control Unit	Upper Nav. Bridge Port Side
Sailor C409 Control Unit #3 "A" & H410 Remote Control Unit	Upper Nav. Bridge Center Console

## L-07 GMDSS Replacement

Sailor C409 Control Unit #4 "A" & H410 Remote Control Unit	Upper Nav. Bridge Starboard Side
Sailor C409 Control Unit #5 "A" & H410 Remote Control Unit	Lower Nav. Bridge Starboard Side
Sailor C409 Control Unit #6 "A" & H410 Remote Control Unit	Lower Nav. Bridge Center Console
Sailor C409 Control Unit #7 "A" & H410 Remote Control Unit	Lower Nav. Bridge Port Side
Sailor C409 Control Unit #2 "B" & H410 Remote Control Unit	Upper Nav. Bridge Port Side
Sailor C409 Control Unit #3 "B" & H410 Remote Control Unit	Upper Nav. Bridge Center Console
Sailor C409 Control Unit #4 "B" & H410 Remote Control Unit	Lower Nav. Bridge Center Console
Two (2) 19" racks	Lower Nav. Bridge

### 3.1.14 Cable Removal

Cable Number Type Label	From	To	Total Length (m)
1 Control Belden 9261	T2130 250 W Transceiver Electronic Equipment Room under Nav. Bridge	250 W Antenna Tuning Unit AT2110 Lower Nav. Bridge Port Side Deckhead	20
2 RF Cable RG-214	T2130 250 W Transceiver Electronic Equipment Room under Nav. Bridge	250 W Antenna Tuning Unit AT2110 Lower Nav. Bridge Port Side Deckhead	20
3 RF Cable LMR-400	GMDSS Console Upper Nav. Bridge Port Side	Inmarsat-C Antenna top of Main Mast starboard yardarm	20
? RF Cable RG-214	GMDSS Console Upper Nav. Bridge Port Side	Main Mast	20
5 RF Cable RG-214	GMDSS Console Upper Nav. Bridge Port Side	Wheelhouse Top Forward Center	10
? RF Cable RG-214	Skanti VHF Transceiver Electronics Equipment Room	Main Mast	25
6 RF Cable RG-58	T2130 250 W Transceiver Electronics Equipment Room under Nav. Bridge	GMDSS Console Upper Nav. Bridge Port Side	5
7	T2130 250 W Transceiver	GMDSS Console Upper Nav.	5

## L-07 GMDSS Replacement

Control Belden 9261	Electronics Equipment Room under Nav. Bridge	Bridge Port Side	
8 RF Cable RG-58	T2130 250 W Transceiver Electronics Equipment Room under Nav. Bridge	GMDSS Console Upper Nav. Bridge Port Side	5
9 DC Power	T2130 250 W Transceiver Electronics Equipment Room	N2161 Power Supply Electronics Equipment Room	1
10 DC Power	N1674 Battery Charger Upper Nav. Bridge Port Side under GMDSS Console	H2096B Power Supply Electronics Equipment Room	5
11 DC Power	H2096B Power Supply Electronics Equipment Room	GMDSS Console Upper Nav. Bridge Port Side	5
13 Control	N1674 Battery Charger Upper Nav. Bridge Port Side under GMDSS Console	GMDSS Console Upper Nav. Bridge Port Side	2
15 DC Power	N1674 Battery Charger Upper Nav. Bridge Port Side	Skanti VHF Transceiver Electronics Equipment Room	5
17 AC Power	N1674 Battery Charger Electronics Equipment Room	GMDSS AC Pony Panel Electronics Equipment Room	5
?	Skanti VHF Transceiver Electronics Equipment Room	Loudspeaker GMDSS Console Upper Nav. Bridge Port side	5
?	Skanti VHF Transceiver Electronics Equipment Room	GMDSS Console Upper Nav. Bridge Port Side	5
S-VHF (A)-1 DC Power	Sailor N163 Power Supply Electronics Equipment Room	Upper Nav. Bridge Center Console	5
S-VHF (A)-3 RF RG-213/U	Sailor RT-146 VHF Transceiver Electronics Equipment Room	Upper Nav. Bridge Center Console	5
? RF	Upper Nav. Bridge Center Console	Main Mast	25
S-VHF (A)-6 Control	Electronics Equipment Room Sailor Rt-146	Upper Nav. Bridge Port Wing	10
S-VHF (A)-8 Control	Upper Nav. Bridge Port Wing	Upper Nav. Bridge Center Console	5
S-VHF (A)- 10	Upper Nav. Bridge Center Console	Upper Nav. Bridge Starboard Wing	5
S-VHF (A)-	Upper Nav. Bridge Starboard	Lower Nav. Bridge Starboard	10

## L-07 GMDSS Replacement

12	Wing	Wing	
S-VHF (A)-14	Lower Nav. Bridge Starboard Wing	Lower Nav. Bridge Center Console	8
S-VHF (A)-16	Lower Nav. Bridge Center Console	Lower Nav. Bridge Port Wing	8
S-VHF (B)-1 DC Power	Sailor N163 Power Supply Electronics Equipment Room	Lower Nav. Bridge Center Console	5
S-VHF (B)-3 RF RG-213/U	Sailor RT-146 VHF Transceiver Electronics Equipment Room	Lower Nav. Bridge Center Console	5
? RF	Lower Nav. Bridge Center Console	Main Mast	30
S-VHF (B)-6 Control	Electronics Equipment Room	Upper Nav. Bridge Port Wing	10
S-VHF (B)-8 Control	Upper Nav. Bridge Port Wing	Upper Nav. Bridge Center Console	8
S-VHF (B)-10 Control	Upper Nav. Bridge Center Console	Lower Nav. Bridge Center Console	8

**3.1.15** Contractor shall install a **new owner** supplied Sailor 6000 Series GMDSS equipment for Sea Area A3 International, as detailed in reference drawings and as per manufacturer's installation instructions. The equipment list is shown below. Locations to be finalized prior to installing and mounting new equipment.

### 3.1.16 Equipment List

Equipment	Location
Sailor 6333A GMDSS Console Three (3) bay (pre-wired)	Upper Nav. Bridge Port Side
Sailor 6363 MF/HF DSC Class A 250 Watt Transceiver	Electronics Equipment Room under Nav. Bridge
Sailor 6381 Antenna Tuning Unit	Lower Nav. Bridge Port Side Deckhead
Sailor 6081 AC/DC Power Supply Unit and Charger #1	Electronics Equipment Room under Nav. Bridge
Sailor 6081 AC/DC Power Supply Unit and Charger #2	Electronics Equipment Room under Nav. Bridge
Sailor 3027 Mini-C Antenna	Main Mast top yardarm port side
Sailor 6090 #2 Power Converter	Upper Nav. Bridge inside Center Console

## L-07 GMDSS Replacement

	Starboard Side
Sailor 6222 VHF #2 c/w Sailor 6201 Handset #2	Upper Nav. Bridge Center Console Starboard Side flush mounted
Battery Junction Box	Upper Nav. Bridge Port Side under GMDSS Console
Sailor 6208 Connection Box #1	Upper Nav. Bridge mounted inside Center Console Starboard Side
Sailor 6208 Connection Box #2	Upper Nav. Bridge mounted inside Starboard Wing Console
Sailor 6204 Remote #1	Upper Nav. Bridge Starboard Wing Window Ledge
Sailor 6208 Connection Box #3	Upper Nav. Bridge mounted inside Port Wing Console
Sailor 6204 Remote #2	Upper Nav. Bridge Port Wing Window Ledge
Sailor 6208 Connection Box #4	Lower Nav. Bridge Starboard Side inside Wing Console
Sailor 6204 Remote #3	Lower Nav. Bridge Starboard Side Window Ledge
Sailor 6208 Connection Box #5	Lower Nav. Bridge Port Side inside Wing Console
Sailor 6204 Remote #4	Lower Nav. Bridge Port Side Window Ledge
Sailor 6208 Connection Box #6	Upper Nav. Bridge Port Side under GMDSS Console
Sailor 6208 Connection Box # 7	Electronics Equipment Room next to the Sailor 6363 Transceiver
Sailor 6390 Navtex Receiver	Upper Nav. Bridge Port Side under GMDSS Console
Sailor 6004 Navtex Display	Lower Nav. Bridge Chart Table Shelf
Navtex A159 Antenna	Main Mast 4 <sup>th</sup> Platform from top Starboard Side (Spare mount)
Sailor 6222 VHF #3 c/w Sailor 6201 Handset #3	Lower Nav. Bridge Port Center Console flush mounted
Sailor 6090 Power Converter #3	Lower nav. Bridge Port Center Console mounted inside
Sailor 6208 Connection Box #8	Lower Nav. Bridge Port Center Console mounted inside
Sailor 6208 Connection Box #9	Lower Nav. Bridge Port Wing Console mounted inside
Sailor 6204 Remote #5	Lower Nav. Bridge Port Wing Window Ledge
Sailor 6208 Connection Box #10	Lower Nav. Bridge Starboard Wing mounted inside console
Sailor 6204 Remote #6	Lower Nav. Bridge Starboard Wing

## L-07 GMDSS Replacement

	window ledge
Sailor 6208 Connection Box #11	Upper Nav. Bridge Port Wing mounted inside console
Sailor 6204 Remote #7	Upper Nav. Bridge Port Wing window ledge
Sailor 6208 Connection Box #12	Upper Nav. Bridge Starboard Wing mounted inside console
Sailor 6204 Remote #8	Upper Nav. Bridge Starboard Wing window ledge
VHF #3 DSC Receive Antenna	Mounted on new post on Monkey's Island Starboard Side
VHF #3 Transmit/Receive Antenna	Mounted on new post on Monkey's Island Port Side

- 3.1.17** Contractor shall supply, install and terminate a suitable junction box to accommodate the GMDSS battery cables and cables from both Sailor 6081 Power Supply and Charger Units. Existing cables labelled 20, 14, & 12 will be reused. Refer to Drawing # 60109401.
- 3.1.18** Contractor shall be responsible to fabricate and install two (2) new plates to accommodate the space of the two (2) new Sailor 6222 VHF's in the Upper Nav. Bridge Center Console Starboard Side and in the Lower nav. Bridge Center Console Port Side. New plates shall be primed and painting to match the existing console. All mounting hardware shall be of stainless steel.
- 3.1.19** Contractor shall be responsible for the fabrication and installation of two (2) new antenna mounts that will be approximately 6' in length of 2 1/2" Schedule 40 steel pipe. The mounts will be mounted on Monkey's Island Port and Starboard Side forward.
- 3.1.20** The contractor shall work in conjunction with a Coast Guard Electronic Technician to oversee the old equipment and cabling removal and 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.
- 3.1.21** All electronic components removed from the vessel resulting from the performance of this specification shall be safely stored and returned to the owner as these components shall be used to service similar systems on CCG vessels.
- 3.1.22** Contractor shall install new console on new table top taking note of the access for cables at the rear. Contractor shall follow template to cut access for external cabling as shown in reference drawings in Sailor 6000 Series GMDSS Console manual.

## L-07 GMDSS Replacement

- 3.1.23** Contractor shall be responsible for the supply, fabrication, and installation of a new antenna mount for the new A159 Active NAVTEX Antenna as per manufacturer's recommendations as referenced in manual.
- 3.1.24** Contractor shall be responsible for the priming and painting of any surfaces that were disturbed to match existing.
- 3.1.25** Contractor shall supply and install AC and DC power cabling as detailed in reference drawings and in table below. Contractor responsible for termination of AC power in panels.
- 3.1.26** Contractor shall install owner supplied cabling for the RF and interconnection associated with the GMDSS system as detailed in reference drawings and according to manufacturer's installation manuals. The cable list is shown below.
- 3.1.27** All cable terminations will be conducted by CCG Technicians.

### 3.1.28 Cable List

Cable Label	Cable Type	From	To	Signal	Length (m)
GMD-1	LMR-400 UF-FR RF Coaxial Cable	Sailor 6363 250 W Transceiver Electronics Equipment Room under Nav. Bridge	Lower Nav. Bridge Starboard Side Deck Head (#41)	RF	20
GMD-2	LMR-400 UF-FR RF Coaxial Cable	Sailor 6363 250 W Transceiver Electronics Equipment Room under Nav. Bridge	Lower Nav. Bridge Port Side Deck Head (#40)	RF	20
GMD-3	LMR-400 UF-FR RF Coaxial Cable	Upper Nav. Bridge Port Side GMDSS Console	Main Mast VHF DSC #1 Antenna (#6) (Location will be determined when old cable removed)	RF	20
GMD-4	LMR-400 UF-FR RF Coaxial Cable	Upper Nav. Bridge Port Side GMDSS Console	Main Mast VHF TX/RX #1 Antenna (#5) (Location will be determined when old cable removed)	RF	20
GMD-5	Factory Cable	Upper Nav. Bridge Port Side GMDSS	Main Mast Top Yardarm Port (#4)	CAN-BUS	25

## L-07 GMDSS Replacement

		Console			
GMD-6	LMR-400 UF-FR RF Coaxial Cable	Upper Nav. Bridge Center Console Starboard Side Sailor 6222 VHF #2	Main Mast VHF DSC #2 Antenna (#10) (Location to be determined when old cable removed)	RF	25
GMD-7	LMR-400 UF-FR RF Coaxial Cable	Upper Nav. Bridge Center Console Starboard Side Sailor 6222 VHF #2	Main Mast VHF TX/RX #2 Antenna (#9) (Location to be determined when old cable removed)	RF	25
GMD-8	Belden 9389	Sailor 6363 250 W Transceiver Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	CAN- BUS	10
GMD-9	Belden 1300SB	Sailor 6363 250 W Transceiver Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	Cat5e (LAN)	10
GMD-10	3C #10 AWG Marine Shielded	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-11	Marine 3C #10 AWG Shielded	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-12	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-13	Marine 3C #14 AWG	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10

## L-07 GMDSS Replacement

	Shielded	under Nav. Bridge			
GMD-14	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-15	Belden 1300SB	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	Cat5e (LAN)	10
GMD-16	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-20	3C #10 AWG Marine Shielded	Sailor 6081 Power Supply and Charger #2 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-21	3C #10 AWG Marine Shielded	Sailor 6081 Power Supply and Charger #2 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Center Console Starboard Side Sailor 6222 VHF #2	DC Power	10
GMD-22	Belden 1300SB	Sailor 6081 Power Supply and Charger #2 Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	Cat5e (LAN)	10

## L-07 GMDSS Replacement

GMD-23	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #2  Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-24	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #2  Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-25	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #2  Electronics Equipment Room under Nav. Bridge	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
GMD-26	Belden 1300SB	Upper Nav. Bridge Port Side GMDSS Console	Upper Nav. Bridge Center Console Starboard Side Sailor 6222 VHF #2	Cat5e (LAN)	10
GMD-31	Belden 9389	Sailor 6222 VHF #2 Upper Nav. Bridge Center Console Starboard	Upper Nav. Bridge Starboard Wing Console	CAN- BUS	10
GMD-32	Belden 9389	Upper Nav. Bridge Starboard Wing Console	Upper Nav. Bridge Port Wing Console	CAN- BUS	15
GMD-33	Belden 9389	Sailor 6222 VHF #2 Upper Nav. Bridge Center Console Starboard	Lower Nav. Bridge Starboard Wing Console	CAN- BUS	20

## L-07 GMDSS Replacement

GMD-34	Belden 9389	Lower Nav. Bridge Starboard Wing Console	Lower Nav. Bridge Port Wing Console	CAN- BUS	15
GMD- PWR-1	Marine 3C #14 AWG Shielded	GMDSS Pony Panel Electronics Equipment Room	Sailor 6081 Power Supply and Charger #1 Electronics Equipment Room	AC Power	5
GMD- PWR-2	Marine 3C #14 AWG Shielded	GMDSS Pony Panel Electronics Equipment Room	Sailor 6081 Power Supply and Charger #2 Electronics Equipment Room	AC Power	5
NAVTEX -PWR	Marine 3C #14 AWG Shielded	Sailor 6081 Power Supply and Charger #2  Electronics Equipment Room	Upper Nav. Bridge Port Side GMDSS Console	DC Power	10
NAVTEX -ANT	LMR-400 UF-FR RF Coaxial Cable	Upper Nav. Bridge Port Side GMDSS Console	Main Mast 4 <sup>th</sup> yardarm from top starboard side (#55) (Spare mount)	RF	20
VHF3-1	LMR-400 UF-FR RF Coaxial Cable	Lower Nav. Bridge Center Console Port Sailor 6222 VHF #3	Wheelhouse Top Monkey's Island Starboard Side VHF DSC #3 Antenna (#54)	RF	25
VHF3-2	LMR-400 UF-FR RF Coaxial Cable	Lower Nav. Bridge Center Console Sailor 6222 VHF #3	Wheelhouse Top Monkey's Island Port Side VHF TX/RX #3 Antenna (#53)	RF	25
VHF3-3	Belden	Lower Nav. Bridge Center Console	Upper Nav. Bridge Port Side GMDSS	Cat5e	15

**L-07 GMDSS Replacement**

	1300SB	Sailor 6222 VHF #3	Console	(LAN)	
VHF3-4	Belden 9389	Lower Nav. Bridge Center Console Sailor 6222 VHF #3	Lower Nav. Bridge Port Wing Console	CAN- BUS	10
VHF3-5	Belden 9389	Lower Nav. Bridge Port Wing Console	Lower Nav. Bridge Starboard Wing Console	CAN- BUS	15
VHF3-6	Belden 9389	Lower Nav. Bridge Center Console Sailor 6222 VHF #3	Upper Nav. Bridge Port Wing Console	CAN- BUS	15
VHF3-7	Belden 9389	Upper Nav. Bridge Port Wing Console	Upper Nav. Bridge Starboard Wing Console	CAN- BUS	15

**3.1.29** For the purpose of adjustment, the contractor shall include a unit cost per meter of each type cable installed.

**3.1.30** Contractor shall be responsible for all AC and DC power terminations in associated panels.

**3.1.31** Contractor shall fabricate and install new mounting base to accommodate two (2) new owner supplied racks on the Lower Navigation Bridge Deck where the existing racks are now located. The contractor shall refer to reference drawings provided for the dimensions of the racks. The material should match the existing composite material. CCG Technicians will be responsible for the removal and reinstallation of the equipment located in the racks.

**3.1.32** Contractor shall be responsible for the removal and disposal of the two (2) existing racks.

**3.1.33** Contractor shall be responsible for priming and painting of the new base to match the new racks.

**3.1.34** Contractor shall be responsible for the mounting of the two (2) new owner supplied racks.

## **L-07 GMDSS Replacement**

**3.1.35** The area for the new base will be determined on site with technical authority.  
The new racks shall be fitted to allow space between the racks and bulkhead.

### **3.2 Location**

**3.2.1** Upper and Lower Navigating Bridge Deck

**3.2.2** Wheelhouse Top

**3.2.3** Main Mast

**3.2.4** Monkey's Island

### **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 of delegate and the attending surveyor if applicable.

### **4.2 Testing**

**4.2.1** The commissioning of the new GMDSS system shall be done under direction of an approved FSR and in accordance with the manufacturers approved procedures.  
This will be arranged by CCG personal.

**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 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.

**4.2.4** All cable testing shall be verified by a Coast Guard Technician.

**4.2.5** Contractor responsible to ensure new AC/DC circuits be proven operational.

### **4.3 Certification**

N/A

## **Part: 5 DELIVERABLES:**

### **5.1 Drawings/Reports**

## **L-07 GMDSS Replacement**

**5.1.1** Contractor shall provide the Technical Authority with a report of the contractors work in both electronic and hardcopy formats outlining the details of the inspections and any alterations/repairs prior to the acceptance of this item.

### **5.2 Spares**

N/A

### **5.3 Training**

N/A

### **5.4 Manuals**

N/A

## L-08 Autopilot Replacement

Spec item #: L-08	<b>SPECIFICATION</b>	TCMSB Field #:
<b>L-08 Autopilot Replacement</b>		

### PART 1: SCOPE:

1.1 The intent of this specification is for removal of the existing Sperry Gyropilot and the installation of a new Navipilot 4000 System.

1.2 This work shall be carried out in Conjunction with the following specifications:

1.2.1 Steering Control System Upgrade

1.3 Contractor shall supply all materials, 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

#### 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

#### 2.3 Regulations

2.3.1 Canada Shipping Act, 2001

#### 2.4 Owner Furnished Equipment

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

## **L-08 Autopilot Replacement**

### **PART 3: TECHNICAL DESCRIPTION:**

#### **3.1 General**

- 3.1.1 The contractor shall supply all equipment, enclosures, ventilation, staging, chain falls, carnage, crane, 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 and transits 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:
  - 3.1.8.1.1 220 VAC Panel T1 Breaker # 16 Autopilot
  - 3.1.8.1.2 24 VDC Panel DC5 Breaker # 2 (Spare)
  - 3.1.8.1.3 24 VDC Panel DC5 Breaker # 3 (Spare)
- 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 Navipilot 4000 system to ensure compliance with

## L-08 Autopilot Replacement

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.

3.1.11 Contractor shall take note that all equipment will be disconnected by Coast Guard Electronic Technicians prior to removal.

3.1.12 Contractor shall remove the following equipment listed below in table.

### 3.1.13 Equipment Removal

Equipment	Location
Sperry Gyropilot	Upper Nav. Bridge Center Console
Sperry Helm (Wheel)	Upper Nav. Bridge Center Console

3.1.14 Contractor shall be responsible for mounting the following owner supplied equipment listed in table below.

### 3.1.15 Equipment List

Equipment	Location
Navipilot 4000 Control and Display Unit (CDU)	Upper Nav. Bridge Center Console (where existing Sperry Gyropilot located)
Steering Control Unit #1	Upper Nav. Bridge inside Center Console on Port Side of divider
Steering Control Unit #2	Upper Nav. Bridge inside Center Console on Stbd Side of divider
CAN-BUS Interface Unit	Upper Nav. Bridge inside Center Console on bulkhead Port Side
Power Supply #1	Upper Nav. Bridge inside Center Console on bulkhead Port Side
Power Supply #2	Upper Nav. Bridge inside Center Console on bulkhead Starboard Side

3.1.16 Contractor shall be responsible to supply and install new mounting plate of 3/16" Aluminum of dimensions 14" by 10" to fill the space left by the old Gyropilot and to flush mount the new Navipilot 4000 CDU. All mounting hardware should be 316 Grade Stainless Steel. New plate shall be primed and painted to match existing console.

3.1.17 Contractor shall be responsible to provide and install an appropriate method of mounting both Steering Control Units (SCU #1 & #2) inside the Center Console in the Upper Nav. Bridge.

3.1.18 Contractor shall be responsible for the supply and installation of cables listed in table below. All cable runs shall follow existing cable ways.

## L-08 Autopilot Replacement

3.1.19 Contractor shall provide a unit cost per supply / installation of a meter of cable listed below.

### 3.1.20 Cable List

Cable Label	Cable Type	From	To	Signal	Length (m)
AP-PWR-SCU1	Belden-M 9312	Panel DC5 Breaker # 2 (F2) Upper Nav. Bridge Center Console Stbd	Upper Nav. Bridge Center Console to SCU #1 located in center of Center Console	DC Power	5
AP-PWR-SCU2	Belden-M 9312	Panel DC5 Breaker # 3 (F3) Upper Nav. Bridge Center Console Stbd	Upper Nav. Bridge Center Console to SCU #2 located in center of Center Console	DC Power	5
AP-PWR-MAIN-AC1	Marine Shielded AC Cable (12/3)	Rolls Royce Motor Controller #1 Steering Gear Compartment	Upper Nav. Bridge Center Console Power Supply #1	AC Power	75
AP-PWR-EMERG-AC1	Marine Shielded AC Cable (12/3)	Rolls Royce Motor Controller #2 Steering Gear Compartment	Upper Nav. Bridge Center Console Power Supply #1	AC Power	75
AP-PWR-MAIN-AC2	Marine Shielded AC Cable (12/3)	Rolls Royce Motor Controller #3 Steering Gear Compartment	Upper Nav. Bridge Center Console Power Supply #2	AC Power	75
AP-PWR-EMERG-AC2	Marine Shielded AC Cable (12/3)	Rolls Royce Motor Controller #4 Steering Gear Compartment	Upper Nav. Bridge Center Console Power Supply #2	AC Power	75
AP-CTRL-DATA1	8C 16 AWG Shielded (Marine)	Upper Nav. Bridge Center Console SCU #1	Rolls Royce Steering Cabinet #1	DATA	20
AP-CTRL-DATA2	8C 16 AWG Shielded (Marine)	Upper Nav. Bridge Center Console SCU #2	Rolls Royce Steering Cabinet #2	DATA	20

## L-08 Autopilot Replacement

AP-HDT-1	Belden 9328	Upper Nav. Bridge Center Console SCU #1	Electronics Equipment Room Gyro Switch- Over-Unit	DATA	10
AP-HDT-2	Belden 9328	Upper Nav. Bridge Center Console SCU #2	Electronics Equipment Room Gyro Switch- Over-Unit	DATA	10
AP-LOG-1	Belden 9328	Upper Nav. Bridge Center Console SCU #1	Electronics Equipment Room Speed Log Electronics Unit	DATA	10
AP-LOG-2	Belden 9328	Upper Nav. Bridge Center Console SCU #2	Electronics Equipment Room Speed Log Electronics Unit	DATA	10

### 3.2 Location

- 3.2.1 Navigation Bridge Deck
- 3.2.2 Steering Flat

### 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 of 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.

## **L-08 Autopilot Replacement**

- 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

## Annex A &B

Spec item #:	SPECIFICATION	TCMSB Field #:
<b>ANNEX A</b>		

### Drawings

Auto Pilot and GMDSS dwg pkg  
Bilge and Ballast Diagram 72-751  
Capacity Plan 72-405  
Docking Plan: # NJC-10-106  
Decks and Stringers 37-00404  
Deck Coverings H64 # 37-113-R  
Exhaust Uptake Arrangement # 37-04209 M-18  
Funnels, Port & Stb #37-01031 H-42  
General Arrangement NJC-10-100  
HVAC Dwgs 4309-030-001 rev C  
HVAC Drawing: NJC - 70 - 200  
Insulation Plan (H60) 37-109-R  
Joiner Bulkheads and linings 37-105-R (H57)  
Joiner Systems Drawings (Weather tight doors and Lloyds certs)  
Joiner Systems Drawings A-60 Doors c/w TC Certs  
Joiner Porthole Replacement Drawing c/w A-60 Cert  
Joiner Systems Drawing Hatches Guidance Drawings 160358-001  
Kongsberg Pressure transmitter Installation dwg 359486  
Manhole Arrangement 37-11052-01  
Rudder and rudderstock (sheets 1-3) 37-01049  
Shell and Framing Expansion NJC-11-100  
SW Circulating Arrangement NJC-64-200  
Scuppers & Drains Diagram # 37-04239 Sh. 1 of 2  
Ventilation dwg NJC 70-200  
Window Arrangement and List (H65) 37-120-R  
Window Plan and List (H125) 37-07120  
Wheelhouse Structure Modifications # 37-500R.

### Manuals

Brattvaag Manual DRG. # 27237, 23927 & 111-042(hydraulic motor) Ref Drwg # 23927  
Brattvaag Winch System A06282  
Bronswerk HVAC 4309-1 Installation manual  
Lohmann+Stolterfoht Type: Pneumaflex KA Model: KAA 280  
Nortec Humidifer Installation manual  
RWO Veolia Separating System Manual  
SBG Hydraulic Technical Manual  
Stern Thruster ULSTEIN Type: 150 TV-A manual  
Tenfjord Type 12M260/2GM435-FU Manual  
WAUKESHA-LIPS manual

## **Annex A &B**

### **Reports**

Eastern Technical Services - UT Report No. 16-449, dated 17 June 2016

Eastern Tech Report 16-725 (MCR and Main deck)

## Annex A &B

Spec item #:	SPECIFICATION	TCMSB Field #:
<b>ANNEX B</b>		

### Technical

Installation of A-60 Fire Doors IM-126

Welding of Steel Windows and Shutters IBH-024

Sir Wilfred Grenfell Tow Winch Technical Overview AMS-DMB/16/0194 , project 16s000375

Sir Wilfred Grenfell Technical Overview Steering gear upgrade UTF010553

Poseidon Marine Consultant's Refrigeration Plant access SOW

### Product Data

Amercoat Product Data/Application Instructions

Marine fire classifications on Gislaved Quality 1320

Polyflor XL PU with DNV Certificate

Styccobon F44 TDS May 14

Wasser Moisture Cured Urethane Product Data/Application Instructions

Holdtight 102













