CCGS Leonard J. Cowley
Annual Refit Alongside 2013

Index

REFIT PREAMBLE

1. INTENT

The intent of this specification shall describe the necessary work involved in carrying out ship's Alongside Annual Refit at the Canadian Coast Guard Base South Side Road in St. John's. Refit is from October 30 to December 3/13 by the contractor.

All work specified herein and all repairs, inspections and renewals shall be carried out to the satisfaction of the: Owner's Representative and Lloyd's Surveyor.

Unless otherwise specifically stated, the Owner's Representative is the Chief Engineer.

2. MANUFACTURER'S RECOMMENDATIONS

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

3. TESTING AND RECORDS

All test results, calibrations, measurements and readings shall be properly tabulated, compiled and three typewritten copies and one electronic copy shall be presented to the Owner's Representative before the completion of the refit. All tests shall be performed to the satisfaction of the Owner's Representative and attending surveyors.

4. WORKMANSHIP

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

5. FACILITIES

Quotation shall include all the necessary labour and equipment required for the erection of access staging, rigging, lighting, tugs, pilotage, necessary cranage and line handling including 5 lifts.

During the entire refit the contractor shall maintain in a state of good order all walk-ways, scaffolding, ladders, guardrails and similar appliances which 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 contractor supplied, new and unused unless otherwise specified. All replacement material in the form of jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, and all others, 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 prior to its use.

7. REMOVALS

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

8. EXPOSURE AND PROTECTION OF EQUIPMENT

Proper precautions shall be taken 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. Owner supplied equipment shall be received by the contractor and stored in a secure warehouse or storeroom having a controlled environment appropriate to equipment in accordance with the manufacturer's instructions.

9. CLEANLINESS

The contractor shall at all times maintain the work areas in which 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 placed there as a result of 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 this refit.

10. LIGHTING AND VENTILATION

Temporary lighting and/or temporary ventilation required to carry out any item of this specification shall be supplied, installed and maintained in safe working condition and removed on completion.

11. ASBESTOS

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

12. ENTRY INTO ENCLOSED SPACES

The Contractor is to 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 are to clearly state the type of work permitted and are to be renewed as required by regulations. Copies of the certificates are to be posted in conspicuous locations for the information of the Ship's and Contractor's personnel for enclosed spaces. Contractor shall be responsible to ensure the safety of Contractor's personnel, including

any subcontractors, inspection personal, Lloyd's Surveyor, Chief Engineer and Technical Authority Representive.
The Contractor is to ensure that any work carried out in confined spaces as defined by the Canada Labour Code must comply fully with all provisions of the code and follow the Coast Guard Fleet Safety Manual Confined space entry 7.D.9 Version 3 effective 2007/06/29 and 7.D.9 (N) Version EdVrl dated November 24, 2006

13. 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 will be responsible for maintaining a competent and properly equipped fire watch during, and for at least one half hour (30) minutes after, all hot work has been completed. The fire watch is to be arranged such that all sides of surfaces being worked on are visible and accessible. The Contractor is to 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 is to be notified immediately should an incident of this nature occur.

All Hot Work to be completed in accordance with Coast Guard Fleet Safety Manual Section 7.D.11 Version Ed 2Vrl March 15/06 and 7.D.11(N) Version 3-1 effective 2008/12/19 Contractor must fill out proper hotwork permits prior to starting any hotwork.

14. PAINTING

All new and disturbed steel work that will not be on the underwater wetted surface of the ship's hull shall be protected with one coat of primer. Unless otherwise stated in the individual specification item the primer shall be International Paints Interplate zinc silicate NQA262/NQA026 red or equivalent. The paint shall be applied as per the manufacturer's instructions on their product data sheet.

15. WELDING

Welding shall be in accordance with the Canadian Coast Guard Welding Specifications for Ferrous Materials, Rev 4., available from Canadian Coast Guard.

Contractor must be currently certified by the Canadian Welding Bureau (CWB) in accordance with CSA Standard W47.1, latest revision at the time of bid closing. All welders must be CWB registered and certified. Contractor is to supply Chief Engineer with all welders certification that will be working on the job prior to any welding taking place.

16. SMOKING

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

17. RESTRICTED AREAS

The following areas are out of bounds to the contractor's personnel except to perform work as required by the specifications:
All cabins, wheelhouse, public washrooms and mess area.

18. ELECTRICAL STANDARDS

The following specifications and standard form part of this specification and shall apply. In each case, the latest edition as of tender closing date shall govern:

- TP 127E - Ship Safety Electrical Standards, available form Transport Canada Marine Safety

- IEEE Standard 45 - Recommended Practice for Electrical Installation on shipboard, available from Canadian General Standards Board.

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 owner. Metal tie wraps must be used everywhere except panels or junction boxes plastic tie wraps may be used.

19. LOCKOUT AND TAG OUT PROCEDURES

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

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

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

The Contractor shall supply and install all locks and tags and shall complete the Lockout Tag out Log sheet provided by the vessel.

20. 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.

21 VESSEL CREW

The contractor shall note that the vessel will be manning during the refit period.

Provision for safe and timely access to the vessel shall be made for the vessel's crew during the period of the refit and until the vessel leaves the contractor's premises. The ship's crew is not to be locked out of the Contractor's premises during security guard rounds or similar situations.

23. FIRE DETECTION AND SUPPRESSION SYSTEM

If any specification item will require disturbing, removing or isolating any heat or smoke sensors the Contractor shall advise the Owner's Representative before work commences. The ship's crew will perform any such work.

24. SAFETY ANNEX

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

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

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

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

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 onboard. 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 Ocean Canada, Canadian Coast Guard Fleet Safety Manual (DFO 5737) – (Adobe Acrobat .PDF version) can be found at http://142.130.14.20/fleet-flotte/Safety/main_e.htm

25. 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.

26 Heavy Metal Based Coatings

Paints containing lead, mercury or copper shall not be used.

27 Blasting Debris

The contractor shall adhere to local bylaws for containment of blasting debris.

28 Work Aloft

Any work aloft shall be conducted in accordance with the Contractor's Standard Operating Procedures (SOP's) based upon a review and acceptance of the Contractor's SOP's by the Contract Authority and the Technical Authority. The contractor shall comply with the work requirements as outlined in the Canada Labour Code and applicable Provincial Regulations.

29. SHIP'S PARTICULARS

Length O.A.:	72.0 m
Length B.P.:	67.0 m
Breadth Overall:	14.0 m
Depth Moulded:	4.9 m
Mean Draft, Extreme:	4.3 m
Displacement, Extreme:	2087 tonnes
Displacement, Docking:	1495 tonnes

Spec Item : HD-1	**SPECIFICATION**	
HD-1 PRODUCTION CHART		

Part 1: SCOPE:

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

1.2 This work shall be carried out in Conjunction with the following:
All refit specification items and shall be updated by the contractor prior to all production meetings.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1.

2.2 Standards

2.2.1

2.3 Regulations

2.3.1

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The successful contractor shall supply three hard copies to Chief Engineer and forward one electronic copy to the vessel's Senior Vessel Maintenance Manager (SVMM)harteryd@dfo-mpo.gc.ca. Also facsimile to be sent to Public Works Government Services Canada (PWGSC) at 709-772-2932.

3.1.2. The chart shall show for each specification item, the start date, the manpower loading, the duration, and the completion date. The Contractor shall include on the updates to the production chart any Work Arising from PWGSC 1379 action and indicate how the additional work will impact the completion schedule for the vessel.

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

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

3.2 Location

3.2.1. N/A

3.3 Interferences

3.3.1 N/A

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. Three updated copies of production chart be completed and presented to the Chief Engineer at least 24 hours prior to each progress meeting. An electronic copy of the updated production chart shall be forwarded to SVMM prior to each progress meeting.

4.2 Testing
N/A

4.3 Certification
N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1

5.2 Spares
N/A

5.3 Training
N/A

5.4 **Manuals**
N/A

Spec item : HD-2	**SPECIFICATION**	
HD-2 GREY WATER TANK		

Part 1: SCOPE:

1.1 The intent of this specification is to open up tank for annual cleaning and inspection. Contractor shall clean and touch up tank coating where affected. Prove operation of all level and operating switches. All work shall be inspected by the Chief Engineer including inspection after cleaning, painting and before tank is closed up and to witness operational tests.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1. Capacity 1.6 cubic meters.
2.1.2. Surface area Approximately 120 square feet.

2.2 Standards

2.2.1

2.3 Regulations

2.3.1 Entry into confined spaces shall be carried out in accordance with the instructions given in the Preamble of this specification.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. Tank level transducer shall be removed from the tank and a blank fitted to the flange plate of the tank while work and testing are being carried out. Upon completion the blank shall be removed and the transducer reinstalled using new gaskets. This work shall be completed by the Contractor.

3.1.2. The gray water tank shall be isolated from the inlets and by-passed to the overboard pipe. The contractor shall make provision for the removal of waste while tank is undergoing cleaning and inspection. The contractor shall make a connection to the overboard at the ships side to the contractor supplied removal/holding tank. The contractor shall bid on the removal of ten cubic meters of grey water and give a cost per cubic meter price and

the final price shall be adjusted up or down based on the invoice for removal. Upon completion of all work in this specification the Contractor shall remove all blanks / by-passes that were fitted to isolate the tank.

3.1.3. The gray water tank shall be pumped down to its lowest level, the manhole cover removed, tank gas freed "safe for personal" certificate to be given to Chief Engineer, and posted by manhole for tank to be entered and on the vessel's gangway. Any remaining water and debris shall be disposed of in accordance with the provincial environmental regulations.

3.1.4. Contractor shall clean all internal surfaces of the tank.

3.1.5. The Contractor shall bid on supplying and coating tank internals with International Intershield ENA 300. Any scaling or damaged internal tank paint surfaces shall be repaired by power tooling to SSPC-SP11 standard (bare metal with profile). Strip coat all welds, stiffeners with Intershield ENA 300 bronze. Damaged areas to be given two coats. The first coat shall be Intershield ENA 300 bronze @ 6 Mils DFT. The second coat shall be Intershield ENA 300 Aluminum grey @ 6 Mils DFT s Contractor shall bid on **50** square feet. The contractor shall quote a unit square foot price and the cost shall be adjusted up or down by 1379 action base on the actual units (square feet) required for repair. Coating applied to the tanks internal surfaces shall follow the recommended procedure as set out in the paints manufacture's product data sheets.

Note ** Either bronze or aluminum, can be used as the first or second coat depending on whether a lighter or darker coat is required as the finish coat.

3.1.6. The tanks shall be inspected by the Chief Engineer or his delegate Engineer.

3.1.7. Suction pipe from discharge pump shall be removed and proven clear and re-installed.

3.1.8. Sounding pipe shall be proven clear.

3.1.9. All float and level switches shall be cleaned.

3.1.10. After all work is completed Contractor shall replace manhole cover using new approved gasket. Manhole securing studs and nuts shall be cleaned up and coated with anti seize compound.

3.1.11. The tank shall be filled with fresh water and the high level alarm, pump cut in / out float switches shall be proven operational.

3.2 Location

3.2.1. Shaft tunnel Frames No. 20 – 21.

3.3 Interferences

3.3.1 N/A

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. Tanks shall be inspected by the Chief Engineer or his delegate Engineer.

4.2 Testing
N/A

4.3 Certification
N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Contractor to supply three typed copies and one electronic copy of report to Chief Engineer.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item : H-1	**SPECIFICATION**	
H-1 AVIATION GAS TRUNK RENEWAL		

1.1 SCOPE:

1.1 The intent of this specification shall be to crop out and renew the ventilation trunk for the aviation fuel pump room and the aviation fuel cofferdam. This is one common trunk separated into two separate vent sections by a divider plate with each section containing a shutdown louver. Two new owner supplied Lloyd's approved shutdown louvers are to be installed in the same location as old louvers.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

Please see attached pictures and sketch.

2.2 Standards

2.3 Regulations

2.3.1

2.4 Owner Furnished Equipment

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

2.4.2 Owner will supply two new Lloyd's approved shutdown louvers.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. Contractor shall gas free the cofferdam and the pump room below the ventilation trunk prior to any hot work or access to this space. These spaces shall be certified for hot work and entry by a certified chemist.

3.1.2. The following precautions shall be taken where hot work is to be conducted:
The compartment(s) affected shall be certified gas free by a certified marine chemist or other qualified person. The Contractor shall keep copies of all active and expired hot work certificates in a central location on the vessel for viewing. Certificates shall specify, "Safe for persons" and/or "safe for hot work" as appropriate. The Contractor shall post a copy of all certificates at the entrance to the affected spaces; Protective material shall be used to prevent the spread of sparks, protecting electrical cables and other services;
Fire sentries shall be provided in each space and in all adjacent spaces, if welding, grinding and burning is being carried out. Fire sentries shall be provided with an appropriate fire extinguisher and shall be trained in its use. The fire sentry shall maintain a watch in his designated area for at least thirty (30) minutes after any hot work has been completed.

3.1.3. Confined Space Entry: Contractor shall keep copies of all active and expired entry permits with certified marine chemist or other qualified person's "Gas Free Certificate" in a central location on the vessel for viewing. Certificates shall specify, "Safe for persons" and/or "safe for hot work".
Any entry into confined spaces during the contract period shall be conducted in accordance with the Canadian Coast Guard Fleet Safety Manual.

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

3.1.4. Contractor shall remove the stainless steel cabinet from the port side of the trunk. This cabinet is secured with four bolts that are now very corroded. These bolts will have to be cut off. There are also two tubes that go to this cabinet that the Contractor shall remove. The contractor shall plug these tubes to prevent the ingress of dirt. There is also a wire going to this cabinet that can remain connected. The cabinet can be laid to the port side of the tank with the wire still connected. After all steel work and coatings are completed the Contractor shall re-install this cabinet the same location as per existing. Welding shall be carried out in accordance with CSA W47.1 & W59.

3.1.5. Contractor prior to any welding taking place has to submit to Lloyd's Surveyor a welding procedure which has to be approved by Lloyd's before any welding is started.

3.1.6. Contractor shall remove the cooling water tank attached to the aft section of the trunk. This tank is tack welded to the trunk on the four corners of its bracket. Also to remove the tank one pipe union must be let go. The Contractor shall re-install the tank and secure it to the new trunk the same location as per existing. Welding shall be carried out in accordance with CSA W47.1 & W59.

3.1.7. Contractor shall remove two pipe brackets on the starboard side of the trunk that bracket two pipes to the trunk. Contractor shall re-install the brackets to the new trunk upon completion in the same location as per existing. Welding shall be carried out in accordance with CSA W47.1 & W59.

3.1.8. **C**ontractor shall remove the tubing to both shut mechanisms for the louvers. Contractor shall re-install this tubing and secure it to the new trunk to its as fitted specifications and condition.

3.1.9. There are three copper tubes that are bolted to the starboards side of the trunk that the contractor shall remove from the side of the trunk so this removal can be completed. The contractor shall re-install the tubing and secure it to the new trunk to its as fitted specifications and condition.

3.1.10. Contractor shall cut the existing trunk out from its base at the Upper Deck level to its top at the deck head above. This includes cutting the trunk away from a catch all to which it is attached.

3.1.11. Temporary Shelter over Side shell opening: Contractor shall erect a temporary shelter over the side shell opening. The shelter shall be erected to provide suitable shelter from rain, snow and wind in way of the specific area under construction. This shelter is to be kept in place until all steel work is completed. The materials in the temporary shelter are to be non-combustible.

3.1.12. Contractor shall fabricate and renew the entire trunk to as fitted specifications. This shall include the fitting of the new (Coast Guard supplied) ventilation louvers. Contractor shall connect the shut down tubing to the new louvers to as fitted specifications. Contractor shall test the shut downs on the louvers and prove to be working to the satisfaction of the

attending Lloyd's Surveyor and Chief Engineer. This shall also include the welding of the attached catch all to the new trunk and proving the catch all to be leak free.

3.1.13. All steel is to be blasted and primed with a weld-able primer before fabrication.

3.1.14. Once installed, all welds and heat affect areas are to be hand tooled and coated with primer, internally (including the divider plate) and externally, to be witness by Chief Engineer.

3.1.15. The complete internal (including the divider plate) and external area, new steel and heat effected steel is then to be coated with one complete coat of primer, to be witness by Chief Engineer This process is to ensure that all steel in the repair area is completely primed.

3.1.16. After priming, the contractor shall supply and apply the complete interior (including the divider plate) and exterior steel work with two topcoats of marine epoxy, to be witness by Chief Engineer. The exterior coating is to match the current vessel paint type and color (White).

3.1.17. All coatings and solvents must be supplied with acceptable WHIMS data sheets and correctly marked. Contractor is responsible to remove all containers of paint and solvents from the work place daily.

3.1.18. New plating for ventilation trunk and divider plate to be new Lloyd's Grade A material or equivalent to be determined by Lloyd's, the plate thickness shall be 7.94mm.

3.1.19. All welding is to be in accordance with CSA W47.1 & W59.

3.1.20. Contractor shall arrange for inspection of all welds:

- 100% visual
- 20% MPI
- All inspections witness by Chief Engineer and Lloyd's Surveyor

3.1.21. Once the work is completed the contractor shall water hose test the trunk to prove it is leak free.

3.1.22. All work shall be to the satisfaction of the Chief Engineer and a Lloyd's Surveyor.

3.2 <u>Location:</u>

3.2.1. Aft section of stern on Upper deck.

3.3 Interferences

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

4.1. PROOF OF PERFORMANCE:

4.1. Weld Inspection and Testing.

4.1.1. Contractor shall perform tests to verify that all requirements of the specification are met. All welds are to be hose tested to ensure a watertight integrity.

4.1.2. The steel work is to be completed to the satisfaction of the attending Lloyd's Surveyor and the Chief Engineer.

4.1.3. The completed steel work is to be 100% visually inspected after welding is completed by Lloyd's Surveyor and the Chief Engineer.

4.1.4. There is to be a 20% MPI testing completed welds by approved testing personnel.

4.1.5. The contractor shall perform function system test on all reinstalled piping removed for trunk remediation.

4.1.6. Contractor shall perform function test on two new installed fire dampers they must be operating as designed.

4.1.7. This testing is to be carried out in the presence of the attending Lloyd's Surveyor and Chief Engineer.

4.1.8. All costs associated with the inspection to be included in the contractor's price for known steel work.

4.1.9. All cost for Lloyd's Surveyor will be will be paid by the owner.

4.1.10. Contractor is to be responsible to contact Lloyd's Register for all inspections. The contractor is responsible for all air quality testing to ensure hot work and entry is permitted.

4.1.11. Contractor shall issue and post hot work permits and shall maintain a fire watch. After acceptance of the test on the weld seams by the Lloyd's Surveyor and Chief Engineer, the area is to be inspected to ensure all debris has been removed.

4.1.12. Contractor shall supply all necessary materials, fittings blanks and labor for respective tests.

4.2. Certification:

4.2.1. Contractor shall obtain and provide to the Technical Authority all required technical Certifications as specified in the applicable rules and codes in accordance with Preamble Section of this specification.

4.2.1. After completion of work, the system shall be proven and certified fully operational.

5.1 DELIVERABLES:

5.1. Documentation:

5.1.1 Contractor is to include the supply of a documentation package as a component of the complete project. This documentation package is to include for all material data (certificates) for the installed steel, the weld procedures used, a record of consumables and the certificates for the welders completing the work.

5.1.2. In addition, the documentation package is to include a record of the hose test, the MPI reports and the visual weld inspection, as well as a copy of all hot work and enclosed space entry signed sheets.

5.1.3. Three copies of the above mentioned documentation are to be supplied upon completion of the work scope.

5.2. Drawings.

Spec item : H-2	**SPECIFICATION**	
H-2 FRESHWATER FILL PIPE		

Part 1: SCOPE:

The intent of this specification is to replace the entire mild steel fresh water fill pipe port and starboard from the Foc'sle deck penetration down through the Upper and Main decks to the roust-a-bout couplings in Forward Machinery Space with new stainless steel piping.
This specification is to be completed prior to the fresh water tank cleaning by crew.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.2 Domestic Fresh water drawing 590-37

2.2 Standards

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

2.3 Regulations

2.3.1

2.4 Owner Furnished Equipment

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

2.5 Related Specifications.

Fresh water tank cleaning by crew.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

Prior to commencement of the work the Contractor shall inform the Chief Engineer.
Contractor shall connect up a separate fresh water supply of 3.5 bar pressure to ship's domestic freshwater system, before the fresh water tank and fill pipes are taken out of service and left in place until the fresh water tank and fill pipes are ready to go back in service. (Normally this is connected to the ships fresh water fill pipe but since this is being replaced it will have to be connected direct to the pressure tank suction pipe).

Spec item : H-2	**SPECIFICATION**	
H-2 FRESHWATER FILL PIPE		

3.1.1. Contractor shall remove all necessary paneling, built in end tables, stainless steel mesh, insulation, deck tiles and “T” bar in the forward machinery space, the forward recreation room, the Seaman’s Cabin forward on Starboard side Upper Deck as well as the Smoke Room Port to gain access for the removal of the old fresh water fill piping.

3.1.2. Contractor will have to conduct Hot work to Foc’sle deck flush fitting port and Stbd and also deck penetrations of the Upper and Main decks.

3.1.3. Contractor to take the following precautions where hot work is to be conducted. Contractor shall keep copies of all active and expired hot work certificates in a central location on the vessel for viewing. Certificates shall specify, "Safe for persons" and/or "safe for hot work" as appropriate. Contractor shall post a copy of all certificates at the entrance to the affected spaces; Protective material shall be used to prevent the spread of sparks, protecting electrical cables and other services; Fire Sentries shall be provided in each space and in all adjacent spaces, if welding, grinding and burning is being carried out. Fire Sentries shall be provided with an appropriate fire extinguisher and shall be trained in its use. The fire sentry shall maintain a watch in his designated area for at least thirty (30) minutes after any hot work has been completed.

3.1.4. Contractor to remove the pipe in its entirety right to the roust –a- bout coupling located approximately 4 feet from ship’s side Port and Stbd in Forward Machinery Space. Total length of pipe to be replaced is 50 feet (25 foot per side). Contractor to quote per foot length of pipe to be replaced, to be adjusted by Public Works and Government Services (PWSGC) 1379.

3.1.5. Contractor shall, clean/flush and install new piping and flanges/fittings complete with new gaskets. Pipe to be 2 inch schedule 40 Stainless steel.

3.1.6. Contractor to weld in a new flush deck fitting at Foc’sle deck Port and Stbd and weld in the pipe penetrations on main and upper deck Port and Stbd. All of the deck and bulkhead penetrations must Lloyd’s approved.

3.1.7. All welds to be 100% visual inspected by Lloyd's Surveyor and Chief Engineer. Welds to be10% MPI tested by approved personnel.

3.1.8. Contractor to thread end of new stainless steel fill pipe Port/Stbd and install new ball valve and new male camlock fitting complete with cap.

3.1.9. Contractor shall hydrostatic test to 1.5 time's normal working pressure, two new sections of piping. Testing to be witness by Chief Engineer and Lloyd's Surveyor.

3.1.10. Contractor shall supply all necessary materials, fittings blanks and labor for respective tests.

3.1.11. On completion of fill pipe replacement Contractor to re-install all paneling, built in end tables, stainless steel mesh, Insulation, Deck tiles and "T" bar. New steel mesh and insulation to be installed.

3.1.12. Contractor to clean up all debris and depose of it as per provincial regulations.

3.2 Location

3.2.1. Frame 75-76 Port and Stbd

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.1.2. Visual inspection off all welding 100%.

4.1.3. Welds 10% MPI testing completed by approved testing personnel.

4.1.4. The contractor is responsible for all air quality testing to ensure hot work and entry is permitted.

4.1.5. The contractor shall issue and post hot work permits and shall maintain a fire watch.

4.1.6. Area where work was carried out to be inspected to ensure all debris has been removed.

4.2 Testing

4.2.1 Hydrostatic test to be carried out to 1.5 time's normal working pressure to be witness by Lloyd's Surveyor and Chief Engineer..

4.2.2 Welding 100% visual by Lloyd's and Chief Engineer.

4.2.3 Welds to 10% MPI by a Certify Technician
4.2.4 Areas where Hot work is to be carried out is to be certified by a Chemist or a qualified person to be determined by Chief Engineer.

4.3 **Certification**

4.3.1 Welders must be CWB Certify
4.3.2 Chemist must be certify
4.3.3 Technicians for NDT testing must be Certify

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1

5.2 Spares
N/A

5.3 Training
N/A

5.4 Manuals N/A

Spec item : H-3	**SPECIFICATION**	
H-3 SHOWER STALL REPAIRS		

Part 1: SCOPE:

1.1 The intent of this specification is to repair a total of 7 damaged shower stalls. All work shall be inspected by the Chief Engineer including inspection after cleaning and preparation for putting on first coating. Contractor must be certified to install fiberglass showers and have extension knowledge of shower repairs.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1. General Arrangement Drawing.

2.2 Standards

2.2.1

2.3 Regulations

2.3.1 Work shall be carried out in accordance with the instructions given in the Preamble of this specification.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. Contractor prior to starting has to contact the Chief Engineer.

3.1.2. Contractor must supply ventilation from all rooms being worked on to the outside of the vessels. In some cases Contractor might be able to use the cabin's port hole but in most cases he will have to use the vent in the cabin door and use sealed ventilation from cabin door to outside off vessel.

3.1.3. Contractor must ensure that no fumes from the work area spread to the adjoining rooms or hallways.

3.1.4. Contractor to note the total area off each shower stall including the floor area is 5.574 meter square. The floor area is 0.65 meter square. Contractor to quote as per cabin described. Contractor to quote per floor layer area

covered of woven gel coat and quote one mat layer of fiberglass for adjustments up or down by PWGSC 1379.

3.1.5. Contractor to repair shower stalls cabins: Senior Engineer's, Second Engineer's, First Officer's, Leading Seamen #1, Seaman #2 and Second Cook and Chief Cook.

3.1.6. Contractor to repair Senior Engineer's the floor requires uplift and three mat layers of fiberglass plus 1 layer of woven gel coat. The complete shower then requires one gel coat.

3.1.7. Contractor to repair Second Engineer's the floor requires uplift and three mat layers of fiberglass plus 1 layer of woven gel coat. The complete shower then requires one gel coat.

3.1.8. Contractor to repair First Officer's the floor requires uplift and three mat layers of fiberglass plus 1 layer of woven gel coat. The complete shower then requires one gel coat.

3.1.9. Contractor to repair Leading Seaman # 1the floor requires uplift and three mat layers of fiberglass plus 1 layer of woven gel coat. The complete shower then requires one gel coat.

3.1.10. Contractor to repair Seaman # 2 the floor requires uplift and three mat layers of fiberglass plus 1 layer of woven gel coat. The complete shower then requires one gel coat

3.1.11. Contractor to repair Second Cook the floor requires uplift and three mat layers of fiberglass plus 1 layer of woven gel coat. The complete shower then requires one gel coat.

3.1.12. Contractor to repair Chief Cook 1 layer of woven gel coat. The complete shower then requires one gel coat.

3.1.13. Contractor shall clean up all debris from work area. The area must be inspection to the satisfaction of the Chief Engineer.

3.2 Location

3.2.1. Focle Deck, Upper Deck and Main Deck

3.3 Interferences

3.3.1 N/A

Spec item : H-3	**SPECIFICATION**	
H-3 SHOWER STALL REPAIRS		

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. All work shall be inspected by the Chief Engineer or his delegate Engineer or Chief Officer.

4.2 Testing
N/A

4.3 Certification
N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Contractor to supply three typed copies and one electronic copy of report to Chief Engineer.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item #: H-4	**SPECIFICATION**	TCMSB Field #: N/A
H-4 FIXED FOAM AND WET CHEMICAL		

Part 1: SCOPE:

1.1 The purpose of this spec is to carry out the annual safety inspection of the Galley Range Guard and the Fixed Fire Fighting Systems in the Helicopter Hangar. Contractor shall perform all required annual maintenance. All work shall be inspected by the attending Lloyd's Surveyor. Contractor shall be responsible for scheduling the Lloyd's Surveyor.

1.2 All annual maintenance is to comply with applicable National Fire Protection Association standards.

1.3 All work to be performed by authorized manufacturer's qualified technicians.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

GALLEY WET CHEMICAL FIXED FIRE EXTINGUISHING SYSTEM

Name	Model No.	Serial No.	Imperial Gallons	Agent	Pressure PSI @ 70 deg F	Last inspection
Range Guard	**RG-4GM**	**015772**	**3.3**	**Karbaloy**	**175**	**2011**

2.1.1.

2.2 Standards

2.2.1

2.3 Regulations

2.3.1

2.4 Owner Furnished Equipment

2.4.1

Part 3: TECHNICAL DESCRIPTION:

3.1 **General**

3.1.1. Contractor shall perform annual maintenance on the Two (2) fixed firefighting equipment (Nordic Foam Flood System and Nordic Twin Agent Skid Unit (AFFF & Purple K) in the Helicopter Hangar.

3.1.2. Contractor shall perform annual maintenance on Galley Wet Chemical fixed equipment

3.1.3. Contractor to take a sample of foam from both Port and Stbd Hanger foam tanks and have foam analysis to see if it's still in good condition..

3.1.4. All inspection certificates, shall be provided for all equipment inspected, and be to satisfaction of a Lloyd's Surveyor, Certification shall be on a date as close as practicable to the completion of refit.

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

3.2 Location

3.2.1.

3.3 Interferences

3.3.1 N/A

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1.

4.2 Testing

4.3 Certification

N/A

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals

N/A

Spec Item: E - 1	**SPECIFICATION**	
EXHAUST SYSTEM TESTING		

Part 1: SCOPE:

1.1 The intent of this specification shall be to determine the thickness off exhaust steel piping material on two main engines, three auxiliary engines, one emergency generator and one incinerator. Also to remove expansion joint(bellows) immediately below the port main engine exhaust silencer.

1.2 Contractor shall supply all staging, parts, materials, tools, equipment and rigging to carry out the work in this specification.

1.3 Contractor must use a certify insulation company and must use only certify Red Seal insulators removing old insulation and installing the new insulation material.

1.4 Contractor must have staging erected by certified Red Seal scaffolding personal only.

1.5 Contractor must use a Certified Nondestructive Testing Company and the personal carrying out the thickness testing has to be a Certified Technician. Copies of their Certifies must be shown to Chief Engineer prior to starting work.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data/Manuals

2.1.1. Exhaust System piping as fitted Drawing number 590-52 sheet 1 of 2 and 590-52 sheet 2 of 2.

2.2 Standards

2.3 Regulations

2.3.1

2.4 Owner Furnished Equipment

2.4.1 Parts / Materials / Equipment / Rigging Contractor shall supply consumables, tools, equipment and rigging to carry out the work in this specification unless otherwise stated in the description of work.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. The Ship's crew with Contractor will isolate and lockout and tag out controls/supply air to each individual machinery component prior to work being started on that unit so that it cannot be started.

3.1.2. Contractor locks out and tagged out (two main engine room supply fans).

3.1.3. Contractor shall fill out all forms required lockout tag outs and working aloft as per ISM.

3.1.4. Contractor must have staging erected by certified Red Seal scaffolding personal only. Copies off the personals Red Seal Certificates must be supplied to Chief Engineer prior to any work starting.

3.1.5. Contractor must have staging from engine room to the penetration where it goes out though the ship's structure.

3.1.6. Contractor once staging is in place have someone using a 4 inch hole saw cut four holes at 3, 6, 9 and12 o'clock in the insulation (thickness of insulation is approximately 2 inches) to the point of the steel. This to allow for Ultrasonic Thickness Testing. Note it is critical for the personal drilling these holes to use extreme caution that they don't drill into the steel piping.

3.1.7. Contractor to quote on having someone using a 4 inch hole saw cutting four holes at 3, 6, 9 and12 o'clock in the insulation (thickness of insulation is approximately 2 inches) to the point of the steel at every elbow and one on each straight piece of piping between the elbows from the output of each piece of machinery to top of the inside of the stack. All except the incinerator it's to be taken from the penetration in the stack housing to top of the inside of the stack. Contractor to quote on the amounts listed below.

i. Port Main Engine 4 elbows and 4 straight pieces of pipe.
ii. Stbd Main Engine 4 elbows and 4 straight pieces of pipe.
iii. #1 Aux Generator 9 elbows and 9 straight pieces of pipe.
iv. #2 Aux Generator 8 elbows and 8 straight pieces of pipe.
v. #3 Aux Generator 8 elbows and 8 straight pieces of pipe.
vi. Emergency Generator 8 elbows and 8 straight pieces of pipe.
vii. Incinerator 4 elbows and 4 straight pieces of pipe.

3.1.8. Contractor to quote on having someone using a 4 inch hole saw cut four holes at 3, 6, 9 and12 o'clock in the insulation (thickness of insulation is approximately 2 inches) to the point of the steel; one elbow and one straight piece of pipe for each component to be adjusted up or down by a Public Works and Government Services (PWGSC) 1379.

3.1.9. Contractor to having a Certified Technician take a total of 90 Ultrasonic Thickness measurements in location described in section **3.1.7.** and quote taking one Ultrasonic Thickness measurement to be adjust up or down by a Public Works and Government Services (PWGSC) 1379.

3.1.10. Contractor must use a Red Seal insulation installer, to install the insulation that was remove by a hole saw with new insulation material (Calcium

silicate). Copies off the personals Red Seal Certificates must be supplied to Chief Engineer prior to any work starting. Contractor to quote on installing insulation type as stated in 90 holes in Locations described in section **3.1.7.** and quote per hole for a to be adjust up or down by a Public Works and Government Services (PWGSC) 1379.

3.1.11. Contractor must make sure that all debris is cleaned up, in the immediate area and the area below in the engine room, #1 Aux Generator room and Emergency Generator room after the insulation is removed.

3.1.12. Contractor after thickness testing has been carried out Contractor has to take off insulation on expansion bellows just below the port main engine silencer.

3.1.13. Contractor is then to remove the expansion bellows so that we can gain access to the port main engine silencer threw the bottom of the silencer by using a camera. Contractor must take a video up inside the silencer so that we can determine the condition of the silencer and baffles Possibly determine the type of material the baffles are made off. The height of the silencer is approximately 101 inches diameter approximately 56 inches.

3.1.14. Contractor when videotaping must have Chief Engineer and the Senior Vessel Maintenance Manager present.

3.1.15. Contractor after inspection to re-install expansion bellows with new exhaust gasket material and new bolts with removable treat lock on the bolts use number 8 strength bolts and nuts.

3.1.16. Contractor must use a Red Seal insulation installer; to install the insulation after repairs are made. To install new removable insulation covers.

3.1.17. Contractor to supply insulation material and fabricate from this material two layers off one inch thick removable blankets.

3.1.18. Contractor to install two layers of removable insulation blankets. The inner layer blanket shall consist of a high temperature insulation core (Superwool 607 blanket by Morgan Thermal Ceramics) with stainless steel mesh on both faces. Outer layer blanket shall consist of insulation core (Tri-L vitreous silicate needled blanket insulation) with stainless steel mesh on the inner face and silicone cloth on the outer face.

3.1.19. Contractor when installing must make sure all covers can be sewn, stapled or hog-ringed. (sewn seams to be of a heavy high temperature thread) All covers to fit snuggly around equipment being insulated.

3.1.20. Contractor to make sure all covers to be made to include, all openings including pipe, packing glands, valve stems and handles, hangers, and other obstacles.

3.1.21. Contractor to make sure covers to be made so as no force bending or folding required for installation and no visible strain on the fabricate once in place.

3.1.22. Contractor to ensure a minimum 2 inch overlap seam where joining to other covers or insulation and where a cover has to be made in more than one piece.

3.1.23. The insulation covers shall be drawn together with stainless steel wire secured through lacing anchors that are place no less than 25mm from any seam edge and secured through the entirety of the pad with a backing plate. Wire shall be woven through the anchors to draw the pad together and allow the overlap to fall in place around seams.

3.1.24. Contractor after insulation is completed and it's to the satisfaction off the Chief Engineer the staging is to be disassembled and take away.

3.1.25. Contractor to remove all lock out tagged locks and fill out all necessary form for vessel's ISM booklets.

3.1.26. All work to be carried out to the satisfaction of Chief Engineer.

3.2 Location

3.2.1. Main Engine room

3.3 Interferences

3.3.1 N/A

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. 100% visual by Chief Engineer.

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

4.2 Testing

4.3 Certification

4.3.1.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 The Contractor shall supply the Chief Engineer with three typed copies and one electronic of the Contractors work that was carried out. The report shall include all measurements off total area covered.

5.1.2 The types off insulation used for each layer and the temperature rating for each.

5.1.3 Ultrasonic Thickness Testing with their location on them.

5.1.4 Supply three copies of video taking inside the silencer.

5.2 Spares

N/A

5.3 Training

N/A

5.4 Manuals N/A

Spec item #: L-1	**SPECIFICATION**	TCMSB Field #: N/A
L-1 FIRE SYSTEMS		

Part 1: SCOPE:

1.1 Intent of this specification is to carry out the annual safety inspection of the FM-200 Fixed Fire Suppressant System(s) fitted to the vessel and Notifier Fire Alarm System. All systems shall be surveyed by Lloyd's. Contractor shall be responsible for scheduling the Lloyd's surveyor.

1.2 The systems shall be thoroughly examined and serviced by an Authorized Kidde distributor manufacturer's qualified technician. Annual maintenance is to comply with applicable National Fire Protection Association standards. Inspection certificates, satisfactory to Lloyd's shall be provided for all systems.

1.3 Contractor are to use a certify Kidde FSR to service the vessel's FM200 and CO2 system and certified Notifier FSR to test and certify the Notifier Fire Alarm System.

1.4 Prior to starting this specification the Contractor is to provide proof of Certifications.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

2.1.1.

2.2 Standards

2.2.1

2.3 Regulations

2.3.1

2.4 Owner Furnished Equipment

2.4.1 The contractor shall supply labour as stated.

Part 3: TECHNICAL DESCRIPTION:

3.1 General

3.1.1. Contractor prior to starting any work must notify the Chief Engineer.

3.1.2. Contractor, to supply one a certify Kidde FSR to service the vessel's FM200 and CO2 system

3.1.3. The following servicing shall be carried out on all FM-200 Fixed Fire Suppressant Systems.

3.1.4. All levers, valves, remote activations, wires, wire junction boxes, pressure operated sirens and pressure operated switches shall be checked. Delay mechanism shall be checked for proper operation.

3.1.5. Contractor shall inspect all associated fire dampers to check if they have released during the testing of all systems. Contractor shall reset all fire dampers. Any deficiencies shall be rectified through the PWGSC work arising procedures.

3.1.6. Piping shall be disconnected from cylinders and blown through with Nitrogen gas. All multi jet nozzles shall be proven clear.

3.1.7. FM-200 cylinders shall be measured using an approved method to determine the existing quantities of FM-200 agent in each cylinder. Cylinders shall be weighed individually. The weights shall be recorded and the cylinders tagged and dated. Individual pressures shall be recorded for each cylinder.

3.1.8. The entire system shall be properly reassembled, inspected and proven serviceable.

3.1.9. Remote release stations, fan shut downs as part of system alarm activated, etc., shall be reset and proven operational.

3.1.10. Three (3) typewritten copies of weight and inspection records with inspection certificates shall be prepared by the Contractor for the Inspection Authority. One additional copy shall be forwarded to Lloyd’s.

3.1.11. Contractor supply a certified Notifier FSR to test and certify the Notifier Fire Alarm system.

3.1.12. Contractor to supply three copies of test reports and three copies of the test Certifies.

3.1.13. All work carried out in this specification shall be inspected by Lloyd's Surveyor and Chief Engineer.

3.1.14. All work shall be carried out to the satisfaction of the Chief Engineer.

3.2 Location

Full weight of cyl & agent incl cap	VESSEL NAME	LOCATION OF HALOCARBON SYSTEM	SYSTEM PURPOSE
181.8	Cowley	Shaft Tunnel	Purifier Room
47.8	Cowley	Tank and Pump Room	Paint Room
175.2	Cowley	Emergency Generator Room	Emergency Generator Room
200.4	Cowley	Harbour Generator Room	Harbor Generator Room
209.8	Cowley	Forward Main Engine Room Port Side	Motor Control Room
615.4	Cowley	Bridge Deck Stbd side Stack	Engine Room Starboard
613.8	Cowley	Bridge Deck Stbd side Stack	Engine Room Port
340	Cowley	Bridge Deck Stbd side Stack	Engine Room Stack Fwd Cylinder
31.0	Cowley	Helicopter Hanger	Av Gas Fueling Dispenser Cabinet
100.3	Cowley	Incinerator Room	Incinerator Room
274.4	Cowley	Bow Thruster Compartment Stbd cyl	Bow Thruster Compartment
240	Cowley	Bow Thruster Compartment Port cyl	Forward Machinery Space
75.8	Cowley	Steering Flat	AV Gas Pump Room
338.4	Cowley	Steering Flat	Steering Gear
187.6	Cowley	Steering Flat	AV Gas Tank Cofferdam

3.3 Interferences

3.3.1 N/A

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

4.1.1. To the satisfaction of Lloyd's Surveyor and Chief Engineer.

4.2 Testing

4.2.1.

4.3 Certification

Contractor must supply three copies of the certifications of each system.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

5.1.1 Contractor must supply three copies of reports and certifications of each system.

5.2 Spares N/A

5.3 Training N/A

5.4 Manuals N/A

Spec item : L-2	SPECIFICATION	
L-2 MEGGAR TESTING		

L -2 INSULATION TESTING (MEGGAR TESTING)

1.1 SCOPE:
The intent of this specification shall be for the Contractor to test the insulation resistance of all the electrical distribution systems onboard, to satisfy the annual requirements of Lloyd's Surveyor. Care is to be taken not to test circuits while electronics (including voltage regulators), which may be damaged by high voltages, are connected. The contractor shall ensure all electronics are unplugged (TV'S, DVD'S, Radios and the like) in cabins, lounges and other common areas before doing insulation testing.

2.1 REFERENCES:
2.1 Nameplate Data
n/a
Related Specifications:
This work shall be carried out in Conjunction with the following:
n/a

3.1 TECHNICAL DESCRIPTION:
3.1.1 The Following Circuits shall be tested. 1000 VDC for alternators (Current transformers to be shorted for protection and field disconnected from electronic regulators) and 500 VDC for all remaining circuits listed.

3.1.2 The Contractor shall megger test all essential and non-essential wiring circuits of vessel's power distribution system and tested all connections of ground cable.
3.1.3 The Contractor shall notify the Technical Authority of deficiencies and conduct repairs as pre PWGSC 1379.
3.1.4 All equipment opened shall be properly reconnected and tightly closed.
3.1.5 List of panels attached.

3.1.6 Contractor is to megger all electrical systems found onboard the vessel. These readings are to be recorded and three hard (3) copies and one Electronic copy to be forwarded. Chief Engineer. Any Grounds or shorts found in any circuit are to be identified and appropriate action taken to correct. Minimum acceptable 100,000 ohms.

3.1.7 The following is a list of panels and locations to be megger tested.

LOCATION	PANEL#	VOLTS
Wheel House	L1	115
Foc'sle deck	L2	115
UPPER DK. FWD.	L3	115

LOCATION	PANEL#	VOLTS
Main deck forward	L4	115
Main deck forward(OFF REC.RM)	L5	115
UPPER DK. AFT. (OFF MESS)	L6	115
MAIN DK. CREWS MESS	L7	115
MAIN DK. STBD.(OUTSIDE GALLEY)	L8	115
M.C.R.	L9	115
E/R PORT AFT	L10	115
WHEEL HOUSE	EL2	115

WHEEL HOUSE	EL3	115
EMERG. GENR. COMPT.	EL4	115
UPPER DK. PORT ALLEY	EL5	115
WHEEL HOUSE	EL7	115
FOC'SLE DK. STBD.	PHD	230
E/R PORT	P1	460
E/R PORT	P2	460
FOC'SLE DK.	P3	460
FWD. MACH. COMPT.	P4	460
FWD. MACH. COMPT.	P5	460
MAIN DK. STBD. AFT	P6	460
UPPER DK. MIDSHIP PORT	P7	460
MAIN DK. STBD.	P51	230
WHEEL HOUSE	P52	230
UPPER DK. PORT ALLEY	EP1	460
EMERG. GENR. COMPT.	EP2	460
FOC'SLE DK. STBD.	7-EP1	460
FOC'SLE DK.	H1	230
UPPER DK. FWD.	H2	230
UPPER DK. PORT	H3	230
MAIN DK. CREWS MESS	H4	230
WHEEL HOUSE	DC1	24V.D.C.
CONTROL ROOM	DC2	24V.D.C.
UPPER DECK,EMERG.GEN.RM.	120 V SECTION 12	
UPPER DECK,EMERG.GEN.RM.	460V DIST.	
NAV. LIGHT PANEL (BRIDGE)		

LOCATION	**PANEL#**	**VOLTS**
CONTROL RM.	P53	230
CONTROL RM. MAIN SWBD.	460 VOLT SECTION #7	
CONTROL RM. MAIN SWBD.	120 VOLT SECTION #8	

MCC #1- MOTOR CONT.R00M (460V) AS FOLLOWS
CAPSTAN TOWING REEL HYD. UNIT #1
CAPSTAN TOWING REEL HYD. UNIT #2
BOARDING BOAT CRANE STBD. POWER PACK
BOARDING BOAT DAVIR PORT
LIFEBOAT DAVIT PORT
LIFEBOAT DAVIT STBD.
WINDLASS-CAPSTAN HYD. POWER UNIT #1
WINDLASS-CAPSTAN HYD. POWER UNIT #1

MCC#2-MOTOR CONTROL ROOM (460V) AS FOLLOWS:
M.E. #2 JACKET WATER PUMP
M.E. #2 JACKET WATER HEATER
ST'BY. CP PROP. PUMP #2
BILGE PUMP
GENERAL SERVICE PUMP

Spec item : L-2	**SPECIFICATION**	
L-2 MEGGAR TESTING		

MCC#3-MOTOR CONTROL ROOM (460V) AS FOLLOWS:
COFFERDAM EXHAUST FAN
HANGAR EXHAUST FAN
BRIDGE DK. SUPPLY FAN
MAIN DK. SUPPLY FAN
MCR A/C UNIT
BOW THRUASTER COMPT. SUPPLY FAN
AVIATION FUEL COMPT. EXHAUST FAN
INCINERATOR ***(DO NOT MEGGER)***
GENERATOR #2 RADIATOR FAN
GENERATOR #3 RADIATOR FAN
EMERGENCY GENERATOR ROOM FAN
#1 S.S. GENERATOR ROOM SUPPLY FAN

MCC#4-MOTOR CONTROL ROOM (460V) AS FOLLOWS:
OILY WATER SEPARATOR (DO NOT MEGGER)
AVIATION FUEL PUMP #1
FUEL OIL SEPARATOR #1 (MOTOR ONLY)
FUEL OIL TRANSFER P.P. #1
LUBE OIL TRANSFER P.P.
MAIN ENGINE FILL-UP P.P. #2
AVIATION FUEL SUMP PUMP
LUBE OIL PURIFIER HEATER
MAIN ENGINE LUBE OIL PUMP #2

MCC#5-MOTOR CONTROL ROOM (460V) AS FOLLOWS:
TURNING GEAR
F.O. SEPARATOR P.P. #2
F.O. TRANSFER P.P. #2
SLUDGE PUMP
M.E. FILL-UP P.P. #1
ST'BY. GEAR BOX L.O. PUMP
M.E. L.O. P.P. #1
GEAR BOX HEATER

MCC VENTILATION MCR (460V) AS FOLLOWS:
E/R SUPPLY FAN #1
E/R SUPPLY FAN #2
GALLEY EXHAUST FAN
SF-3 SUPPLY FAN WORKSHOP
EF-2 BRIDGE & FOC'SLE DK. PORT EXHAUST FAN
EF-3 BRIDGE & FOC'SLE DK. STBD EXHAUST FAN
EF-4 UPPER & MAIN DK. PORT EXHAUST FAN

EF-5 UPPER & MAIN DK. STBD EXHAUST FAN
EF-6 MAIN DK. AFT EXHAUST FAN
EF-8 PURIFIER RM. EXHAUST FAN
EF-9 TANK ROOM & ENGINEER'S CHANGE ROOM EXHAUST FAN
STERN TUBE P.P. #1
AIR COMPRESSOR #1
M.E. #1 J.W. HEATER
STERN TUBE P.P. 32
BOW THRUSTER HYD. UNIT
M.E. #1 JACKET WATER PRECIRCULATING PUMP.

ALL THREE S.S. GENERATORS
EMERGENCY GENEARTOR

NOTE ALL ELECTRONIC MONITORING AND REGULATING DEVICES ON S.S. AND EMERG. GENERATORS MUST BE ISOLATED BEFORE MEGGERING COMMENCES.**

4.1 PROOF OF PERFORMANCE:
4.1 All work shall be completed to the satisfaction of the Chief Engineer.

4.2 This specification is to be carried out in order to obtain Lloyd's survey credit. The Contractor shall be responsible for contacting the Lloyd's Surveyor when items are ready for the inspections.

4.3 The Contractor shall restore connections to all circuits tested and shall ensure that each of the circuits is operating correctly.

5.1 DELIVERABLES:
5.1.1 The Contractor shall produce three bound copies of readings and one electronic copy to be given to Chief Engineer.

5.1.2 The Contractor shall make necessary repairs using 1379 action.

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

Spec item : L-3	**SPECIFICATION**	
L-3 THERMOSCAN		

L-3 THERMOSCAN

1.1 SCOPE:

The intent of this specification shall be for the Contractor to address the requirements to survey the ship's electrical generators, switchboards and transformers (over 10 kVA) using Infrared Thermography as required by Lloyd's.

2.1 REFERENCES:

2.1.1 Nameplate Data

n/a

Related Specifications

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

n/a

3.1 TECHNICAL DESCRIPTION:

3.1.1 The Contractor shall provide the services of certified Infrared Thermography who will, survey the three Diesel Generators, Emergency Diesel Generator, Main, Emergency and Ship's Service Switchboards, and the required transformers. All surveys shall be done at Vessel's peak operating loads.

Summary of Equipment to be surveyed:

Cell #	Description
1A	440 Volt Dist. Breakers
1B	440 Volt Dist. Breakers
2A	Shore Power Controls
2B	460 Volt Buss
3A	Generator # 1 Metering
3B	Generator # 1 Breaker/Buss
4A	Synch. Section
4B	Emergency Gen. Tie
5A	Gen # 2 Controls
5B	Gen # 2 Breaker
6A	Gen # 3 Controls
6B	Gen # 3 Breaker
7A	440 Volt Dist. Breakers
7B	440 Volt Dist. Breakers
8A	120 Volt Dist. Breakers
8B	220 Volt Dist. Breakers

Generator # 1, approximate load = 150 Amps

Generator # 2, approximate load = 150 Amps

Generator # 3, approximate load = 180 Amps

Ship Services Transformers, 460 – 230 Volt, 3 single phase@ 25 kVA/Phase

Ship Services Transformers, 460 –120 Volt, 3 single

phase@ 25 kVA/Phase

Emergency Generator Room

1A	Emerg Gen Controls
1B	Emerg Gen Breaker
2A	120 Volt Section
2B	460 Volt Section
3A	DC Section
3B	Emergency Tie

Emergency Generator, approximate load = 150 Amps

Emergency 3 X 15KVA Transformers

Shorepower Transformer 300KVA

3.1.2 The Contractor will prepare a written report, detailing any defects or deficiencies discovered and the proposed corrective action to the attending) Lloyd's Register Inspector and Chief Engineer..

4.1 PROOF OF PERFORMANCE:

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

4.1.2 This specification is to be carried out in order to obtain Lloyd's survey credit. The Contractor shall be responsible for contacting the Lloyd's Surveyor when items are ready for the inspections.

5.1 DELIVERABLES:

5.1.1 The Contractor shall produce three bound copies and one electronic copies of the reports of readings and digital images of deficiencies identified to be given to Chief Engineer. The contractor shall include an IR image and normal photographic views of each deficiency.

5.1.2 The Contractor shall make necessary repairs using PWGSC 1379 action.

5.1.3 The Contractor shall provide the current certification of the Thermography.

Spec item : L-4	**SPECIFICATION**	
L-4 SWITCHBOARD BREAKERS INSTALLATION		

Part 1: SCOPE:

The intent of this specification shall be to remove the existing specified Siemens MW Air Circuit Breakers, custom buss and rewire where necessary, the Main and Emergency Switchboards to retrofit the new Schneider Masterpact NW 08H1 series breakers. There are six (6) breakers in total. See list of breakers in the Table at the end of this Specification item.

1.1 The original Siemens MW Air Circuit Breakers and cradles are to be removed and transported ashore to CCG Tech Stores by the contractor.

1.2 The existing necessary Busswork is to be removed; modifications made to custom rebuss for connection of the Masterpact NW 08H1 series cradle in cradle breakers.

1.3 All 6 of the Masterpact NW 08H1 series breakers and cradles, are owner supplied.

1.4 All six trip units on the new replacement breakers must be tested, proven and approved by Lloyd's as existing trip unit devices were fitted to Siemens MW breakers.

1.5 The Contractor shall supply and install each new breaker door with new lamacoid labels (2 ½ " x 4", white on black) indicating breaker name, number and description, plus breaker trip characteristics.

1.6 Contractor shall supply a Schneider FSR and put an allowance of $45,000.00 for FSR in their bid price. The actual cost will be adjusted by Public Works and Government Services (PWGSC) 1379 action as per Schneider FSR invoice.

1.7 All work to satisfaction of owner's representative and Lloyd's Surveyor.

Part 2: REFERENCES:

2.1 Guidance Drawings/Nameplate Data

See list of drawings below:

Switchboard Drawings:
590-ED-1
G62013-S1015-S122
G62013-S1015-S130

G62013-S1015-S132
G62013-S1015-S134
G62013-S1015-S135
G62013-S1015-S143
G62013-S1015-S145
G62013-S1015-S148
G62013-S1015-S150
G62013-S1015-S154
G62013-S1015-S160
G62013-S1015-S164
460 Volt Electrical Dist
Emergency Switchboard Drawings
G62013-S1015-S210
G62013-S1015-S213
Emergency Tie

2.2 Standards

The Contractor is to perform all of the following work and provide fully certified personnel acceptable to Lloyd's in accordance to Ship Safety Electrical Standards TP127E and IEEE Standard 45 – Recommended Practice for Electrical Installation on Shipboard.
All work shall be completed in accordance with Canadian Coast Guard's Ship's ISM Fleet Safety Manual concerning Hot Work, Confined Space Entry, Fall Protection, and Lock-Out and Tag Out Procedures.

2.3 Regulations

All work performed and any modifications made, must be compliant with the latest Canada Shipping Act Regulations and in particular to the Marine Machinery Regulations. All work shall meet the requirements of Lloyd's Register Rules and Regulations and in particular Chapters 6, 12, 13, 14 and17.

2.4 Owner Furnished Equipment

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

Part 3: TECHNICAL DESCRIPTION:

3.1 General

Spec item : L-4	**SPECIFICATION**	
L-4 SWITCHBOARD BREAKERS INSTALLATION		

3.1.1. Breakers to be replaced consist of the following with locations:

Item	Circuit	Description	Location
1	2CB1	Shore Power Supply Breaker	Main Switchboard in Motor Control Room
2	3CB1	Ship Service Gen Breaker #1	Main Switchboard in Motor Control Room
3	5CB1	Ship Service Gen Breaker #2	Main Switchboard in Motor Control Room
4	6CB1	Ship Service Gen Breaker #3	Main Switchboard in Motor Control Room
5	11CB1	Emergency Generator Breaker	Emerg. Swbd in Emerg. Gen. Room
6	13CB1	Emergency Tie Breaker	Emerg. Swbd in Emerg. Gen. Room

3.1.2. Breakers will be installed by contractor over a 5 day period (Mon - Fri). Allowing for (5) 12 hour work days (Mon -Fri) and (1) 4 hour day (Sat) for testing if not tested on Fri.

3.1.3. Vessel is responsible for transporting Breakers and Cradles on board prior to start of work Monday morning.

3.1.4. Work areas in switchboard to be isolated from power prior to Monday morning.

3.1.5. Contractor shall relocate control wiring to terminal blocks within each section of the switchboard. All materials required for this purpose to be supplied by Schneider.

3.1.6. Contractor will install 6 Masterpact breakers and cradles supplied by the Coast Guard.

3.1.7. Contractor will supply and install custom bussing between cradles and existing bus bars.

3.1.8. Contractor will supply and install control wiring as required for the new breakers.

3.1.9. Existing switchboard doors will remain in place.

3.1.10. Contractor will set and test the breaker trip units to settings similar to existing breakers via FFTK test kit. Spare breaker shall be set with the same parameters as Generator breaker settings.

3.1.11. Contractor will perform contact resistance, megger as well as conduct mechanical and electrical tests. Submit a detailed test result to the Chief Engineer / Electrical Officer.

3.1.12. Contractor shall provide electrical drawings showing changes which have been made.

3.1.13. Contractor shall make sure installation of temporary cables to power the distribution section by Subcontractor must be proven both safe and practical, thus allowing for both affected switchboard sections to be de-energized simultaneously.

3.1.14. This work shall be carried out by Contractor in conjunction with the following: The majority of this work is confined to the Ship Service Switchboard and as a result will compromise most of the vessel's hotel load. Therefore, the Contractor is requested to arrange to isolate the Ship Service Switchboard work area. Bus sections in switchboard are to be removed to isolate the 4 breaker section being worked on. A jumper arrangement of 3 cables, minimum 20 twenty feet in length, capable of 400 amps hotel load is to be connected to power up distribution loads on switchboard.

3.1.15. Contractor shall have distribution power re-routed to isolate work area and removed and return power distribution to normal state after work is completed in switchboard.

3.1.16. The Emergency Generator will be run up and placed on line to power up Emergency Bus only, during the preparation, transfer and completion stages at the beginning and end of project for disconnecting and reconnection of bus sections. Ensure Emergency Tie is locked out and racked out in Emergency Gen Room during these planned blackout conditions.

3.1.17. All control and signal wiring for auxiliary connections for these 4 Ship Service Switchboard Breakers, plus Emergency Swbd Breakers is to be isolated/ de-energized before disconnecting in local breaker cubicles.

3.1.18. Shore Power breaker will supply power distribution for G1-G3 retrofits through temp Jumper cables to Distribution section. Once Generator 1-3 cubicle section is isolated at Ship Service Switchboard, All bus connections in Ship Service Switchboard for 3 (G1-G3) new Masterpact breakers shall be retrofitted, breaker installed, control wiring verified and proven operational.

3.1.19. Gen 1 will supply power distribution for Shore power section retrofit. Gen 1 may be run up and breaker closed to power Distribution section during the Shore Power retrofit, through temp jumper power cables. All bus connections in Ship Service Switchboard for Shore Power breaker shall be retrofitted, breaker

installed, control wiring verified and proven operational. Once Shore Power breaker assembly has been retrofitted and cubicle wiring is complete, ship can be blacked out temporarily to reconnect Shore Power breaker to Distribution section, emergency generator on line in blackout mode during this time, with Bus Tie locked out.

3.1.20. Emergency switchboard breaker retrofits can be carried out with Emergency bus isolated and powered down.

3.1.21. The two (2) breakers to be retrofitted in Emergency Switchboard are isolated from the hotel bus once the Emergency Tie Feeder in MCR is opened, locked out. The full Emergency switchboard is dead once this breaker is locked out. All control and signal wiring for auxiliary connections are to be proven isolated before disconnecting in local Emergency breaker cubicles.

3.1.22. Once breakers are installed and busswork is retrofitted in Emergency Switchboard, all busswork and cabling can be reconnected by contractor. Once connections in Emergency Switchboard are verified and completed, power can be restored to this section by closing Emergency Tie Feeder in MCR.

3.1.23. A full test of all retrofitted breaker units shall be carried out before energizing each bus. This is in the primary interest of providing safety to all personnel while maintaining power for the vessel's hotel load. 48 hour notice is to be given for any planned power outages. Any work on energized electrical equipment to be carried out with proper arc flash protection PPE and procedures as per ISM and Industry safety standards listed below.

3.1.24. Contractor shall insure that all test be witness by Lloyd's Surveyor and the Chief Engineer. Contractor is responsible for contacting Lloyd's Surveyor and Chief Engineer prior to any testing.

3.2 Location

See Table

3.3 Interferences

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

Part 4: PROOF OF PERFORMANCE:

4.1 Inspection

All work shall be completed to the satisfaction of the Lloyd's Surveyor and Chief Engineer.

4.2 Testing

4.2.1. Contractor shall insure that all test be witness by Lloyd's Surveyor and the Chief Engineer.

4.2.2. After installation all breakers shall be tested and all associated functions proven operational along with remote controls and indication circuits.

4.3 Certification

All breakers shall be recently certified and copies of each certification shall be given to the vessel's Chief Engineer.

Part 5: DELIVERABLES:

5.1 Drawings/Reports

The associated drawings using AutoCAD shall be updated where necessary to reflect any and all changes.

5.2 Spares

A list of recommended spares shall be provided upon completion of installation of new Schneider Masterpact series breakers.

5.3 Training

N/A

5.4 Manuals

There shall be 3 copies of manuals left with the vessel upon completion of project.