

# CCGS CAPE ROGER

## Annual Refit 2013

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## **PREAMBLE**

### **1. INTENT**

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

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

**Refit to start April 4/13 and end May 10/13.**

### **2. MANUFACTURER'S RECOMMENDATIONS**

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

### **3. TESTING AND RECORDS**

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

### **4. WORKMANSHIP**

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

### **5. FACILITIES**

Quotation is to include all the necessary parts, labor and equipment required for the erection of access staging, rigging, lighting, necessary crange, transportation and line handling.

During the entire Refit, the Contractor will maintain in a state of good order all walkways, scaffolding, ladders guardrails and similar appliances that are necessary for the safety of persons working or on business in the areas where work is in progress.

## **6. MATERIALS AND SUBSTITUTIONS**

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

## **7. TOOLS**

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

## **8. REMOVALS**

Any items of equipment to be removed and subsequently reinstalled in order to carry out work specified or 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.

## **9. EXPOSURE AND PROTECTION OF EQUIPMENT**

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

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

## **10. CLEANLINESS**

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

## **11. LIGHTING AND VENTILATION**

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

## **12. ASBESTOS**

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

## **13. ENTRY INTO ENCLOSED SPACES - CHEMIST'S CERTIFICATES**

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

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

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

The Contractor shall ensure that any work carried out in confined spaces as defined by the Canada Labor Code must comply fully with all provisions of the code and follow the Coast Guard Fleet Safety Manual Confined space entry 7.D.9 and 7.D.9 (N) Version 3 dated November 24, 2006.

## **14. HOTWORK**

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

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

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

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

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

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

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

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

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

## **16. PAINTING**

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

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

## **17. WELDING**

Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for Ferrous Materials, Revision 4. (TP6151 E)  
The Contractor shall be currently certified by the Canadian Welding Bureau (CWB) in accordance with CWB 47.1 latest revision Division I, II or III at the time of bid closing.

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

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

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

## **18. SMOKING**

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

## **19. RESTRICTED AREAS**

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

## **20. ELECTRICAL STANDARDS**

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

- (a) TP 127E-TC Marine Safety Electrical Standards.
- (b) IEEE Standard 45: Recommended Practice for Electrical Installation on Shipboard.

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

## **21. DRAWINGS**

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

## **22. FIRE DETECTION AND SUPPRESSION SYSTEM**

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

The Ship's Crew will perform any such work. The Contractor should note that failure to observe proper precautions while performing work of this nature could result in system malfunction and spontaneous discharge of FM-200, Halon or CO<sub>2</sub>.

## **23. ANNEX**

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

The Contractor shall be aware that the vessel is considered to be a Federal Work Place and thereby regulated by the Canada Labor Code. The Contractor shall comply with the work requirements as outlined in the Canada Labor Code and applicable Provincial Regulations.

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

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

An electronic copy of the Fisheries and Oceans Canada, Canadian Coast Guard Fleet Safety Manual (DFO 5737) - (Adobe Acrobat .PDF version) can be found at [http://142.130.14.20/fleet-flotte/Safety/main\\_e.htm](http://142.130.14.20/fleet-flotte/Safety/main_e.htm)

## **24. SUSPENSION OF WORK**

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

## **25. REGULATORY AUTHORITY INSPECTIONS**

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

## **26. VESSEL SECURITY**

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

## **27. WHMIS**

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

## **SHIP'S PARTICULARS**

Length O.A. 205' – 0"  
Length B.P. 187' – 0"  
Breadth Moulded 40' – 0"  
Depth Moulded Main Deck 18' – 0"  
Depth Moulded to Foscle Deck 26' – 0"  
Design Draft MLD. 13' – 3"  
Rise of Floor 1' – 6"  
Chamber (Parabolic) 0" – 10"  
Service Speed 15 Knots  
Complement 28 persons  
Vessel Type Fisheries Patrol

Spec item #: H-1	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>PRODUCTION CHART</b>		

**Part 1: SCOPE:**

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

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

2.1.1 N/A

**2.2 Standards**

2.2.1 N/A

**2.3 Regulations**

2.3.1 N/A

**2.4 Owner Furnished Equipment**

2.4.1 N/A

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

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

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

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

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

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

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

##### **4.1 Inspection**

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

##### **4.2 Testing**

**4.2.1** N/A

##### **4.3 Certification**

**4.3.1** N/A

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

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

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

##### **5.3 Training**

**5.3.1** N/A

##### **5.4 Manuals**

**5.4.1** N/A

Spec item #: H-2	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>SERVICES</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to supply and connect as specified, the necessary services to the vessel at the start of refit and to disconnect the same services at the completion of the repairs.
- 1.2 This work shall be carried out in conjunction with the entire refit period under the supervision of the Chief Engineer. The contractor shall supply all material and tools to the point of connection and quote on the cost of each individual service.

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

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

#### **3.1 General**

- 3.1.1** The Contractor shall include the cost to remove and dispose of Ten Thousand liters of oily water mixture and oil from engine sumps, sludge tanks, bilges, and fuel tanks to be cleaned. The Contractor must provide a quote per cubic meter for the removal of the oil water mixture to be adjusted up or down by PWGSC 1379 action.

#### **3.2 Location**

- 3.2.1** N/A

#### **3.3 Interferences**

- 3.3.1** N/A

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

#### **4.1 Inspection**

- 4.1.2.** All work shall be completed to the satisfaction of the Chief Engineer and TCMS Inspector.
- 4.1.3.** After the refit is finished, the contractor shall supply sufficient dock trials and sea trials to prove that all specification items that were worked on are operating properly and to the satisfaction of the Chief Engineer & TCMS.
- 4.1.4.** Trials shall consist of ahead and astern movements at various power levels.
- 4.1.5.** The contractor must have sufficient supervisory staff onboard to witness the operation of all machinery worked on during the refit and should quote on 8 hour trials.

#### **4.2 Testing**

- 4.2.1** N/A

#### **4.3 Certification**

- 4.3.1** N/A

**Part 5: DELIVERABLES:**

**5.1 Drawings/Reports**

**5.2.1** Contractor must supply the receipts from the waste management company for the amounts removed. These amounts will be adjusted up or down by PWGS 1379.

**5.2 Training**

**5.2.1** N/A

**5.3 Manuals**

**5.3.1** N/A

Spec item #: H-3	<b>SPECIFICATION</b>	TCMSB Field #: N/A
CLEANING OF THE HVAC & SANITARY FAN SYSTEM		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to open up and clean the entire HVAC ventilation systems on the vessel. There are three (3) decks: foosle, main and lower. The duct work from the dryer exhaust must also be thoroughly cleaned leading from the laundry room to the vent head outside. All sanitary exhaust duct work must be cleaned of lint and debris from all the washrooms, and discharge duct work to outside of the ship. The contractor shall verify the operation of all isolating valves, free up and lubricate.
- 1.2 All deficiencies shall be reported to the Chief Engineer as soon as they are found.
- 1.3 The contractor shall report to the Chief Engineer prior to any work commencing on this item, to ensure proper isolation of electrical fans and scheduling of different areas.

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

- 2.1.1 Reference drawing # 761/01 Accommodation Ventilation diagrams (3 shts).

**2.2 Standards**

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

- 2.4.1. The contractor shall supply all materials, equipment, labor and parts required to perform the specified work unless otherwise stated.
- 2.4.2. The contractor must include an allowance of \$1,000.00 to be adjusted up or down by PWGSC 1379 action for the repairing of damaged dampers and sealing leaks.

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

#### **3.1 General**

- 3.1.1. The contractor shall ensure ventilation fans are locked and tagged out prior to commencing work on any system. Once it is safe to do so, the ventilation system shall be opened up and thoroughly cleaned.
- 3.1.2 The contractor shall open and thoroughly clean the HVAC distribution box and all of the ducting internally from the distribution box to the diffusers in all of the spaces on all 3 decks. The contractor shall also internally clean all of the intake ducting to the distribution box.
- 3.1.3 The contractor shall clean the internal duct work for the laundry room dryer exhaust from the laundry room to the vent outside. The lint trap must be opened, thoroughly cleaned, and put back in good working order.
- 3.1.4 The contractor shall isolate and thoroughly clean the sanitary ventilation system commencing in all the washrooms, leading to the exhaust fan, and the discharge duct work from the exhaust fan to the outside of the ship. All the diffusers in the washrooms are to be thoroughly cleaned and disinfected prior to re-installation.
- 3.1.5 The Contractor shall ensure that all inspection covers, vent fixtures, louvers, access plugs, and diffusers that were removed for cleaning, are properly re-installed once the cleaning is complete. There shall be no plastic plugs installed and patches/plugs are to be made of metal of the same or heavier schedule as the duct work the patch is applied to.
- 3.1.6 Ducting shall be cleaned of all residue and dust buildup and then properly disposed of by the contractor.

#### **3.2 Location**

- 3.2.1. The HVAC unit is situated on the lower deck.
- 3.2.2. The laundry room is situated on the Main deck.

#### **3.3 Interferences**

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

**Part 4: PROOF OF PERFORMANCE:**

**4.1 Inspection**

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

**4.2 Testing**

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

4.2.2 The contractor shall check the operation of all isolating valves, free up and lubricate.

**4.3 Certification**

4.3.1 N/A

**Part 5: DELIVERABLES:**

**5.1 Drawings/Reports**

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

**5.2 Training**

5.2.1 N/A

**5.4 Manuals**

5.4.1 N/A

Spec item #: H-4	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>GALLEY EXHAUST FAN &amp; VENTILATION CLEANING</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to have the annual maintenance for the Galley Range Hood & exhaust ventilation completed (opened and cleaned).
- 1.2 This work shall be carried out in Conjunction with the operation of the galley and to have the item completed during a time to minimize the disruption in the galley. This time shall be between 1900 to 0500 hrs.
- 1.3 The contractor shall report to the Chief Engineer prior to any work commencing with this item.

**Part 2: REFERENCES:**

- 2.1 **Guidance Drawings/Nameplate Data**
  - 2.1.1 Drawing Ventilation Drawing. 761/01 3 shts.
- 2.2 **Standards**
  - 2.2.1 The galley ventilation can be a source for fire hazards and has to be cleaned in such a manner as to keep the possibility to a minimum. The contractor must adhere to the Ships ISM Hot-work, Confined Space, Fall protection, and Lockout procedures.
- 2.3 **Regulations**
  - 2.3.1 The cleaning practice used must be an approved method, and the waste must be disposed of in accordance to local regulations.
- 2.1 2.4 **Owner Furnished Equipment**
  - 2.4.1. The contractor shall supply all materials, equipment, labor, and parts required to perform the specified work unless otherwise stated.

**Part 3: TECHNICAL DESCRIPTION:**

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

- 3.1.2. The contractor shall open up and steam clean the exhaust ventilation trunking between the deck ventilator and the galley exhaust hood. The contractor shall remove the 3 grease filters and thoroughly clean the interior of the exhaust hood in the galley. The deck ventilator shall be steam cleaned.
- 3.1.3. The contractor shall make every reasonable effort to minimize the disruption in the galley while performing this item. The contractor shall thoroughly clean and sanitize the galley after the work has been completed and inspected by the Chief Engineer. The contractor shall make effort to complete this specification as soon as possible.
- 3.1.4. The contractor shall use a video camera to visually inspect the trunking after the cleaning is complete. Copy of CD shall be given to the Chief Engineer.
- 3.1.5. The contractor shall re-assemble all the components in good working order.

### **3.2 Location**

- 3.2.1. This system is located on the main deck in the galley area.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

### **4.2 Testing**

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

### **4.3 Certification**

- 4.3.1 N/A

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

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

**5.2 Training**

**5.2.1** N/A

**5.3 Manuals**

**5.3.1** N/A

Spec item #: H-5	<b>SPECIFICATION</b>	TCMSB Field #: N/A
PORT & STARBOARD MIRANDA DAVIT ANNUAL INSPECTION / REPAIR		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to have an annual inspection carried out by an FSR from the manufacturer- Schat Harding on both the Port & Starboard Miranda davits.
- 1.2 The contractor shall include in their quote for an allowance of \$5000.00 for the replacement of any parts required to complete this inspection / repair to be adjusted up or down by PWGSC 1379 action.
- 1.3 The contractor shall report to the Chief Engineer prior to any work commencing with this item.

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

- 2.1.1 Davit Type –Miranda MRT 3900, Schat-Harding Reference
- 2.1.2 Winch unit G/A M902624 & M903384.
- 2.1.3 Sectional Arrangement S711550.
- 2.1.4 Manual stored onboard the CCGS Cape Roger.

**2.2 Standards**

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

### **3.1 General**

- 3.1.1.** The contractor shall include in their bid a \$5000 allowance for the services of a Schat FSR to perform the following annual maintenance to be adjusted up or down by PWGSC 1379 action upon proof of invoice.
- 3.1.2.** The annual maintenance must be completed in accordance with SOLAS Chapter III, Regulation 20, Section 11.
- 3.1.3.** The Contractor shall lock out the Electric Motors as per ISM lockout procedure prior to work commencing on this item.
- 3.1.4.** The Gearbox shall be completely drained of oil (11 litres of EP 100) and properly disposed of by the contractor.
- 3.1.5.** The gearbox covers shall be removed and the gearbox and gears shall be examined for wear and contamination.
- 3.1.6.** The winch brakes, drive chain, clutch, bearings and seals shall be inspected / serviced (replaced if required).
- 3.1.7.** The Contractor shall replace the Pinion Shaft, brake Housing and Cover Plate on the Stbd Davit. These parts shall be Owner Supplied.
- 3.1.8.** Once inspections are completed, the covers shall be replaced with new contractor supplied gaskets. The oil shall be supplied / replenished with correct type / quantity (contractor supplied).
- 3.1.9.** There shall be a visual inspection of the davit and winch foundations.
- 3.1.10.** The FSR must advise the Chief Engineer of any defects as soon as they are identified.
- 3.1.11.** The FSR shall train the crew to show operation and general maintenance required on the equipment.

### **3.2 Location**

- 3.2.1.** The Miranda Davits are located on the Foscle Deck, on the port and stbd sides.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

## **4.2 Testing**

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

## **4.3 Certification**

**4.3.1** Certificate indicating compliance must be provided to the Chief Officer, Chief Engineer, and TCMS Inspector.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

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

### **5.2 Training**

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

### **5.3 Manuals**

**5.3.1** N/A

### **5.4 Spares**

**5.4.1** N/A

Spec item #: H-6	<b>SPECIFICATION</b>	TCMSB Field #: N/A
FM-200 ANNUAL INSPECTION, SERVICE & RECERTIFICATION		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to have the fixed fire fighting systems serviced and re-certified for use on the CCGS Cape Roger, and credited by TCMS. (Galley Wet Chemical, FM-200 & CO2 smothering systems).
- 1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item. This work shall be carried out in conjunction with the servicing of the Fire Detection System and the portable fire extinguishers and, in a manner that does not compromise the ability to extinguish a shipboard fire.

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

- 2.1.1 Galley – 4 gal Range Guard Wet Chemical (Karbalo) cylinder.  
CO2 System – 74-265-1, 74-265-2 & 74-265-3.  
FM-200 – National & Marine Fire Services Corp. dwg # NS1005 (2 shts.)

**2.2 Standards**

- 2.2.1 The contractor must be approved by TC to recertify these systems and must be done so in accordance with the latest TC regulations concerning marine safety. The FM-200 system was installed and commissioned by “National and Marine Fire Services Corp”.
- 2.2.2 The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.

**2.3 Regulations**

- 2.3.1. All the systems must be labeled as being certified to use, the date, and company’s name.
- 2.3.2. The testing shall be in accordance to TCMS regulations, and regulations in the Canada Shipping Act pertaining to fire fitting systems on ships.

**2.4 Owner Furnished Equipment**

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

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

### **3.1 General**

- 3.1.1.** The contractor shall provide an authorized representative to perform the tests and inspections of the vessel's FM 200, Wet Chemical, and CO2 smothering systems for annual safety inspection and certification. The Chief Engineer and TCMS Inspector must witness all tests.
- 3.1.2.** The Contractor shall include in their quote an allowance of \$8,000.00 for the FSR to be adjusted up or down by PWGSC 1379 action upon proof of invoice.
- 3.1.3.** The contractor shall complete the following tests, as well as any other tests requested by the attending TCMS surveyor. The contractor shall include in their quote on the cost of testing of any / all time delays, alarms (lights and sirens) on all units, testing of all of the Nitrogen start cylinders, testing of the ventilation shut downs, testing of all the local / remote releasing loops, pull cables, handles, cocks and valves.
- 3.1.4.** The contractor shall blow through all piping and pneumatic actuator and prove that they are operational with compressed air or nitrogen. All piping and nozzles shall be proven clear and free. All pressure operated switches shall be proven operational.
- 3.1.5.** The contractor shall prove operational all alarm displays and sirens. The contractor shall weigh all bottles and the weight shall be recorded. The contractor shall provide the Chief Engineer with all certificates before completion of the refit, in duplicate.
- 3.1.6.** Once all the testing and inspections are completed, the systems must be re-assembled and put back into operation by the Contractor.

### **3.2 Location**

#### **3.2.1**

#### **Galley Wet Chemical, FM 200 & CO2 - FIXED FIRE SYSTEMS**

Wet Chemical – Galley - Main Deck – 4 gal. Range Guard (Karbalyo Cyl.).

CO2 – E/R, Cargo Hold, MCR & Aux. Mach. - CO2 Room – Main Deck, Aft – 15 x 100 lbs.

FM-200 - Bow Thruster Compt. – 270.8 lb. Unit  
- Lamp Room # 301 – 43.8 lb. Unit  
- Paint Locker #300 – 68.8 lb. Unit

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

**4.1.2.** The Chief Engineer and TCMS Surveyor shall be present during the Inspection of the FM-200 system, Wet Chemical and CO2 Smothering Systems.

### **4.2 Testing**

**4.2.1** The Chief Engineer and TCMS Inspector shall be present during the testing the FM 200 system, Wet Chemical and CO2 Smothering Systems.

### **4.3 Certification**

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

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

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

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

### **5.2 Training**

**5.2.1** N/A

### **5.3 Manuals**

**5.3.1** N/A

Spec item #: H-7	<b>SPECIFICATION</b>	TCMSB Field #: N/A
ANNUAL SERVICE OF THE FIRE DETECTION SYSTEM		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to perform the annual inspection and certification of the ship's Betatron / Notifier Fire Detection & Alarm System.
- 1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item. This work shall be carried out in conjunction with the FM-200, Wet Chemical and CO2 systems Service and Re-certification.
- 1.3 This work shall be completed and inspected to TCMS requirements.

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

- 2.1.1. Fire Alarm System is Notifier, model # NFS-2640(E)
- 2.1.2. Fire Detection and Alarm Wiring diagrams & Fire Detection System layout drawings D-20020-1 to 3.

**2.2 Standards**

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

**2.3 Regulations**

- 2.3.1. The contractor performing the work on this system shall be fully certified to do so and shall be recognized by TC to certify this system.
- 2.3.2. The testing of this equipment and the automatic functions must be witnessed by the Chief Engineer and TCMS Inspector.
- 2.3.3. The testing shall be in accordance to TCMS regulations, and regulations in the Canada Shipping Act pertaining to fire detection systems on ships and regulation CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.

## **2.4 Owner Furnished Equipment**

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

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

### **3.1 General**

- 3.1.1.** The contractor shall obtain the services of a qualified technician to carry out the testing and inspection of this equipment.
- 3.1.2.** The system consists of a master panel in the wheelhouse c/w 2 mimic panels fitted at various locations throughout the ship. All panels shall be tested / re-certified.
- 3.1.3.** The Contractor shall test the systems battery back-up power capabilities to ensure it meets manufacturers specifications. All detector heads shall be tested and all deficiencies corrected. The system consists of 2 zones (zone 1 – 19 smoke and 3 heat detectors, zone 2 – 44 smoke and 21 heat detectors).
- 3.1.4.** The contractor shall provide the Chief Engineer with a copy of the Fire Alarm System Test and inspection report and a certificate of inspection upon the completion of the tests.
- 3.1.5.** The contractor shall immediately bring to the attention of the Chief Engineer, any and all deficiencies found during the testing and inspection. The deficiencies shall be approved by the Chief Engineer prior to commencing repairs.
- 3.1.6.** Once all testing is completed, the technician shall return the Fire Detection System back into operational status.

### **3.2 Location**

- 3.2.1.** The main fire detection panel is located in the Wheelhouse.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

**4.2 Testing**

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

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

**4.3 Certification**

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

**Part 5: DELIVERABLES:**

**5.1 Drawings/Reports**

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

**5.2 Training**

**5.2.1** N/A

**5.3 Manuals**

**5.3.1** N/A

Spec item #: H-8	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>ANNUAL LEAK TESTING OF REFRIGERATION SYSTEMS</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to test the identified refrigeration systems onboard for leaks, change oil, certify the system as being leak free and indicate any deficiencies / repairs that shall be addressed by PWGSC 1379 action.
- 1.2 The Contractor shall report to the Chief Engineer prior to any work commencing with this item.

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

- 2.1.1. HVAC air conditioning system.
- 2.1.2. 2 Domestic refrigeration systems - Bitzer , type 2T. 2Y.
- 2.1.3. Domestic refrigeration system refrigerant – R507.

**2.2 Standards**

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

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

- 3.1.2. The contractor shall follow the lockout and tag out procedures of the vessel.
- 3.1.3. The Contractor shall remove the sight glasses from each compressor sump and remove the oil and any contaminants found in the sump.
- 3.1.4. The Contractor shall supply / install new oil for all compressors once the sight have been re-installed with approx. 4 litres of oil for each compressor.

### **3.2 Location**

- 3.2.1. The Two (2) domestic refrigeration systems are located in the Sewage Compartment.
- 3.2.2. The HVAC air conditioning system.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

- 4.1.1. The contractor shall complete all work to the satisfaction of the Chief Engineer.
- 4.1.2. The contractor shall apply tags to each piece of equipment stating that it has been leak tested, and suitable for use.
- 4.1.3. The refrigeration technician must possess a halocarbon certificate and number and sign the work performed in the Halocarbon Logbook, held by the Chief Engineer.

### **4.2 Testing**

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

### **4.3 Certification**

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

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

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

### **5.2 Training**

**5.2.1** N/A

### **5.3 Manuals**

**5.3.1** N/A

Spec item #: H-9	<b>SPECIFICATION</b>	TCMSB Field #: N/A
#2 PORT & STBD F/O TANK TOP RENEWAL		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to have a section of steel from #2 Port & Stbd F/O Tanks Tops repaired / replaced.
- 1.2 The F/O tanks shall be air pressure tested after repairs have been completed and shall be witnessed by the attending TCMS Surveyor.

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

- 2.1.1 Tank Capacity Plan .

**2.2 Standards**

- 2.2.1. The contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.
- 2.2.2. The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.2.3. The standards used to replace the metal plating shall be in accordance with standard shipyard practices, in relation to plating replacement.

**2.3 Regulations**

- 2.3.1 . This ship is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector.
- 2.3.2 Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for ferrous Materials, Rev. 4 (TP6151E).
- 2.3.3 The Contractor performing the welding shall be currently certified by the Canadian Welding Bureau (CWB) at the time this work is performed.

**2.4 Owner Furnished Equipment**

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

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

- 3.1.1 There are a total of 2 tanks/spaces to be dealt within this specification.
- 3.1.2 The Contractor shall schedule the visit of Transport Canada when the tank/space is ready for inspection.
- 3.1.3 The ship's crew will pump the fuel oil storage tanks down to the suction levels. The Contractor shall remove and properly dispose of the remaining fuel oil in each of the 2 F/O storage tanks. The Contractor shall supply a quote for each cubic meter of fuel to be disposed of and the actual amount shall be adjusted with PWGSC 1379 action.
- 3.1.4 The Ships crew shall lock out the F/O transfer pump and any supply valves to the tanks.
- 3.1.5 The contractor shall remove the manhole covers and gaskets from the tanks identified below. The sealing surfaces will be cleaned on the cover and the ship's tank side. The threaded studs shall be cleaned from rust and paint. Following the completion of the work, the covers will be fitted with new, contractor supplied 3/16" neoprene gaskets and the studs coated with moly cote and the nuts secured.
- 3.1.6 The contractor shall certify/gas free the 2 tanks after thoroughly cleaning the internals of the 2 tanks. All cleaning equipment and waste dirt / debris shall be collected and properly disposed of by the contractor.
- 3.1.7 Any bare, rusty, and loose paint scale areas present, shall be cleaned with a wire brush to the bare metal and all residual debris both from cleaning and build up on tank bottom shall be removed.
- 3.1.8 The Contractor shall check the pipe connections for the remote sounding bell housings to ensure they are tight.
- 3.1.9 The Contractor must ensure the tank transducers are kept free from debris and not damaged during the cleaning and steel replacement process. The transducers are extremely sensitive and should be protected at all times.
- 3.1.10 The vents heads **must** be removed from each of the tanks/spaces **prior** to any work commencing, opened, cleaned, and proven operational and inspected by the Chief Engineer and TCMS prior to securing back to the tank. The Contractor shall re-install the (proven correct operational) vent heads after tank testing is complete.
- 3.1.11 All hotwork shall be carried out as per the vessels ISM Hotwork Procedure and all necessary precautions taken. Forced air portable ventilation shall be used during any hotwork or grinding operations to lead smoke, etc, to the outside of the ship. The contractor shall be responsible for the proper maintaining of an appropriate fire watch during all hotwork procedures.
- 3.1.12 The Contractor shall crop out the sections of wasted steel tank top plating only after TCMS Inspector has specified what plating has to be replaced. This work shall be directed by TCMS Inspector.
- 3.1.13 The Contractor shall quote on removal / replacement of 2 square meters of plate and bid a cost for each additional square meter to be adjusted up

or down by PWGSC 1379 action. All new plating shall be Grade A 5/16" steel plate.

- 3.1.14** The Contractor shall thoroughly reclean the tanks after all welding is completed.
- 3.1.15** Following the final cleaning and removal of any rusty / loose pain scale from the areas and dirt / debris from the cropping out and welding in of steel plate, the Chief Engineer and TCMS Inspector will complete the tank inspection.
- 3.1.16** and they shall be inspected by the Chief Engineer & TCMS.
- 3.1.17** Once the tanks/spaces are accepted by TC, the tanks/spaces shall be air pressure tested by the Contractor and witnessed by TC for credit.
- 3.1.18** The Contractor shall be responsible for installing blanks in the remote sounding air tubes to prevent leakage into the control panels while the test is being performed. The Contractor must protect the tank transducers from damage when applying the pressure test and remove the protective cover once the test is complete. The Contractor shall be responsible for fitting all fitted plugs and then removing all fitted plugs and proving the vents piping are free and clear once the pressure test is completed.
- 3.1.19** The contractor shall repair any defects found by the Chief Engineer or TCMS Inspector after inspection has been completed.
- 3.1.20** The Contractor shall re-install the tank vents heads (prove operational) after this test.
- 3.1.21** All bare and disturbed metal on the outside of the tanks, shall have 2 coats of primer after the work is completed according to the vessels painting schedule.

### **3.2 Location**

- 3.2.1** Both #2 F/O tanks ( port & Stbd ) are located in the Sewage Compartment. Stbd side between frames 63 & 64 and Port side between frames 65 & 66. Frame Spacing in this area is at 2 feet.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

## **4.2 Testing**

**4.2.1** The contractor shall be responsible for the air pressure testing of each of the tanks and witnessed by the attending TCMS Inspector and credits obtained from TC. F/O tanks are normally pressure tested with compressed air to about 2 psi. **The contractor shall supply and connect the manometer to determine the pressure in the tank.** The Contractor shall install balloons into the tank vents piping and sounding pipes to perform the tests.

## **4.2 Certification**

**4.3.1** The Contractor shall certify/gas free the 2 tanks prior to entering the confined space.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

**5.1.1** The Contractor shall provide three copies of a detailed work report in electronic format on the findings in the 2 tanks, the work and pressure tests performed, any leaks detected and repaired, and the condition of the 2 tanks as left.

### **5.2 Training**

**5.2.1** N/A

### **5.3 Manuals**

**5.3.1** N/A

Spec item #: H-10	<b>SPECIFICATION</b>	TCMSB Field #: N/A
PORT & STBD FRESH WATER TANKS CLEANING & INSPECTION		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to open both P & S Fresh Water Tanks for cleaning & Inspection.

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

- 2.1.1 N/A.

**2.2 Standards**

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

**2.3 Regulations**

- 2.3.1 This ships fresh water is regulated by Health Canada and all work must be approved / inspected by the Chief Engineer.
- 2.3.2 The water in the tank shall be subjected to laboratory testing once the super-chlorination procedure is completed and flushed. It is imperative that the water that shall be held in these tanks meet the highest drinking water regulations stated by Health Canada.

**2.4 Owner Furnished Equipment**

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

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

- 3.1.1 The ships crew shall pump both tanks down to the suction levels. The manhole covers from both tanks shall then be removed by the contractor and the residual water remaining shall be sucked out by the contractor. Contractor shall quote on removing 1000 litres from each tank to be adjusted up or down by PWGSC 1379 action.

- 3.1.2 The contractor shall be responsible for the removal of any / all dirt / debris and residual water in the tanks at the initial draining as well as the chlorinated water used to flush the tanks twice (2).
- 3.1.3 The contractor shall provide each tank with a mechanical ventilation system, vented to the outside of the ship. These blowers / extractor fans shall ensure appropriate air movement from the lowest point in the tanks. Tanks shall be certified as safe for personnel to enter prior to any work commencing in the internals of the tanks.
- 3.1.4 These tanks are used for the ships own drinking water, so proper protection shall be worn by the workers inside at all times to reduce the contamination and dirt accumulation from performing the work. The contractor shall be responsible for cleaning any foot prints and black marks introduced by the workers.
- 3.1.5 The tanks shall be cleaned removing all rust discoloration. The cleaning method used shall be approved by Health Canada for its intended use. Proof of such approval shall be furnished to the Chief Officer.
- 3.1.6 Any rust and/or bare areas shall be dealt with as per direction of the Chief Engineer. No painting shall be carried out on tank internals while the vessel is afloat.
- 3.1.7 Upon completion of the final wipe cleaning of the tanks to the satisfaction of the Chief Engineer and Chief Officer, the manhole covers shall be re-installed using new contractor supplied ¼" O-rings. Any studs broken shall be renewed. Anti-seize compound shall be used on the stud threads.
- 3.1.8 The contractor shall check the pipe connections for the remote sounding bell housings to ensure that they are tight. The floating valve in the housing shall be checked to ensure that it is free. The tanks vent heads shall be removed, dismantled, cleaned and re-assembled to prove clear.
- 3.1.9 The Contractor shall fill both the Port & Stbd Fresh Water Tanks with fresh water and then Super - Chlorinate the tanks as per Fleet Safety Manual (contractor supplied bleach level of 50 mg/L of free chlorine). The fresh water distribution system valves shall be opened to ensure the chlorine reaches into the entire associated pipe work. This water / chlorine shall be allowed to sit in the system for a minimum of 4 hours.

- 3.1.10 The Chlorinated water shall be removed and disposed of by the contractor in accordance with Provincial and Federal Regulations. (It can be neutralized with hydrogen peroxide). After removing the super-chlorinated water from the tanks, they shall be flushed with 2 full volumes of fresh potable water until a free chlorine level of less than 0.5 mg/L is obtained.
- 3.1.11 The tanks vent heads shall be re-installed by the contractor.
- 3.1.12 The contractor shall include the cost of the water to fill the tanks 4 times in total.
- 3.1.13 The contractor shall quote on sending a water sample from the completed tanks to an accredited laboratory for testing. The testing shall be in accordance to the Fleet Safety Manual Standards and meet the 28 parameters for testing. The original certificate shall be given to the Chief Engineer.

### **3.2 Location**

- 3.2.1 Frames 52-56.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

### **4.2 Testing**

- 4.2.1 The contractor shall send a water sample from the completed tanks to an accredited laboratory for testing. The testing shall be in accordance to the Fleet Safety Manual Standards and meet the 28 parameters for testing and drinking water standards as set out by Health Canada. The certificate shall be given to the Chief Engineer.

### **4.3 Certification**

- 4.3.1 The Certificate shall be delivered to the vessels Chief Engineer prior to opening the fresh water tanks for shipboard use.

**Part 5: DELIVERABLES:**

**5.1 Drawings / Reports**

5.1.1 The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer indicating the condition of the fresh water tanks, the work performed and the water reports from the Laboratory.

**5.2 Training**

5.2.1 N/A

**5.3 Manuals**

5.3.1 N/A

Spec item #: H-11	<b>SPECIFICATION</b>	TCMSB Field #: N/A
OFFICERS WASHROOM DOOR REPLACEMENT		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to install new Owner Supplied door in the Officers Washroom.

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

- 2.1.1 Joiner Systems Inc. B Class Door

**2.2 Standards**

- 2.2.1. The contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.
- 2.2.2. The Contractor must adhere to the Ships ISM Hot-work, Confined Space Entry, Fall Protection and Lockout procedures.
- 2.2.3. The standards used to replace the metal door frame shall be in accordance with standard shipyard practices, in relation to welding.

**2.3 Regulations**

- 2.3.1 This ship is regulated by Transport Canada and all work performed must be approved and inspected by Transport Canada Marine Safety Inspector.
- 2.3.2 Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for ferrous Materials, Rev. 4 (TP6151E).
- 2.3.3 The Contractor performing the welding shall be currently certified by the Canadian Welding Bureau (CWB) at the time this work is performed.

**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 existing washroom door #323 and frame shall be removed in its entirety.

- 3.1.2 The contractor shall supply / install the required protection for any adjacent or external fittings or materials requiring protection from the heat generated during the welding process.
- 3.1.3 The contractor shall take all possible measures to protect / remove adjoining bulkheads / panels, deck heads / panels, decking / flooring, hardware and fittings, etc, to prevent damage during the removal of old door / frame and installation of new door / frame.
- 3.1.4 The welding for the newly installed door shall be continuous around its perimeter both sides. Care shall be taken not to distort the bulkhead / deckhead / deck during the cropping / removal of old door frame and welding of new door frame into place. Any raw edges shall be dressed up prior to painting.
- 3.1.5 Any exposed / disturbed metal shall be primed (2 coats) and painted (2 coats) with contractor supplied primer and paint same as ships painting schedule.
- 3.1.6 The contractor shall re-install all bulkheads / panels, deck heads / panels, hardware and fittings, etc, that was removed during the removal of the old door / frame.

### 3.4 Location

- 3.4.1 N/A

### 3.5 Interferences

- 3.5.1 The contractor shall be responsible for the identification of all interference items, their temporary removal, storage and refitting to 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 N/A

### 4.3 Certification

- 4.3.1 N/A

**Part 5: DELIVERABLES:**

**5.1 Drawings / Reports**

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

**5.2 Training**

5.2.1 N/A

**5.3 Manuals**

5.3.1 N/A

Spec item #: H-12	<b>SPECIFICATION</b>	TCMSB Field #: N/A
PORT & STBD LIFEBOAT DAVITS ANNUAL INSPECTION		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be for the contractor to supply the services of a Schatt Harding Representative to carry out an annual inspection on the Vessels Lifeboats and Lifeboats Davits.
- 1.2 This work shall be carried out in Conjunction with the following: H-5

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

- 2.1.1. Davit Type SPG(L) 5400/3100
- 2.1.2. Electric Winch Type BE5500
- 2.1.3. Order No: 1605/94070
- 2.1.4. Brake unit : D406700E

**2.2 Standards**

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

- 3.1.1. The contractor shall supply the services of a Schatt Harding Representative to carry out an annual inspection on the Lifeboat Davits. The contractor shall include in their bid an allowance of \$5,000 for the FSR to be adjusted up or down by PWGSC 1379 action.
- 3.1.2. Contact information for the FSR:  
Colin Edwards, Manager, Umoe Schatt Harding, Tel: 604-543-0849
- 3.1.3 **Electric motors shall be locked out as per ISM lockout procedure.**
- 3.1.4 The contractor to carry out an inspection of the brake assemblies on both port & stbd Lifeboat Davits.
- 3.1.5 The annual maintenance must be completed in accordance with SOLAS Chapter III, Regulation 20, Section 11
- 3.1.6 The Gearbox shall be completely drained of oil and properly disposed of by the contractor for each Davit.
- 3.1.7 The Gearbox covers shall be removed and the Gearboxes and gears shall be examined for wear and contamination.
- 3.1.8 Once the inspections are completed, the covers shall be replaced with new contractor supplied gaskets. The oil shall be supplied and replenished with the correct type and quantity by the contractor.
- 3.1.9 The contractor shall inspect the Lifeboat hooks and releases on both Port & Stbd Lifeboats.
- 3.1.10 The contractor shall check the hydrostatic release diaphragms on both the port & stbd Lifeboats.
- 3.1.11 The FSR must advise the Chief Engineer of any defects as soon as they are identified.
- 3.1.12 The FSR shall train the crew to show operation and general maintenance required on the equipment.

## 3.2 Location

- 3.2.1. Lifeboat Davits are located on the Port and Stbd side of the Foc'sle deck.

## 3.3 Interferences

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

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

### 4.1 Inspection

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

4.2 Testing  
N/A

4.3 Certification  
N/A

**Part 5: DELIVERABLES:**

5.1 Drawings/Reports

5.1.1 The contractor shall arrange for the Schatt Harding FSR to provide three type written reports detailing the inspections, his findings and work completed to the Chief Engineer.

5.2 Spares  
N/A

5.3 Training  
N/A

5.4 Manuals  
N/A

Spec item #: E-1	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>PORT MAIN ENGINE OVERHAUL</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be for the Contractor to Completely Overhaul the Port Main Engine and obtain Credit from TCMS. The Contractor shall provide a Wartsila FSR to assist and supervise the contractor for this work.
- 1.2 The engine being overhauled is a NOHAB type F212V Engine # 2704, 2200 HP, 12 cylinder four cycle engine. The NOHAB Manufacturers manual (in the possession of the Chief Engineer) shall be adhered to and its instructions carried out. This work is subject to survey by TCMS and the Chief Engineer. The contractor shall be the responsible to notify the regulatory bodies as work progresses.
- 1.3 Crankshaft deflections shall be taken before dismantling the engine and after overhaul is completed. These deflections shall be taken on #6, #4 and #2 cylinders. All main bearings including thrusts shall be opened up, cleaned and inspected. Thrust clearances shall be taken before dismantling and after overhaul is completed. All bearings and journals shall be accurately gauged and sizes recorded and given to the Chief Engineer before re-assembly.
- 1.4 Three (3) copies of all readings are to be passed to the Chief Engineer. All parts found defective and worn near tolerance limits shall be brought to the immediate attention of the Chief Engineer for remedial action.
- 1.5 All spare parts shall be supplied by the owner unless otherwise specifically stated. All new gaskets and joints shall be used throughout. The contractor will be required to unwrap and clean any new parts used in the overhaul.
- 1.6 Safety System shut down testing, dockside and sea trials shall be a requirement after overhaul is completed. Refer to Wartsila service instruction "Running in of Engines after Major Overhauls." Document No. 91 960 009 00E dated 1995 – 09 – 04
- 1.7 **Wear measurements and clearances**  
Contractor shall be responsible for taking and recording all wear measurements, gearing back lashes and clearances on all components as specified in the description of work. Contractor shall review the measurements in conjunction with the FSR, Chief Engineer and the manufacturer's specifications as soon as they are taken to determine further component serviceability.

The Addendum lists all required measurements. The contractor shall be given detailed tables with all measurements listed to be filled in.

## **1.8 Fasteners**

The Contractor shall refer to manufacturer's instructions for torque and tightening sequence required on all bolts, screws, nuts and studs.

**1.9** This work shall be carried out in conjunction with the Port M/E Turbo Charger Overhaul.

## **Part 2: REFERENCES:**

### **2.1 Guidance Drawings / Name Plate Data**

2.1.1 Nohab Type F212V

### **2.2 Standards**

2.2.1 The contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.

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

### **2.3 Regulations**

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

### **2.4 Owner Furnished Equipment**

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

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

### **3.1 General**

The overhaul shall include the following items:

3.1.1 The vessel's Chief Engineer / representative shall carry out the following prior to commencement of work in this spec as follows:

- Isolate and lock out the engine's air starting system
- Isolate and lock out the jacket water pre-heat system
- Isolate and lock out the fuel system valves supply and return
- Isolate and lock out the raw water system valves
- Drain the jacket water system
- Pump out the lubrication system

3.1.2 Cylinder heads (12) twelve in number shall be lifted from the engine and taken to the Wartsila repair shop for overhaul. The heads shall be chemically cleaned, pressure tested and returned on completion of work.

3.1.3 While the heads are removed, inlet, exhaust, air start, relief valves, indicator cocks, fuel injectors and valve operating gears shall be removed. All parts shall be thoroughly cleaned and inspected. Upon reinstallation the cylinder heads shall be torqued as per manufacturer's specifications.

3.1.4 Valves and seats shall be refaced by machining and lapped in. Valve guide clearances and valve depth in seat shall be measured and recorded. New parts shall be owners supply.

3.1.5 Pressure relief and indicator cocks (12) twelve in number once removed, shall be completely disassembled, cleaned, overhauled and reassembled. Once reassembled they shall be set and witnessed by the chief engineer for 145 kp/sq cm. (2060 psig)

3.1.6 Valve mechanism components inspection and wear measurements:

a) Inspect rocker arm end balls, record rocker arm bushing inside diameters and pin outside diameters. Clean and blow through oil ways.

b) Inspect push rods for damage, check straightness by turning in lathe, clean and blow through oil ways

3.1.7 Prior to installing each cylinder head, the machined faces of both the cylinder head and the cylinder liner shall be hand lapped in to assure a good mating surface. The contractor shall use an owner's supplied lapping tool for this purpose. Upon reinstallation of the overhauled cylinder heads, they shall be torqued as per manufacturer's specifications.

3.1.8 Bottom end bearings, Twelve (12) in number shall be released and pistons withdrawn. Wrist pins and piston rings shall be removed, pistons and their ring grooves and all parts thoroughly cleaned, inspected and tolerances taken. Connecting rods shall be checked for straightness and cracks. Pistons shall be fitted with new owner supplied rings.

3.1.9 Total of twelve (12) Liners shall be removed to the Wartsila repair shop. Liners shall be cleaned and checked for cracks. Inside measurements of liners shall be taken at various heights according to manufacturer's specifications / FSR.

3.1.10 Remove all main bearing caps. Remove the top half of the bearing shell and thoroughly clean and inspect for scoring and flaking. Roll out the bottom halves and thoroughly clean and inspect. Any showing signs of wear or flaking shall be replaced with spares held on board the ship. Shell thickness shall be measured and compared with new shell thickness as listed in the engine manual.

3.1.11 Check the crank shaft for cracks. Journals and crankpins shall be measured and readings recorded.

3.1.12 Examine the teeth of the resilient drive gear wheel. Check that all main bearing caps are numbered as to their station.

3.1.13 Check that the main bearing caps receiving nuts are numbered. Nuts shall be torqued to the manufacturer's specifications.

3.1.14 Check to ensure that lubrication oilways, drilled between the journals and the crankpins for pressure lubrication of the large bearing, are clear.

3.1.15 The balance weight housing bolts shall be retorqued to 841 ft lbs .

3.1.16 The exhaust manifold shall be removed in sections, cleaned and inspected for fractures and distortions. The manifold shall be replaced on the engine using new gaskets, and joint rings from the ships supply.

3.1.17 The Air Induction Manifold shall be removed cleaned and inspected for fractures. All bolts, nuts and studs shall be renewed. The manifold shall be replaced on the engine using all new owner supplied joints and gaskets.

3.1.18 Charge air coolers (2) shall be removed and sent to Wartsila shop for cleaning.

3.1.19 The contractor shall remove the cover from the back end of the engine and the Camshaft inspection ports on both sides of the engine. Pushrods shall be removed. Camshaft wheel timing gears shall be checked and all gear train gears shall be cleaned and backlash checked and recorded.

3.1.20 All parts shall be thoroughly cleaned and inspected for wear and defects. All worn or defective parts shall be replaced as necessary with Owner Supplied parts.

3.1.21 The three (3) crank case explosion relief valves on the base doors shall be dismantled, cleaned and laid out for inspection by the Chief Engineer and TCMS.

On completion, the doors shall be reassembled using new gaskets and seals and tested prior to installation on the engine.

3.1.22 The Two (2) Port main engine fresh water pumps shall be opened up, overhauled and inspected by TCMS Inspectors and Chief Engineer.

Note: Check gear backlash before removing Fresh water pumps

3.1.23 Pumps shall be disconnected and removed to contractors repair shop. The pumps shall then to be dismantled, cleaned and examined for defects:

3.1.24 Pumps shafts and casings shall be examined for corrosion, erosion and wear by the FSR, Chief Engineer and TCMS.

3.1.25 Impellers shall be examined for scoring, pitting, corrosion, erosion and wear by the FSR, Chief Engineer and TCMS.

3.1.26 Impeller wear rings shall be cleaned, examined by the FSR, Chief Engineer & TCMS and gauged for wear and replaced if necessary with owner supplied material.

3.1.27 All defective parts shall be replaced as decided upon by the Chief Engineer and TCMS inspector.

3.1.28 Pumps shall be reassembled and reinstalled on engine using new gaskets.

3.1.29 All spare parts shall be owners supply unless otherwise specifically stated.

3.1.30 The Lube oil pump shall be removed:

3.1.31 Area adjacent to the pump shall be cleaned.

3.1.32 All necessary piping to gain access to pump shall be removed.

3.1.33 All lube oil piping left open to have metal or wooden blanks and gaskets fitted immediately to prevent the ingress of dirt by the contractor.

3.1.34 Care shall be taken not to spill oil in the bilge.

3.1.35 The L/O pump shall be opened up for TCMS and Chief Engineer Inspection, examined for wear, reassembled using new gasket material and "O" rings shall be supplied by the owner.

3.1.36 Upon completion the pump, it shall be reinstalled on the engine and associated piping reconnected (blanks removed).

3.1.37 The fuel oil booster pump shall be removed from the lube oil pump and opened for inspection by the Chief Engineer & TCMS inspector.

3.1.38 The pump shall be examined for wear and defects. New seals shall be fitted and the pump reassembled using new gaskets and new drive coupling.

3.1.39 Both vibration Dampers shall be changed out. **See last report. (Chief Engineer to supply).**

3.1.40 Upon completion of damper installation, the Front housing shall be checked for proper alignment and rechecked.

3.1.41 The engine shall be reassembled in an operable condition using new owner supplied gaskets. New owner supplied lube oil filters / fuel oil filters shall be installed by the contractor.

3.1.142 The air filters (2) shall be washed and cleaned and blown dry with compressed air. All fresh and raw water systems shall be checked for leakage and systems purged of air.

3.1.43 Once all the engine components, the engine and all associated piping / interference items are completely reassembled to an operable condition by the FSR & Contractor it shall then be barred over manually with the prelube pump on, to ensure that there is no binding taking place through moving engine parts. The engine shall be test run for a period of one (1) minute, three (3) minutes, ten (10) minutes, thirty (30) minutes, 1 hour and 2 hours in the

presence of the Chief Engineer. At the end of each period the crankcase doors shall be removed and the crankcase inspected to ensure that lubrication is good and no overheating has occurred. All leaks of lube oil, fuel oil, fresh and salt water shall be corrected during trials by the contractor.

**The engine shall have a four (4) hour sea trial under full load with the FSR and Contractor present.**

### **3.2 Location**

#### **3.2.1 E/R**

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

### **4.2 Testing**

4.2.1 The contractor shall the engine is reassembled to an operable condition by the FSR & Contractor it shall then be barred over manually with the prelube pump on, to ensure that there is no binding taking place through moving engine parts. The engine shall be test run for a period of one (1) minute, three (3) minutes, ten (10) minutes, thirty (30) minutes, 1 hour and 2 hours in the presence of the Chief Engineer. At the end of each period the crankcase doors shall be removed and the crankcase inspected to ensure that lubrication is good and no overheating has occurred. All leaks of lube oil, fuel oil, fresh and salt water shall be corrected during trials by the contractor.

**The engine shall have a four (4) hour sea trial under full load with the FSR and Contractor present.**

### **4.3 Certification**

4.3.1 The work covered in this specification shall be to obtain TCMS Survey Credit. The Contractor shall be responsible for contacting TCMS Inspector according as items become ready for inspection.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings / Reports**

5.1.1 The Contractor shall provide three copies of a detailed report in electronic format to the Chief Engineer indicating all the work performed covering the entire Overhaul, measurements taken, temperatures and pressure readings taken during Sea Trials and the condition left. This shall also include the Service Report from the Wartsila FSR.

### **5.2 Training**

5.2.1 N/A

### **5.3 Manuals**

5.3.1 N/A

Spec item #: E-2	<b>SPECIFICATION</b>	TCMSB Field #: N/A
PORT MAIN ENGINE TURBO CHARGER OVERHAUL		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be for the contractor to supply the services of the Wartsila FSR for the survey, dismantle, cleaning, inspection / repair of the Port Main Engine turbochargers.
- 1.2 This work shall be carried out in Conjunction with the Port main Engine Overhaul.

**Part 2: REFERENCES:****2.1 Guidance Drawings/Nameplate Data****2.1.1. Model VTR 200 N**

Serial Numbers: HT 319368 & HT 320806

Specific: Z 8C 15.0 IV CH 65A WP3L

**2.2 Standards**

2.2.1 The contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

3.1.1. The Port Main Engine inboard and outboard turbochargers are scheduled for TCMS inspection. Contractor shall quote on Wartsila FSR for the survey, dismantling, cleaning and inspection of the turbochargers.

- 3.1.2. The Contractor & FSR shall ensure main propulsion engines are properly locked out as per FSM 7.D.19-Lockouts.
- 3.1.3. Contractor shall remove the turbo chargers from the Main Engine and have both turbochargers moved to the Wartsila facility for dismantling, cleaning and inspection.
- 3.1.4. The Oil shall be removed from the turbochargers and properly disposed of ashore by the contractor.
- 3.1.5. The FSR shall disassemble both turbochargers for inspection to be witnessed by TCMS and Chief Engineer. All bushings & bearings shall be inspected for wear, measured and readings taken.
- 3.1.6. The Turbochargers shall be reassembled using new gaskets. All parts shall be contractor supplied.
- 3.1.7. Both turbochargers shall be reinstalled onto the Port Main Engine using owner supplied gaskets.
- 3.1.8. The turbochargers shall be filled with new contractor supplied oil.
- 3.1.9 The Contractor shall be responsible for arranging TCMS surveyor when required.

### 3.2 Location

- 3.2.1 Main Engine - E/R

### 3.3 Interferences

- 3.3.1 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 FSR, Chief Engineer and TCMS Inspector.

### 4.2 Testing N/A

4.3 Certification  
N/A

**Part 5: DELIVERABLES:**

5.1 Drawings/Reports

5.1.1 The contractor to arrange for the FSR to provide three copies of the detailed work report in electronic format indicating the work completed and all measurements / reading taken to be given to the Chief Engineer.

5.2 Spares  
N/A

5.3 Training  
N/A

5.4 Manuals  
N/A

Spec item #: E-3	<b>SPECIFICATION</b>	TCMSB Field #: N/A
PORT M/E S/W COOLING PUMP INSPECTION (ELECTRICAL DRIVEN)		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be for the contractor to dismantle, clean, inspect / repair the Port Main Engine Sea Water Cooling Pump for TCMS Credit.
- 1.2 This work shall be carried out in Conjunction with the Port Main Engine S/W Cooling Pump Motor.

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

- 2.1.1 Scanpump JMW Type Z16A 154  
No: 91451  
Volumetric flow 180 m<sup>3</sup>/h  
Head 25 Meters  
Speed 1800 rpm

**2.2 Standards**

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

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

- 2.4.2 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. Pump shall be dismantled, cleaned and examined for defects by the contractor.
- 3.1.2. Pump shaft and casing to be examined for corrosion/Erosion and wear.
- 3.1.3. Impeller shall be examined for scoring, pitting, corrosion/Erosion and wear.
- 3.1.4. Impeller wear rings shall be cleaned, examined and gauged for wear and replaced if necessary with Owner supplied spares.
- 3.1.5. All defective parts shall be Owner Supplied and replaced as decided upon by the Chief Engineer at the time of inspection by himself and TCMS. It will be the Contractors responsibility to call the regulatory body for these inspections as work progresses.
- 3.1.6. Pump casing shall be machined to fit new mechanical seal.
- 3.1.7. Pump shall then be reassembled using new gaskets and mechanical seal, Owner supply.
- 3.1.8. The following measurements shall be taken, recorded and a type written copy given to the Chief Engineer.
  1. Shaft and housing diameters
  2. Impeller diameter
  3. Internal housing (wear ring) diameters
  4. Impeller thickness.
- 3.1.9. Alignment shall be checked and adjusted using a dial indicator and coupling reconnected when the correct alignment is achieved.

#### **3.2 Location**

- 3.2.1 E/R

#### **3.3 Interferences**

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

- The contractor on completion of work, shall test run the pump for one hour. Pressure's and temperature's to be monitored, recorded and given to the Chief Engineer.

#### 4.3 Certification

4.3.1 The work covered in this specification shall be to obtain TCMS Survey Credit. The Contractor shall be responsible for contacting TCMS Inspector according as items become ready for inspection

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

#### 5.1 Drawings/Reports

5.1.1 The contractor shall provide three copies of the detailed work report in electronic format indicating the work completed and all measurements / reading taken to be given to the Chief Engineer.

5.2 Spares  
N/A

5.3 Training  
N/A

Spec item #: E-4	<b>SPECIFICATION</b>	TCMSB Field #: N/A
PORT M/E S/W COOLING PUMP ELECTRIC MOTOR INSPECTION		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be for the contractor to dismantle, clean, inspect / repair the Port Main Engine Sea Water Cooling Pump Electric Motor for TCMS Credit.
- 1.2 This work shall be carried out in Conjunction with the Port Main Engine S/W Cooling Pump.

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

2.1.1 ABB, MBT 180M, 23 Kw @ 1765 rpm.

**2.2 Standards**

2.2.1 The contractor must complete the specified work in a manner that is acceptable to the Chief Engineer and TCMS Inspector.

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

2.2.3 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 Installations

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

#### **3.1 General**

- 3.1.1. The electric motor shall be removed and transported to the Contractors shop. Contractor responsible for transportation to and from shop.
- 3.1.2. Motor shall be megger tested and readings recorded.
- 3.1.3. Motor to be completely disassembled for cleaning and inspection by TCMS.
- 3.1.4. Bearings and shaft seals if fitted shall be renewed. The contractor shall bid an allowance of \$1,000 for these parts to be adjusted up or down by PWGSC 1379 action.
- 3.1.5. On reassembly motor shall be megger tested and readings again recorded.
- 3.1.6. Motor shall be bench tested and vibration levels checked and motor balanced.
- 3.1.7. At completion of overhaul, motor shall be given two spray coats of good quality marine grade paint of similar colour to original paint.

#### **3.2 Location**

- 3.2.1 E/R

#### **3.3 Interferences**

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

#### **4.2 Testing**

- 4.2.1 The contractor on completion of work, shall test run the pump for one hour. The temperature's and vibration levels shall be monitored, recorded and given to the Chief Engineer.

#### **4.3 Certification**

- 4.3.1 The work covered in this specification shall be to obtain TCMS Survey Credit. The Contractor shall be responsible for contacting TCMS Inspector according as items become ready for inspection.

**Part 5: DELIVERABLES:**

5.1 Drawings/Reports

5.1.1 The contractor shall provide three copies of the detailed work report in electronic format indicating the work completed and all measurements / readings taken and shall be given to the Chief Engineer.

5.2 Spares  
N/A

5.3 Training  
N/A

Spec item #: E-5	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>HEATING BOILER INSPECTION</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to open up the Pyro boiler for cleaning, inspection and testing in order to obtain credits from TCMS.
- 1.2 The boiler must be fully dismantled, cleaned, inspected by TC, re-assembled, and pressure tested to 3 bar and all deemed satisfactory to the attending surveyor and Chief Engineer. The Contractor shall include in their bid an allowance of \$2,000 for parts to be adjusted up or down by PWGSC 1379 action.

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

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

**2.2 Standards**

- 2.2.1 The contractor shall meet the manufacturer's instructions for the maintenance performed on the boiler. The Ship's ISM hot work, confined space entry, fall protection, and lock out procedures must be adhered to.
- 2.2.2 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.

**2.3 Regulations**

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

**2.4 Owner Furnished Equipment**

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

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

### **3.1 General**

- 3.1.1 The contractor must ensure the boiler is isolated and locked-out prior to commencing work on the unit.
- 3.1.2 The Contractor shall drain the boiler and properly dispose of the contents. All the boiler mountings ( wiring, piping, sensors, brackets, pressure gauges, and other associated hardware) shall then be removed and blanks installed. All items shall be cleaned, inspected by TC, re-assembled and re-connected in good order upon completion of all cleaning, inspection and testing.
- 3.1.3 There are a total of eight valves to remove for inspection. The main stop valve, safety relief valve, feed water pump inlet valve, feed water pump outlet valve, boiler feed valve, blow down valve and drain valves shall be removed and opened for TC inspection. The valves and seats shall be lapped and new packing and gaskets supplied / installed upon reassembly by the contractor.
- 3.1.4 The contractor shall remove the inspection cover on the boiler and thoroughly clean the inside of the boiler. The boiler tubes, piping, and end pieces shall be thoroughly cleaned with a stiff brush with an extended handle.
- 3.1.5 The contractor shall clean the boiler internally using Drew Safe Acid, Oaktite, or an approved equivalent. Circulation of the solution must be pumped from a separate solution tank (contractor supplied) into the boiler at the top supply valve, and return from the bottom valve flange. The concentration and circulation of the solution must be as per manufacturer's instruction. Once the cleaning process is completed, the boiler must be thoroughly flushed with fresh water. The cleaning solution and flush water must be received at the owner's facility and disposed of in accordance to local and Environmental Regulations by the contractor. Under no circumstances will these waters be permitted to enter the ship's bilge area.
- 3.1.6 The contractor shall be responsible for scheduling the attending TCMS surveyor at points previously agreed upon, to inspect the boiler and allow the contractor to proceed to the next stage of survey.
- 3.1.7 The contractor shall arrange a burner technician and remove the burner. The combustion chamber shall be thoroughly cleaned and shall be inspected by TC. The refractory cement shall be inspected for cracks. The burner tube must be cleaned and checked. The burner insert shall be removed, the parts cleaned, the nozzle replaced, and the electrode adjustments confirmed.
- 3.1.8 The contractor shall remove all pressure relief valves from the boiler and send them to an accredited firm to have them re-certified and returned to the vessel, along with certificates.

- 3.1.9 Following the cleaning procedures, inspections and re-installation of all fittings, etc, the contractor shall hydrostatically pressure test the boiler to 1.5 times the working pressure of the boiler for one hour, or a pressure and time to satisfy the attending TCMS surveyor and Chief Engineer.
- 3.1.10 The contractor shall supply all the equipment including blank flanges, gaskets, fittings, pressure gauges, pumps, etc, necessary to perform the hydrostatic test.
- 3.1.11 The contractor shall arrange the attendance of the TCMS and Chief Engineer to witness the hydro-test.
- 3.1.12 After all this work is completed, and marine surveyor is completely satisfied, the contractor shall remove all the blanks, boiler shall be suitably drained and properly disposed of by the contractor and completely reassemble the boiler.
- 3.1.13 The set points for the thermostats and pressure switches must all be positioned to the points identified in the boiler manual. The safety valves shall be checked for leaks.
- 3.1.14 The contractor shall test the function of the boiler, safety / pressure relief valves and all the safety shut-downs to the satisfaction of TCMS and the Chief Engineer. Any defects / leaks in the covers and fittings must be secured by the contractor at the contractor's expense.
- 3.1.15 The burner technician shall check and adjust the burner parameters to achieve the maximum efficiency and clean burning characteristics desired. The contractor shall bid an allowance of \$2000.00 for the services of the burner technician to be adjusted up or down by PWGSC 1379 action upon proof of invoice.
- 3.1.16 Once the boiler is tested and TCMS is satisfied, the contractor shall put the boiler back into service.

## **3.2 Location**

- 3.2.1 Engine Room.

## **3.3 Interferences**

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

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

### **4.1 Inspection**

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

## **4.2 Testing**

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

## **4.3 Certification**

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

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

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

### **5.2 Training**

**5.2.1** N/A

### **5.3 Manuals**

**5.3.1** N/A

Spec item #: E-6	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>DOCK / SEA TRIALS</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification is to have the Contractor onboard to perform a minimum of three hours dockside trials, and four hours of continuous sea trials.
- 1.2 The intention of the dock trials is to run up the affected machinery during the past refit (Main Engine) to operating temperatures and pressures, check for abnormal vibrations and temperatures, record operating parameters from the main engine. The load is limited on the main engine while at the dock to ensure no damage to the propeller or rudder occurs.
- 1.3 The intention of the sea trial is to run for 4 hours under Full Load under the recommendations of the FSR to the satisfaction of the Chief Engineer.

**Part 2: REFERENCES:**

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

**Part 3: TECHNICAL DESCRIPTION:**

- 3.1 **General**
  - 3.1.1 The Contractor shall ensure there are sufficient personnel onboard to attend to/repair any faults directly related to the equipment worked on by the Contractor during the refit.
  - 3.1.2 The Contractor shall ensure there are workers available to perform dock trials with the amount of load being limited to what the Owner's Representative feels is a safe level. This shall be performed for three hours to allow everything to rise to operating temperatures and settle out. Once this is deemed to be satisfactory by the Chief Engineer and TCMS Inspector, the sea trial shall be scheduled.
  - 3.1.3 Sea trials shall be scheduled for four hours and the contractor shall ensure there are sufficient workers available to attend to any repairs required to affected machinery.

### **3.2 Location**

**3.2.1** Main Engine.

### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

### **4.2 Testing**

**4.2.1** These sea trials are to prove the integrity of the machinery worked on by the Contractor during the past refit, and shall be included in the reports delivered to the Chief Engineer.

### **4.3 Certification**

**4.3.1** N/A

## **Part 5: DELIVERABLES:**

### **5.1 Drawings/Reports**

**5.1.1** The operating condition of the equipment worked (Main Engine) on shall be included in the three copies of the work reports in electronic format from the Contractor to the Chief Engineer at the end of refit.

### **5.2 Training**

**5.2.1**

### **5.3 Manuals**

**5.3.1**

Spec item #: L-1	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>ELECTRICAL INSULATION TEST</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be for the Contractor to test the insulation resistance of all the electrical distribution systems onboard (Generators, Motors, Panels, Cables / Feeds, Heaters, Etc,,,,), using a 500 V DC "Meggar"-type Direct Indicating Ohm tester, provided by the contractor.
- 1.2 Care shall be taken not to test circuits while electronics (including voltage regulators), which may be damaged by high voltages, are connected.

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

2.1.1 N/A

**2.2 Standards**

2.2.1 Meggar readings shall be taken and recorded in accordance with normal Shipboard practices and procedures, keeping in mind that UPS and electronic equipment is susceptible to damage if megged.

2.2.2 CG Lockout Procedures, ISM Hotwork, Confined Space Entry and Fall Protection Procedures shall be strictly adhered.

**2.3 Regulations**

2.3.1 The Readings shall be recorded and be acceptable according to the limits stated in the TP 127 Electrical Code for ships.

2.3.2 The Report of readings shall be delivered to the Chief Engineer and attending TCMS Inspector and be accepted.

**2.4 Owner Furnished Equipment**

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

**Part 3: TECHNICAL DESCRIPTION:**

**3.1 General**

- 3.1.1** The Contractor shall inform the Chief Engineer prior to commencing the Meggar Tests and shall confirm that no electronic equipment is connected or shall be damaged by the tests.
- 3.1.2** The Contractor shall submit three (3) signed type written copies of the final readings to the Chief Engineer and TCMS Inspector before completion of Refit.
- 3.1.3** The Contractor shall include in their quote a \$2,000.00 allowance for the tracing and repair of any / all ground faults detected. This shall be adjusted up or down by PWGSC 1379 action.

1 The Following Circuits shall be tested.

#1(PORT) S/S GENERATOR:  
SWITCHBOARD BREAKER -  
GENERATOR ARMATURE TO -

T1 -  
T2 -  
T3 -

EXCITER FIELD -

#2 (STBD) S/S GENERATOR:  
SWITCHBOARD BREAKER -  
GENERATOR ARMATURE TO -

T1 -  
T2 -  
T3 -

EXCITER FIELD -

460 VAC/3 PHASE ESSENTIAL MWSB:  
ESS 1 STEERING GEAR TRANSFER PANEL -  
ESS 2 CP HYDRAULIC PUMP -  
ESS 3 STBY M/E S.W. CIRC PUMP -  
ESS 4 ESSENTIAL MCC #1 -  
ESS 5 GENERAL SERVICE PUMP -  
ESS 6 S.W. CIRC PUMP PORT M/E -  
ESS 7 ESSENTIAL MCC #2 -  
ESS 8 STBY CP HYDRAULIC PUMP -  
ESS 9 S.W. CIRC PUMP STBD M/E -  
ESS 10 ESSENTIAL MCC #3 -  
ESS 11 E.R. VENT. MCC -  
ESS 12 DECK CRANE POWER PACK #1 -

ESS 13 SPARE -  
ESS 14 FRC DAVIT -  
ESS 15 SPARE -  
ESS 16 SPARE -  
ESS 17 460/115 V TRANSFORMERS -  
ESS 18 460/230 V TRANSFORMERS -

460 VAC/3 PHASE NONESSENTIAL MWSB:

NONESSENTIAL TIE-IN BREAKER -

NES 1 NONESSENTIAL MCC #1 -  
NES 2 NONESSENTIAL MCC #2 -  
NES 3 ACCOMODATION VENT. MCC -  
NES 4 HYDRAULIC POWER PACK #1 -  
NES 5 HYDRAULIC POWER PACK #2 -  
NES 6 GALLEY PWR DIST PANEL -  
NES 7 HEATING TRANSFORMERS -  
NES 8 R.O. UNIT -  
NES 9 SPARE -  
NES 10 AFT TOW WINCH -

MAIN SWITCHBOARD 115 VAC/3 PHASE DISTRIBUTION:

NL NAVIGATION LIGHTING PANEL W/H -  
ES1-1 COMM EQUIP PANEL #1 -  
ES1-2 NAVIGATION AIDS PANEL W/H -  
ES1-3 DISTRIBUTION PANEL WORKSHOP -  
ES1-4 DISTRIBUTION PANEL Q.M. STATION -  
ES1-5 BRIDGE DECK POWER & LIGHTING PANEL -  
ES1-6 FOCSLE DECK POWER & LIGHTING PANEL -  
ES1-7 MAIN DECK POWER & LIGHTING PANEL #1 -  
ES1-8 MAIN DECK POWER & LIGHTING PANEL #2 -  
ES1-9 MISC DISTRIBUTION PANEL E/R -  
ES1-10 MACHINERY SPACE POWER & LIGHTING PANEL -  
ES1-11 HEATING BOILER -  
ES1-12 SPARE -

MAIN SWITCHBOARD 230 VAC/3 PHASE DISTRIBUTION:

ES2-1 COMM EQUIP PANEL #2 -  
ES2-2 Q.M. POSITION 230V PANEL -  
ES2-3 WORKSHOP 230V PANEL -  
ES2-4 WELDER -  
ES2-5 HEATED WINDOW 230 V PANEL W/H -

ES2-6 MISC DIST 230V PANEL MAIN DECK -

MAIN HEATING PANEL 230VAC/3 PHASE:

- T 1 HEATING PANEL #1 -
- T 2 HEATING PANEL #2 -
- T 3 HEATING PANEL #3 -
- T 4 HEATING PANEL #4 -
- T 5 HEATING PANEL #5 -
- T 6 AC COOLING PUMP -
- T 7 SPARE -
- T 8 SHAFT TUNNEL SPACE HEATER -

ESSENTIAL MCC #1:

- ESS 2-1 C.P. HYDRAULIC P/P, PORT -
- ESS 3-1 STBY M/E S.W. CIRC P/P -
- ESS 4-1 DOMESTIC F.W. P/P -
- ESS 4-2 B/T HYDRAULIC P/P -
- ESS 4-3 D.O. TRANSFER P/P -
- ESS 4-4 PRELUBE P/P, PORT M/E -
- ESS 4-5 INBOARD AIR COMPRESSOR -
- ESS 4-7 L.O. WARM-UP P/P, PORT M/E -
- ESS 4-8 SANITARY P/P -
- ESS 4-9 SPARE -

ESSENTIAL MCC #2:

- ESS 5-1 GENERAL SERVICE P/P -
- ESS 6-1 S.W. CIRC P/P, PORT M/E -
- ESS 7-1 BILGE & BALLAST P/P -
- ESS 7-2 SPARE -
- ESS 7-3 STBY SANITARY P/P -
- ESS 7-4 FRC F.O. P/P CONTROL PANEL -
- ESS 7-5 PRELUBE P/P, STBD M/E -
- ESS 7-6 J.W. WARM-UP P/P, PORT M/E -
- ESS 7-7 J.W. HEATER, PORT M/E -
- ESS 7-8 L.O. PREHEATER, PORT M/E -
- ESS 7-9 L.O. WARM-UP P/P, STBD M/E -
- ESS 7-10
- ESS 7-11 GEN J.W. HEATER, STBD -
- ESS 7-12 GEN J.W. HEATER, PORT -

ESSENTIAL MCC #3:

- ESS 8-1 STBY CP HYD P/P -
- ESS 9-1 S.W. CIRC P/P, STBD M/E -
- ESS 10-1 STBY D.O. TRANSFER P/P -

ESS 10-2 J.W. WARM-UP, STBD M/E -  
ESS 10-3  
ESS 10-4 STBY GEARBOX L.O. P/P -  
ESS 10-5 STBY DOMESTIC F.W. P/P (BOTTOM) -  
ESS 10-6 OUTBOARD (STBY) AIR COMPRESSOR -  
ESS 10-7  
ESS 10-8 J.W. HEATER, STBD M/E -  
ESS 10-9 L.O. PREHEATER, STBD M/E  
ESS 11 SPARE

E/R VENTILATION MCC:

ESS 11-1 ENGINE ROOM SUPPLY FAN #1 (PORT) -  
ESS 11-2 ENGINE ROOM SUPPLY FAN #2 (STBD) -  
ESS 11-3 AUX MACH COM'T SUPPLY FAN -  
ESS 11-4 ENGINE ROOM EXHAUST FAN -  
ESS 11-5 B/T COMP'T SUPPLY FAN -  
ESS 11-6 EXHAUST FAN-SAR LOCKER -

NONESSENTIAL MCC #1:

NES 1-1 EVAPORATOR S.W. P/P, PORT M/E -  
NES 1-2 EVAPORATOR F.W. P/P, PORT M/E -  
NES 1-3 GREY WATER LIFT P/P -  
NES 1-4 GREY WATER DISCHARGE P/P -  
NES 1-5 DOMESTIC REFRIGERATION -  
NES 1-6 SEWAGE CONTROL PANEL -  
NES 1-7 G/B TURNING GEAR -  
NES 1-8 EVAPORATOR CIRC P/P -  
NES 1- 09 CALORIFIER "A"  
NES 1- 10 H.W. CIRC P/P #1

NONESSENTIAL MCC #2:

NES 2-1 L.O. PURIFIER -  
NES 2-2 F.O. PURIFIER -  
NES 2-3 EVAPORATOR S.W. P/P, STBD M/E -  
NES 2-4 EVAPORATOR F.W. P/P, STBD M/E -  
NES 2-5 SPARE -  
NES 2-6 OILY WATER BILGE P/P -  
NES 2-7 HANGER AIR COMPRESSOR  
NES 2- 8 CALORIFIER "B" -H.W. CIRC P/P #2 -  
NES 2- 9 H.W. CIRC P/P #2 -

ACCOMODATION VENT. MCC:

NES 3-1 ACCOMODATION SUPPLY FAN -  
NES 3-2 ACCOMODATION EXHAUST FAN -

NES 3-3 GALLEY EXHAUST FAN -  
NES 3-4 TOILET EXHAUST FAN, FOCSLE/LOWER DECK -  
NES 3-5 TOILET EXHAUST FAN, MAIN DECK AFT -  
NES 3-6 FORWARD TOILET EXHAUST FAN -  
NES 3-7 SPARE -  
NES 3-8 SPARE -

EMERGENCY GENERATOR:  
SWITCHBOARD BREAKER -  
GENERATOR ARMATURE TO -

T1 -  
T2 -  
T3 -

EXCITER FIELD -

EMERGENCY FEEDBACK BREAKER -  
EMERGENCY GENERATOR TIE-IN BREAKER -  
SHORE POWER BREAKER -

460 VAC/3 PHASE EMERGENCY DISTRIBUTION:

EMS 1 TRANSFORMER 460/115V -  
EMS 1A SEARCHLIGHT -  
EMS 2 EMERGENCY FIRE P/P -  
EMS 3 BILGE P/P -  
EMS 4 W/T DOOR XFMR FOR INDICATORS -  
EMS 5 EMERGENCY MCC -  
EMS 6 EMERGENCY STEERING GEAR -  
EMS 7 STEERING GEAR TRANSFER PANEL -  
EMS 8 SPARE -  
EMS 9 SPARE -  
EMS 10 EMERGENCY GENERATOR J.W. HEATER -  
EMS 11 SPARE -

EMERGENCY MCC:

EMS 5-1 SPARES -  
EMS 5-2 HANGAR DOOR MECHANISM -  
EMS 5-3 BOAT DAVIT, PORT -  
EMS 5-4 BOAT DAVIT, STBD -  
EMS 5-5 HANGER TRACK HEATING  
EMS 5-6 SPARES -

115 VAC/3 PHASE EMERGENCY DISTRIBUTION:

E 1 NAV AIDS PANEL #1 -  
E 2 W/H & FOCSLE DK EMERGENCY LIGHTING -  
E 3 MAIN DK EMERGENCY LIGHTING -

- E 4 MACHINERY SPACES EMERGENCY LIGHTING -
- E 5 MISC ALARM/MONITORING & CONTROL PWR BATT CHGR -
- E 6 PORT SSG & M/E CONTROLS BATT CHGR -
- E 7 STBD SSG & M/E CONTROLS BATT CHGR -
- E 8 "B" BANK NAV/COMM BATT CHGR -
- E 9 FRC & L/B MISC POWER PANEL -
- E 10 FIRE ALARM SYSTEM -
- E 11 EMER. GEN. STARTING BATT CHGR -
- E 12 "A" BANK NAV/COMM BATT CHGR -
- E 13 SPARE PANEL, Q.M. STATION -
- E 14 UNDER-VOLTAGE TRIPS -

PMC NAV LIGHTS PANEL:

FOREMAST	A -	B -
MAINMAST	A -	B -
PORT	A -	B -
STBD	A -	B -
STERN	A -	B -
FWD TOWING #1	A -	B -
FWD TOWING #2	A -	B -
AFT TOWING	A -	B -
FWD ANCHOR	A -	B -
AFT ANCHOR	A -	B -
UPPER N.U.C.	A -	B -
LOWER N.U.C.	A -	B -
POWER	A -	B -
SPARE	A -	B -

PANELS BY DECKS

BRIDGE DECK

230 V HEATING PANEL #5:

- 1 CHART ROOM -
- 2 ARMS RM, COMPACTOR RM, BATTERY LK, HTR RELAY -
- 3 W/H FWD HTR RELAY -
- 4 RADIO RM & W/R -
- 5 W/H STBD & PORT -
- 6 20 A SPARE -
- 7 15 A SPARE -

115 V POWER & LIGHTING ES1-5:

- 1 MOBILE STATELLITE PHONE -
- 2 RECEPTACLES SRE DESK, LTS Rm 103 -
- 3 RECEPTACLES W/H STBD & Rm 103, LTS W/H FWD -

- 4 BRIDGE DK AFT LTS -
- 5 F/L's FOCSLE DK FWD -
- 6 PORT S/L -
- 7 STBD S/L -
- 8 F/L's BOAT DK AFT -
- 9 RECEPTACLES CHARTROOM/STBD AFT BLKHD -
- 10 LTS BRIDGE DK -
- 11 REGULUS -
- 12 OSL - ALDEBARAN 11 PORT SIDE

230 V HEATED WINDOW & WIPER PANEL:

- 1 HEATED WINDOWS #4, 5 & 6 -
- 2 15 A SPARE -
- 3 15 A STBD ECHO SOUNDER -
- 4 STBD BD LAN
- 5 HEATED WINDOWS #1, 2 & 3 -
- 6 15 A SPARE -
- 7 15 A SPARE -
- 8 WIPERS -
- 9 SPARE -
- 10
- 11 CLEARVIEWS P & S -
- 12 WIPER HEATERS -

115 V NAVIGATION AIDS PANEL #1

- 1 NAV LT CONTROL -
- 2 RECEPTACLES P & S/SKANTI-DATAHAIL -
- 3 ECHO SOUNDERS -
- 4 12V POWER SUPPLY CHART ROOM -
- 5 FAX/INMARSAT -
- 6 ELECTRIC LOG -
- 7 S- BAND TURNING UNIT -
- 8 LOUDHAILER/TALKBACK -
- 9 SPERRY RADAR -
- 10 EXICON VHF -
- 11 W/H-E/R ALARM -
- 12 RUDDER ANGLE INDICATOR -
- 13 RECEPTACLES, CHARTROOM FWD -
- 14 WHISTLE CONTROL -
- 15 UPS -
- 16 MORSE LT -
- 17 COMPUTER MONITOR COMM-
- 18 AUTO-PILOT ILL. -
- 19 CABLES\_UNKNOWN LEAD -
- 20 BRIDGE MASTER RADAR -

115 V NAVIGATION AIDS PANEL #2:

- 1 RECEPTACLES STBD WALL, SAILOR AM -
- 2 RECEPTACLES, PORT WALL Rm 101 -
- 3
- 4 15 A SPARE -
- 5
- 6 MAG. COMPASS LT -

24 VDC NAV/COMM EQUIPMENT PANEL:

- 1 SKANTI HF -
- 2 SKANTI HF -
- 3 GYROCOMPASS -
- 4 LORAN "C" -
- 5 SAILOR VHF -
- 6 FIRE DOOR PANEL -
- 7 CHART TABLE LT -
- 8 UNKNOWN LOAD -
- 9 SPARE -
- 10 ICS -

12 VDC NAV/COMM PANEL #1:

- 1 SKANTI -
- 2 SPARE -
- 3 SPARE -
- 4 SPARE -

FOCSLE DECK

230 V HEATING PANEL #4:

- 1 C/E's CABINS & W/R -
- 2 CAPT's CABINS & W/R -
- 3 2nd OFFICER, SNR F.O. -
- 4 1st OFFICER, CHIEF OFFICER -
- 5 FOCSLE DK W/R -
- 6 20 A SPARE -
- 7 EMERG. GEN. RM -

230 V Q.M. STATION POWER DIST. PANEL:

- 2 ISIS CHARGER -
- 4 ISIS CHARGER -
- 6 POWER SUPPLY TO FRIDGE COMPRESSOR -
- 8 POWER SUPPLY TO FRIDGE COMPRESSOR -

115 V Q.M. STATION POWER DIST. PANEL:

- 1 STEAM HEATER CARGO HOLD -
- 2 WINDLASS SOLENOIDS -
- 3 STEAM REGULATING VALVE FAN ROOM -
- 4 SCIENTIFIC REQ. -

115 V FOCSLE POWER & LIGHT ES1-6:

- 1 RECEPTACLES FOCSLE S. FWD/ LTS Rm 200 -
- 2 RECEPTACLES/LTS Rm 206 & 207 -
- 3 RECEPTACLES/LTS Rm 206 & 207 -
- 4 RECEPTACLES Q.M. STN, BRIDGE DK P & S -
- 5 LTS, FOCSLE DK -
- 7 RECEPTACLES BRIDGE DK P & S, Rm 208 & 209 -
- 9 RECEPTACLES Rm 201, FOCSLE FWD, HALLWAY -
- 11 RECEPTACLES Rm 209/BRIDGE DK P., LTS Rm 209 -

115 V W/H & FOCSLE EMERGENCY LIGHT PANEL E 2:

- 1 E. LTS OFFICERS ACC/FOCSLE & BRIDGE STAIRS -
- 2 F/L's W/H TOP FWD -
- 3 E. LTS, BOAT DK -
- 4 F/L's BRIDGE DK MIDSHPIS -
- 5 F/L's FOCSLE DK MIDSHPIS -
- 6 E. LTS EMERG. GEN Rm, EXIT LTS Q.M. STN -
7. SARLIGHT -
8. GMDSS PONY PANEL ON BRIDGE -

115 V FRC & L/B MISC POWER PANEL E 9:

- 1 55 V RECEPT, S L/B -
- 2 RECEPT, TRASH COMPACTOR -
- 3 HANGAR LTS/RECEPTACLES -
- 4 55 V RECEPT, P L/B -
- 5 GALLEY FIRE SYS'T -
- 6 ISIS ALARM SYS'T SUPPLY -
7. FLOODLIGHTS FRC AREA -
8. LIFEBOAT AND FRC EMERG. LIGHTS -
9. FLOODLIGHTS WHEELHOUSE TOP AFT -

115 V Q.M. STATION SPARE PANEL E 13:  
(ALL SPARE CIRCUITS)

24 V DC DISTRIBUTION #1:

- 1 GENERAL ALARM FUSE PANEL -
- 2 E. STOP SYS'T -
- 3 W/T DOORS -

- 4 TELEGRAPH -
- 5 EMERG. GEN. CONTROLS -
- 6 INSTRUMENT ILL. -
- 7 F/L's W/H TOP -
- 8 F/L's FRC P & S -

MAIN DECK

460 V COMMISSARY POWER DIST. PANEL #2:

- 1 GRILL -
- 2 20 A SPARE -
- 3 DEEP FRYER -
- 4 BAKE OVEN -
- 5 40 A SPARE -
- 6 GALLEY RANGE -

115/208 V COMMISSARY POWER PANEL #1

- 2 MIXER -
- 8 HOT WATER DISP., OFFICER'S MESS -
- 10 POTATO PEELER -
- 13 SPARE -
- 14 FREEZER -
- 16 PROOFER OVEN -
- 17 SPARE
- 18 RECEPTACLE (FRIDGE) -
- 5 SEWAGE COMPARTMENT EXHAUST FAN -
- 11 SMOKE ROOM FAN -
- 12 UNKNOWN LOAD -
- 7 REFRIGERATOR-

COMMISSARY POWER DIST. PANEL #3 - ES2

- 1 TOASTER -
- 2 SPARE -
- 3 TOASTER -
- 4 FOSTER REFIGERATOR -
- 5 SPARE -
- 6 GARBARATOR 3Q -
- 7 SPARE -
- 8 DISHWASHER -
- 9 SPARE -
- 10 GALLEY AC UNIT -
- 11 SPARE -

230 V HEATING PANEL #1:

- 1 MCR -

- 2 PROG OFF CABIN 325 -
- 3 CABIN 319 & 321 -
- 4 WORKSHOP -
- 5 CABIN 320 & 322 -
- 6 CABIN 317 & 318 -

230 V HEATING PANEL #2:

- 1 OFFICER'S MESS -
- 2 CREW'S MESS (SMALL HTR) -
- 3 2nd COOK/CHIEF STEWARD -
- 4 GALLEY STEAM TABLE -
- 5 (ENGINEER'S OFFICE)
- 6 CREW'S LOUNGE -
- 11 CREW'S MESS (LARGE HTR) -

230 V HEATING PANEL #3:

- 1 SEAMAN COOK/ 2 SEAMEN, LWR DK. -
- 2 W/R #403, PROVISIONS Rm -
- 3 CABIN #405 -
- 4 CABIN #308 -
- 5 CABIN #303 -
- 6 W/R #304 -
- 7 BOSUN'S & STEWARD'S CABIN -
- 8 SEWAGE COMP'T HTRS -
- 9 W/R #303, PAINT & LAMP Rm -
- 11 CABIN #406, STOREROOM -
- 12 FWD ROPE STORES HEATER -

115 V WORKSHOP POWER DIST. PANEL ES1-3:

- 1 WASHING MACHINE
- 2 RECEPTACLE S. AFT -
- 3 RECEPTACLE S. -
- 4 RECEPTACLE S. FWD -
- 5 SPARE -
- 6 SPARE -

115 V MAIN DK POWER & LIGHT ES1-7:

- 1 RECEPTACLES Rm #315, 321, 325 -
- 2 LTS 320, RECEPTACLES 316, LTS/RECEPTACLES 318 -
- 3 GALLEY RECEPTACLES -
- 4 LTS/RECEPTACLES Rm #308, 310, 314 -
- 5 WORKSHOP LTS, STBD HALLWAY RECEPTACLES -
- 6 LTS/RECEPTACLES Rm #324, 327 -
- 7 RECEPTACLES Rm #318, 320/LTS CO<sub>2</sub> Rm, HALLWAY -
- 8 LTS/RECEPTACLES Rm #315, 317, 319, 321, 323 -

- 9 RECPTACLES Rm #315, HALLWAY P & S -
- 10 GALLEY RECEPTACLES -
- 11 CREWS MESS FRIDGE AND ICE MACHINE -
- 12 GALLEY RECEPTACLE-
- 14 BLANK -
- 15 LTS GALLEY, Rm 313, 315 -
- 16 GALLEY RECEPTACLES -
- 17 SAPRE -
- 18 LTS MAIN DK, HALLWAY P, Rm #327/RECEPTACLES Rm #325, 326 -
- 19 RECEPTACLE HANGER-
- 20 HANGER RECEPTACLE -

115 V MAIN DK POWER & LIGHT #2 ES1-8:

- 1 SHIPS OFFICE -
- 2 RECEPTACLES Rm #307, LTS Rm #300, 304/ HEAT LAMP #2, Rm 304 -
- 3 RECEPTACLES OFFICER'S MESS, Rm 306, LTS Rm 309 -
- 4 LTS/RECEPTACLES Rm #301, 309; RECEPTACLES Rm #307, 309
- 5 RECEPTACLES HALLWAY, LTS E/R STRS. -
- 6 LYS/RECEPTACLES Rm #314 -
- 7 RECEPTACLES HALLWAY -
- 8 LTS HALLWAY, Rm #401 -
- 9 LTS/RECEPTACLES Rm #400 -
- 10 RECEPTACLES Rm #401 -
- 11 HEAT LAMP #1, Rm 304/LTS Rm #305, 310 -
- 12 EMERG LIGHT B/T COMPARTMENT, CARGO HOLD, ESCAPE HATCH

230 V WORKSHOP POWER DIST. PANEL E2-3:

- 1 SPARE -
- 2 DRYER #1 FWD -
- 3 DRYER #2 AFT -

230 V MAIN DL MISC DIST PANEL:

- 1 AUTRONICA -
- 2 MAHAK TORQUE -
- 3 LATHE
- 4 BOILER TREATMENT CHEM TANK

115 V MAIN DK EMERGENCY LIGHT PANEL E 3:

- 1 E. LTS, OFFICER'S MESS -
- 2 E. LTS MAIN DK AFT, MCR, WORKSHOP -
- 3 E. LTS, E 3 PNL CLOSET -
- 4 FUNNEL F/L's -
- 5 E. LTS HALLWAY, CREW'S MEES, LWR DK -
- 6 E. LTS MAIN DK FWD, HALLWAY, EXIT LTS -
- 8 E. LIGHTS MAIN DECK

### LOWER DECK

#### 115 V MISC DIST. PANEL E/R: ESSI-9

- COUPLING START BLK, PORT -
- 1 G/B L.O. HTR -
- 2 ENGINE ROOM MONITOR-
- 3 STEERING FLAT RECEPTACLE -
- 4 MIG WELDER PLUG -
- 5 UNIT HTRS, AUX Rm/STEERING -
- 6 WATER QUALITY METERS -
- 7 UNIT HTRS, E/R -
- 8 CPP, MCR CONSOLE -
- 9 DRILL -
- 10 GRINDER -
- 11 OWS P/P -
- 12 DK MACHINERY SELECTOR SOLENOID -
- 13 B/T AUTO START PNL -
- 14 COUPLING START BLK, STBD -
- 15 B/T, MCR CONSOLE -
- 16 TELEGRAPH, CPP O.D. BOX -

#### 24 V DC DIST #2:

- 1 PORT S/S GEN CONTROLS -
- 2 PORT S/S GEN GOVERNOR -
- 3 PORT MAIN ENGINE CONTROL -
- 4 PORT M/E BLOCKING -

#### 24 V DC DIST #3:

- 1 STBD S/S GEN CONTROLS -
- 2 STBD S/S GEN GOVERNOR -
- 3 STBD MAIN ENGINE CONTROL -
- 4 STBD M/E BLOCKING -

### TANK TOPS

#### 115 V MACH SPACES POWER & LIGHT ES1-10:

- 1 E/R LIGHTING -
- 2 AUX RM/ ENGINEER STR LIGHTING -
- 3 LTS E/R, TUNNEL, HATCH COAMING, CHAIN LKR -
- 4 E/R LIGHTING -
- 5 LTS/RECEPTACLES, E/R -
- 6 LTS/RECEPTACLES PIPE TUNNEL, SEWAGE COMP'T -

- 7 LTS CARGO HOLD/HATCH -
- 8 FLUME TK DUMP V/V's -
- 9 CHLORINATOR -
- 10 E/R GAUGE LTS/E. LTS
- 11 GEN HTR PLUGS/RECEPTACLES -
- 12 BOILER FD P/P's -

115 V MACHINERY SPACES EMERGENCY LIGHTING PANEL E 4:

- 1 E. LTS STEERING & AUX COMP'T -
- 2 STBD RECEPTACLES/LTS BELOW S/S GEN -
- 3 E. LTS, E/R -
- 4 LTS/RECEPTACLES, PIPE TUNNEL, SEWAGE COMP'T, B/T COMP'T -
- 5 WORK BENCH RECEPTACLE -

### 3.4 Location

- 3.4.1 The location of the panels, breakers, etc,,, can be found in the panel and breaker index binder in the MCR.

### 3.5 Interferences

- 3.5.1 The Contractor shall be responsible for the identification of all interference items, their temporary removal, storage and refitting to 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 Any repairs to grounded circuits shall be tested before it is considered complete.

### 4.3 Certification

- 4.3.1 The contractor shall provide current calibration certificates for all meters used during testing.

**Part 5: DELIVERABLES:**

**5.1 Drawings / Reports**

5.1.1 The Contractor shall submit three (3) signed type written copies of the final completed insulation tests and work completed to the Chief Engineer prior to the completion of Refit.

**5.2 Training**

5.2.1 N/A

**5.3 Manuals**

5.3.1 N/A

Spec item #: L-2	<b>SPECIFICATION</b>	TCMSB Field #: N/A
<b>ELECTRICAL THERMAL IMAGE SCAN</b>		

**Part 1: SCOPE:**

- 1.1 The intent of this specification shall be to provide the Owner's representative with a Thermal Image Scan of the Main and Emergency Switchboards, Generators and Transformers (over 10 KVA). The purpose of this scan shall be to identify and repair any / all defects discovered in the image.
- 1.2 This work shall be carried out in conjunction with the operation of the ship. The Chief Engineer shall be consulted well in advance of the scheduled test to ensure ample time to set up the available loads.

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

- 2.1.1 N/A

**2.2 Standards**

- 2.2.1 The Main and Emergency Buses shall be scanned in accordance to and in compliance with the TCMS Inspector and TP 127E Ship's Electrical Standards.
- 2.2.2 The Contractor shall use Certified Equipment and produce Imagery that is acceptable to the TCMS Inspector.

**2.3 Regulations**

- 2.3.1 CG Lockout Procedures, ISM Hotwork, Confined Space Entry and Fall Protection Procedures shall be strictly adhered.

**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 complete a thermal image scan of the Main and Emergency Switchboards.
- 3.1.2** The Contractor shall complete a thermal scan of the three ships service generators. This shall include the Port & Starboard Auxiliary Generators and the Emergency Generator.
- 3.1.3** The Contractor shall complete a thermal image scan of the Transformers (over 12 KVA).

- Generator Breaker #1
- Generator Breaker #2
- Shore Power & Feedback Breaker
- Main Switchboard 230 V bus
- 460V Essential Bus
- 460V Non-Essential Bus
- 115V Distribution Bus

- 3.1.4** The Contractor shall include in their quote a \$2,000.00 allowance to correct any defects discovered during the thermal scan. This shall be adjusted up or down by PWGSC 1379 action.
- 3.1.5** The scan shall be taken with the maximum load achievable while secured alongside.
- 3.1.6** The Contractor shall submit three signed copies of the Final Readings to the Chief Engineer.

#### **3.2 Location**

- 3.2.1** The location of the port & starboard generators can be found in the engine room, and the emergency generator can be found in the emergency generator compartment on the main deck.
- 3.2.2** The main switchboard is located in the MCR and the emergency switchboard is located in the Emergency generator Compartment.

#### **3.3 Interferences**

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

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

### **4.1 Inspection**

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

### **4.2 Testing**

4.2.1 The final thermal scan shall not indicate any defects once all identified problems have been corrected.

### **4.3 Certification**

4.3.1 The contractor performing the thermal image scan shall be currently certified and it shall be acceptable to the Chief Engineer and TCMS Inspector.

## **Part 5: DELIVERABLES:**

### **5.1 Drawings / Reports**

5.1.1 The Contractor shall deliver a detailed work report on the thermal images taken, defects and problem areas clearly identified and corrected action taken.

5.1.2 Once all repairs have been completed, the contractor shall provide the Chief Engineer with an image that is acceptable to the TCMS Inspector and the Chief Engineer not indicating any problem areas. (submit three (3) signed type written copies of the completed scan to the Chief Engineer prior to the completion of Refit. (Included shall be an IR Image and Normal Photographic Views of each deficiency).

### **5.2 Training**

5.2.1 N/A

### **5.3 Manuals**

5.3.1 N/A

