



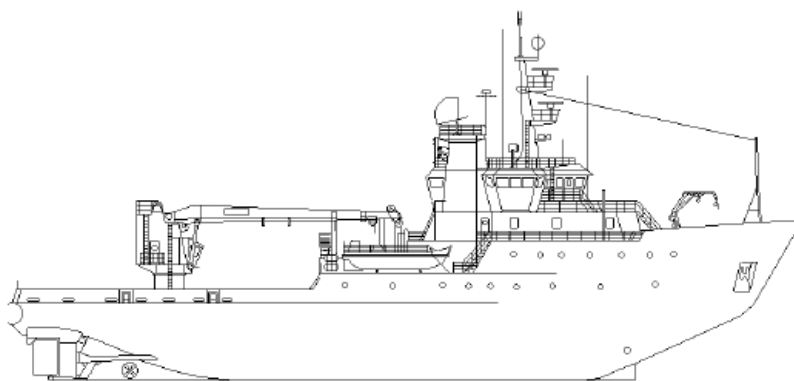
Fisheries and Oceans
Canada

Canadian
Coast Guard

Pêches et Océans
Canada

Garde côtière
canadienne

DRY DOCKING AND REFIT SPECIFICATION CCGS EARL GREY



September 18 – November 8, 2017



A T L A N T I C R E G I O N

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1 – GENERAL NOTES

1. ON-SITE PROJECT OFFICER: All the specified work, as well as all work arising, must be completed to the satisfaction of the Coast Guard Technical Authority (CGTA) who, unless otherwise advised, will be the Chief Engineer of the ship, or their designated representative. Upon completion of each item of the specification, the CGTA must be notified so that he/she may inspect the work prior to the complete closing up of any work. Failure to give notification does not absolve Contractor of the responsibility of providing CGTA the opportunity to inspect any item. Inspection of any item by the Chief Engineer does not substitute for any required inspection by Transport Canada Marine Safety and Security (TCMSS), Classification Societies or alternate inspection authority identified by the CGTA.
2. SAFETY: Potential Contractors must include with their bids the name of their Safety Manager or Supervisor who will ensure that these requirements for workplace safety are met. When under CCG Care and Custody the ISM Safety annex must apply.
3. SUB-CONTRACTORS: All conditions, stipulations etc. listed in the General Notes apply to any Sub-Contractors employed by the Main Contractor to carry out work on any Specification item.
4. SCHEDULE: At the Pre-Refit Meeting, the successful Contractor must provide a Production Bar Chart or Schedule showing commencement and completion dates for each item in this specification. This document must highlight any critical dates and be capable of showing the effects of late completion date of the work package. Contractor must provide updated Production Schedules to the CGTA, Senior Vessel Maintenance Manager and Public Services and Procurement Canada (PSPC) Contracting Authority whenever the schedule is revised.
5. SAFE WORK CERTIFICATES: Contractor must obtain Marine Chemist's Certificates in accordance with TCMSS TP 3177E before any cleaning, painting or hot work is commenced in confined spaces or machinery compartments. Contractor and subcontractor personnel issuing these certificates must be fully trained, qualified and certified in accordance with Canada Labour Code (CLC) requirements and all relevant provincial legislation. Certificates must clearly state the type of work permitted and renewed as required by the regulations. Contractor and their sub-Contractors are advised that any work carried out in confined spaces as defined by the Canada Labour Code (CLC) and relevant provincial legislation must fully comply with all provisions therein.
6. CONFINED SPACE: For all work requiring entering or working in confined spaces; Contractor must note that Canadian Coast Guard ships are presently working under the ISM CODE and that each ship has a FLEET SAFETY MANUAL onboard. This manual is also available in soft copy and can be distributed upon request. As a minimum, Contractor must comply with the WORK REQUIREMENTS as outlined in the FLEET SAFETY MANUAL during the contracted work period. In accordance with Fleet Safety Manual, all work involving the entering of confined spaces must make use of a qualified rescue team. This team must be used at all times when tanks or confined spaces must be entered. The costs associated with all known work requiring the services of a confined space rescue team is the responsibility of Contractor.

1 – GENERAL NOTES (CONTINUED)

7. WELDING: All welding work must be performed in accordance with the requirements of the Canadian Coast Guard Welding Specification CT-043-EQ-EG-001, January 2016 in its entirety.

7.1 CONTRACTOR REQUIREMENTS

7.1.1. **Steel Structures**

All welding contractors must be certified by the CWB to CSA Standard W47.1 Division 1 or 2 for new construction and work packages other than new construction.

7.1.2. **Aluminum Structures**

All welding contractors must be certified by the CWB to CSA Standard W47.2 Division 1 or 2 for new construction and work packages other than new construction.

7.1.3. **Welding Procedures**

All welding procedure specifications and/or welding procedure data sheets must be reviewed and approved by the CWB prior to use.

7.1.4. **Welding Personnel**

All welding personnel must be approved by the CWB prior to their commencing any welding work.

7.1.5. **Performance and Qualification Testing**

All performance and procedure qualification testing must be fully witnessed and documented by the CWB.

7.1.6. **Limitations Prior to Commencing Welding Work**

All Contractors must submit their welding personnel qualification records and approved welding procedures to the Delegated Representative prior to commencing any welding work. All welding procedures, including welding procedure specifications and welding procedure data sheets, must include an indication of acceptance by Contractor (by signature, seal or other appropriate means) and a stamp of acceptance by the CWB.

7.1.7. **Governing Standards for Welding**

For structural steels > 3 mm in thickness, welding must meet the requirements of CSA Standards W47.1 and W59, except as modified by the Canadian Coast Guard Welding Specification CT-043-EQ-EG-001, March 2014.

For structural aluminum > 3 mm in thickness, welding must meet the requirements of CSA Standards W47.2 and W59.2, except as modified by the Canadian Coast Guard Welding Specification CT-043-EQ-EG-001, March 2014.

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1 – GENERAL NOTES (CONTINUED)

7.2 INSPECTION OF WELDS

The methods of inspection, extent, acceptance criterion and inspection personnel qualifications must be in accordance with the requirements of the Canadian Coast Guard Welding Specification CT-043-EQ-EG-001, January 2016 in its entirety.

8. **HOTWORK VENTILATION AND CONTAINMENT:** During all known work and work arisings that involve hotwork Contractor is to ensure that all dust, debris, gas and smoke generated by the work is evacuated from the vessel by the most direct method.

Each item that involves hotwork must have a defined zone which is to be kept sealed off from the rest of the vessel during the complete work period that involves the generation of welding gases, smoke, and grinding dust etc. These zones must be indicated in the items contained within the known work package. All extra work arisings that involve hotwork must have a zone determined using the same logic. The zone must be limited to the space(s) where the hotwork is being done, boundary areas where fire watches are required, and the access routes between the zone and the exterior of the vessel for workers, welding and cutting equipment and ventilation ductwork.

In areas where accommodations and or workplaces cannot be completely isolated from personal access a double sealed door (air lock) arrangement must be erected to minimize ingress of the contaminants into occupied areas. A ventilation extraction point must be located as near as practical to the inside door on the worksite side to reduce the egress into the air lock and subsequently the accommodations and/or workspaces.

All doorways within the affected area that are not being worked or require access for fire watch activities must be sealed off to prevent all containments from getting in. Passageway branches that connect to the zone must be sealed off. Contractor must completely clean all surfaces and fabrics within a compartment that are not suitably protected.

9. **ENCLOSURES AND HEATING:** Contractor must provide all enclosures and heating required to carry out all the scheduled work, taking into account the nature of the work, the time of year the refit is, and the weather conditions for that time of year in Contractor's geographic area. Examples of where heating and enclosures could be required include but are not limited to painting, Potable Water coating, and tank cleaning.

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1 – GENERAL NOTES (CONTINUED)

10. SERVICE CONDITIONS: Unless specified otherwise, all components, materials and installations supplied by or carried out by the Contractor must be adequate to meet the following service conditions:

In areas that are exposed to the elements:

- outside air temperature of minus (-) 40° C to plus (+) 35° C;
- wind velocity of 50 knots;
- water temperature of minus (-) 2° C to plus (+) 30° C;
- shock loading of 2.5g horizontal, 1.5g vertical.

All new components, materials and installations within the ship must be adequate to withstand the specified shock loading accelerations.

11. HOTWORK & FIRE WATCHES: Contractor must abide by their Safety Management Program when performing Hot-work. Contractor must 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 an emergency. Should the Contractor have to use ship's extinguishers in an emergency they must be recharged and re-certified by a local facility, of CCG's choice, at Contractor's cost.
12. RELOCATIONS: Any piping, manholes, parts and/or equipment requiring temporary relocation to carry out specified work, or to gain access, must be refitted upon completion with new jointing, anti-seize compound, clamps and brackets as applicable (Contractor supply). All equipment and systems, so disturbed, must be tested to prove correct function and fluid integrity upon completion. Defects must be corrected at Contractor's cost. NOTE: It is Contractor's responsibility to identify equipment and systems that must be tested to verify correct function, prior to being disturbed for required work.
13. LIGHTING: Temporary lighting and/or temporary ventilation required by Contractor to carry out any item of this specification must be supplied, installed and maintained in safe working condition by the Contractor and removed on completion of the related work. Naked light bulbs or tubes must not to be used as temporary lighting inside the vessel. All lights used in the vessel must be supplied with approved guards.
14. CLEANUP: Contractor to ensure that all spaces, compartments, and areas where work has been carried out, or Shipyard staff has used for transit routes, are left in "as clean a condition as found" when the vessel commenced refit. All rags, debris, and associated garbage generated by the shipyard staff while on board must be removed to the garbage container(s) each day. The costs associated with the removal of dirt, debris, and garbage is to be included in the quote.
15. INSPECTION: Contractor must be responsible for calling in the services of TCMSS, PSPC and HC Inspectors when and as required for survey and inspection items. All TCMS surveyors called in by Contractor must sign-off the Chief Engineer's Inspection Log Book for all items surveyed.

16.

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1 – GENERAL NOTES (CONTINUED)

CORRESPONDANCE & REPORTS: Unless otherwise agreed upon, all type written correspondence, reports, certificates and drawings presented to the CGTA must be in English. All reports must be computer generated and provided in English. Additional copies may be submitted in French. All reports must be completed in a timely manner and provided to the CGTA immediately following their completion, and must continue as required throughout each specification item. Upon delivery of the vessel, a compilation of all reports, drawings and correspondence must be provided on a CD or DVD in Adobe PDF format to CGTA.

17. PAINTING: Unless specified otherwise, replacement and/or disturbed steelwork must be given a minimum of two (2) coats of Intershield 300 Aluminum Pure Epoxy , each coat to be of contrasting colour. Lead-based paints must not be used. Prior to painting, all new and disturbed steelwork is to be power tool cleaned as a minimum standard of surface preparation. Contractor must notify the CGTA after the first coat of paint is fully cured so that it may be inspected prior to the application of the second coat. Failure to do so must result in another coat being applied at the Contractor's expense.
18. MATERIALS & TOOLS: All materials, unless otherwise specified, must be supplied by the Contractor. Contractor to supply all necessary tools and equipment to perform the specified work. Special, ship-specific tools, as required, will be issued by and returned to Chief Engineer. Contractor must be responsible for removing the tools from their stored location aboard the vessel, and returning them and securing them in place when finished. Otherwise, ship's tools and equipment will not be available for Contractor's use. Contractor must provide power and air for any tools required, the ship's supply must not be used.
19. MEASUREMENTS: All dimensional measurements must be taken and recorded in inches, unless otherwise specified. Unless otherwise specified, the dimensions must be taken and reported in thousandths of an inch (0.000"). All measuring devices must be described on the submitted reporting sheets. All reported dimensions must be either typed or printed in a neat legible manner, and must include the name of the person who took the readings.
20. CO-OPERATION: During the period that the ship is in refit, members of the ship's complement, Coast Guard technical staff, and service specialists may be carrying out repairs to, maintenance of, or modifications of various ships' equipment not covered in this specification. Contractor must not deny access to the vessel to these persons. Every effort will be taken to ensure that this Coast Guard controlled work will not interfere or conflict with that being carried out by Contractor.
21. SMOKING: The Public Service Smoking Policy forbids smoking in Government ships in all areas inside the ship where shipyard personnel will be working. Contractor must inform workers of this policy and ensure that it is complied with in all cases.
22. ACCESS: The following areas are out of bounds to Contractor's personnel except to perform work as required by the specifications: all cabins, offices, workshops, Wheelhouse, Control Room, public

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1 – GENERAL NOTES (CONTINUED)

washrooms, Officers' and Crew's Messes and Lounges. Contractors must ensure that no workers bring meals onboard the ship.

23. INSPECTION & GUIDANCE: During this contract, Ship's Crew and Regional Staff will be onboard conducting inspections and providing guidance to the Contractor personnel.

24. PROTECTION OF EQUIPMENT

Contractor must take measures to ensure that all surfaces and items of material or equipment installed on the vessel, finished surfaces, final color coats and other finished work must be protected against damage, soiling, and/or contamination.

All electrical and electronic equipment and components must be protected during the execution of the specified work against damage by direct or indirect physical contact or by the effects of adverse temperatures or other environmental conditions.

Any damage to surfaces, equipment, furnishings or decor incurred prior to acceptance by Canada must be returned to "As Delivered" condition by Contractor at no expense to Canada.

All openings in machinery and/or systems prior to connections being made must be kept covered by inserts or covers at all times.

Contractor must obtain and follow instructions from its sub-Contractors for any special protection required for sub-Contractor furnished equipment during the specified work. Such instructions must be made available to the CGTA and TCMSS. Contractor must ensure that the ship's machinery, equipment and systems are protected from all hazards, including but not limited to damage from ongoing work, corrosion, sandblasting (directly or indirectly), paint over, hot work, adverse temperature or other environmental conditions and contaminants.

25. ASBESTOS: There may be locations having asbestos containing materials (ACM). The latest Asbestos Assessment Report is available upon request.
26. Removed equipment Categorization (A, B and C) is located in the attachment / technical data package.

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2 - SERVICES

The intent of this specification item is for Contractor to provide general services to the vessel while alongside and while Dry Docked.

1. GENERAL: The following services must be supplied, fitted and/or connected upon arrival at Contractor's facility, maintained throughout the docking / contract period, and removed from the vessel on completion of the work and return to CCG custody. Contractor is responsible for any additional connections required when ship is moved between dock/slipway and alongside berth at Contractor's premises.
2. UNMANNED REFIT: During the majority of the contract period, the CCGS Earl Grey will be unmanned. As a result, the ship shall be placed in the care and custody of Contractor as described in this specification. However, access to the vessel shall not be denied to CCG, PWGSC and TCMSB personnel by the Contractor. Every effort will be taken to ensure that vessel access by these personnel shall not interfere or conflict with the Contractor's work.
3. General (Unmanned): The services as described in H-01 Services shall be supplied, fitted and/or connected upon formal handover to Contractor, and maintained throughout the period that the ship is under Contractor's control. Contractor shall be responsible for any additional disconnections and re-connections required when the ship is moved between dock / slipway and any berth at Contractor's premises.
4. CCG / PWGSC Offices: For the period of the Contract, the Contractor must provide furnished office accommodation for authorized representatives of Canada including the provision of high speed wireless internet service.
The above office furnishings and accommodations are to be made available for two (2) representatives of Canada only and may not be occupied at all times during the period of the Contract. During periods of non-occupancy the Contractor may make other uses of the office accommodations as required.
5. Care and Custody: During the contract period, the ship shall be placed in the custody of Contractor who shall be responsible for all safety and security matters pertaining to the vessel. As the ship will not be de-stored, Contractor shall provide whatever security arrangements are required to safeguard CCG and DFO equipment and material that remain onboard during the contract period.
6. Security Watches: During the contract period, Contractor shall provide and maintain a continuous, 24 hour-per-day, 7 day-per-week security watch consisting of at least one (1) mobile security patroller. The patrollers are to provide mobile safety and security checks throughout the vessel. The patrols shall be adequate to ensure integrity against personal injury, fire and flood in

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2 - SERVICES (CONTINUED)

accordance with Part II of the Canada Labour Code, as well as to ensure that the ship remains free from damage and/or theft resulting from unauthorized entry or activity.

7. Turnover: The turnover of the ship to and from Contractor shall be carried out on a compartment-by-compartment basis with a Contractor's Representative, and Captain (or Representative) in attendance.

As part of the initial turnover, digital photographs will be taken by the CGTA with Contractor Representative in attendance consisting of a minimum of four photographs per space. CD copies of the photographs will be distributed to Contractor, CCG Representative and the PSPC and shall be accepted as representative of the condition of the vessel at turnover.

On completion of the photographic survey and compartment inspections, CGTA shall provide Contractor's Representative with keys as required for access to all areas of the ship's interior spaces. Turnover to the Contractor shall be finalized by completion of an "Assumption of Custody Certificate" to be supplied by PSPC.

When custody is returned to CCG, a "Resumption of Custody Certificate" shall be completed after completion of a second compartment inspection survey and return of all keys to CGTA.

Contractor shall be responsible for the safe transfer of the ship between its pre/post-docking berth and its docking blocks. During docking and undocking of the ship, radio contact shall be maintained between the vessel's Commanding Officer and the Contractor's Docking Officer, if the vessel is crewed at these times. If the ship is unmanned at the docking and undocking, the safe movement of the ship shall be the sole responsibility of the Contractor.

8. DOCKING: Contractor is responsible to coordinate a safe transfer of the ship between its pre/post-docking berth and its docking blocks. During docking and undocking of the ship, radio contact must be maintained between the vessel's Commanding Officer and Contractor's Docking Officer.
9. PRICES: Contractor must provide a global price and daily or unit cost rates for all services supplied to the vessel during the refit period in their bid.
10. GANGWAYS: Contractor must supply and install two (2) gangways complete with safety net, while the ship is on the dock or slipway or at berth. Gangways, complete with safety nets, one of the two gangways must be installed in such a manner that they provide separate routes for escape in the event of fire. CGTA will advise of specific locations.

Safety nets must be in compliance with the Canada Labour Code. Gangways must be safe, well-lit and structurally suitable for the passage of shipyard personnel and the ship's crew. Contractor must maintain gangways in a safe condition throughout the duration of the refit while the ship is out of the water.

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2 - SERVICES (CONTINUED)

Initial installation and later removal of gangways must be included in bid, as well as maintenance and upkeep while vessel is in Contractor's yard. Any movement of gangway(s) required by Contractor will be at their cost.

11. INSPECTION AND TESTING PROCEDURE PLANS: Contractor's Project Management Team, in preparation for conducting the refit are responsible for implementing an INSPECTION AND TESTING PLAN for the duration of the refit. The cost must form part of the overall bid price and identified as a separate cost in the bid. Contractor must ensure that the ship is ready for trials by the specified Contract date.

Contractor is responsible for the following at the start of refit;

- 11.1 Quality and Assurance (Q&A) Surveyor, Contractor to provide contact name.
 - 11.2 Administration Quality Assurance Program Plan – hand over to CGTA at Pre-refit
 - 11.3 Provide documentation throughout the refit for each specification item to ensure the scope of work is completed at each relevant stage and Inspection / testing is carried out in the time frame identified in the specification.
 - 11.4 Documentation must be signed during the inspection / testing stages by Q&A Surveyor and the CGTA.
 - 11.5 Q&A Surveyor must note any observations and update and review the documentation during the in-process production work and during the scope of the work on each specification item.
 - 11.6 Q&A Surveyor must schedule and ensure witnessing is completed at pre-determined check points by TCMSS and CGTA. Contractor must perform verification inspections as specified in Contractor's Administration Quality Assurance Program.
 - 11.7 Contractor must confirm and deliver all documentation for the objective quality evidence that the ship is in compliance with the specifications. All test reports, measurements and Sub-Contractor's reports are provided to TCMSS and CGTA prior to the end of refit.
12. ELECTRIC POWER: Contractor must connect and bid on supplying electrical power at 600 VAC, 3 PH, 60 Hz at 400 Amp rating upon ship's arrival at Contractor's facilities.

Contractor must bid on the supply of 3000 kWh per day for the refit period. The actual consumption must be pro-rated up or down as per power used as indicated by vessel's kWh meter. The power meter must be read and recorded by CGTA and Contractor's Representative together at the start and end of contracted period. Contractor must provide a unit cost for kWh for PWGSC 1379 adjustment purposes. Cost of connection and disconnection must be included in the bid.

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2 - SERVICES (CONTINUED)

If no kW consumption meter is available, a daily consumption (amps) must be negotiated and power requirement determined by the following formula:

$$\text{KWH} = I \times E \times P.F. \times 1.73 \times 24 / 1000.$$

A ground cable must be attached to the ship's hull. Contractor must ensure compliance as per the Transport Canada Marine Safety Bulletin – “Grounding Safety in Dry dock”.

Contractor must ensure the electrical service provided has protection system fitted such that loss of a single phase at Contractor's end of the cable results in immediate opening of the remaining phases. Problems have been experienced in the past with the loss of one phase with Contractor supplied shore power, due to a fuse blowing.

13. FIRE MAIN: Contractor must connect a two inch diameter fresh water line to the ship's fire main, with an isolation valve placed onboard. **** Fire main will be dry.**

14. POTABLE & SANITARY WATER: Potable fresh and sanitary water at 415 kPa (60 PSI) constant pressure shall be connected to ship's systems, complete with pressure regulator and shut-off valves. Approximately 1 tonne/day shall be supplied for duration of the contract. Contractor shall supply and connected a water meter to the ship's inlet line. Contractor shall quote a unit rate for PWGSC 1379 adjustments, and include all connection / disconnection costs in bid price. Contractor shall make arrangements to prevent the potable water supply piping/hoses are protected against freezing. Contractor shall provide to Chief Engineer at the Pre-Refit Meeting a certificate of potable water quality before water service is connected to the vessel.

15. HULL DISCHARGE CONNECTIONS:

Connections shall be made to the following and directed to suitable drains:

Sewage Treatment Tank Overboard
Forward grey water overboard Starboard.

These connections must be maintained for the duration of the vessel's docking period. Arrangements shall be made to prevent the freeze up of these drains. Contractors must include the cost of all connections and disconnections in their quotations, and quote a daily rate for PWGSC 1379 adjustment purposes.

16. GARBAGE: Not required when vessel is in Care and Custody of the Contractor

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2 - SERVICES (CONTINUED)

17. CRANAGE: Contractor must bid on supplying general services of a dockside crane, driver and rigger for ten hours during the dry-docking period as and when required by the CGTA, plus an hourly rate for rigger, driver and crane for adjustment purposes through PWGSC 1379 action.
18. WASTE OIL: Contractor must bid on removal and disposal of 10,000 liters of waste oil / water mixture from the vessel during the refit period, and provide a unit rate in their bid for PWGSC 1379 adjustment purposes. Removal and disposal must be performed by an identified licensed waste oil disposal company in full compliance with regulatory requirements.
- Copies of all dirty water and oily water removal invoices with quantities must be given to the CGTA. Copies of invoices detailing disposal of the liquids must be given to the CGTA.
19. CLEANING: Contractor must ensure that all spaces, compartments and areas of the ship where work has been carried out, or Shipyard staff has used for transit routes, are “as clean as found” when work is completed. Contractor must provide the cost of clean-up work in their bid for each specification item.
20. PARKING: Sufficient parking for DFO/CCG and PSPC representatives must be provided conveniently close to the berthed or docked vessel. Contractor must provide five (5) clearly designated for “DFO/CCG and PSPC use only” parking spaces for the duration of the docking period.
21. TELEPHONES: Contractor must supply a listing of shipyard contacts, fire, police and emergency telephone numbers to CGTA when vessel arrives at Contractor's facilities. Contractor must ensure that the CGTA is notified of any “on call personnel” and their contacts during non-working hours and days.
22. INTERNET: Contractor must supply two dedicated hard wired high speed internet connections and wireless access to the vessel.

Internet charges must be billed directly to:

DFO / Canadian Coast Guard – Accounts Payable
Coast Guard Maritimes Regional Headquarters Building
50 Discovery Drive, Dartmouth, Nova Scotia
B2Y 3Z8
Attn: Diane McNair

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2 - SERVICES (CONTINUED)

23. ALLEYWAY AND BULKHEAD PROTECTION: Alleyways and areas being used by Contractor's personnel on a regular basis for access to required work areas must be suitably protected from damage, soil, etc. All affected alleyways must have deck surfaces covered by ¼ inch Masonite extending to the full extremities of the areas dealt with. All seams, butts, and edges of the applied Masonite must be taped to discourage ingress of soil beneath, as well as to stop any migration of the applied sections. Contractor must supply and install 5200 sq. ft. of ¼ inch Masonite rough one side and installed rough side up. Upon completion of refit, Contractor must lift and remove all Masonite and dispose ashore. The area must be swept and mopped on completion of the refit and any tape residue must be removed. Contractor must provide a separate cost per square foot for; supply, install and removal of Masonite in their bid for PWGSC 1379 adjustment purposes.

All internal bulkhead panels in the above-noted areas must be suitably protected with application of 1/8 inch Masonite panels (or heavy construction paper) extending to a minimum five (5) foot height above the deck level and all corners, butts, seams and edges must be covered and taped. Contractor must supply and install 3200 sq. ft. of 1/8 inch Masonite (or heavy construction paper). Upon completion of refit Contractor must remove all Masonite/paper and dispose ashore. The areas must be wiped clean on completion of the refit and any tape residue removed. Contractor must provide a separate cost per square foot for supply, install and removal of Masonite/paper for PWGSC 1379 adjustment purposes.

24. SCAFFOLDING: Contractor must supply the necessary manpower, materials and equipment to erect CFM scaffolding and staging to facilitate the inspection of the ship's hull as necessary for TCMSS Surveyor and Ship's personnel. This includes access to propellers, rudder, thruster and renewal of anodes. The scaffolding must be removed when the work is complete, at Contractor's expense.
25. COATING INSPECTIONS: An independent third party Surveyor, certified by the authoritative body known as the National Association of Corrosion Engineers (NACE) has been independently contracted to assist the CGTA with overseeing the preparation and application of coating to all areas identified in this specification. Surveyor will ensure that the manufacturer's specifications are met with respect to the preparation and application of the coating and curing of the coating. This requirement is further clarified to state that the Surveyor will be a NACE level 2 Surveyor (minimum). The Surveyor is not an employee of the painting subcontractor and must be given access to the work areas described within this specification in order to perform inspections. Contractor will be provided with the NACE Surveyor contact information at the start of refit. Contractor to schedule the NACE Surveyor and inform CGTA prior to start of any coating applications so that that they can be present prior to, during and after the completion of the application for inspection purposes.

Contractor must follow the vessels paint scheme specification for any and all paint work unless otherwise advised by the CGTA.

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2 - SERVICES (CONTINUED)

26. HYDROSTATIC TESTING: Bidders who submit no cost or substantially low costs for hydrostatic testing of tanks are doing so entirely at their own risk. The ultimate decision to perform hydrostatic testing is at the discretion of the CGTA regardless of any TCMSS recommendation that air testing would suffice. Bidders are to be fully prepared to undertake hydrostatic testing as per the requirements of the specification at the discretion of the CGTA.

3 – PRODUCTION CHART

PART 1: SCOPE:

The intent of this specification item is for Contractor to provide a means for tracking the overall progress of the refit.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must supply three copies of a detailed Gantt chart showing the planned work schedule for the ship's refit, all copies to be in color.
2. A copy of the initial Gantt chart, in PDF format, must be provided via email to the PSPC Contracting Officer and SVMM before the close of business on the first day of Refit.
3. The Gantt chart must show for each specification item; the start date, manpower loading, duration and completion date. The chart must also outline Contractor's "critical path" for completion and actual time the ship is in Refit.
4. The Gantt chart must be updated weekly and for each production meeting to reflect the actual production on the refit and changes to the anticipated completion dates of each individual item. All copies must be in color as per the originals.
5. The Gantt chart must clearly indicate the arrival / departure dates of any Subcontractors / Field Service Representatives (FSR).
6. The Gantt chart must include the status and production on each PWGSC 1379 arising.
7. Three color copies of the updated Gantt chart must be given to the Chief Engineer the day prior to each Production Meeting. An updated electronic copy, in Portable Document Format (PDF), must be emailed to the Senior Vessel Maintenance Manager (SVMM), Dan Chipman (dan.chipman@dfo-mpo.gc.ca) the day prior as well.
8. Each update must be emailed to PWGSC Contracting Officer the day prior to the weekly scheduled Progress Meeting.

2.2 Location

N/A – Intentionally left blank

2.3 Interferences

N/A – Intentionally left blank

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3 – PRODUCTION CHART (CONTINUED)

PART 3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A – Intentionally left blank

3.2 Standards and Regulations

N/A – Intentionally left blank

3.3 Owner Furnished Equipment

N/A – Intentionally left blank

PART 4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A – Intentionally left blank

4.2 Testing

N/A – Intentionally left blank

4.3 Certification

N/A – Intentionally left blank

PART 5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor must provide a weekly production chart and excel spreadsheet for subcontractor allowances every week on the timelines indicated.

5.2 Spares

N/A – Intentionally left blank

5.3 Training

N/A – Intentionally left blank

H-01 GREY WATER PIPING MODIFICATIONS

PART 1: SCOPE:

The intent of this specification item is for Contractor to modify the grey water piping and install a 3-way valve on the fwd grey water transfer tank, in order to allow for by-pass and isolation of the transfer tank. Also, a GSM level indicating gauge glass is to be installed on the grey water transfer tank.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Prior to commencement of any and all work, Contractor shall issue a Safety Lockout Procedure. Contractor shall install locks and tags accordingly during the scope of work. Contractor shall supply and install their own locking devices and retain all keys during the scope of this work. Grey water transfer pump and tank are to be electrically and mechanically locked out. Potable water system shall also be isolated.
2. All precautions are to be taken to protect all areas from hotwork damage. All hotwork shall be carried out as per Contractor's and Coast Guard hot work authorisation with all necessary precautions being taken.
3. Grey water transfer tank must be cleaned and certified safe for hotwork prior to any modifications on the grey water system. Contractor shall bid on removal and disposal of tank contents in accordance with all Federal, Provincial, and Municipal guidelines in effect. Tank capacity is approximately 0.3m³.

Piping Modifications

4. Contractor shall remove, modify, and reinstall the grey water inlet pipe to accommodate a GSM 3-way 4" ball valve as indicated in the photo in section 3.1. A new CSM 4" flange shall be welded to this pipe to accommodate the new valve.
5. Contractor shall install a new GSM 3-way valve on the inlet pipe to the grey water transfer tank. New CSM gaskets (Durlon 8400 or equivalent) and stainless steel fasteners are to be used. Orientation of the new valve shall permit full operation of the handle. Operation to be proven to CGTA.
6. Contractor shall supply, fabricate, and install a new length of 4" schedule 80, seamless pipe. This pipe shall be fitted between the new three way valve and the inlet flange on top of the grey water transfer tank. Pipe is to be flanged on both ends with new CSM 4" flanges.

H-01 GREY WATER PIPING MODIFICATIONS

7. Contractor shall remove the existing 4" ball valve which is currently fitted to the inlet flange on the top of the grey water transfer tank. This valve is to be relocated onto the vent flange on the top of the tank, as indicated in the reference photograph. New CSM gaskets (Durlon 8400 or equivalent) are to be used. Orientation of the valve shall permit full operation of the handle. Operation of the new valve shall be proven to CGTA.
8. The existing vent/overboard pipe shall be removed, modified, and re-installed to connect to the new 3-way ball valve which is to be installed on the inlet pipe. A CSM tee section, fabricated from 4" schedule 80 seamless pipe, is to be welded to the pipe, with CSM flanges on the valve ends of the pipe.
9. All new and modified sections of pipe are to be hydrostatically pressure tested at 2 bar for 30 minutes upon completeing of welding. Pressure tests are to be witnessed by CGTA. Contractor shall be responsible to provide the testing equipment required.
10. All new CSM pipe shall be 4" schedule 80, seamless pipe. All new and modified pipes shall be hot dip galvanized upon completion of successful pressure tests.
11. Contractor shall use new CSM gaskets (Durlon 8400 or equivalent) on all flange faces and new stainless steel fasteners.

Tank Level Indicating Gauge Glass

12. Contract shall supply and weld two (2) stainless steel, schedule 80, ¾ inch threaded spigot fittings to the side of the grey water transfer tank to accommodate a new GSM tank level indicating gauge glass. Final location of the new gauge glass to be determined by CGTA.
13. Upon completion of welding, contractor shall conduct an air pressure test on the tank, not exceeding a pressure of 1.5psi for 30 minutes. Contractor is responsible to install necessary blanks and plugs on the tank fittings to permit the pressure test, and must remove all blanks and plugs upon successful completion of testing. Contractor is responsible to provide all test equipment required. Pressure test shall be witnessed by CGTA.
14. Contractor shall install the new GSM tank level indicating gauge glass, as per manufacturer's instructions.
15. All work to be completed to the satisfaction of the CGTA.

2.2 LOCATION

The grey water transfer tank and associated piping is located on the starboard side of the fwd domestic machinery space, outboard of the domestic hot water heaters. This area is located below the main deck, between frames 39-41.

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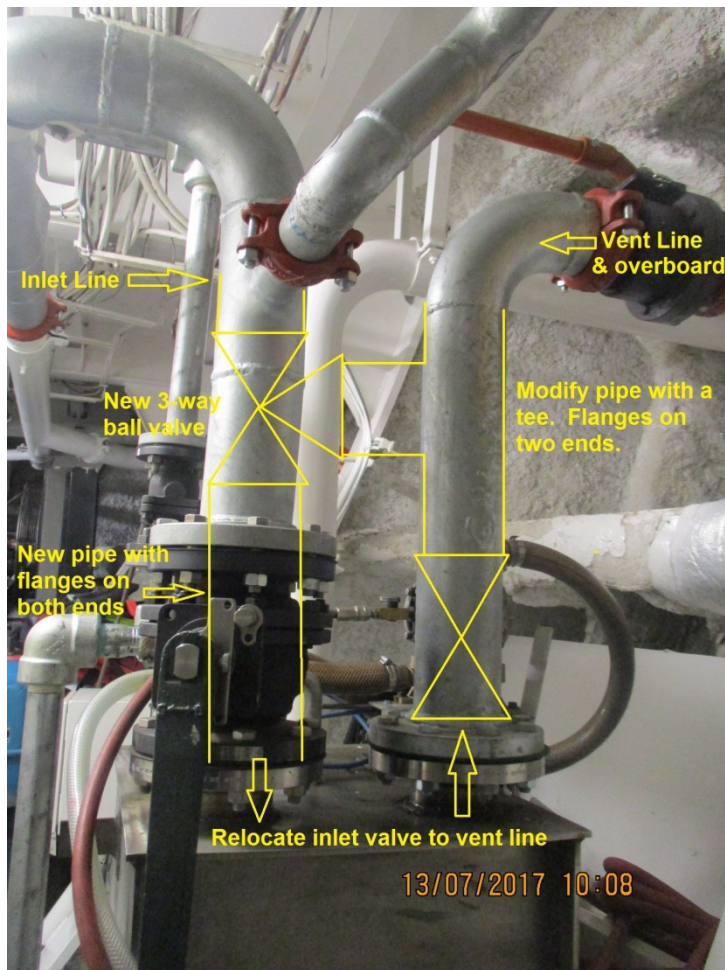
H-01 GREY WATER PIPING MODIFICATIONS

2.3 INTERFERENCES

N/A – INTENTIONALLY LEFT BLANK

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA



3.2 STANDARDS AND REGULATIONS

N/A – INTENTIONALLY LEFT BLANK

3.3 OWNER FURNISHED EQUIPMENT

1. 3-way ball valve.
2. Level indicating gauge glass.

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H-01 GREY WATER PIPING MODIFICATIONS

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Operation of all valves to be proven to CGTA.

4.2 TESTING

1. Hydrostatic test of new and modified piping at 2 bar for 30 minutes.
2. Air pressure test of grey water transfer tank, not exceeding a pressure of 1.5 psi for 30 minutes.

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – Intentionally left blank

5.2 Spares

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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H-02 FM200 FIRE SYSTEM TCMSS INSPECTION

PART 1: SCOPE:

The intent of this specification item is for Contractor to have the fixed FM-200 fire system inspected.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The vessel's fixed fire suppression system must be inspected and certified by only a current factory certified marine fire suppression system inspection and certification specialist. Contractor must supply the original certificate and two (2) copies to the CGTA immediately upon completion of the work.
2. The System is a Kidde Marine FM200.
3. Contractor must include in their bid, all costs to complete the inspection and certification of the system including any travel or accommodations requirements. Any subsequent defects found will be addressed and corrected through PWGSC 1379 action.
4. The galley ANSUL R 102 system is to be inspected and serviced by certified personnel.
5. The vessel's FM200 system components are listed in Appendix A.
6. All weights, levels, and pressures of cylinders to be measured and recorded.
7. All rotating beacons and flashing lights are to be tested and proven in good working order.
8. All audible alarms are to be tested and proven in good working order.
9. All wires and cables to be proven in good working order.
10. All piping and nozzles to be proven clear.

2.2 LOCATION

1. Main Engine Room
2. Emergency Generator room
3. Incinerator Room
4. Bowthruster Compartment
5. Electronic and Battery Room
6. Crawl Space Under Bridge
7. Paint Locker and Bosun's Stores
8. Steering Gear
9. Fore Peak Stores

H-02 FM200 FIRE SYSTEM TCMSS INSPECTION (CONTINUED)

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. Marine certified service personnel specialist to follow current regulations.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. System must be inspected and serviced by current marine certified service personnel

4.2 TESTING

- a) All rotating beacons and flashing lights must be tested
- b) All audible alarms must be tested
- c) All piping and nozzles must be proven clear

4.3 CERTIFICATION

1. The system must be inspected and certified by current marine certified service personnel and upon completion of the work the original compliant inspection certificate must be provided to the CGTA.

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H-02 FM200 FIRE SYSTEM TCMSS INSPECTION (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply a final report, two (2) type written and one (1) electronic copy in PDF format to the CGTA upon completion of this scope of work. The final report must contain the results, cylinder weights, pressures, levels, recommendations, tests, etc.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

H-03 FIRE DETECTION SYSTEM TCMSS SURVEY

PART 1: SCOPE:

The intent of this specification item is for Contractor to inspect the vessel's fire detection system and have it serviced by marine certified personnel.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

System is a Notifier NFS-640

1. The vessel's fixed fire detection system must be inspected and certified by a Class approved, certified marine systems inspection agency.

NOTE: Powering down the system: Turn DC power off first and AC off last. Powering up the system: AC power first and DC last.

2. Prior to commencing any work, Contractor must electrically and mechanically isolate the fire detection system. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install /remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the Electrical Officer must be in attendance when all locks/tags are removed.
3. The vessel's fire detection system consists of the following:
 - a) 69 Smoke Detectors
 - b) 6 Heat Detectors (rate of rise)
 - c) 20 Heat Detector (fixed)
 - d) 13 Pull Station
 - e) 7 Monitor
 - f) 8 Bells
 - g) 1 General Alarm Activation
 - h) 1 Fire Door Activation

Refer to Appendix B for component locations.

4. All the above components must be tested including a power supply inspection and emergency power supply inspection, annunciation test and Inspection, control unit test and inspection.
5. All rotating beacons and flashing lights are to be tested and proven in good working order.

H-03 FIRE DETECTION SYSTEM TCMSS SURVEY (CONTINUED)

6. All audible alarms are to be tested and proven in good working order.
7. Any defects found are to be corrected and dealt with through PWGSC 1379 action.
8. Contractor must supply two (2) copies of each Certificate to CGTA on completion of work.

2.2 LOCATION

1. Locations are as follows;
 - a) Wheelhouse
 - b) Focsle Deck
 - c) Boat deck
 - d) Main deck
 - e) Engine room
 - f) Below tween
 - g) Below main
 - h) Bow thruster compartment

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. Marine certified service personnel specialist to follow current regulations.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

H-03 FIRE DETECTION SYSTEM TCMSS SURVEY (CONTINUED)

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. System must be inspected and serviced by current marine certified service personnel

4.2 TESTING

1. All rotating beacons and flashing lights must be tested
2. All audible alarms must be tested

4.3 CERTIFICATION

1. The system must be inspected and certified by current marine certified service personnel and upon completion of the work the original compliant inspection certificate must be provided to the CGTA

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply a final report, two (2) type-written and one (1) electronic copy in PDF format to the CGTA upon completion of this scope of work. The final report must contain the results, recommendations, tests, etc.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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H-04 PORTABLE FIRE EXTINGUISHER ANNUAL SURVEY

PART 1: SCOPE:

The intent of this specification item is for Contractor to have the portable fire extinguishers inspected.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The extinguishers must be weighed, inspected, and tagged for recertification by a qualified service agency.
2. The type and quantity of extinguishers are listed in table "H-07A".
3. Contractor must supply two copies of the certificates of inspection and test reports to the CGTA as soon as they are received from the inspection authority.
4. Portable extinguishers must remain operational and onboard the vessel at all times, except when being serviced. Any extinguishers that are required to be sent out for the purpose of recharging, repairs or testing, must be replaced with temporary extinguishers of the same type and size provided by Contractor. Time required to carry out this work must be kept to a minimum.
5. Any additional service work must be negotiated through PWGSC 1379 actioned.
6. All work must be completed to the satisfaction of the CGTA and TCMSS Surveyor.

2.2 LOCATION

1. Location provide in table H-07A

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by CGTA, storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

H-04 PORTABLE FIRE EXTINGUISHER ANNUAL SURVEY (CONTINUED)

TABLE H-07A PORTABLE FIRE EXTINGUISHERS

#	LOCATION	TYPE (LBS)	S/N	HYDRO/ 6 YEAR INSP. DUE	DATE MFG	FULL WEIGHT (LBS)
SPB	Bridge, forward of stairs	10 ABC	539798	10/2018 (Hydro)	2006	-
2	Bridge, forward of flag locker	5 CO2	X589922	03/2021 (Hydro)	2001	13.5
3	Foc'sle Deck, Fire Stn #2	10 ABC	286633	10/2020 (Hydro)	2008	-
4	Boat Deck, Fire Stn #4	20 ABC	482371	12/2021 (6 Year)	1979	-
5	Boat Deck, Fire Stn #5	10 ABC	539795	10/2018 (Hydro)	2006	-
6	Main Deck, Fire Stn #6	10 ABC	547523	10/2018 (Hydro)	2006	-
7	Main Deck, Fire Stn #7	10 ABC	839111	10/2018 (Hydro)	2006	-
8	Main Deck, Galley	6L K Class	950	10/2018 (Hydro)	2002	-
9	Fridge Compressor Flat	10 ABC	513004	03/2022 (6 year)	2005	-
10	Bow Thruster Compartment	10 ABC	285113	10/2020 (Hydro)	2008	-
11	Main Deck, outside Laundry Room	10 ABC	838959	10/2018 (Hydro)	2006	-
12	Main Deck, Deck Workshop	10 ABC	970008	10/2020 (Hydro)	2008	-
13	Main Deck, Fire Stn #9	10 CO2	154403	04/2018 (Hydro)	-	30.8
14	Main Deck, Emergency Gen. Room	10 ABC	056383	12/2021 (6 Year)	2009	-
15	Main Deck, Emergency Gen. Room	5 CO2	590667	02/2021 (Hydro)	2001	13.6
16	Liebherr Crane, Upper Level	10 ABC	543776	11/2018 (Hydro)	2006	-
17	Liebherr Crane, Lower Level	10 ABC	547638	11/2018 (Hydro)	2006	-
18	Liebherr Crane, Lower Level	10 CO2	0032608	01/2020 (Hydro)	2015	26.9
19	Liebherr Crane, Crane Base above door	10 CO2	381351	10/2018 (Hydro)	1998	24
20	Main Deck, Entrance to Engine Room	20 ABC	580685	10/2020 (Hydro)	2008	-
21	Main Deck, Entrance to Engine Room	10 CO2	42060	10/2019 (Hydro)	2009	26.1
22	E/R Forward, bottom of stairs on bulkhead	10 ABC	45131	10/2019 (6 Year)	2001	-
23	MCR Port	5 CO2	590893	12/2020 (Hydro)	2001	13.5
24	MCR Starboard	5 CO2	X672574	03/2021 (Hydro)	2011	13.1
25	Engine Rm Workshop Aft	20 ABC	580694	10/2019 (Hydro)	2008	-
26	Firewatch, ER Workshop	10 CO2	20708	10/2017 (Hydro)	-	40
27	Firewatch, ER Fwd Fuel Purifier	10 CO2	73593	03/2021 (Hydro)	-	25

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H-04 PORTABLE FIRE EXTINGUISHER ANNUAL SURVEY (CONTINUED)

TABLE H-07A PORTABLE FIRE EXTINGUISHERS (CONTINUED)

#	LOCATION	TYPE (LBS)	S/N	HYDRO/ 6 YEAR INSP. DUE	DATE MFG	FULL WEIGHT (LBS)
28	ER Stbd, Fire Stn#11, Outboard of S/S Gen.	20 ABC	580695	10/2020 (Hydro)	2008	-
29	ER Port by F/W Distiller	20 ABC	580676	10/2020 (Hydro)	2008	-
30	ER Port, inboard of RO Unit	10 CO2	10-552	03/2021 (Hydro)	-	35
31	ER between ME2 & ME3	20 ABC	580675	10/2020 (Hydro)	2008	-
32	ER Aft of ME 3, Fire Station #12	20 ABC	580678	10/2020 (Hydro)	2008	-
33	ER Auxiliary Flat, Top of Stairs	15 CO2	124711	10/2017 (Hydro)	1982	39.8
34	ER Auxiliary Flat, Starboard	5 CO2	590903	12/2020 (Hydro)	2001	13.5
35	Cargo Hold, Fwd.	10 ABC	572500	01/2019 (6 Year)	2013	-
36	Cargo Hold Aft	10 ABC	997240	12/2021 (Hydro)	2009	-
37	Steering Gear Compartment	20 ABC	580686	10/2020 (Hydro)	2008	-
38	Electronic Equipment Room	15 CO2	24458	10/2017 (Hydro)	1982	44
39	Incinerator Room	2.5 ABC	939287	10/2019 (Hydro)	2007	-
40	Sewage System Room	10 CO2	751428	03/2021 (Hydro)	2001	24.1
FRC1A	Rescue Boat – Aft Storage Locker	5 ABC	303448	10/2020 (Hydro)	2008	-
FRC1B	Rescue Boat – Aft Storage Locker	10 ABC	764391	03/2022 (Hydro)	2010	-
FRC2A	Workboat Aft Locker	5 ABC	38256979	01/2021 (6 Year)	2015	-
FRC2B	Workboat Fwd Locker	2.5 ABC	A23540197	01/2020 (6 Year)	2014	-
1	SAR Locker	5 CO2	X703890	03/2021 (Hydro)	2011	13.1
SP1	SAR Locker	10 ABC	539771	10/2018 (Hydro)	2006	-
SP2	SAR Locker	10 ABC	15163	10/2018 (Hydro)	2006	-
SP3	SAR Locker	10 ABC	217547	10/2020 (Hydro)	2008	-
SP42	SAR Locker	15 CO2	5742	10/2019 (Hydro)	2009	35.5
SP5	SAR Locker	20 ABC	BM-754080	01/2019 (6 Year)	2013	-
SP5A	SAR Locker	20 ABC	374971	10/2020 (Hydro)	2007	-
SP6	SAR Locker	10 ABC	898803	10/2018 (Hydro)	2006	-
SP7	SAR Locker	10 ABC	15191	10/2018 (Hydro)	2006	-
SP8	SAR Locker	20 CO2	554302	10/2017 (Hydro)	2006	46.9
SP9	SAR Locker	2.5 ABC	343026	10/2019 (Hydro)	2007	-
SP10	SAR Locker	20 CO2	738534	12/2020 (Hydro)	2005	46.5
SP11	SAR Locker	10 ABC	221822	10/2020 (Hydro)	2008	-

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H-04 PORTABLE FIRE EXTINGUISHER ANNUAL SURVEY (CONTINUED)

TABLE H-07A PORTABLE FIRE EXTINGUISHERS (CONTINUED)

#	LOCATION	TYPE (LBS)	S/N	HYDRO/ 6 YEAR INSP. DUE	DATE MFG	FULL WEIGHT (LBS)
SP41	SAR Locker	10 CO2	535	12/2020 (Hydro)	1978	37
SP4	Deck Workshop	15 CO2	74364	12/2020 (Hydro)	1987	34
N/A	Extra ABC in Eng workshop	10 ABC	283786	01/2017 (6 Year)	2011	-

3.2 STANDARDS AND REGULATIONS

1. Qualified service agency to follow current regulations.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor must supply the original certificates of inspection to the CGTA

4.2 TESTING

1. Contractor must follow all applicable testing procedure for this scope of work as required by the qualified service agency.

4.3 CERTIFICATION

1. Contractor must supply certificates where applicable.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply a final report containing a copy of the certificates of inspection and test results to the CGTA. Contractor must supply an electronic copy of the certificates and test result in PDF format to the CGTA.

H-04 PORTABLE FIRE EXTINGUISHER ANNUAL SURVEY (CONTINUED)

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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H-05 LIFE RAFT ANNUAL INSPECTION & CERTIFICATION

PART 1: SCOPE:

The intent of this specification item is for Contractor to arrange and subcontract the annual servicing and certification of the vessel's life rafts and hydrostatic releases to an authorized service facility.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The following inflatable life rafts must be removed from vessel within the first 7 days and delivered to the service depots certified by each applicable raft manufacturer for inspection, repair and re-certification of the rafts. On completion of the work, the rafts must be stowed in place in the racks on board the vessel as per their original setup.

Description	Size	Manufacturer	Serial No.
Liferaft PS #1	20 person	Surviva	S/N P7649
Liferaft SS #3	20 person	Surviva	S/N P3246
Liferaft PS #3	20 person	Surviva	S/N P3233
Liferaft SS #1	20 person	Surviva	S/N P7620
Liferaft SS #2	20 person	Surviva	S/N P7605
Liferaft PS #2	20 person	Surviva	S/N P7604
Liferaft SAR LR	12 person	Surviva	S/N B01466
Liferaft Barge	6 person	Surviva T/O	S/N B01476

2. Contractor must quote an allowance of \$15,000 for sub-contractor to perform repairs, inspect and recertification all life rafts and hydrostatic releases. This allowance will be adjusted up or down through PWGSC 1379 action upon proof of invoice.
3. Contractor is responsible for removal, transportation, and crane services to and from the ship to the service shop.

2.2 LOCATION

1. Life rafts are located in various areas throughout the vessel; CGTA will identify these locations to Contractor upon request.

Description	Location	Description	Location
Liferaft No.1	Port Side	Liferaft No.1	Starboard Side
Liferaft No.2	Port Side	Liferaft No.2	Starboard Side
Liferaft No.3	Port Side	Liferaft No.3	Starboard Side
Liferaft SAR	Port Side	Liferaft Barge	Towing Compartment

H-05 – LIFE RAFT ANNUAL INSPECTION & CERTIFICATION (CONTINUED)

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. Contractor must follow all applicable regulations and standards when performing service on each life raft.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Marine certified service personnel specialist authorized by manufacturer for life rafts being serviced.

4.2 TESTING

1. Testing based on manufacturers recommendations

4.3 CERTIFICATION

1. Certificates must be given to the CGTA on completion of the inspections and testing.

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H-05 – LIFE RAFT ANNUAL INSPECTION & CERTIFICATION (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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H-06 MIRANDA DAVIT INSPECTION ANNUAL SURVEY

PART 1: SCOPE:

The intent of this specification item is for Contractor to perform an annual survey to the Schat-Harding Miranda Davit in order to receive TCMSS survey credit. Contractor must arrange for and schedule FSR to perform the inspection.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must obtain the services of a qualified Palfinger Marine Canada Inc. Field Service Representative. Contractor must provide all equipment, hardware, personnel, weights, scales, etc. to carry out the required work under the direction and guidance of the FSR. Contractor must obtain certification for the FSR from Palfinger Marine Canada Inc.
2. Contractor must include an allowance of \$15,000.00 for the services of an attending FSR and an allowance of \$5,000.00 for parts and materials. This information must be included in the PSPC data pricing sheet as separate items. FSR will be reimbursed for the authorized travel and living expenses reasonably and properly incurred in the performance of their work. The allowances must form part of the overall bid and will be adjusted through PWGSC 1379 action upon proof of final invoice.

PALFINGER MARINE CANADA INC

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Langley BC V3A 5E8 CANADA
Office +604 530 0814

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Web www.palfingermarine.com
Fax + 604 530 0812

3. All manufacturer's procedures and recommendations must be followed during the scope of all work with all technical specifications being adhered to as a minimum by Contractor. Contractor must arrange for the on-site presence of a TCMSS Surveyor as required for inspections / testing during the course of all work.
4. Contractor must supply all the necessary staging and craneage as required to work on, remove, transport, and install the various components during this scope of work. All personnel working on the davit system must be suitably trained in fall restraint and all fall restraint equipment must be certified and current.
5. Prior to the commencement of any and all work, Contractor must lock out the power pack unit, associated 110 volt condensation heaters, and the oil reservoir immersion heater as a minimum per the DFO/5737 Fleet Safety Manual, 7.B.5-LOCKOUT AND TAGOUT. Contractor must install /remove locks and tags accordingly during the scope of work. CGTA will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor/FSR must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the CGTA must be in attendance when all locks / tags are removed.

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H-06 MIRANDA DAVIT INSPECTION ANNUAL SURVEY (CONTINUED)

6. Once all work has been completed to the Miranda davit, all new, disturbed and rusty areas must be Power Tool Clean to Bare Metal SSPC-SP11. The bare areas must be primed as per Paint Specification CM60022. This must include the deck seat mounts for the hydraulic pump sets, pump sets (motor and pump). Primed area must be feathered back to provide a smooth surface for the top coats
7. The entire Miranda davit must be painted, Boat Davit Ramps (top coat), with colour Interthane 990 PHA163/A RAL9003 White for the davit components and Interthane 990 PHL274/A Red for the seat mounts. Contractor to confirm the coating with the CGTA prior to ordering.
8. All manufacturer's procedures and recommendations must be followed during the scope of work with all technical specifications being adhered to as a minimum by Contractor. Contractor must arrange for the onsite presence of a TCMSS Surveyor as required for inspections / testing during the course of all work. No materials substitutions will be undertaken without the expressed written consent of Harding Canada Inc.
9. FRC will be removed by the vessels' crew, prior to docking, for storage at Contractor's facility. CGTA will provide all equipment, manpower, etc. to remove and land the FRC in the water and bring alongside at the Contractors facility.
10. Contractor must provide all equipment and manpower to remove the FRC from the water, provide their own cradle and transport to a secure location for storage until reinstallation on the vessel. The FRC must be protected from damage and kept in a clean environment at all times. Alternatively, Contractor can provide a safe / sheltered berth for the vessel until all work is completed. Vessels' crew will operate the FRC when going to and returning from the secure / sheltered berth.
11. Miranda Davit Cradle must be removed by Contractor for storage if required by the FSR. Contractor must provide all equipment, manpower, etc. to remove and land the Cradle and to reinstall it upon completion of all work. Contractor must store the Cradle as per FSR instructions. The Cradle must be protected from damage, paint, and dirt/debris during the Refit period. Contractor must provide a cost in their bid for this work, actual work performed will be adjusted through 1379 action.
12. The FSR must complete an Annual Inspection on the FRC Davit as per the manufacturers' instructions / requirements. The inspection shall include the replacement of the descant air filter/breather assembly & changing of the gearbox oil (GSM). Any defects requiring repairs must be worked on and cost negotiated through PWGSC 1379 actions.
13. All work must be carried out to the satisfaction of the CGTA.

2.2 LOCATION

1. The davit is located on the port side of the Boat Deck between frames 25-32.

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H-06 MIRANDA DAVIT INSPECTION ANNUAL SURVEY (CONTINUED)

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by CGTA, storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Miranda Davit Information (Also known as the FRC workboat Davit).

Miranda: Type MRT 3900 / Winch is a Type BHY 5300

Contact Info:

PALFINGER MARINE CANADA INC

120-20575 Langley By Pass,
Langley BC V3A 5E8 CANADA

Office +604 530 0814

Fax + 604 530 0812

Email sean.kasper@palfingermarine.com

Web www.palfingermarine.com

2. Drawing #31111 "SECTIONAL ARRANGEMENT OF WINCH TYPE BHY 5300".

Drawing #21249 "Sectional Arrangement of Brake Unit"

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - Canadian Coast Fleet Safety Manual (DFO 5737)
 - Coast Guard ISM Lock Out/Tag Out Procedures

3.3 OWNER FURNISHED EQUIPMENT

1. Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All documentation must be provided to demonstrate OEM compliance.

H-06 MIRANDA DAVIT INSPECTION ANNUAL SURVEY (CONTINUED)

4.2 TESTING

1. Demonstrate operation to satisfaction of Transport Canada Surveyor, FSR and the CGTA.

4.3 CERTIFICATION

1. Annual compliance certificate from Palfinger Marine Canada Inc.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply two typewritten reports and one electronic copy in PDF format upon completion of all work from the FSR. The report must at a minimum list all work undertaken, repairs, parts used, results, measurements, readings, recommendations, etc. Copies of the report must be provided to the CGTA within 24 hours of the completed work.
2. Safety Management System forms and checklists.
3. Inspected and certified for TCMSS and Survey credit obtained.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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H-07 PALFINGER DAVIT INSPECTION ANNUAL SURVEY

PART 1: SCOPE:

The intent of this specification item is for Contractor to perform an annual survey to the Palfinger Davit in order to receive TCMSS survey credit. Contractor must arrange for and schedule FSR to perform the inspection.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must obtain the services of a qualified Palfinger Marine Canada Inc. Field Service Representative. Contractor must provide all equipment, hardware, personnel, weights, scales, etc. to carry out the required work under the direction and guidance of the FSR. Contractor must obtain certification for the FSR from Palfinger Marine Canada Inc.
2. An allowance to cover the expenses for a Palfinger Marine Canada Inc. FSR for this specification item is shared with specification item H-06 Miranda Davit Annual Inspection. The FSR will be reimbursed for any necessary parts, services, authorized travel and living expenses reasonably and properly incurred in the performance of the work. The Allowance will be adjusted through 1379 action upon proof of final invoice.
3. All manufacturer's procedures and recommendations must be followed during the scope of all work with all technical specifications being adhered to as a minimum by Contractor. Contractor must arrange for the on-site presence of a TCMSS Surveyor as required for inspections / testing during the course of all work.
4. Contractor must supply all the necessary staging and craneage as required to work on, remove, transport, and install the various components during this scope of work. All personnel working on the davit system must be suitably trained in fall restraint and all fall restraint equipment must be certified and current.
5. Prior to the commencement of any and all work, Contractor must lock out the power pack unit and associated equipment as a minimum per the DFO/5737 Fleet Safety Manual, 7.B.5-LOCKOUT AND TAGOUT. Contractor must install /remove locks and tags accordingly during the scope of work. CGTA will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor/FSR must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the CGTA must be in attendance when all locks/tags are removed.
6. Once all work has been completed to the Palfinger davit, all new, disturbed and rusty areas must be Power Tool Clean to Bare Metal SSPC-SP11. The bare areas must be primed and painted as per FSR's recommendations. This must include the deck seat mounts for the hydraulic pump sets, pump sets (motor and pump). Primed area must be feathered back to provide a smooth surface for the top coats.

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H-07 PALFINGER DAVIT INSPECTION ANNUAL SURVEY (CONTINUED)

7. The entire Palfinger davit must be painted as per the FSR recommendations. Contractor to confirm the coating with the CGTA prior to ordering.
8. All manufacturer's procedures and recommendations must be followed during the scope of work with all technical specifications being adhered to as a minimum by Contractor. Contractor must arrange for the onsite presence of a TCMSS Surveyor as required for inspections / testing during the course of all work. No materials substitutions will be undertaken without the expressed written consent of Palfinger Marine Canada Inc.
9. FRC will be removed by the vessels' crew, prior to docking, for storage at Contractor's facility. CGTA will provide all equipment, manpower, etc. to remove and land the FRC in the water and bring alongside at the Contractors facility.
10. Contractor must provide all equipment and manpower to remove the FRC from the water, provide their own cradle and transport to a secure location for storage until reinstallation on the vessel. The FRC must be protected from damage and kept in a clean environment at all times. Alternatively, Contractor can provide a safe / sheltered berth for the vessel until all work is completed. Vessels' crew will operate the FRC when going to and returning from the secure / sheltered berth.
11. Cradle must be removed by Contractor for storage if required by the FSR. Contractor must provide all equipment, manpower, etc. to remove and land the Cradle and to reinstall it upon completion of all work. Contractor must store the Cradle as per FSR instructions. The Cradle must be protected from damage, paint, and dirt/debris during the Refit period. Contractor must provide a cost in their bid for this work, actual work performed will be adjusted through 1379 action.
12. The FSR must complete an Annual Inspection on the FRC Davit as per the manufacturers' instructions / requirements. Any defects requiring repairs must be worked on and cost negotiated through PWGSC 1379 actions.
13. All work must be carried out to the satisfaction of the CGTA.

2.2 LOCATION

1. The davit is located on the Starboard side of the Boat Deck between frames 25-32.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by CGTA, storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

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H-07 PALFINGER DAVIT INSPECTION ANNUAL SURVEY (CONTINUED)

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Palfinger Davit Information (Also known as the FRC Rescue Boat Davit).

Davit: Type PRHE 35 / S/n 130658-1

Contact Info:

PALFINGER MARINE CANADA INC

120-20575 Langley By Pass,
Langley BC V3A 5E8 CANADA

Office +604 530 0814

Fax + 604 530 0812

Email sean.kasper@palfingermarine.com

Web www.palfingermarine.com

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - Canadian Coast Fleet Safety Manual (DFO 5737)
 - Coast Guard ISM Lock Out/Tag Out Procedures

3.3 OWNER FURNISHED EQUIPMENT

1. Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All documentation must be provided to demonstrate OEM compliance.

4.2 TESTING

1. Demonstrate operation to satisfaction of Transport Canada Surveyor, FSR and the CGTA.

4.3 CERTIFICATION

1. Annual compliance certificate from Palfinger Marine Canada Inc.

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H-07 PALFINGER DAVIT INSPECTION ANNUAL SURVEY (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply two typewritten reports and one electronic copy in PDF format upon completion of all work from the FSR. The report must at a minimum list all work undertaken, repairs, parts used, results, measurements, readings, recommendations, etc. Copies of the report must be provided to the CGTA within 24 hours of the completed work.
2. Safety Management System forms and checklists.
3. Inspected and certified for TCMSS and Survey credit obtained.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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H-08 GALLEY EXHAUST DUCT CLEANING

PART 1: SCOPE:

The intent of this specification item is for Contractor to open up and clean the galley exhaust trunking, including the galley range hood.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor is responsible for the removal of all coverings in the galley to gain access to the trunking. The length of trunking runs from the galley (center line of the ship at frame 38 to outboard on the boat deck port frame 34) being approximately 35 feet.
2. Contractor is responsible for any rigging or scaffolding, its installation and removal to complete the specified work.
3. Prior to the commencement of any and all work, Contractor must lock out mechanical/ electrical system as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install/remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the Electrical Officer must be in attendance when all locks/tags are removed.
4. Contractor is responsible for the cleanliness of the immediate area during and after the work is complete.
5. Contractor is responsible for closing and resealing air tight all access covers disturbed during ducting cleaning and inspection, upon completion of work.

Note: Plastic plugs must not be used to seal access points. All access points must be sealed with Contractor supply metal plugs.

6. The Range Hood and trunking shall be chemically and/or steam cleaned. All dirt, grease, debris, and cleaning fluids shall be trapped and shall be removed ashore and disposed of by Contractor.
7. Prior to cleaning, all mechanical and electrical connections to range hood shall be released, including piping for fire extinguishing system, associated controls and electrical lighting. All fittings liable to interfere with cleaning of the range hood shall be temporarily relocated and protected.
8. The Range Hood filter screens shall be removed and steam cleaned.

H-08 GALLEY EXHAUST DUCT CLEANING (CONTINUED)

9. Trunking in way of the exhaust fan shall be opened to allow complete degreasing of fan, fan motor, and its support brackets. Contractor shall remove sections of the stainless steel cladding for access and reinstalled upon completion.
10. Trunking and Range Hood shall be reassembled in good order and adjustment upon completion of cleaning and inspection. All items removed or relocated to allow this work package to proceed shall be reassembled in good order and functionally tested to the satisfaction of CGTA.
11. All work is to be completed to the satisfaction of the CGTA.

2.2 LOCATION

1. Main deck – CGTA will identify the location to Contractor upon request.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - a. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedure

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to complete all tasks in this specification.
2. All labour required to complete the cleaning, including that required for removals, reinstallation, opening, and closing up of equipment and ducting is Contractor's responsibility.

H-08 GALLEY EXHAUST DUCT CLEANING (CONTINUED)

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor must allow CGTA to inspect the system prior to “Closing up” the areas. Failure to provide CCG with adequate inspection period shall result in a full credit to Coast Guard for all items in this specification.
2. The CGTA must inspect all spaces to ensure all removals are replaced.

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

4.3 CERTIFICATION

1. Signoff will occur when all work is completed to the satisfaction of the CGTA.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must provide two (2) typewritten copies and one (1) electronic copy in PDF format of the final report detailing all readings, locations, records, recommendation and etc.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

H-09 INTENTIONALLY LEFT BLANK

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H-10 VENTILATION DUCT CLEANING

PART 1: SCOPE:

The intent of this specification item is for Contractor to access and clean the air ducting for accommodations (Main Deck, Boat Deck, Focsle Deck), the exhaust air ducting for the washrooms, the supply ducting to the wheelhouse, as well as the return air ducting for the accommodations and wheelhouse systems and the Main Deck Laundry Room/Change room Exhaust. Contractor must not commence work until late as possible in the refit, after most of the work is completed.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must provide the services of a qualified HVAC representative to mechanically clean the vessel's ducting. All ducting must be cleaned thoroughly of dust, dirt, debris, scale, rust, etc. Contractor is responsible for making penetrations for the cleaning equipment and the subsequent sealing of such access points upon completion of all work, with approved fire rated materials and sealant.
2. Since this task has been carried out in previous maintenance periods, a good many access points exist. Note: Plastic plugs are not to be used to seal access points. All access points must be sealed with CFM metal plugs. If any additional access points are required, Contractor is responsible for making penetrations for the cleaning equipment and re-sealing upon completion as per above requirements.
3. It will be necessary to remove ceiling panels and diffusers on all decks in order to access the applicable ventilation trunking, ducting, and tubes. All items must be replaced in good order upon completion of all work. Any wiring, piping, lighting, fixtures, fasteners, metal work, etc. that has been removed or repositioned to carry out this work must be reinstalled in good order in its original location and condition. All insulation removed must be reinstalled accordingly and all taped seams must be re-taped with new approved tape for HVAC systems.
4. Prior to commencing any work, Contractor must electrically and mechanically isolate each system supply/exhaust fan set. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install/remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the Electrical Officer must be in attendance when all locks/tags are removed.
5. Contractor is responsible for all materials, coverings, and equipment required to perform the specified work. All labor required for completing the cleaning, including the requirement for removals, reinstallation, opening, and closing up of equipment and ducting is Contractor's responsibility.

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H-10 VENTILATION DUCT CLEANING (CONTINUED)

6. Contractor must remove all waste materials generated by this scope of work from the vessel. Ship's waste receptacles and those on the dock must not be used for disposal of any Contractor removed materials.
7. Contractor is responsible for the cleaning of all spaces, furniture, equipment, etc., that are contaminated or soiled during and upon completion of this scope of work.
8. All systems must be closed up as per original upon completion of the cleaning process.
9. Presently some diffusers have been physically blocked with stuffing, etc., in various cabins and spaces. This has been carried out by various personnel without approval or knowledge. Contractor must remove all blanks and/or plugs as they are encountered. These blanks/plugs are not to be put back, such that all spaces will be served by ventilation and exhaust flow as intended by the original design.

ACCOMMODATION VENTILATION CLEANING

10. The accommodation HVAC supply and return air system must be mechanically cleaned of dust, dirt, oil, grease and other debris. Focsle deck, boat deck and main deck supply trunking must be cleaned from discharge side of main supply fans on focsle deck to all discharge outlet fittings. All outlet fittings must be removed and cleaned. All air trunking in each associated heating/air conditioning unit must be cleaned.

Note: During the cleaning of ductwork, care must be taken not to allow the ingress of contaminants into the accommodations and work areas serviced by the air outlets.

11. It may be necessary to remove ceiling panels to access the applicable ventilation trunking, ducting, and tubes. All items must be replaced in good order upon completion of all work. Any wiring, piping, lighting, fixtures, fasteners, metal work, etc. that has been removed or repositioned to carry out this work must be reinstalled in good order in its original location and condition. All insulation removed must be reinstalled accordingly and all previous/new seams re-taped with new approved tape for HVAC systems.
12. All equipment exposed to the possibility of contamination must be protected with taped down polyethylene film. Contractor is responsible for removal from the vessel of all dirt and debris removed from the air handling system. Contractor is responsible for the removal of all polyethylene film and tape upon completion of work. Tape used to hold the polyethylene film in place must not damage the underlying material when removed.

H-10 VENTILATION DUCT CLEANING (CONTINUED)

MAIN DECK LAUNDRY/CHANGE ROOM EXHAUST

13. Main Deck Laundry/Change Room Exhaust must be cleaned from all intake screens through to point of fan discharge and include connection to both laundry units in the Laundry/Change room. All intake screens must be removed and cleaned. Dryers associated with these laundry units must be cleaned internally to remove any and all accumulated lint build up. Fan blower and housing must be cleaned internally.
14. If necessary, in order to access the combination washer/dryer ducting, Contractor will unbolt the units and pull them forward to access the ducting behind the units, the units must be pushed back in place, without damaging the ducting or causing interference to the existing area, when all work is completed and fasten in place as per original.

WASHROOM EXHAUST

15. Washroom exhaust trunking must be cleaned from all intake screens through to point of fan discharge outlet including connection to laundry unit in forward washroom on main deck and connection to laundry unit in washroom on focsle deck. All intake screens must be removed and cleaned. Dryer associated with these laundry units must be cleaned internally to remove any and all accumulated lint build up. Fan blower and housing must be cleaned internally.

WHEELHOUSE HVAC SYSTEM

16. Wheelhouse ductwork must be cleaned from air handling units (on wheelhouse top) through to all discharge fittings. All discharge fittings must be removed and cleaned. All internal air trunking and fans in air handling units must be cleaned. All return air ducts and intake screens must be cleaned.

2.2 LOCATION

1. Accommodation
2. Main Deck Laundry/Change Room
3. Washroom
4. Wheelhouse

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

H-10 VENTILATION DUCT CLEANING (CONTINUED)

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Ductwork layout and system definition is shown on drawing #218-761-014 Sheets 1 & 2.

3.2 STANDARDS AND REGULATIONS

1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - a. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to complete all tasks in this specification.
2. All labour required for completing the cleaning, including that required for removals, reinstallation, opening, and closing up of equipment and ducting is Contractor's responsibility.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor must allow CGTA to inspect each system prior to "Closing up" the areas. Failure to provide CGTA with adequate inspection period shall result in a full credit to Coast Guard for all items in this specification.
2. The CGTA must inspect all spaces to ensure all removals are replaced.

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

4.3 CERTIFICATION

1. Sign off will occur when all work is completed to the satisfaction of the CGTA.

H-10 VENTILATION DUCT CLEANING (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must provide a report on the Duct Cleaning, when the work is completed, summarizing the date and time each duct was cleaned, and the workers who were performing the task. The locations of any blockages encountered must be identified in this report.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

H-11 INTENTIONALLY LEFT BLANK

INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

H-12 ANCHORS, CHAINS AND CHAIN LOCKERS

PART 1: SCOPE:

The intent of this specification item is for Contractor to remove both anchors and chains and open both chain lockers for cleaning, painting, and inspection by CGTA and TCMSS Surveyor.

Field #	Tank Name	Location	Manhole Location
3L001	Port Chain Locker	Fr. 46-47	Boat Deck level, Fwd stores space
3L002	Stbd Chain Locker	Fr. 46-47	Boat Deck level, Fwd stores space

Anchor Weight: 1920 kg

Chain Size: 38 mm

Chain length: 8 shots per side (720 feet)

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Both anchors must be lowered to the dock floor by Contractor. The ship's windlass may or may not be available, so Contractor must bid on the assumption that they must supply craneage, personnel, and equipment to lower the anchors and run out both chains. The port and starboard anchor chains are both 8 shots in length.
2. Both port and starboard chain lockers must be adequately ventilated to provide good air movement and permit entry of personnel. Each chain locker must be tested for oxygen content and proven safe for personnel to enter. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the tank and a copy of each certificate must be posted in a conspicuous location in close proximity to the manhole cover for each space. Spaces must be tested each day that personnel are required entry in the tanks. Contractor must take note of the requirement outlined in the DFO/5737 Fleet Safety Manual, 7.B.3 – ENTRY INTO CONFINED SPACES and DFO/5737 Fleet Safety Manual, 7.B.4 – HOTWORK.
3. After both chain lockers have been proven and certified as gas free, Contractor must release both chain bitter ends and lower the remaining chain to the dock floor.
4. Both anchor chains must be arranged in a suitable area of the dock floor for cleaning, inspection, and application of a protective sealant. Chains must be inspected by TCMSS Surveyor.
5. Contractor must gage individual link diameter of two links per shot, randomly selected. Measurements must be recorded and provided in a written report to CGTA.

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H-12 ANCHORS, CHAINS AND CHAIN LOCKERS (CONTINUED)

6. Each chain must be hydro blasted clean at a pressure of approximately 5000 psi. All seizing wire markings must be removed from each cable and disposed of by Contractor.
7. All links and studs on each cable must be hammer tested and visually inspected for defects. Any defective links and studs must be marked for identification and brought to the attention of the CGTA. Contractor must provide a cost of repairs to a total of 10 stud links for the anchor cables. This cost must form part of the overall bid price. Contractor must provide a cost per stud link for adjustment purposes through PWGSC 1379 action.
8. Anchor shackle pins must be removed for inspection. Swivels must be cleaned, inspected for ease of operation, and lubricated. Upon assembly, new taper pins must be fitted.
9. Contractor must clean the Bitter end connection point and arrangement and TCMSS inspection must follow.
10. The first shot on each chain, port and stbd, must be removed, rejoined to the bitter end of the remaining cable. Upon completion of all work, each chain must be attached at their respective bitter ends in the chain locker. The bitter end pins must be locked as per original. The anchors must be reconnected to the chain. All associated shackles must be reconnected and secured.
11. Contractor must sand blast both anchors to bare metal and each anchor must be given 2 coats of Devoe BAR RUST 235. Each coat must be of contrasting color with the second coat being gloss black. Contractor must allow sufficient time between application of coats to permit total curing of the paint as per manufacture's instructions.
12. Both chains must be sand swept, chain flipped and a second sand swept blast prior to painting. Contractor must apply 2 coats of Linseed oil. The first coat must be thoroughly dried prior to the second application.
13. Upon completion of inspection, the joining shackles must be assembled and the split pins sealed in place with lead. Cable shots must be marked as per accepted marine practice using new seizing wire. The shot lengths must be marked off with white paint and joining shackles must be painted with red marine enamel as per standard marine practice.
14. Contractor must open both access manholes and lift false bottoms of each chain locker. All sand, mud and other loose materials must be removed from the chain lockers and disposed of ashore by Contractor.
15. All internal surfaces of each chain locker must be hydro blasted and mechanically cleaned to remove all rust, scale, and debris. The false floor plates must be unfastened and taken up for thorough cleaning and subsequent painting on both sides. Bilge wells must be thoroughly cleaned and suctions proven clear. The proper operation of the bilge alarm must be proven and the test must be witnessed by the CGTA. All scale, dirt, debris, liquid from cleaning must be disposed of ashore.

H-12 ANCHORS, CHAINS AND CHAIN LOCKERS (CONTINUED)

16. Securing pins and holes in clenching arrangements for chain bitter ends must be dressed/reamed to provide a smooth, non-binding fit.
17. Chain lockers must be inspected by TCMSS Surveyor and CGTA prior to painting.
18. Total tank area is approximately 120 square meters for both chain lockers, including the top and bottom surfaces of the false bottoms, which accounts for approximately 3 square meters of area per side.
19. Contractor must scale and mechanically clean to SSPC-SP3 standard areas of missing, disturbed or failing paint as identified by CGTA. All interior areas must be wiped clean. All scale, dirt, debris, liquid from cleaning must be disposed ashore by Contractor. CGTA must perform an additional inspection of affected areas prior to application of repair coatings. Contractor must ensure that the bilge level sensors are isolated and protected while cleaning and coating is being applied. Contractor must function test the sensors prior to any work commencing and after work is completed to prove their function as per the original tests.
20. Both chain lockers, both sets of false bottoms and bilge piping must be coated with 2 full coats of Devoe BAR RUST 235. Each coat must be of contrasting colour with the second coat being light grey. For bidding purposes, Contractor must provide a cost for re-coating a total of 30 square meters of interior surface area for both chain lockers and provide a unit cost per square meter for preparation and coating for adjustment purposes through PWGSC 1379 action.

Sounding pipes, drains, and vents must be checked for obstruction and proven clear. Both chain lockers must be inspected by the CGTA and TCMSS upon completion of all cleaning and prior to coating application. This inspection must be carried out while the false bottoms plates are removed.
21. Upon completion of all work to the chain lockers, all false bottoms must be installed and fastened in place. All work must be inspected by CGTA and TCMSS prior to re-shipping the anchor chains.
22. Both anchors must be reconnected to its respective cable and both sets of anchors and chains must be stowed on board, while ensuring the proper fleeting of each chain within the locker. Contractor must supply the necessary manpower and equipment to carry out the stowage of the anchors and chains. Both manhole covers must be reinstalled using new CFM neoprene gaskets. Contractor must supply and put Anti-Seize compound on all fasteners. Any defective studs must be renewed as per H-11.
23. Ship's crew, if available, can assist with removal and re-shipping of anchors and chains by supplying an operator for vessel's anchor windlass. Proper stowage of the chain in the chain lockers will remain the responsibility of Contractor. Contractor must secured chains and anchors when completion of above work.
24. All work to be completed to the satisfaction of the CGTA and TCMSS Surveyor.

H-12 ANCHORS, CHAINS AND CHAIN LOCKERS (CONTINUED)

2.2 LOCATION

1. Work area is primarily the Focsls area. The anchor pockets are located in the forward void space.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. The following drawings shall be made available to Contractor. The original drawings must be returned to CGTA after copies have been made.
 - a. Anchoring Handling and Pocket arrangement Drawing # 218-431/020

3.2 STANDARDS AND REGULATIONS

1. The following Coast Guard Standards and/or Technical Bulletins shall be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - a. CCG Welding Specification EKME#3049715v3A CT-043-eq-eg-001-E
 - b. Materials Welding and Weld Inspection For Ship Construction and Repair EKME#3113928
 - c. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
 - d. Coast Guard ISM Lock Out/Tag Out Procedures
 - e. Coast Guard ISM Confined Space Entry Procedures
 - f. Coast Guard Hot Work Procedures & Gas freeing
 - g. CSA 17, Canada Shipping Act – Tackle Regulations
 - h. CSA 57, Canada Shipping Act – Safe Working Practices Regulations
 - i. MOSHR, Canada Labour Code – Marine Occupational Safety and Health Regulations

In case of conflict between any of the standards, the most stringent requirements will prevail.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

H-12 ANCHORS, CHAINS AND CHAIN LOCKERS (CONTINUED)

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates.
2. All links and studs on each chain must be visually inspected for defects.
3. Both anchor chains must be arranged in a suitable area for cleaning, coating, and subsequent inspection.
4. Anchor shackle pins must be removed for inspection. Swivels must be cleaned, inspected for ease of operation, and lubricated.
5. Both chain lockers must be inspected by the CGTA upon completion of all cleaning and prior to coating application. This inspection must be carried out while the false floor plates are removed.

4.2 TESTING

1. Each chain locker must be tested for oxygen content and proven safe for personnel to enter.
2. Spaces must be tested each day that personnel are required entry in the tanks.
3. All links and studs on each cable must be hammer tested.
4. The proper operation of the bilge alarm and pump shall be proven and the test shall be witnessed by the CGTA and TCMSS Surveyor.
5. Contractor must function test the sensors prior to any work commencing and after work is completed to prove their function as per the original tests.

4.3 CERTIFICATION

1. Certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates.
2. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the tank.
3. A copy of each certificate must be posted in a conspicuous location in close proximity to the manhole cover for each space.

H-12 ANCHORS, CHAINS AND CHAIN LOCKERS (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Copies of all hand-written measurements must be given to the CGTA immediately.
2. Contractor must provide the CGTA with a final report, two typewritten copies and one electronic copy, in PDF format. At a minimum the report shall include all readings taken, drawings, certificates, results/recommendations, etc. identified in this specification item. Report must be provided within 48 hours of completion of this specification item.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

H-13 POTABLE WATER TANKS - STARBOARD

PART 1: SCOPE:

The intent of this specification item is for Contractor to open up the starboard fresh water tank for cleaning, coating repair and inspection by TCMSS Surveyor.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The following tank must be opened for cleaning and inspection:

TANK	FRAME	CAPACITY
Starboard Fresh Water	27-32	44.4 m ³

2. The manhole cover must be removed from tank by Contractor. Contractor must provide the tank with a mechanical ventilation/extraction system, vented to the outside of the ship. Good ventilation must be provided and any blowers/extractors must ensure good air movement and solvent vapour removal from the lowest point in the tanks. Vapours, dust, dirt, etc. must not be allowed to enter the ship and must be directed by flexible ducting to the outside of the vessel.
3. Contractor must supply and maintain good ventilation during all stages of this work in compliance with the coating manufacturer's requirements.
4. Tank must be certified safe for personnel to enter prior to any work being carried out internally. Contractor must arrange for a certified Marine Chemist to visit the ship, test the tank, and certify that the tank is safe for personnel to enter. Copies of certificate must be given to the CGTA and posted outside the manhole cover in a conspicuous location, the access gangway, and one copy to be provided to CGTA. Tank must be tested daily for safe entry.
5. Contractor to note this tank is fitted with PSM tank level sensor, Contractor must remove the transducer when carrying out this work. Contractor to install a new GSM transducer and test the unit to ensure proper functioning after completion of work.
6. Installation shall include the supply and install of a new bracket to hold the new GSM electronic module.
7. All contractor personnel must be outfitted with appropriate CFM disposable work clothing and protective safety boot covers to be worn at all times within these tanks. The admission of contaminants to the tank internals must be minimized in this fashion due to worker activity within this sensitive tank.

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H-13 POTABLE WATER TANKS – STARBOARD (CONTINUED)

8. Contractor must remove any water remaining in tank following discharge of the contents. The amount is estimated to be approximately 2 cubic meters. Contractor must quote a cost per 100 liters of waste fluid removal for adjustment purposes through PWGSC 1379 action.
9. Tank must be completely drained and all internal surfaces are to be washed down. All dirt and debris must be removed and disposed of ashore. Contractor must ventilate tank until dry.
10. Contractor to provide a cost for re-coat 15 m² of tank surface. Contractor must provide a unit price per square meter to re-coat tank surfaces for adjustment purposes through PWGSC 1379 action. All surface cleaners and coatings are CFM.
11. Tank must be inspected by CGTA, Contractor and TCMSS after cleaning, prior to any further work to determine the actual extent of damage coating, if coating doesn't require repairs then a credit for the work will be sought through PWGSC 1379 action .
12. Tank must be inspected by CGTA and TCMSS prior to and after any coating application. Contractor must ensure that all sounding and suction pipes are free and clear as well as all limber holes in the floors, stringers and webs so as to allow for proper drainage.
13. Contractor must take precautions to ensure that no damage, unnecessary cleaning, or repairs shall accrue from hydro blasting (3000 psi) and/or the application of coatings. Contractor must ensure that every opening in the tank where paint chips and debris from hydro-blasting can gain entry is suitably covered. Measures must be taken to ensure that surfaces and equipment other than those specified are not coated and that any inlets or discharges will not be blocked by the coating or grit.
14. All areas of coating loss, breakdown, or blistering, as identified by CGTA and Contractor must be scaled and mechanically cleaned to SSPC-SP3 standard. All areas, so prepared are to extend out to sound, intact coating, tightly adhered to steelwork. Intact coating around perimeter edges of prepared areas must be generously feathered. The tank is then to be thoroughly cleaned and wiped down to remove any and all grit, dirt, debris, and any other solid or liquid contamination that may be present, prior to coating application. CGTA to perform an additional inspection of affected tanks prior to application of repair coatings. Contractor is responsible for disposing of all removed paintwork ashore, scale, dirt, etc. in an environmentally safe manner as per local, provincial / federal requirements.
15. Contractor must apply Royal Coatings "Easy Prep" by airless sprayer to all internal surfaces of the tanks and let stand 20 to 30 minutes. Apply 2000 -3000 psi water blasting to all internal surfaces then remove wash down liquid and debris and ventilate tanks until dry.
16. Upon completion of blasting, all residue and debris must be cleaned up and removed from the tank. Contractor to ensure that all sounding and suction pipes are free and clear as well as all limber holes in the floors, stringers and webs so as to allow for proper drainage. Upon completion of all cleaning, CGTA must thoroughly inspect the tank internals. Tank to be inspected by CGTA after cleaning, prior to and after any coating application.

H-13 POTABLE WATER TANKS – STARBOARD (CONTINUED)

17. Suggested supplier of Royal Coatings - EasyPrep, EasyPrime and EasyFlex is:

Barry Schnare, Manager
21 Frazee Avenue, Burnside Industrial Park
Dartmouth, NS B3B 1Z4
[d] (902) 480-3011 [c] (902) 456-9238
[p] (902) 468-1955 [f] (902) 468-6756
[fd] (800) 567-1955
barry.schnare@kdpratt.com
www.kdpratt.com

18. Before application, the coatings (EasyPrime and EasyFlex) must be above 22°C prior to mixing.
19. Contractor must note that the application conditions must provide a substrate temperature greater than 3°C and rising while air temperature must be greater than 4°C. Relative humidity must be lower than 90% during application. Contractor is responsible to supply and maintain heating/dehumidifying equipment required to ensure proper environment.
20. All disturbed areas must be coated with one coat to 3-4mils of Royal's Easy Prime to all prepared steel. Any sharp edges within the prepared areas must be stripe coated with Easy Flex. Apply one top coat of Easy Flex to all primed areas to a wet film thickness of 12-14mils. Runs and sags in the applied coating should be left alone. Allow the coating to cure for 48hours @ 20°C or above. At lower temperatures let cure for 72hours.
21. When coating is thoroughly cured, tank to be inspected by CGTA and local accredited health inspector. Coating adhesion and condition must be acceptable to the CGTA and local accredited health inspector. Contractor must obtain verbal approval from CGTA prior to closing the tank.
22. All recorded information must be provide in two (2) typewritten copies and one (1) electronic copy in PDF format given to CGTA upon completion of this specification item.
23. Upon completion of the specified work and to the satisfaction of the CGTA and accredited health inspection representative, tank must be wiped clean. Sounding pipes, suction pipes and vents must be proven clear prior to filling the tank with water. All debris must be removed ashore and tank closed up in good order. The Chief Officer must examine the tank prior to final closing. Manhole cover must be reinstalled using new CFM ¼ inch neoprene gasket, cut from sheet to match shape of manhole with center removed. CFM Anti-seize compound (marine grade) must be applied to the manhole cover fasteners. No use of power tools permitted to tighten the fasteners.
24. Upon completion of all work the tank must be filled with fresh water. Vent must be removed and the tank must be filled to overflowing for a hydrostatic test on the tank to the satisfaction of the CGTA. Vent must be installed with new CFM gaskets upon successful completion of all work.

H-13 POTABLE WATER TANKS – STARBOARD (CONTINUED)

25. Tank to be filled with fresh water and the calculated amount of Sodium hypochlorite 5% solution to attain 50mg/L of free chlorine for the purpose of super-chlorination of the tank. Contractor must supply enough 5%~sodium hypochlorite solution to provide a mixing ratio of 1 litre solution / 1 m³ water within the tank. Tank must rest in this condition for a period of 24 hours. The solution must be circulated by Contractor, if ship's personnel are not available, under the direction of the CGTA.
26. The super-chlorinated water must then be run through various potable water piping systems on board the vessel for at least one hour. Testing must be carried out to ensure that the super-chlorinated solution is flowing through each tap. Contractor must test various locations, as identified by CGTA, to prove this.
27. Upon completion of the super-chlorination process, the tank solutions must be neutralised in each tank using 35% hydrogen peroxide, CFM. The contents of the tank water must be tested to ensure that the chlorine has been neutralised. Once this has been achieved Contractor must dispose of the water in accordance with the Municipal /Provincial /Federal Regulations. Contractor must submit a report to the Chief Officer showing the results of the various tests during the super-chlorinated /de-chlorination process.
28. The tank must receive one complete fill and flush operation with fresh water. All water used in the flushing process must be disposed of by Contractor as per previous item 27.
29. Upon completion of all testing, Contractor must fill the tank with potable water. Contractor must dose and test the tank contents until a free chlorine maintenance level of 0.2-0.5 mg/l of free chlorine has been attained.
30. Tank must be refilled and samples taken after water had rested in the tank for a period of 24 hours. Contractor must include in their bid the cost to retain the services of an accredited Potable water sampling company. Contractor must provide CGTA the contact information of the accredited Potable water sampling company, prior to testing.

Samples must be collected in approved containers by a representative of the accredited company and then tested at their laboratory facility. The water must be certified acceptable as a potable source. CGTA is to receive a report and final analysis of the potable water samples for posting on board the vessel.

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H-13 POTABLE WATER TANKS – STARBOARD (CONTINUED)

31. The following twenty-eight (28) parameters to be tested for contamination:

HEALTH-BASED OBJECTIVES	AESTHETIC OBJECTIVES
• Antimony 0.006 mg/L	• Chloride 250 mg/L
• Barium 1.0 mg/L	• Colour 15 TCU
• Benzene 0.005 mg/L	• Copper 1.0 mg/L
• Boron 5.0 mg/L	• Iron 0.3 mg/L
• Cadmium 0.005 mg/L	• Manganese 0.05 mg/L
• Chromium 0.05 mg/L	• pH 6.5 – 8.5 pH Units
• E. Coli 0 per 100ml	• Sodium 200 mg/L
• Ethylbenzene 0.14mg/L	• Sulphates 500 mg/L
• Fluoride 1.5 mg/L	• Toluene 0.024mg/L
• Lead 0.01 mg/L	• Total Dissolved Solids 500 mg/L
• Mercury 0.001 mg/L	• Zinc 5 mg/L
• Nitrate/Nitrite 45 mg/L	
• Selenium 0.05 mg/L	
• Total Coliform 0 per 100ml	
• Turbidity 1 NTU	
• Uranium 0.02 mg/L	
• Xylenes 0.09 mg/L	

Acceptable maximum values from the current Guidelines for Canadian Drinking Water Quality are shown to the right of each test parameter.

32. Contractor must arrange and co-ordinate the visits required for the Provincial health inspector or accredited testing authority.

33. Upon acceptance of the potable water sampling report, all equipment must be removed from the ship that was involved with the execution / completion of this specification item.

34. All work must be completed to the satisfaction of CGTA.

2.2 LOCATION

TANK	FRAME
Stbd Fresh Water	27-32

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

H-13 POTABLE WATER TANKS – STARBOARD (CONTINUED)

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Capacity Plan Drawing No. H218-131-011

3.2 STANDARDS AND REGULATIONS

1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
 - c. Coast Guard ISM Confined Space Entry Procedures
2. The bare areas must be buffed to SSPC-SP-3 standards.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. CGTA and local accredited Health Inspection Representative must thoroughly inspect the internals of each fresh water tank.

4.2 TESTING

1. Certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry certificates.

4.3 CERTIFICATION

1. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry certificates.
2. Contractor must hire a third party inspector, certified by an authoritative body such as the National Association of Corrosion Engineers (NACE) to oversee the application of the coating to the inside of any potable water tank.

H-13 POTABLE WATER TANKS – STARBOARD (CONTINUED)

3. Contractor must have the water in the tank tested at an accredited Potable water testing facility that certifies that the water in the tanks is “fit to drink”.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. All recorded information requested in the specification must be provided in a final report, two (2) type written copies and one (1) electronic copy in PDF format given to the CGTA upon completion of work.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-01 BERTHING AND MOORING

PART 1: SCOPE:

The intent of this specification item is for Contractor to provide berthing services. During the contract period at Contractor's facilities, while not in dock, the vessel must be berthed at Contractor's wharf at a safe and secure berth with adequate water at extreme low tide to ensure that the vessel will not touch bottom.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The vessel will be delivered to Contractor's facility under its own power.
2. Contractor is to include in their overall bid, all costs for initial tying up, any movement of the vessel during refit, and letting go of lines from Contractor's wharf on departure after completion of contract. Contractor is responsible for supplying all necessary lines for securing the vessel at their facility.
3. Maneuvering of the vessel into and out of Contractor's docking facilities is the responsibility of Contractor. Costs for tugs and pilots required for any movements of the vessel during the contract period must be included in the bid price, shown as a separate cost.
4. One gangway must be supplied and set up by Contractor while alongside Contractor's jetty. This gangway must be set up and rigged from the wharf onto the buoy deck, complete with safety net. Gangway must be safe, well lighted and structurally sufficient to support passage of Contractor's workmen and ship's crew. The supplied gangway must be in accordance with the provisions stipulated in the Tackle Regulations (s.8) as well as the Safe Working Practices Regulation (s.54-60) made pursuant to the **Canada Shipping Act** and the Marine Occupational Safety and Health Regulations, part 2 on Temporary Structures (s. 2.8-2.11) made pursuant to the **Canada Labour Code**, Part II

5. VESSEL PARTICULARS

Length Overall.....	68.682 m	Design Draft.....	5.2 m
Breadth Overall.....	14.37 m	Displacement.....	2881 Tonnes
Depth	6.7 m	Keel Blocking Length: Fr. 6 - Fr. 43	47.7 m
Average Block Loading - 2700/47.7 = 56.6 tonnes per meter			

2.2 LOCATION

N/A – INTENTIONALLY LEFT BLANK

2.3 INTERFERENCES

N/A – INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-01 BERTHING AND MOORING (CONTINUED)

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

N/A – INTENTIONALLY LEFT BLANK

3.3 OWNER FURNISHED EQUIPMENT

N/A – INTENTIONALLY LEFT BLANK

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

N/A – INTENTIONALLY LEFT BLANK

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-02 DRY DOCKING

PART 1: SCOPE:

The intent of this specification item is for Contractor to dock and undock the vessel and allow sufficient time to complete the specified work.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must quote on docking and undocking the ship, allowing sufficient service days to carry out the specified work, with a reasonable time allowance for arising new work.
2. Contractor must prepare blocks and necessary shoring to maintain true alignment of the vessel's hull and machinery throughout the dry-docking period. Immediately after the vessel is out of the water, either in a graving dock or on a floating dock, Contractor must verify that the vessel is properly seated on all blocks. Blocks that are found not to be bearing the vessel's weight must be immediately adjusted so as to bear the vessel's weight. No block is to be placed directly under the stern thruster tunnel. Additional shoring and support must be provided under the following locations:

Shaft Bosses
Rudder skeg under Kort Nozzles
C/L under aft void spaces
Bow - C/L in line with Fr. 46

3. The vessel must be docked so that all docking plugs, transducers, anodes, and sea inlet grids are clear and accessible. A minimum clearance of 4 feet (1.22 m) must be available below the keel. If any hull fittings are covered, Contractor is responsible for all labor and materials required for making any alternate arrangements to drain tanks and/or move blocks to gain access to the areas of specified work. The vessel must be grounded electrically for the duration of the time it is drydocked.
4. Dry docking must be under the direct supervision of a Certified Docking Master. Prior to docking the vessel, Contractor must present to Canadian Coast Guard their plan to effect a safe docking. This will include, but not limited to, an explanation of block loading, dock preparation, tide-wind-tug issues, manpower arrangements and communications. Contractor must provide reasonable notice to CCG prior to undocking the vessel and make similar presentations regarding safe undocking and for the vessel's on dock period. Vessel's crew must be present for docking and undocking.
5. Contractor must supply the services of a diver to confirm that the vessel is sitting evenly on the bilge and keel blocks. (As a minimum, Contractor must comply with the CCG Diving Policy as outlined in the Safety Annex)

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-02 DRY DOCKING (CONTINUED)

6. Contractor must provide a unit daily service day cost on dock. This cost must form part of the overall bid. This cost must include any tug and/or pilotage service cost.
7. Work must begin on the vessel on day one of the refit. The docking must be undertaken in a timely fashion to ensure that the schedule is maintained. Contractor must work additional hours at no cost to the Crown in the event that a late docking, caused by Contractor, results in the delay of time sensitive work. Contractor must not request additional time resulting in the completion date being changed to a later date to make up for this lost time. Contractor must make up the time within the approved schedule. If necessary, Contractor must prepare the dock in advance of the ship's arrival and the official start date of the contract period. If evening shifts or weekend work is required to meet this objective, Contractor must identify this and include all costs in the bid."
8. Ship's personnel is responsible for all line handling on board the vessel only during the docking and undocking operations. Contractor must supply personnel on the dock walls and ashore for all line handling. It is understood that when the vessel is afloat and under care and custody of CCG, ships lines will be used. Otherwise all lines must be CFM.
9. Contractor must endeavour to give the CGTA at least one (1) weeks prior notice of the undocking date to allow for the arrival of the vessels full crew.
10. During undocking Contractor must ensure that sufficient personnel are in attendance throughout the ship's spaces to monitor for leakage from the numerous sea connections, stern tubes, sea chests, etc. and any other areas in communication with the underwater area of the vessel that were opened up during dry docking and to correct any deficiencies that may arise.
11. Contractor must quote a unit cost on the removal of keel blocks as well as a unit cost on the insertion of keel blocks. This quote must be priced separately and included in the overall bid.
12. Prior to docking, all ship's tanks must be sounded and the quantities observed are to be recorded on a "Ship Condition Report". The document must be signed by the CGTA and Contractor's Docking Master.
13. During the period on (in) the dock, any and all changes to tank conditions due to transfers, draining, testing etc. must be recorded and the Ship Condition Report amended accordingly, on a daily basis, or as required, with copies of this information being held by Contractor and CGTA. Contractor must not fill or empty any tanks without first obtaining the permission of the CGTA. Similarly, it is incumbent on the CGTA to ensure that no tank transfers are undertaken by ship's crew without the contractor having been duly advised. Contractor must provide a minimum of four (4) hours advance notice before adding or removing liquids from any of the ship's tanks.

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HD-02 DRY DOCKING (CONTINUED)

14. At undocking, all tanks must be refilled to their original levels so as to obtain the same draughts and trim as at docking, and the condition must be agreed to by both the Contractor and the CGTA. Contractor is ultimately responsible for re-floating the ship and any consequences thereof and therefor confirming and approving the ship's tank conditions prior to commencement of re-floating.
15. Any contamination of the vessel's hull by materials in Contractor's docking facility must be removed at Contractor's expense after the vessel is re-floated.
16. A copy of the Earl Grey's stability book will be made available to Contractor. All established stability requirements must be satisfied, and Contractor is responsible for all costs related to safely docking and undocking the vessel.

2.2 LOCATION

N/A – INTENTIONALLY LEFT BLANK

2.3 INTERFERENCES

N/A – INTENTIONALLY LEFT BLANK

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Vessel docking plan 218-293/000 is located on board the vessel and will be made available to Contractor.

3.2 STANDARDS AND REGULATIONS

N/A – INTENTIONALLY LEFT BLANK

3.3 OWNER FURNISHED EQUIPMENT

N/A – INTENTIONALLY LEFT BLANK

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

N/A – INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-02 DRY DOCKING (CONTINUED)

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

HD-03 UNDERWATER HULL INSPECTION/BUTTS AND SEAMS

PART 1: SCOPE:

The intent of this specification item is for Contractor to repair welded joints in hull plating as identified in a hull survey by TCMS and CGTA.

PART 2: TECHNICAL DESCRIPTION:

2.2 GENERAL

1. The TCMSS Surveyor must carry out a hull inspection and determine those areas that require weld renewal. Joints selected for repair will be marked and must be cleaned to sound metal by air arc gouging and / or grinding. Joint welds are then to be built up to the original level by TCMSS approved welding techniques with approved materials. Electrodes for repair build-up of corroded welds in the shells of icebreaking ships must be as follows: Grade D, E and EH Steels E8016 or E8018 electrodes (ESAB 73:08) are suitable for Shielded Metal Arc Welding (SMAW). Contractor to ensure that last pass or "hard cap" over any welded seam is done using 7018 RCR welding rods. All work must be to the approval of TCMSS and the CGTA.
2. For bidding purposes, Contractor must include in their overall bid price the cost of 400 feet of air arc gouging and 1200 feet of bead weld. Contractor must include cost per foot for each of air arc gouging and bead welding for adjusting purposes.
3. Butts and seams falling in way of any fuel tanks will require the fuel tank to be pumped down by the vessel's crew. Contractor must gas free and certified safe for hot work after they remove and dispose of any remaining fuel in accordance with all Federal, Provincial and Municipal regulations. Disposal certificates must be provided to the CGTA.
4. Butts and seams falling in way of ballast/void tanks with coated internals will require interior paint work to be touched up in way of heat damaged. The foregoing gas freeing and paint work will be handled through PWGSC 1379 action.
5. Contractor must supply all scaffolding, materials, equipment, and personnel to arc gouge and re-weld the existing deteriorating welds as identified by the TCMSS Surveyor on both sides of the vessel. Contractor to quote on the services of a person lift and operator for 8 hours for survey and inspection purposes. Contractor to quote hourly rate for this work.
6. Upon completion of all work, NDT (UT or Mag particle or equivalent) must be carried out by a qualified technician in areas chosen by the attending TCMSS Surveyor. Contractor must schedule the attendance of a certified NDT Technician along with the TCMSS Surveyor. TCMSS Surveyor will direct the NDT technician as to areas that require inspections.

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HD-03 UNDERWATER HULL INSPECTION/BUTTS AND SEAMS (CONTINUED)

7. In addition to the above work, Contractor must provide a cost on the following in their bid;
 - Unit cost per additional foot of arc gouging.
 - Unit cost per additional foot of welding.
 - Unit cost per additional NDT (UT or Mag particle or equivalent)
 - Unit cost for gas free certified
8. This work must be carried out in conjunction with Specification Item HD-14 Hull Cleaning and Painting. The cost must form part of the overall bid price. The actual work performed will be adjusted up or down through PWGSC 1379 actions.

2.2 LOCATION

1. All work must be conducted on the vessel's outer hull; if any hot work is required, tank access will be required to access the interior surfaces of the hull plating.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by CGTA, storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Shell Expansion drawing (218-131-205)

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.

- a) Canadian Coast Fleet Safety Manual (DFO 5737)
- b) Coast Guard ISM Lock Out/Tag Out Procedures

2. All hot work must be done in accordance with CCG Welding Specification CT-043-EQ-EG-001

HD-03 UNDERWATER HULL INSPECTION/BUTTS AND SEAMS (CONTINUED)

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise indicated, Contractor must provide all materials, labour, and equipment required to complete this specification item.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All work to be carried out to the approval of the CGTA and TCMSS.

4.2 TESTING

1. Contractor must include a cost for NDT on the new welds; these tests will be directed by the attending TCMSS Surveyor. Contractor must provide a unit cost for each additional NDT test and the cost must include travel expenses for the NDT testing company.

4.3 CERTIFICATION

1. Contractor is responsible for arranging TCMSS for all required inspections in order to obtain a credit toward the vessels Division 3 survey item 3LL040.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must provide the CGTA with a final report, two typewritten copies and one electronic copy, in PDF format. At a minimum the report must include all readings taken, NDT readings, drawings, certificates, results/recommendations, etc. identified in this specification item.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

HD-04 INTENTIONALLY LEFT BLANK

INTENTIONALLY LEFT BLANK

HD-05 INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-06 ANFOMATIC ANTI-FOULING SYSTEM ANODES

PART 1: SCOPE:

The intent of this specification item is for Contractor to renew twenty marine growth (MG) and corrosion control (TG) anodes in the ships sea water cooling system.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Prior to any anodes being removed, they will be inspected by CGTA and Jastram FSR and renewed as deemed necessary by CGTA:

Port Sea Chest (Fr. 25 – 27)	2-MG Anodes 2-TC Anodes
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Stbd Sea Chest (Fr. 25 – 27)	2-MG Anodes 2-TC Anodes
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Port Fire Monitor Sea Chest (Fr. 16 – 18)	1-MG Anode 1-TC Anode
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Bow Thruster Sea Chest (Fr. 39 – 41)	1-MG Anode 1-TC Anode
---	--------------------------

Stbd Fire Monitor Sea Chest (Fr. 16 – 18)	1-MG Anode 1-TC Anode
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Port Sea Bay	3-TC Anodes
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Stbd Sea Bay	3-TC Anodes
--------------	-------------

MG-Marine Growth Control-Copper-Red Safety Cap
TC-Corrosion Control-Aluminum-White Safety Cap

2. Existing anodes must be electrically disconnected at safety cap, securing nuts released, and spent anode lowered from mounting flange in respective compartments. Old anodes must be returned to CGTA.
3. The sea bays and sea chests must be opened up and gas freed.
4. Contractor must include an allowance of \$10,000.00 to cover the travel and living expenses of the Jastram FSR. The FSR will be reimbursed for the authorized travel and living expenses reasonably and properly incurred in the performance of the work, at cost without any allowance for the overhead or profit. The Allowance must form part of the overall bid and will be adjusted by PWGSC 1379 action upon proof of final invoice.

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HD-06 ANFOMATIC ANTI-FOULING SYSTEM ANODES (CONTINUED)

5. The Seachests and Seabay must be opened out and certified gas free and safe for personnel to enter. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the space and a copy of each certificate must be posted in a conspicuous location in close proximity to the access for each space. Spaces must be tested each day that personnel are required entry in the space. Please note that as a minimum, Contractor must follow the procedure outlined in DFO/5737 Fleet Safety Manual, 7.B.3 - ENTRY INTO CONFINED SPACES which deals with Entry into Enclosed Spaces as well as the Coast Guard Hot work Guidelines DFO/5737 Fleet Safety Manual, 7.B.4 - HOT WORK.
6. Contractor must provide each space with a mechanical ventilation/extraction system, vented to the outside of the ship. Good ventilation must be provided and any blowers / extractors used must ensure good air movement and solvent vapour removal from the lowest point in the space. Vapours as well as airborne dust and debris must not be allowed to enter the vessel.
7. All of the above noted spaces must be opened up for access. The sea bays and sea chests are to be drained of any remaining water. A docking plug is available for removal in the main sea bay to assist drainage.
8. Upon completion of all work, the sea bays and sea chests must be closed up in good order. New neoprene gaskets must be used on all manhole door joints.
9. Fitted anodes in affected compartments are to be suitably protected against physical damage.
10. Stainless securing bolts on fire monitor sea bay removable grids are to be secured using stainless steel locking bars welded across them.
11. Docking plugs for the sea bay shall be securely re-installed.
12. Contractor must coordinate this work with the Underwater Hull Coating specification item.
13. New anodes (Coast Guard Supply) of the correct type for each location are to be installed in way of removed units with new neoprene gaskets used. Once anodes are in place, they shall be tightened with securing nuts as required. Care is to be exercised to ensure units are not over tightened. The electrical connection at the top of the anode is to be megger tested to ensure the anode is isolated electrically from the ships hull. The conductor is to then to be reconnected to the anode as required and made secure from the possibility of short circuits and/or grounds. The safety cap is to be filled with a non-hardening dielectric compound before installation, it is then to be restored and secured in place using a new gasket.

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HD-06 ANFOMATIC ANTI-FOULING SYSTEM ANODES (CONTINUED)

14. This work is to be overseen by Jastram field service representative. Contractor is to include \$5,000.00 in bid cost for cost of Jastram representative and this will be adjusted as required by 1379 action.

Jastram FSR:

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Cell: (902) 219-3697
Fax: (902) 468-6901
Other Tel: (888) 346-3855

15. Contractor will be responsible for all handling and transportation of anodes once units are delivered to the yard. This will include unloading of delivery transport.
16. System information will be available on board the vessel. Copies of the calibration and test results are to be given to the Chief Engineer.
17. All work is to be done to satisfaction of the Chief Engineer.

2.2 LOCATION

Port Sea Chest	(Fr. 25 – 27)
Starboard Sea Chest	(Fr. 25 – 27)
Port Fire Monitor Sea Chest	(Fr. 16 – 18)
Bow Thruster Sea Chest	(Fr. 39 – 41)
Starboard Fire Monitor Sea Chest	(Fr. 16 – 18)
Port Sea Bay	(Fr. 25 – 27)
Starboard Sea Bay	(Fr. 25 – 27)

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by the CGTA and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

HD-06 ANFOMATIC ANTI-FOULING SYSTEM ANODES (CONTINUED)

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - a) CCG Welding Specification EKME#3049715v3A CT-043-eq-eg-001-E
 - b) Materials Welding and Weld Inspection For Ship Construction and Repair EKME#3113928
 - c) Canadian Coast Fleet Safety Manual (DFO 5737)
 - d) Coast Guard ISM Lock Out/Tag Out Procedures
 - e) Coast Guard ISM Confined Space Entry Procedures
 - f) Coast Guard Hot work Procedures & Gas freeing
 - g) CSA W47.1-03, Certification of Companies for Fusion Welding of Steel
 - h) CSA W59-03, Welded Steel Construction (Metal Arc Welding)
 - i) CSA 28, Canada Shipping Act - Hull Construction Regulations
 - j) CSA 29, Canada Shipping Act - Hull Inspection Regulations
 - k) CSA 57, Canada Shipping Act – Safe Working Practices Regulations
 - l) MOSHR, Canada Labour Code – Marine Occupational Safety and Health Regulations

In case of conflict between any of the standards, then the most stringent requirements will prevail.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to complete all tasks in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

N/A – INTENTIONALLY LEFT BLANK

4.2 TESTING

1. Demonstrate operation to satisfaction of Transport Canada Surveyor, FSR and the CGTA

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

HD-06 ANFOMATIC ANTI-FOULING SYSTEM ANODES (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

- 1.
- 2.
3. FSR Installation and Test reports
4. Contractor must provide a copy of all test certificates (hot work, entry confined spaces etc.), to CGTA.
5. Safety Management System forms and checklists must be provided to CGTA.
6. FSR reports

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-07 CATHELCO SYSTEM ANODES

PART 1: SCOPE:

The intent of this specification item is for Contractor to repair the four "Cathelco" system impressed current anodes on the ships hull to preserve their dielectric separation from the ships hull. The extent of the repairs will be determined after the vessel is dry-docked and a thorough examination is conducted on the four anodes by the CGTA and Contractor.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Any work associated with the "Cathelco" system anodes will be carried out under the general direction of a Jastram field service representative. An allowance to cover the expenses for the FSR for this specification item is shared with specification item HD-12 Anfomatic Anti-Fouling System Anodes.
2. Any holes in the dielectric shield between the anode bodies and the ships hull shall be cleaned of any growth and encrustation and be thoroughly dried. The edges of the holes shall be roughened in preparation of the filler coat. The holes shall be filled with International Paints "Red Hand" compound. The contractor is responsible for the supply of this compound and if an alternative product is used, Contractor is to supply data sheets to prove that it is equivalent. Contractor is to quote on repairing an area of 80 square feet. The contractor is to provide a unit cost per square foot including preparation and all materials for adjustment purposes.
3. Upon completion and drying of the compound repairs, in the area of the hull adjacent to the hull coating care should be taken to ensure that the hull coating overlaps the outer edges of the anode dielectric shields to preclude an electrical short circuit from the anodes to the hull. At the same time, however, the hull coating is not allowed to contact the anode face.
4. Work is to be carried out to the satisfaction of the CGTA.
5. Jastram Representative:

Charles Brown
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B3B 1R6

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Cell: (902) 219-3697
Fax: (902) 468-6901
Other Tel: (888) 346-3855

6. This work item to be performed in conjunction HD-12 Anfomatic Anti-Fouling System Anodes.

2.2 LOCATION

N/A – INTENTIONALLY LEFT BLANK

HD-07 CATHELCO SYSTEM ANODES (CONTINUED)

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by the CGTA and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CGTA.
 - CANADIAN COAST FLEET SAFETY MANUAL (DFO 5737)
 - COAST GUARD ISM LOCK OUT/TAG OUT PROCEDURES

3.3 OWNER FURNISHED EQUIPMENT

1. Contractor must supply all materials, equipment and parts required to perform the specified work unless otherwise stated

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

N/A – INTENTIONALLY LEFT BLANK

4.2 TESTING

1. Demonstrate operation to satisfaction of Transport Canada Surveyor, FSR and the CGTA

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

HD-07 CATHELCO SYSTEM ANODES (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply two typewritten reports and one electronic copy in PDF format upon completion of all work from the FSR. The report must at a minimum list all work undertaken, repairs, parts used, results, measurements, readings, recommendations, etc. Copies of the report must be provided to the CGTA within 24 hours of the completed work.
2. Safety Management System forms and checklists.
3. Inspected and certified for TCMSS and Survey credit obtained.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

HD-08 UNDERWATER HULL COATINGS

PART 1: SCOPE:

The intent of this specification item is for Contractor to repair and/or replace the existing low friction coating on the hull of the vessel.

PART 2: TECHNICAL DESCRIPTION:

2.3 GENERAL

1. The existing low friction coating must be repaired and/or renewed utilizing Contractor Supplied Coatings as specified below.
2. Contractor must prepare the underwater hull and apply the coating system in strict accordance with the manufacturer's instructions. In conjunction with any other functional quality assurance procedure as may be specified by the manufacturer, the following points must be carried out:
 1. Provide a list of batch numbers with correspondent dates of manufacture.
 2. Record the quantity and type of any solvent added.
 3. Measure and record the ambient conditions.
 4. Record details of spray tips and pressures used.
 5. WFT gauge readings to be taken on a regular basis during application.
 6. Using a calibrated DFT gauge, fifteen (15) measurements per 100 square ft. are to be taken and recorded. Upon agreement of consistency with the CGTA, fifteen (15) measurements per 1000 square ft. are then to be taken and recorded over the entire underwater hull area. All recorded information must be typewritten and two hard copies and one electronic copy in PDF format to be given to the CGTA.
3. Once the vessel has been dry-docked, the entire hull from the keel to the freeboard deck aft and a level in line with the boat deck rubbing strake forward, must be hydro-blasted (5000 psi) to remove any accumulated growth salt deposition and loose paint. This must include all underwater appendages such as rudders, kort nozzles, bow thruster tubes, stern thruster etc. The sea inlet grids for the bow thruster, sea chests, sea bays and underwater overboard discharge valves are also to be hydro-blasted as far as practical to remove any accumulated growth.
4. Upon completion of high pressure wash, the hull must be inspected for paint damage by the CGTA and the Contractor. Areas must be inspected for damage, including all plating and appendages from the keel to 30.5 cm. (12") above the load line, the section of bow plating from the stem bar at bottom of the anchor pocket to Frame 44 and the section of plating in way of the buoy deck steel rubbing strakes up to the bottom horizontal rubbing strake (where the buoy work is normally carried out). The "underwater" hull coating system must be extended above the water line in these areas of high abrasion.
5. Any local requirements for protective structures (ie. Shelter around the vessel while sandblast and coating application) will be the responsibility of the Contractor and must be included in the bid price.

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

HD-08 UNDERWATER HULL COATINGS (CONTINUED)

6. Painting must be carried out only after any tank repairs are completed, hull anodes are installed, hull identity markings (excludes vinyl decals) and hull inspections are complete.
7. Intact epoxy hull coating must be sandblasted to a surface profile of 3 mils to allow adhesion of additional coats. In hull areas where only small amounts or sections of existing epoxy coating exist, removal of coating to bare steel must be accomplished. All bare areas of hull steel and areas where existing coating is damaged, loose, blistered, missing or otherwise compromised, must be blasted to near white standard, SSPC-SP-10.
8. Grit used for blasting is not allowed to enter any part of the vessel or its exposed equipment, and where such ingress may occur, the equipment and vessel must be suitably protected.
9. Prior to grit blasting the hull, Contractor must temporarily mark the original location of each hull symbol so that the GSM decals and/or templates where applicable can be applied, upon completion of all work, as per their subsequent original locations.
10. The dielectric shield, a heavier epoxy coating circle of approximately 3m (10') diameter around impressed current cathodic protection anodes (four in number) must be applied, must be smoothed by mechanical means of all drips, peaks, ripples etc. The Epoxy used must be "International", Contractor supplied.
11. Where existing hull coating is intact and well adhered, coating edges around periphery of bare steel areas must be generously feathered.
12. Immediately upon completion of sandblasting, bare areas must be given one (1) coat of "Amercoat 238 Black". Paint application to hull steel affected by "flash" rusting is not acceptable. Coating must be applied to a dry film thickness of 10 mils (single coating) and be free of runs and sags. Contractor shall provide a coating data sheet to the CGTA.
13. Following the proper curing time for the Amercoat 238 Black, the following coatings must be applied, in the order presented below, allowing proper drying time between coats. The entire underwater hull plus the ice band must be treated. Contractor shall provide the relevant data sheets on the coatings to the CGTA

Amercoat 238 Red to a minimum DFT of 10 mils (single coat).
Amercoat 339 C.G. Red to a minimum DFT of 8-10 mils per coat, two (2) coats.
14. All coatings must be applied to the manufacture's specifications and recommendations.
15. Transition line between epoxy coatings and remaining hull paint must be neatly cut in during coating application.

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HD-08 UNDERWATER HULL COATINGS (CONTINUED)

16. All hull plate openings including overboard discharges, suction, grids, etc. must be plugged to prevent the ingress of sand during sandblasting operations. In addition, deck mounted/fitted equipment, including but not limited to those listed below are to be protected during any and all sandblasting operations. Contractor will be responsible for repair/replacement of any damaged items to the satisfaction of the CGTA. Where suitably fitted closure arrangements are not available for use, protection must be made by complete coverage with heavy gauge poly-wrap and/or canvass suitably secured against environmental elements. All applied coverings must be removed upon completion of blasting.
17. Areas of obvious concern include but are not limited to:
 - a) Liebherr crane pedestal bearing, winches and exposed rams.
 - b) After and forward tugger deck winches.
 - c) All fan intakes and discharges.
 - d) All natural ventilation intakes and/or discharges.
 - e) Main Engine crankcase vents.
 - f) All machinery exhaust pipe ends.
 - g) Fwd deck crane.
 - h) Anchor windlass.
 - i) Lifeboat cables and blocks.
 - j) Navigation Equip, (radars' etc.)
18. During sandblasting and painting operations, the "Cathelco" system anodes (4 each) must be protected from damage and paint over spray as are all fitted sacrificial anodes. The CP propellers, stern thruster, bow thruster and all echo transducers are also to be suitably protected during blasting and painting operations.
19. Total hull area to be dealt with is approximately 1675 square meters (18,030 square feet). Contractor to quote on blasting approximately 837 square meters (9,000 square feet) to bare steel and coated as specified previously, the remainder of the hull must be sand-swept. Contractor must provide a unit cost per square meter for sandblasting to bare steel, unit cost for sweep-blasting per square meter and a unit cost per square meter for coating application as previously specified. Actual area dealt with must be agreed upon by the CGTA and Contractor and will be adjusted through PWGSC 1379 action.
20. The existing load lines and draft marks, port and starboard, forward and aft are to be painted upon completion of the hull coating application. These markings are to be painted with two coats of Amercoat 229 Finish White. Application of this paint must be completed within 24 to 48 hours of the primary hull coating initial set up time.
21. Contractor to plug all deck scuppers and discharges, or take whatever means required to prevent water and other liquids from contaminating hull areas being coated or prepared for coating application. Contractor shall be responsible for removing these plugs upon completion of underwater hull work.

HD-08 UNDERWATER HULL COATINGS (CONTINUED)

2.2 LOCATION

N/A – INTENTIONALLY LEFT BLANK

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal with approval from the CGTA and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.
2. Contractor must supply all coatings, paints, equipment, and hardware necessary for the cleaning and painting of the underwater and above water areas of the hull.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. The CGTA and TCMSS Surveyor must inspect the entire hull for defects and deficiencies.
2. National Association of Corrosion Engineers (NACE) Surveyor to oversee the application of the coating and perform inspections.

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HD-08 UNDERWATER HULL COATINGS (CONTINUED)

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Copies of all hand-written measurements must be given to the CGTA immediately.
2. Contractor must provide the CGTA with a final report, two typewritten copies and one electronic copy, in PDF format. At a minimum the report must include all readings taken, drawings, certificates, results/recommendations, etc. identified in this specification item. Report must be provided within 48 hours of completion of this specification item. The report must include the following information also;
 - a) Provide a list of batch numbers with correspondent dates of manufacture.
 - b) Record the quantity and type of any solvent added.
 - c) Measure and record the ambient conditions.
 - d) Record details of spray tips and pressures used.
 - e) WFT gauge readings to be taken on a regular basis during application.
 - f) Using a calibrated DFT gauge, fifteen (15) measurements per 100 square ft. are to be taken and recorded. Upon agreement of consistency with the CGTA, fifteen (15) measurements per 1000 square ft. are then to be taken and recorded over the entire underwater hull area.
 - g) All recorded information must be typewritten and two hard copies and one electronic copy in PDF format to be given to the CGTA.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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HD-09 HULL IDENTITY MARKINGS

PART 1: SCOPE:

The intent of this specification item is for Contractor to prepare and recoat the existing hull identity markings, they presently show wear due to hull interaction during normal vessel operations.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must bid on preparing and recoating 50 square meters of existing hull identity markings because of wear due to hull interaction during normal vessel operations in areas where buoy work is carried out and other areas as determined by the CGTA when the vessel is dry docked.
2. CFM Coating must be applied as per the manufactures recommendations
Suggested coating: Amershield minimum DFT of 4-6 mils per coat, two (2) coats.
3. Contractor must provide a unit cost per square meter for adjustment purposes. The paint must be compatible with the coatings being applied to the underwater hull.
4. The actual amount of coating will be adjusted upward or downward though PWGSC 1379 action.

2.2 LOCATION

1. Locations will be identified by the CGTA.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal with approval from the CGTA and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. The areas requiring remarking must be remarked in accordance with the Canadian Coast guard Fleet Federal Identity Program Guide and will include black or white color stripes, letters and symbols as noted in the guide CCG/6016.

3.2 STANDARDS AND REGULATIONS

N/A – INTENTIONALLY LEFT BLANK

HD-09 HULL IDENTITY MARKINGS (CONTINUED)

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.
2. Contractor must supply all coatings, paints, equipment, and hardware necessary for the cleaning and painting of the hull identity markings.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All work must be carried out to the satisfaction of CGTA.

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

HD-10 INTENTIONALLY LEFT BLANK

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HD-11 UNDERWATER HULL ANODES

PART 1: SCOPE:

The intent of this specification item is for Contractor to supply and replace forty-six (46) 10 kilogram zinc anodes on the hull of the vessel.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. In conjunction with the hull painting, Contractor must inspect and renew **M24 sacrificial zinc anodes** located on the entire hull area (includes rudder and sterntube areas) that are unduly wasted. CGTA will advise as to which anodes must be renewed. Contractor must bid on renewing forty-six 10 kilogram zinc anodes. The cost must be included in the overall bid. Contractor must maintain a fire watch in the Tank(s) during all hot work. Contractor must also provide a cost, but not form part of the overall bid, to supply and install one anode for adjustment purposes through PWGSC 1379 action.
2. Contractor must supply and erect staging as required to access the Hull area to carry out the anode renewals. The staging will also be used by CGTA to inspect the Hull area and anodes. Upon completion of all work, staging must be removed.
3. Once anodes are removed, the hull area under the existing anode must be prepped and coated as per the Underwater Hull coating specification item. Hull coating applied prior to anode being installed, coating to be applied as per the underwater hull coating specification item. New anode installations must be protected during the Underwater Hull Coating application.
4. All anodes must be removed including all strapping as per the CGTA direction. All existing strapping welds must be ground flush. Excessively deep gouges resulting from strap removal must be filled with weld and ground smooth. Areas where anodes are found to be missing must be dealt with similarly.



5. Contractor must prepare the area in way of the new anode welding straps, the area must be prepped to bare metal to allow for welding of the straps to the hull.

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HD-11 UNDERWATER HULL ANODES (CONTINUED)

6. Contractor must provide a unit cost for the supply and install of one anode for adjustment purposes. Cost must include hull preparation work and installation as defined above.
7. Welding in way of fuel tank(s) requires that the fuel tank(s) be pumped down by Contractor under the direction of the CGTA (if vessel crew is aboard they will complete the task). Contractor must remove and dispose of any remaining fuel in accordance with all Federal, Provincial and Municipal regulations. Disposal certificates must be provided to the CGTA.
8. Contractor must ventilate each tank and provide mechanical ventilation to all areas of the tank. Each tank must be gas freed and certified gas free as required for entry. Each tank must be safe for personnel to enter and safe for hot work.
9. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the tank and a copy of each certificate must be posted in a conspicuous location in close proximity to the manhole cover for each tank. Spaces must be tested each day that personnel are required entry in the tanks. As a minimum, Contractor to follow the DFO/5737 Fleet Safety Manual, 7.B.3 - ENTRY INTO CONFINED SPACES (Entry into Enclosed Spaces).
10. Upon completion of all work, Tank(s) must be closed up in good order using new, CFM, neoprene jointing. Any defective manhole cover studs must be renewed as per the Manhole Cover Stud Renewal specification item.
11. Welding in way of ballast/void tanks with coated internal surfaces will require interior paint work to be touched up in way of heat damage. The paint touch up work will be negotiated through PWGSC 1379 action.

2.2 LOCATION

1. Location will be identified by CGTA.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by CGTA, storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

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HD-11 UNDERWATER HULL ANODES (CONTINUED)

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.

- m) CCG Welding Specification EKME#3049715v3A CT-043-eq-eg-001-E
- n) Materials Welding and Weld Inspection For Ship Construction and Repair EKME#3113928
- o) Canadian Coast Fleet Safety Manual (DFO 5737)
- p) Coast Guard ISM Lock Out/Tag Out Procedures
- q) Coast Guard ISM Confined Space Entry Procedures
- r) Coast Guard Hot work Procedures & Gas freeing
- s) CSA W47.1-03, Certification of Companies for Fusion Welding of Steel
- t) CSA W59-03, Welded Steel Construction (Metal Arc Welding)
- u) CSA 28, Canada Shipping Act - Hull Construction Regulations
- v) CSA 29, Canada Shipping Act - Hull Inspection Regulations
- w) CSA 57, Canada Shipping Act – Safe Working Practices Regulations
- x) MOSHR, Canada Labour Code – Marine Occupational Safety and Health Regulations

In case of conflict between any of the standards, then the most stringent requirements will prevail.

1.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise indicated, Contractor must provide all materials, labour, and equipment required to complete this specification item.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All work to be completed to the satisfaction of the CGTA.

4.2 TESTING

N/A – INTENTIONALLY LEFT BLANK

HD-11 UNDERWATER HULL ANODES (CONTINUED)

4.3 CERTIFICATION

1. All staging systems and components must have current inspection certificates and permits.
2. A copy of the hot work certificates must be given to the CGTA and a copy posted in a conspicuous location adjacent to the hot work area.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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E-01 AIR SAFETY VALVES

PART 1: SCOPE:

The intent of this specification item is for Contractor to remove eight valves and send out for inspection and testing.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The following valves must be sent out for service and inspection.

NAME	MAKE	MODEL	SIZE	PRESSURE	CAPACITY	SERIAL #
Air to SS Gens	Knukle	6010 DCM01-KM	½"	145 psi	339 cfm	V15-5144-2
Service Air	Apollo	19MDCK102	½"	102 psi	248 cfm	23336270XP
Air Receiver #1	Kunkle	913BEDM03-KE	¾"	400 psi	1579 cfm	V15-5144-1
Air Receiver #2	Anderson-Greenwood	961100MD	½"	400 psi	894 cfm	06-54405
Air Receiver #3	Anderson-Greenwood	961100MD	½"	400 psi	894 cfm	06-54404
Air Receiver #4	Anderson-Greenwood	961100MD	½"	400 psi	894 cfm	08-50350
Emergency Air Receiver	Apollo	523DDDKMAA0400	¾"	400 psi	928 cfm	41270
Air to Emergency Generator	Kunkle	6010 ED	¾"	147 psi	610 cfm	1686044-2-1

2. Contractor must electrically and mechanically isolate the compressed air system to allow the removal of the safety valves. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install /remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the Electrical Officer must be in attendance when all locks/tags are removed.
3. CGTA must be notified of any valves that do not test successfully. Any additional work will be addressed through PWGSC 1379 actioned.
4. On completion of recertification, the valves must be re-installed in their original locations.
5. Test certificates to be provided for each valve and given to the CGTA.
6. All work must be completed to the satisfaction of the CGTA.

2.2 LOCATION

1. Valves are located in various areas throughout the vessel; CGTA will identify these locations to Contractor.

E-01 AIR SAFETY VALVES

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. All applicable regulations and standards must be followed when performing service on each valve.

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor must utilize certified service personnel authorized to perform the specified work.

4.2 TESTING

1. Testing based on manufacturers recommendations.

4.3 CERTIFICATION

1. Certificates must be given to the CGTA on completion of the inspections and testing.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

E-01 – AIR SAFETY VALVES

5.2 SPARES

N/A - INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A - INTENTIONALLY LEFT BLANK

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E-02 LIEBHERR CRANE ANNUAL INSPECTION

PART 1: SCOPE:

The intent of this specification item is for Contractor to subcontract the services of a certified Liebherr Canada Service Technician to complete the annual survey and obtain TCMSS survey credit.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must include an allowance of \$15,000 to cover the expenses of a Liebherr Canada Field Service representative (FSR). The FSR will be reimbursed for services, authorized travel and living expenses reasonably and properly incurred in the performance of this specified work. The Allowance must form part of the overall bid and will be adjusted through PWGSC 1379 action upon proof of final invoice.

FSR:

Erwin O'Brien

Product Support Manager

erwin.obrien@liebherr.com

Liebherr Canada

Tel: +1 (709) 748-7829

49 Mews Place

Fax: +1 (709) 368-6494

St. John's, NL

Mobile: +1 (709) 682-3331

A1N 4N2

Internet: www.liebherr.com

2. All manufacturer's procedures and recommendations must be followed during this scope of work with all technical specifications being adhered to as a minimum by Contractor. Contractor must arrange and schedule the on-site presence of a TCMSS Surveyor as required for inspections / testing. Contractor to inform the CGTA as soon as the TCMSS Surveyor is scheduled.
3. Contractor must provide the services of one (1) labourer to assist the FSR, as required, for the duration of the FSR's onsite work and allot a total of 24 labour hours for this period with the FSR. Contractor must quote a separate cost for this work and include it as part of the overall bid. The actual labourer hours worked will be adjusted up or down through PWGSC 1379 action.
4. Contractor must supply all the necessary staging and craneage as required to work on, remove, transport, inspect and install the various components during this Specification Item. Contractor must remove all the staging upon completion of work.
5. FSR will complete an Annual Inspection on the crane as per the manufacturers' instructions / requirements. Any defects requiring repairs will be through PWGSC 1379 action.
6. Upon completion of the Annual Inspections, two typewritten copies and one electronic copy in PDF format, of the final report, must be provided to the CGTA.
7. All work must be carried out to the satisfaction of the CGTA.

E-02 LIEBHERR CRANE ANNUAL INSPECTION

2.2 LOCATION

1. Starboard side of main buoy deck aft

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. Manufacturer's recommendations / requirements

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor to subcontract the services of a certified Liebherr Canada Service Technician to complete the annual survey.
2. Contractor is responsible for making arrangements / scheduling of a TCMSS Surveyor to be present during the inspection process. Contractor must determine in consultation with the Liebherr crane FSR an appropriate time for the TCMSS inspection and obtain a survey credit.

4.2 TESTING

1. Testing / inspection based on manufacturers recommendations

E-02 LIEBHERR CRANE ANNUAL INSPECTION

4.3 CERTIFICATION

1. Annual Liebherr Crane Survey certificate
2. TCMSS Survey credit for Div 3 report

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

E-03 PORT AND STARBOARD WINDLASS BRAKE BANDS

PART 1: SCOPE:

The intent of this specification item is for Contractor to overhaul the port and starboard Windlass brake bands.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. This work must be done in conjunction with the work detailed in section H-12 ANCHORS, CHAINS, AND CHAIN LOCKERS.
2. Contractor must remove 7 pins from the port windlass brake band and 7 pins from the starboard windlass brake band.
3. Pins must be thoroughly cleaned and lightly machined to provide adequate clearance. Grease passages must be cleaned and proven clear. Contractor must provide a cost for supplying and machining one pin for the brake band, to be used for adjustment purposed through 1379 action. There may be brass bushes in way of the brake bands.
4. Port and starboard brake tensioner screw assemblies must be removed and dismantled. New tensioner screws must be fabricated as per dimensions indicated on the Brake Screw Assembly drawing, with confirmation measurements taken from the existing screw assemblies. Bearing carriers, handwheels, and 'sel-lok' pins must be reused. New GSM thrust bearings must be installed in the tensioner screw bearing carriers. New CFM capscrews, lockwashers, keystock, O-rings, and grease fittings must be installed for the scope of this work. Stainless Steel fasteners must be supplied and installed.
5. Brake pads on the port and starboard brake bands must be renewed and installed with new CFM non-asbestos material of required dimension as deemed necessary following an inspection by the CTGA.
6. Brake bands must be assembled and reinstalled, as per the manufacturer's recommendations. Contractor must make all necessary adjustments to the brake bands to ensure adequate tension and contact. All linkages and pins must be greased during assembly.
7. Proper operation of the individual brakes must be functionally demonstrated to the CGTA by an operational trial with the unit adequately supporting the weight of both the anchor and chain.
8. All work must be carried out to the satisfaction of the CGTA.

E-03 PORT AND STARBOARD WINDLASS BRAKE BANDS (CONTINUED)

2.2 LOCATION

1. Windlass is located on the bow of the vessel.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal with approval from the CGTA and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work

PART 3: REFERENCES:

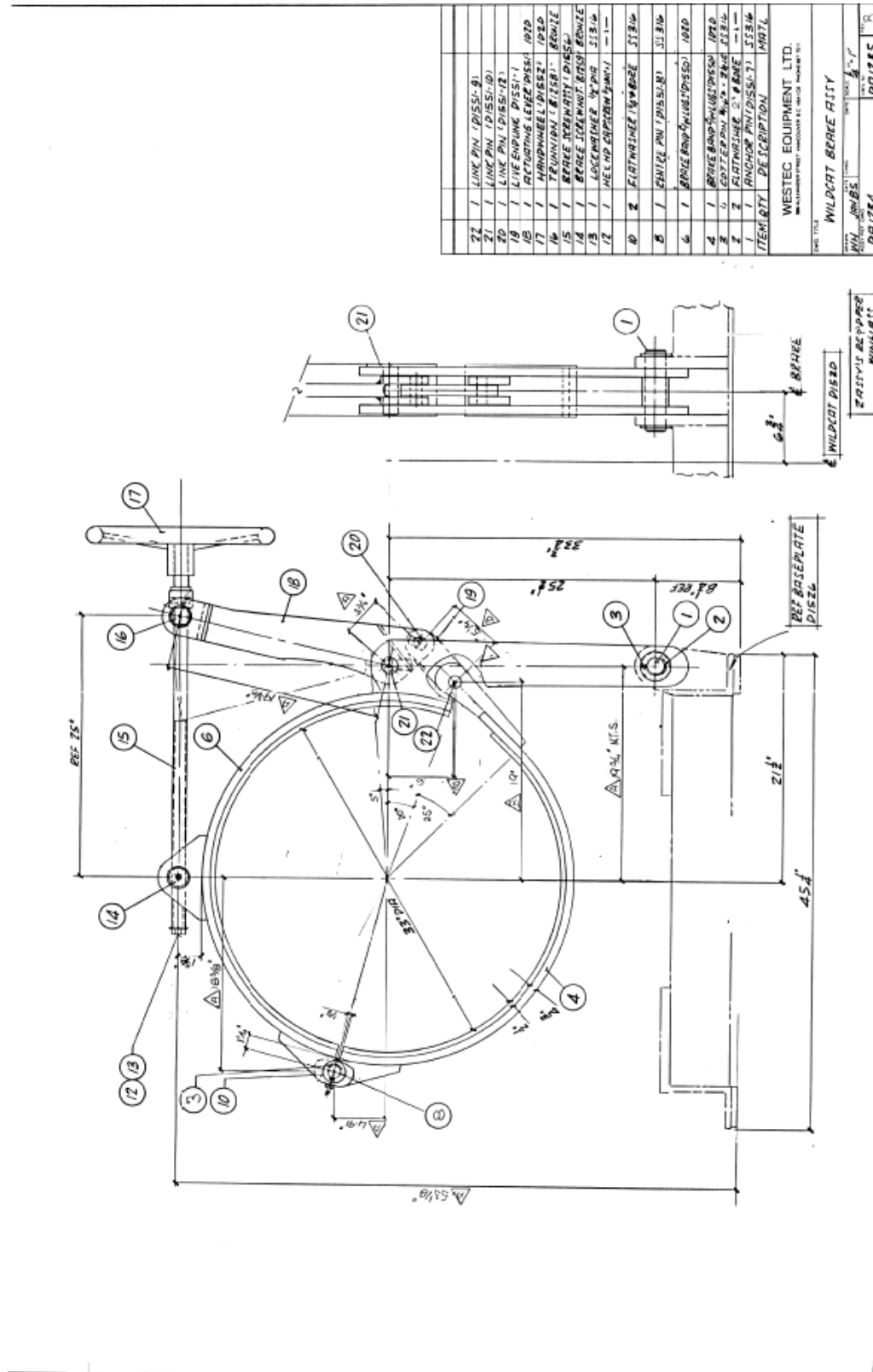
3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Westec Equipment Ltd – Forward Hydraulic System & Deck Machinery Manual available from CGTA upon request.

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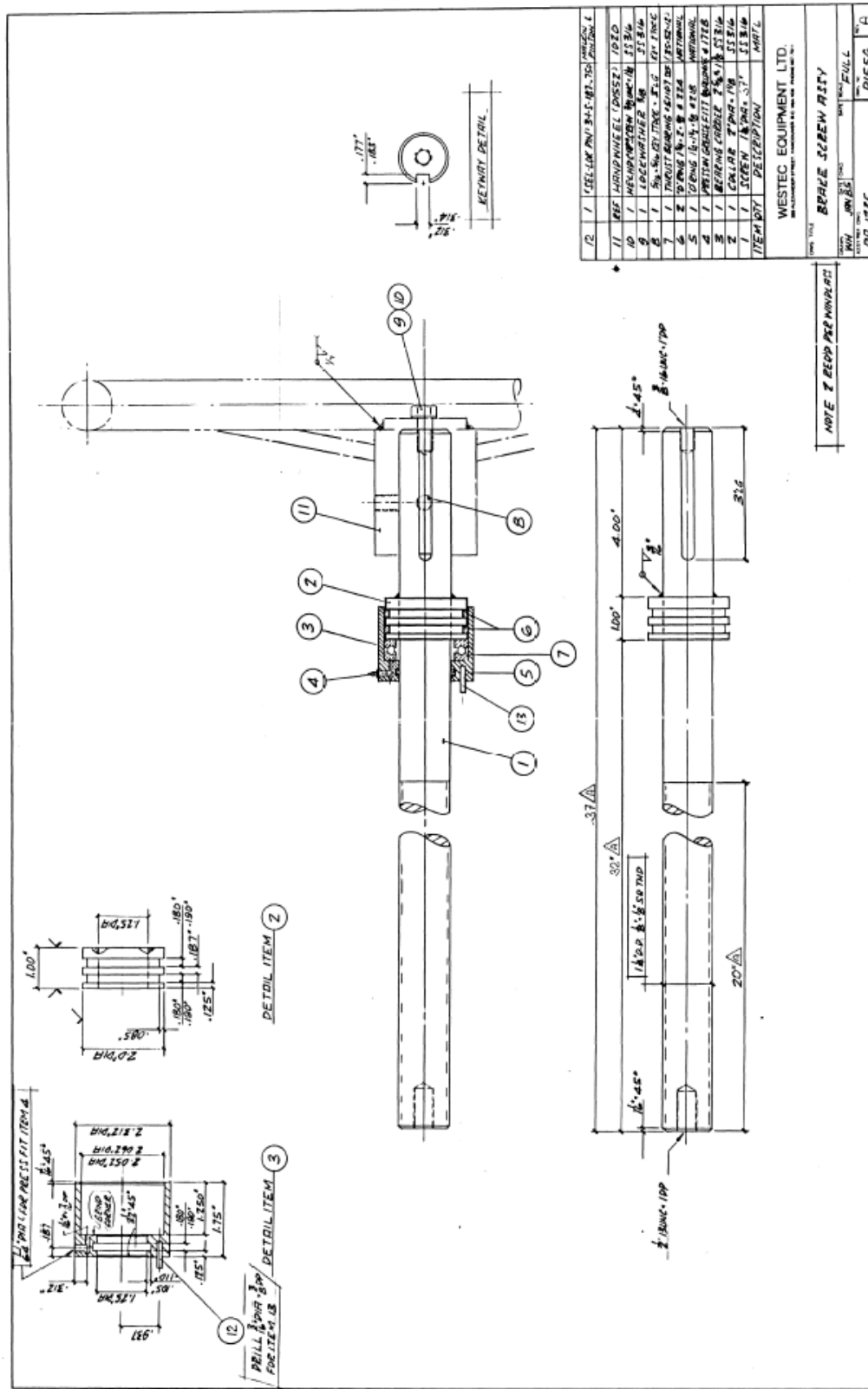
2. Wildcat Brake Assembly Drawing #DA1234



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3. Brake Screw Assembly Drawing #DA1235



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E-03 PORT AND STARBOARD WINDLASS BRAKE BANDS (Continued)

3.2 STANDARDS AND REGULATIONS

N/A – INTENTIONALLY LEFT BLANK

3.3 OWNER FURNISHED EQUIPMENT

1. Two (2) Thrust Bearings #51107

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All disassembled components and new fabricated components will be inspected by the CGTA.

4.2 TESTING

1. Proper operation of the individual brakes must be functionally demonstrated to the CGTA by operational trial with the unit adequately supporting the weight of both the anchor and chain.

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must provide a report on the Port and Starboard Windlass when the job is completed. Two typewritten copies and one electronic copy in PDF format must be given to the CGTA upon completion. At a minimum the report must include all readings, certificates, results / recommendations, etc.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

E-04 INSTALLATION OF NEW BRIDGE WINDOW WIPERS

PART 1: SCOPE:

The intent of this specification item is for Contractor to renew the ten (10) GSM Wynn bridge window wipers, complete with new motors and controllers.

PART 2: TECHNICAL DESCRIPTION:

2.4 GENERAL

1. Prior to commencement of any and all work, Contractor shall issue a Safety Lockout Procedure. Contractor shall install locks and tags accordingly during the scope of work. Contractor shall supply and install their own locking devices and retain all keys during the scope of this work. Window wipers and window heaters must be locked out.
2. Contractor is responsible for removal, disassembly of all deckhead and bulkhead panels and interference items in order to gain access to the wiper motors and reassembly upon completion of all work in this specification item.
3. Contractor must implement a fall restraint system for all workers working on the wiper systems. Contractor must supply all necessary and currently certified restraint equipment and devices for all their workers.
4. Contractor is responsible for staging or lift equipment required in order to access the wiper assemblies.
5. All precautions must be taken to protect all areas from hot work damage. All hot work must be carried out as per Contractor's and Canadian Coast Guard hot work authorisation with all necessary precautions being taken. Forced portable ventilation with flexible ducting must be used during any hot work or grinding operations to lead any dirt, dust, smoke, etc. to the outside of the ship.
6. Consoles and decking within the bridge must be adequately covered and protected from dirt, debris, materials, etc. during the course of all work. Contractor must ensure all control panels and consoles are protected from damage with ¼" masonite. Contractor must remove all protective covering upon completion of this specification item.
7. Contractor shall remove 10 external Wynn Window Wiper units (complete). Contractor must electrically disconnect and remove the existing 10 wiper assembly motors from the deckhead area inside the bridge.

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E-04 INSTALLATION OF NEW BRIDGE WINDOW WIPERS (CONTINUED)

8. At each window location, the existing wiper drive shaft holes and mounting bolt screw holes will require sealing off if the new units have a different mounting arrangement. Contractor shall check to see if the mounting holes and wiper drive shaft holes for the new wiper units match the old mounting holes prior to welding over. Contractor must bid on welding in the holes for each existing wipe mounting location, grind flush (smooth), prime and paint. Cost to be included in their overall bid price but shown separately. Contractor must provide a cost to perform the above work for one wiper location, cost will not form part of the overall bid, but will be used for adjustment purposes through PWGSC 1379 action.
9. In conjunction with paragraph 7 above, Contractor must bid on fitting a round insert, approximately 57mm diameter of 6mm thick Lloyds Grade "A" steel or equivalent, into each wiper drive shaft hole. The insert must be welded on both sides, ground flush on both sides. The 4x10mm mounting bolt holes shall be welded, both sides, ground flush on both side. Contractor can forego the grinding on the interior if it does not interfere with the installation of the new wiper.
10. Contractor must install 10 new GSM Wynn Window Wiper units in the same location as the currently fitted units being removed.
11. If the existing mounting holes are no being used and have been welded over, Contractor must mark new mounting holes for the wiper assembly and drill as indicated in the manufacturer's mounting instructions.
12. If the existing drive shaft holes are not being used and have been welded over, Contractor must mark new wiper drive shaft holes and drill as indicated in the manufacturer's mounting instructions. Rubber seals supplied with the motor/wiper assembly must be installed as per mounting instructions.
13. New wiper motors must be electrically connected using existing wiring.
14. Contractor must disconnect and remove the existing 10 wiper controllers from the four bridge consoles and renew them with new GSM controllers, using existing wiring.
15. Contractor must fabricate and install one mounting plate for each of the 4 consoles to cover the openings from the old controllers and to accommodate the new controllers. Plate shall be fabricated from 1/8" aluminum and powder coated in a matte black finish. Prior to powder coating, Contractor must make all necessary cut outs into the new plates to accommodate the new controller installation taking into account where it will be installed on the new console in order to not restrict the operation of the new controller or existing controls on the console. New controllers must be mounted on this plate. Prior to fabrication the final location will be determined by CGTA.
16. Contractor must perform a functional test of all bridge window wipers, upon completion of all work, with CGTA in attendance.

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E-04 INSTALLATION OF NEW BRIDGE WINDOW WIPERS (CONTINUED)

17. Water tight integrity of the plug and insert welds, as well as the new motor shaft seal, shall be tested by means of a garden hose, with CGTA in attendance. Contractor is responsible to investigate and repair any leaks found on the items listed in this specification.
18. For all areas where the existing coating has been disturbed, Contractor shall power tool clean/prepare all steel surfaces in accordance with "SSPC-SP3 Power Tool Cleaning" standards. A minimum profile of 25 microns (1 mil) is specified.
19. Contractor must ensure all coated surfaces are clean and dry before any over-coating. The degree of surface preparation specified by the paint manufacturer must exist as the appropriate coat of paint is applied.
20. Contractor must "feather back" existing coating around all heavy pitted areas so that the appearance of the front structure is smooth.
21. Contractor must apply the following coating system to all prepared areas in accordance with the manufacturer's requirements:
 - a) 1 coat of Wasser primer – MC MIOZINC (DFT 3mil)
 - b) An intermediate coat of MC-Ferrox B (DFT 3mil)
 - c) A topcoat of MC Luster 100 –RAL 9003 White (DFT 3mil)
22. All work must be completed to the satisfaction of the CGTA.

2.2 LOCATION

1. Bridge windows – exterior and interior
2. 4 Bridge consoles

2.3 INTERFERENCES

1. Contractor is responsible for removal and reinstallation of all necessary bulkhead and deckhead panels, and any other interference items.
2. Contractor must ensure all bridge consoles and areas in way of the identified work are suitably protected to prevent damage to equipment controls.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

E-04 INSTALLATION OF NEW BRIDGE WINDOW WIPERS (CONTINUED)

3.2 STANDARDS AND REGULATIONS

N/A – INTENTIONALLY LEFT BLANK

3.3 OWNER FURNISHED EQUIPMENT

1. 10 each WYNN Window wiper assemblies
2. 10 each WYNN Wiper motors
3. 10 each WYNN Wiper controllers

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor initiated water testing of plugs, insert welds, and new motor shaft seals shall be witnessed by CGTA for each new wiper assemblies.

4.2 TESTING

1. Contractor must perform a functional test of all new wiper assemblies with CGTA in attendance.

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. All manuals and drawings supplied (including those that came with the new wiper assemblies) for this installation must be returned to the CGTA upon completion of this specification item.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT

PART 1: SCOPE:

The intent of this specification item is for Contractor to remove the port and starboard tail shafts and controllable pitch propeller hubs. Propeller hubs must be shipped to Wartsila Canada in Dartmouth, Nova Scotia for overhaul and installation of new blade carriers and sliding blocks.

All work in this spec must be done under the guidance of a Wartsila FSR.

FSR Contact info and address:



Pieter Groot
Contract Manager
Unit 3, 90 Cutler Avenue,
Dartmouth, NS
B3B 0J6
Telephone: (902) 468-1264
Cell: (902) 209-4412
Fax: (902) 468-1265
Pieter.groot@wartsila.com

Survey credit from TCMSS must be obtained for the propellers, propeller shafts, stern tube bearings, and line shaft bearings.

THE WORK DESCRIBED HEREIN APPLIES TO A SINGLE SHAFT LINE, AND MUST BE REPEATED FOR BOTH THE PORT AND STARBOARD SHAFT LINE SYSTEMS. CONTRACTOR MUST BID ON PERFORMING THE WORK FOR BOTH THE PORT AND STARBOARD SHAFTS AND THE COST MUST BE INCLUDED IN THE OVERALL BID PRICE.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must include an allowance of \$20,000.00 to cover the expenses of the Wartsila FSR. The FSR will be reimbursed for services rendered, the authorized travel and living expenses reasonably and properly incurred in the performance of the work, at cost without any allowance for the overhead or profit. The Allowance must form part of the overall bid and will be adjusted by PWGSC 1379 action upon proof of final invoice.
2. The rope guards for the propeller shafts must be removed and lowered into the dock bottom, protected from damage and retained for re-installation upon completion of work.

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ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

3. Wear down readings for the propeller shafts must be taken prior to any work being carried out on the shaft lines. The CGTA will provide a depth gauge specific to each shaft. Contractor must record the measurements and present them to the CGTA.
4. Propeller hubs must be examined for signs of oil leakage. Blades must be operated through full pitch range at least twice, and left in the "FULL ASTERN POSITION".
5. Port and starboard rudders shall be removed as per VLE-02 Port & Starboard Rudder Survey and Refurbishment.
6. Run-out readings must be taken fore and aft of the SKF coupling, as well as on both the forward and aft seal liners prior to removal of the tail shaft. All readings must be recorded and given to the CGTA.
7. Stern tube lube oil systems must be drained. Oil must be drained to a suitable reception facility and disposed of in accordance with all Federal, Provincial and Municipal regulations in effect. Disposal manifests must be provided to CGTA. For bidding purposes it is estimated that the quantity of oil is 550 litres of Tellus 68 per stern tube.
8. The oil tank for the inner seal must be disconnected from the seal housing and drained, Contractor to assume 2 litres per side for bidding purposes.
9. Outer seal units (WAUKESHA/LIPS type 450 MKII) must be dismantled from the ends of the stern tube and secured on the propeller shaft until it is withdrawn. Inner seal is to remain secured in place.
10. Shaft grounding brush gear must be dismantled and retained in a secure location for re-installation when work is completed.
11. Shafting, fore and aft of SKF coupling, must be cleaned and polished.
12. SKF coupling (type OK290HB) must be released according to manufacturer's instruction. Coupling must be moved forward on shaft to expose shaft ends.
13. CPP oil system must be drained from the hub and through joint in shaft to a suitable reception facility, and disposed of in accordance with all Federal, Provincial and Municipal regulations in effect. Disposal manifests must be provided to CGTA. For bidding purposes it is estimated that the system capacity is 1000 litres of Tellus 46 oil per side. Please refer to the next paragraph (14) prior to draining the system.

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ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

14. Suitable support blocks and lifting gear must be used to ensure the propellers and shafts are withdrawn from the vessel without placing undue stress or strain on the shafts or stern tube bearings. Lifting lugs must be welded onto the hull as necessary. The weight of the shaft and propeller must be suitably supported and maintained in alignment at all times when removed, and during removal/installation, from the ship.
15. When coupling is clear and with blades set to maximum astern position, tail shaft must be gently eased aft. Inner oil pipes must be disconnected and clear for tail shaft removal, as per instructions from FSR.
16. When pipes are clear, shaft and propeller must be withdrawn from the stern tube.
17. During the entire period the tail shaft and propeller assemblies are withdrawn from the vessel, their surfaces must be thoroughly protected from the surrounding elements, dust, and debris. During stowage, lifting and movement of shafting and propeller, shaft surfaces must be suitably protected against damage due to lifting slings and/or supports.
18. Propeller blades (4 per propeller) must be removed from the hub assemblies and the hub assemblies removed from the tail shafts. Hub assemblies must be clearly marked as to their original location - Port and Starboard.
19. Contractor must include in their bid the cost of transportation of the hub assemblies from Contractor's facility to the Wartsila Canada shop in Dartmouth, Nova Scotia where the overhaul will be completed. 16 blade bolts must also be shipped to the Wartsila shop with the hubs. Hubs must be ready for transport within 7 days following commencement of contract. Upon completion of the hub overhaul, Contractor shall arrange for, and include in their bid the cost of return transportation of the hub assemblies from the Wartsila Canada shop in Dartmouth, Nova Scotia to Contractor's facility.
20. For transportation, the hubs must be secured on a wooden support on a flatbed truck or equivalent, flange face down. Hub internals must be suitably protected with the use of plywood and tarps. Blade bolts must be suitably crated in a manner which protects the threads from damage. Any damage to the hub assemblies or blade bolts must be repaired by Contractor at their expense.
21. Propeller blade bolts must be examined using dye penetrant NDT. The final report must be submitted to CGTA. Currently, the port propeller has two blade bolts in pocket #1 which are slightly shorter in length than the other bolts on both propellers. Contractor must renew these two blade bolts with new GSM bolts.
22. Dye penetrant NDT shall be performed on the root of each propeller blade. The final report must be submitted to CGTA.

ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

23. Propeller blade foot seal areas must be cleaned and inspected. Blades must be re-installed on hub with new GSM blade-foot seals.
24. The hardening-up of the propeller blade bolts must be witnessed by the CGTA and TCMSS Surveyor. Contractor must observe correct torque procedure for the hardening-up of all propeller blade bolts, under the guidance of the Wartsila FSR.
25. Contractor must weld GSM stainless steel locking across the propeller blade bolts as indicated in the instruction manual.
26. The hub non-return valve must be removed, dismantled, and cleaned. The valve must be closed up and re-installed upon its acceptance by CGTA, using new GSM O-rings.
27. The forward and aft stern tube seal assemblies must be disassembled for cleaning and examination. Forward seal assembly must be completed in situ. Upon completion, the forward and aft seal assemblies must be reassembled using GSM seal overhaul kits.
28. Forward and aft seal liners must be removed from the tail shaft and the outside diameter seal areas must be measured. All measurements must be recorded and submitted to the CGTA. Liners to be polished or machined as directed by the FSR.
29. Tail shaft must be mounted on a lathe and checked for total indicated run-out. Shaft surfaces and bearing surfaces will be inspected by the CGTA for any abnormalities. The shaft bearing surfaces must be polished and measured as indicated in the Wartsila measurement sheet found in section 5.1 under Part 5 Deliverables. All measurements are to be recorded and presented to CGTA.
30. Dye penetrant NDT must be completed on the flange radius of the tailshaft. Test results must be recorded and presented to the CGTA.
31. Seal liners and aft seal assembly must be reinstalled on the tailshaft. Final assembly of the forward seal must be completed once the tailshaft is installed in the stern tube.
32. Propeller hub flange bolts must be examined using dye penetrant NDT. Final report must be submitted to CGTA.
33. The hubs must be re-installed on their respective propeller shafts and all bolts must be torqued in accordance with the FSR requirements in the presence of the CGTA and TCMSS Surveyor. All propeller hub flange bolts must be secured as originally fitted.
34. The stern tube and stern tube bearings must be thoroughly cleaned of all remaining oil. Bearings must be as indicated on the Wartsila measurement sheet found in section 5.1 under Part 5 Deliverables. Results must be recorded and given to the CGTA.

ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

35. Forward and aft stern tube bearing temperature sensors must be renewed with new GSM sensors. Currently, there is 1 sensor in the forward bearing and 1 sensor in the aft bearing of each sterntube. During this work, Contractor must install a second sensor to the aft bearing for a total of 3 sensors in each stern tube. The two lengths (four in total) of exposed conduit for the aft bearing sensors in each sterntube must be removed and renewed with a CFM stainless steel tube of adequate size to accommodate the new sensors. A junction box for the additional sensor in each stern tube must be supplied (CFM) and mounted on the aft bulkhead of the shaft tunnel. The sensor must be connected into the new CFM junction box and will be tied into the alarm and monitoring system at a later date. All sensors must be proven operational prior to installation of the tail shafts in the stern tubes.
36. Stern tube lube oil systems must be flushed a minimum of 2 times with Shell Tellus 68 oil to remove any emulsified oil from the systems. Sump tank must be opened and cleaned. Suction strainer in the sump tank must be cleaned and reused. CGTA shall witness the results of the final flush. New GSM spin-on filters are to be installed at the circulating pump location once flushing is complete.
37. A new GSM pressure transducer must be installed on the stern tube lube oil system, located on the return line from the stern tube to the sump tank as indicated by the CGTA. A temperature sensor is currently located in this line and must be renewed with a GSM pressure transducer, along with a GSM isolation valve.
38. Contractor must remove and inspect the port and starboard intermediate line shaft bearings.
39. Prior to the removal of the line shaft bearings, all sensors and thermometers must be isolated and removed. On completion of the work, the sensors and thermometers must be tested and then fitted.
40. Contractor must drain the oil from the port and starboard line shaft bearing. Oil must be disposed of in accordance with all Federal, Provincial and Municipal regulation in effect. Disposal manifests must be provided to CGTA. Approximate quantity of oil is 5 litres of Shell Gadina 30 per bearing.
41. Port and starboard line shaft bearing upper caps must be removed and set securely on the deck. The shafts must be secured to allow the lower bearings to be rolled out. The bearings must be thoroughly cleaned.
42. Line shaft bearing sumps must be thoroughly wiped clean with lint free rags. The cooling water side must be opened and thoroughly cleaned with a descaler. A hydrostatic pressure test on the cooling water lines of the line shaft bearing housing must be completed at a pressure of 2 bar and witnessed by CGTA.

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ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

43. Prior to assembly, the line shaft bearings must be inspected by CGTA and the attending TCMSS Surveyor. A new GSM bearing assembly must be installed in the port line shaft bearing housing. Contractor must safely retain the old bearing assembly until the new bearing has been properly run-in and accepted by the CGTA.
44. Intermediate line shaft bearings must be assembled with new CFM gaskets and fasteners on the cooling water lines. Bearing housings must be filled with new GSM Shell Gadinia 30 lubrication oil.
45. Tail shaft and propeller must be reinstalled in the sterntube. Final assembly of forward seal assembly will take place when shaft is in position.
46. The inner piping for CPP control rods will be connected using new GSM O-rings. Shaft must be drawn into its final position for re-coupling.
47. SKF coupling must be repositioned and mounted as required to original dimensions. Run-out readings must be taken forward and aft of the SKF coupling, as well as on the forward and aft seal liners.
48. Stern tube lube oil system must be refilled using CFM Shell Tellus T-68 oil via the header tank in the crane base. Approximately 550 litres of oil is required per stern tube. The fitted stern tube lube oil circulating pump must be used to circulate oil and removed air from the system. An oil sample must be taken from each stern tube system and witnessed by the CGTA once the systems are filled with new oil and are given time to circulate.
49. A final wear-down measurement on the aft seal liner must be taken and results given to the CGTA.
50. Forward and aft stern tube seals must be filled with new GSM Shell Tellus 68 oil. Drain and vent plugs must be installed and secured with stainless steel lock wire.
51. Contractor must remove the common return pipe section for the starboard CPP pump set arrangement. This pipe is a 2-1/2 inch diameter pipe, which reduces down to 1-1/2 inch at its lower end and is provided with two 1-1/2 inch flanged connection. Contractor shall modify the pipe to allow the fitting of a new GSM 2-1/2 inch isolation ball valve. The new valve must be mounted such that the handle is easily operated. Final location of the new valve will be determined by the CGTA. All pipe, flanges, gaskets, and fasteners for this work to be CFM. The modified pipe must be cleaned and flushed with oil prior to installation.

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(CONTINUED)

52. Contractor must re-fill both the port and starboard CPP oil systems with CFM oil at the completion of all work in this spec item. Contractor must pump the supplied oil into the vessel's holding tank and then use the vessel's internal transfer pump to pump the oil from the storage tank into the CPP header tanks. Ship's crew will assist as required. Contractor must provide a unit cost per litre and include in their bid a cost for 2000 litres of new Shell Tellus 46 oil for this specification (1000 litres for port CPP, 1000 litres for stbd CPP).
53. The new CPP return line isolation valve must be checked for leaks in the presence of the CGTA and any deficiencies must be corrected by Contractor at their expense.
54. Contractor shall bleed all air from the port and starboard CPP systems through the propeller hubs. Pitch test in the full ahead and full astern position must be completed.
- NOTE: The port and starboard CPP return line isolation valves MUST be locked in the OPEN position before the CPP pumps are started. CGTA must be informed prior to starting the CPP pumps.
55. The CPP Pitch mechanism axial stroke of the propeller hub cylinder must be correlated with the OD box mechanical feedback scale and the remote control system pitch indicators in the control room and on the bridge readouts after reassembly.
56. Contractor shall ensure that the propeller blades do not foul in the nozzles in all three positions (full ahead, neutral, and full astern pitch) for each of the blades within the nozzles, throughout one full rotation of the shaft. CGTA will witness this test.
57. Sterntube, forward and aft seal assemblies, and propeller hubs must be visually inspected for leaks once all systems are full of oil. A period of 24 hours must be given to observe oil leakage prior to the rope guards being installed.
58. The final level of oil in the CPP and stern tube oil header tanks shall be marked prior to the floating of the vessel to allow for observation of oil loss or water ingress once the vessel is in the water.
59. All old welds must be ground from both the stern tube bossing and the rope guards themselves in preparation for reattachment. Rope cutting knives on guards must be sharpened using hand/power tools as appropriate.
60. Upon completion of all shaft work and testing, rope guards must be reinstalled. The guards must be aligned concentric with the propeller shaft and hub so the access holes are in the top and bottom positions. Rope guards must be securely welded in position.
61. Clearance between rope guards and propeller hub must be verified through one full turn of the propeller and witnessed by CGTA after completion of installation.

ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

62. Tail shaft grounding brush gear must be re-installed.
63. Port and starboard rudders must be reinstalled as per VLE-02 Port & Starboard Rudder Survey and Refurbishment.
64. All lifting eyes on the hull must be removed and ground flush. Paint touch ups must be completed where the lifting eyes were removed and on the rope guards in accordance with the hull coatings HD-08 Underwater Hull Coatings.
65. When undocked, functional alongside trials of the stern tube and CPP system must be completed. Temperatures and pressures of the stern tube and CPP systems, as well as the line shaft bearings must be monitored and recorded and provided to the CGTA.
66. A sea trial of approximately 4 hours duration must be carried out to prove shafting and seals at full power. Yard personnel and FSR must be in attendance.

2.2 Location

N/A – INTENTIONALLY LEFT BLANK

2.3 Interferences

3. Contractor is responsible for the identification of any interference items, their temporary removal with approval from the CGTA and storage and refitting to the vessel.
4. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Details of the vessels CPP system are as follows:

Manufacturer:	LIPS B.V – Drunen, Holland
Serial No's:	HO-2233/2234
Diameter of Shaft:	425mm
Weight of Shaft:	9520 kg
Weight of Propeller:	6305 kg
Weight of Sleeve Coupling:	590 kg
Length of Shaft & Propeller:	10,295 mm

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(CONTINUED)

Hub particulars:

Type:	LIPS 4C11SW
Diameter:	1100mm
Mass:	3900 kg

3.2 Standards and Regulations

1. As a minimum, the following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - Canadian Coast Fleet Safety Manual (DFO 5737)
 - Coast Guard ISM Lock Out/Tag Out Procedures

3.3 Owner Furnished Equipment

Government Supplied Material

1. Depth gauge specific to each shaft
2. Two blade bolts
3. Blade-foot seals
4. Stainless steel locking strips for propeller blade bolts
5. O-rings for hub non-return valve
6. Seal overhaul kits for forward and aft seal assemblies
7. Temperature sensors for forward and aft stern tube bearings
8. Spin-on filters for circulating pump location
9. Pressure transducer for stern tube lube oil system and isolation valves
10. Bearing assembly for port line shaft bearing housing.
11. Shell Gadina 30 lubrication oil for bearing housings
12. O-rings for inner piping for CPP control rods
13. Shell Tellus 68 oil for forward and aft stern tube seals
14. 2-1/2 inch isolation ball valve for modified pipe

Contractor Furnished Material

1. Gaskets and fasteners on the cooling water lines - Intermediate line shaft bearings
2. Shell Tellus T-68 oil for Stern tube lube oil system
3. All pipe, flanges, gaskets, and fasteners for common return pipe section for the starboard CPP pump set arrangement
4. 2000 litres Shell Tellus 46 oil

ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

PART 4: PROOF OF PERFORMANCE:

4.1 Inspection

1. TCMS survey credit must be obtained for all components contained within this specification.

4.2 Testing

1. The Contractor must develop a set-to-work trials procedure with the guidance of the Wartsila FSR to bring the CPP propeller system back to original operating parameters.

4.3 Certification

1. N/A INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

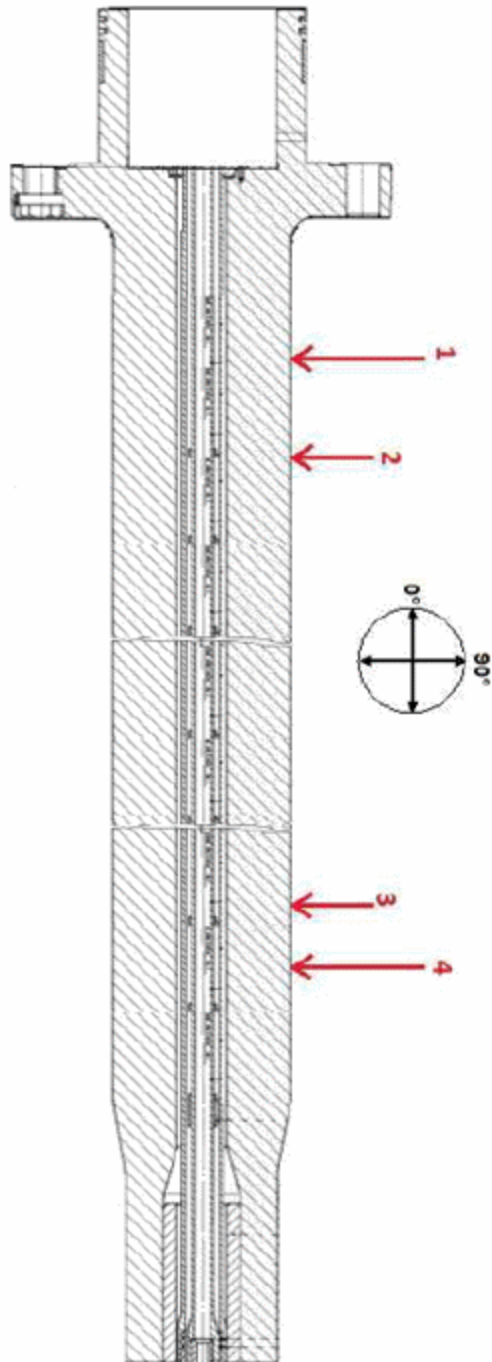
1. Two typewritten copies and one electronic copy in PDF format of all measurement readings obtained must be prepared and turned over to the CGTA.
 - a. Tail shaft measurements
 - b. Stern tube bearing measurements
 - c. Fwd and aft seal liner measurements
 - d. Tail shaft run-out measurements (prior to and upon completion of work)
 - e. Wear down measurements (prior to and upon completion of work)
2. A copy of the NDT reports:
 - a. Tail shaft flange radius
 - b. Propeller blade bolts
 - c. Propeller hub flange bolts
 - d. Propeller blade roots
3. A final copy of the work report from the Wartsila FSR must be submitted to the CGTA.
4. Disposal certificates for the removed oil.
5. Recorded temperatures and pressures of the CPP and stern tube systems during sea trials.

PORT SIDE SHAFT JOURNALS:

Surface Finish

_____ Ra

_____ Ra



Aft

Forward

	1	2				
0°						
90°						

3	4		

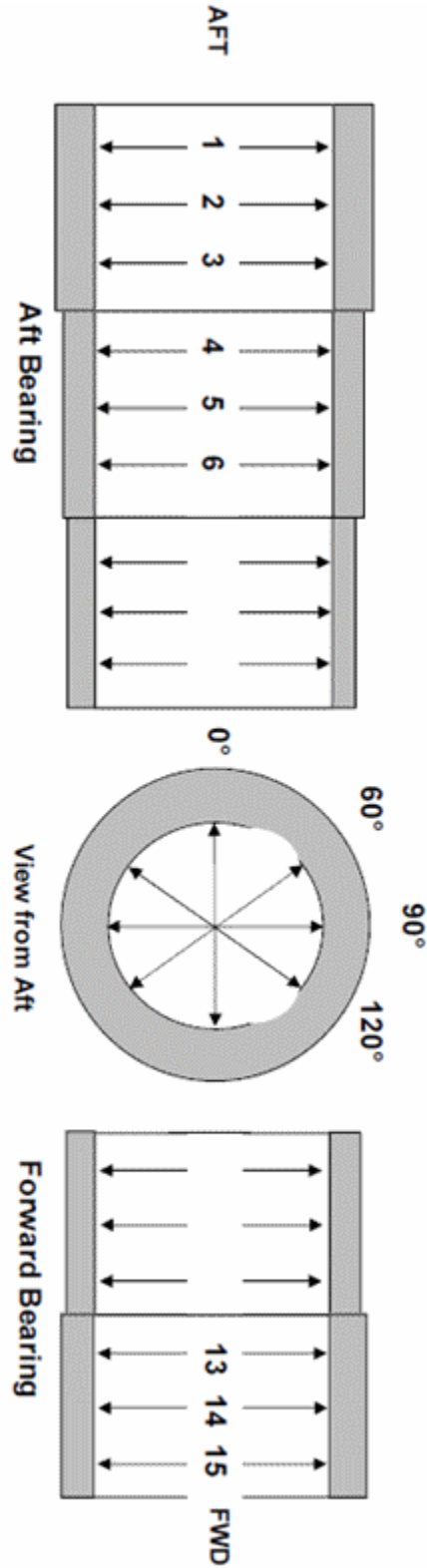
Observations

Wartsila Bearing Fitting Report Twin Screw

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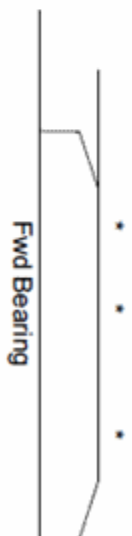
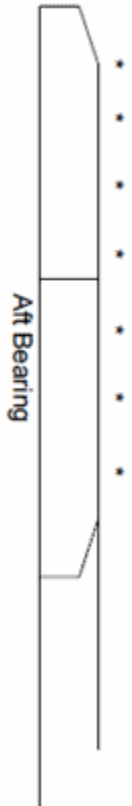
PORT SIDE AS FOUND:



Nominal shaft Diameter						
I/D	Position	1	2	3	4	5
shaft	0°					
	60°					
	90°					
	120°					
Bearing Length	X =	... mm			Y =	... mm

Shaft Dia. mm		
13	14	15
V =	... mm	

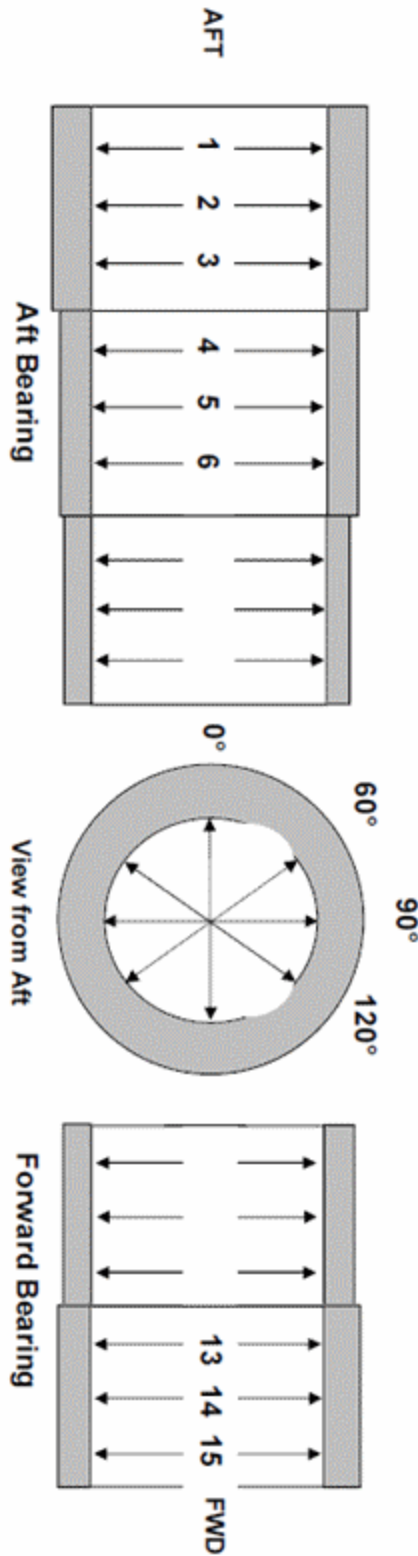
Straight edge check bottom surface:
(enter values if gaps are found at the corresponding position on diagram below)



Wartsila Bearing Fitting Report Twin Screw



STARBOARD SIDE – AS FOUND



I/D	Position	1	2	3	4	5	6
shaft	0°						
	60°						
	90°						
	120°						
Bearing Length	X =	--	mm	Y =	--	mm	

Shaft Dia. mm	13	14	15
V =	--	mm	

Straight edge check bottom surface: :
 (enter values if gaps are found at the corresponding position on diagram below)



Wartsila Bearing Fitting Report Twin Screw

ED-01 PORT & STBD TAIL SHAFT REMOVAL & CPP HUB REFURBISHMENT
(CONTINUED)

5.2 Spares

N/A – INTENTIONALLY LEFT BLANK

5.3 Training

N/A – INTENTIONALLY LEFT BLANK

ED-02 INTENTIONALLY LEFT BLANK

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ED-03 FUEL TANKS SURVEY

PART 1: SCOPE:

The intent of this specification item is for Contractor to open up fuel tanks identified below for cleaning, inspection and testing, as per TCMSS Surveyor requirements and Division 3 report. These tanks are considered to be a confined space under the Coast Guard's Safety Management System and must be treated as such.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. The following fuel tanks must be opened up by Contractor for cleaning, survey and testing to TCMSS Surveyor requirements.

Field	Tank Name	Volume (M ³)
3L032	No. 3 Fuel Oil Tank Port	91.90
3L034	No. 3 Fuel Oil Tank Stbd	91.90
3L035	No. 4 Fuel Oil Tank Port	64.88
3L036	No. 4 Fuel Oil Tank Stbd	64.88
3L005	Day Tank	30.30

2. Prior to commencing any work, Contractor must mechanically/electrically isolate the fuel tanks listed above. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install/remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the Electrical Officer must be in attendance when all locks/tags are removed.
3. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the tank and a copy of each certificate must be posted in a conspicuous location in close proximity to the manhole cover for each tank. Spaces must be tested each day that personnel are required entry in the tanks. Please note DFO/5737 Fleet Safety Manual, 7.B.3 - ENTRY INTO CONFINED SPACES (Entry into Enclosed Spaces).

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ED-03 FUEL TANKS SURVEY (CONTINUED)

4. Ship's crew must pump the fuel tanks down to the suction levels. Contractor must remove the manhole covers from the tanks and remove the residual fuel oil (approximately 2m³) for disposal ashore. Contractor must quote a cost for removal and disposing of 2000 litres from each tank. The bid must also include the cost per litre for removal and disposal for adjustment purposes. The total amount will be adjusted up or down (credit) through PWGSC 1379 action.

Note: Any defective studs shall be renewed as per H-11.

5. If any of the above tanks contain fuel on arrival, Contractor and CGTA must agree upon a sequence for cleaning the tanks prior to commencing the work. Fuel will then be transferred within the ship, by the vessels engineering staff, to give Contractor access to tanks as required. CGTA will provide an estimate of the fuel remaining and which tanks will be available at the start of refit, during the bidders' conference and updated at the pre-refit meeting.
6. Contractor must ensure that the fuel tank level sensors are isolated and protected while tanks are being cleaned and testing is being conducted. Contractor must function test the sensors prior to any work commencing and after work is completed to prove their function as per the original tests.
7. Contractor must thoroughly clean the internal surfaces of the tanks and remove all debris, rust, and scale. In addition, each fuel tank must be high pressure washed (3000 psi) with hot water to ensure that all microbiological contaminants are killed. The required water temperature must be 70 degrees Celsius, minimum. Contractor must supply the hot water source. Hot water from the ship's supply must not be used. All material and liquids remaining in the tank resulting from the cleaning must be removed and disposed of ashore by Contractor. All surfaces must be wiped down using lint free material upon completion of all work to remove excess moisture. Rusty areas must be wire brushed cleaned.
8. After initial cleaning, a visual inspection of tank internals must be performed by Contractor, CGTA and TCMSS Surveyor.
9. Testing requirement will be defined and specified by TCMSS Surveyor upon completion of inspection. Contractor must quote separately, unit cost of hydrostatically test and a unit cost for pressure test of each tank listed and include the cost for each tank (both methods) in their overall bid price. Whichever tests are not used will be adjusted (credited) by PWGSC 1379.
10. Quoted cost of hydrostatic test is to include all necessary requirements of such a test including, but not limited to, closing and sealing of tank, filling, removal and disposal of test water (fresh water), re-opening, ventilating and re-certifying the tank safe for entry, renewal of any disturbed jointing etc. for blanking purposes and return of the tank to a serviceable condition in all respects.

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ED-03 FUEL TANKS SURVEY (CONTINUED)

11. Quote for air test is to assume a test pressure of three (3) psi max and is to include, but not be limited to, all necessary requirements to close and seal tank, supply and connection of suitable pressure monitoring instrument, supply and connection of air supply, removal of test equipment, re-opening, ventilating and re-certifying the tank safe for entry, renewal of any disturbed joining for blanking purposes and returning the tank to a serviceable condition in all respects.
12. Contractor to note that fuel tanks have a common vent/overflow system. Any blanking off of vent/overflow line connections, or modification to the vent lines, to be Contractor's responsibility.
13. Testing the fuel tanks with a head of fuel oil is not acceptable.
14. A final tank inspection is to be carried out by CGTA, TCMSS Surveyor and Contractor before closure.
15. Upon completion of all specified work and inspections, all tanks are to be closed up in good order using new CFM nitrile gaskets on manhole covers and CFM anti-seize compound on fasteners. Any disturbed connections to the tanks must be returned to an in service state with new jointing.
16. All work to be completed to the satisfaction of the CGTA and TCMSS Surveyor.

2.2 LOCATION

Field	Tank Name	Location	Manhole Location
3L032	No. 3 Fuel Oil Tank Port	Fr. 10-16	Port Shaft Tunnel
3L034	No. 3 Fuel Oil Tank Stbd	Fr. 10-16	Stbd shaft Tunnel
3L035	No. 4 Fuel Oil Tank Port	Fr. 5-10	Steering Gear Compt., Port
3L036	No. 4 Fuel Oil Tank Stbd	Fr. 5-10	Steering Gear Compt., Stbd
3L005	Day Tank	Fr. 37-39	Sewage Compartment

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal as approved by CGTA, storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

ED-03 FUEL TANKS SURVEY (CONTINUED)

3.2 STANDARDS AND REGULATIONS

1. As a minimum, the following Coast Guard Standards and/or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - a. Canadian Coast Guard Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
 - c. Coast Guard ISM Confined Space Entry Procedures
 - d. Transport Canada Marine Safety & Security TP 3177E

3.3 OWNER FURNISHED EQUIPMENT

1. Unless otherwise stated, Contractor must provide all materials, labour, and equipment required to perform all tasks identified in this specification.

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor is responsible for coordinating all inspections with TCMSS Surveyor and producing an inspection schedule prior to commencement of work.
2. Contractor must provide the CGTA a minimum of four hours' notice of each inspection, to allow their attendance.
3. Upon completion of all repairs and testing, Contractor and the CGTA will conduct a final inspection and ensure all tanks, covers, vents and piping connections have been returned to operating conditions and the attending Transport Canada surveyor has completed all inspections.

4.2 TESTING

1. The attending TCMSS Surveyor will determine the test method. All tests must be witnessed by attending TCMSS Surveyor and the CGTA.
2. For bidding purposes, Contractor must bid on the pneumatic testing of each individual tank, and provide a unit price for hydrostatic testing each tank. The quote must include the installation and removal of blanks for suction, overflow pipes, removal and blanking vent heads, and blanking additional tank openings. Tank drainage (including the disposal of water and the wiping down of the tank internals) must also be included in this quote.

4.3 CERTIFICATION

1. Contractor is responsible to ensure the TCMSS Surveyor signs off all surveyed tanks in the vessel's Hull and Machinery Survey Record Book and Division 3 report under the field numbers specified above.

ED-03 FUEL TANKS SURVEY (CONTINUED)

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must supply the product data sheets and MSDS sheets on all products used in the course of this work (cleaning, coating, sterilizing and neutralizing).
2. Contractor must provide a copy of all test certificates to CGTA.
3. Safety Management System forms and checklists must be provided to CGTA/Safety Officer.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

L-01 ANNUAL MEGGER TESTING

PART 1: SCOPE:

The intent of this specification item is for Contractor to complete the annual megger survey for the vessel as per regulatory requirement.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor must carry out annual megger testing of all electrical panels and breakers listed at the end of this specification item. Contractor must not megger test circuits with either navigation equipment or electronic components. The generator breakers must have their electronic components isolated before they are meggered.
2. Megger Testing must be carried out within the first week of the vessel refit to allow sufficient time for repairs to any electrical system.
3. Any low readings or defects must be brought to the attention of the CGTA as soon as possible. Repairs must be carried out through PWGSC 1379 action.
4. Two typewritten copies and one electronic copy, in PDF format, of the final results must be given to CGTA upon completion.
5. Note: It is important that CGTA receive the report immediately upon completion of this specification item.
6. All work to be carried out to the satisfaction of the CGTA

2.2 LOCATION

1. Systems are located throughout the vessel; CGTA will identify these locations to Contractor.

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

L-01 ANNUAL MEGGER TESTING (CONTINUED)

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

1. Refer to the list at the end of this specification item.

3.2 STANDARDS AND REGULATIONS

1. TP127E latest edition.
2. Canada Shipping Act 2001 - Machinery Inspection Regulations

3.3 OWNER FURNISHED EQUIPMENT

N/A – INTENTIONALLY LEFT BLANK

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor must ensure the functionality of all equipment disassembled for insulation testing following the completion of the vessels electrical system insulation test and prior to the end of the contract period.

4.2 TESTING

1. Testing of the equipment must be performed in the presence of the CGTA

4.3 Certification

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor must provide to the CGTA:
 - Copies of the ship's megger report in electronic format as well as two typewritten copies.
 - Updated reports for any circuits and/or deficiencies corrected through 1379 action
 - Copies of the survey credit for the inspection and meggering of the vessel's electrical circuits.

L-01 ANNUAL MEGGER TESTING (CONTINUED)

2. Contractor must provide to TCMSS Surveyor:
 - Copy of the updated Megger Report to obtain Survey Credit.
3. Contractor must provide to the CGTA;
 - Copy of the updated Megger report within 24 hours of completion of the work prior to completion of the refit.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

MEGGAR READINGS

ELECTRICAL PANELS AND BREAKERS

CCGS EARL GREY

SEPTEMBER 2017, DRY-DOCKING AND REFIT

C.C.G.S. Earl Gray

Meggar Readings

Date

Panel: Navigation Light Panel 115 Volt

Location: Bridge

Steering Light		Aft Anchor Light	
Forward Anchor Light		Aft Towing Light	
Lower NUC Light		Restricted Maneuver Light	
Upper NUC Light		Lower Fwd Towing Light	
Upper Fwd Towing Light		Stern Light	
After Mast Light		Stbd Side Light	
Port Side Light		Fwd Mast Light	

Panel: Distribution Panel 1M3 115 Volt

Location: Bridge

Port Search Light Heater		Coffee Maker	
Stbd Search Light Heater		Receptacles Telephone	
W/H Recept Stbd Fwd		WheelHouse	
W/H Recept Port Fwd		Recept W/H Top	
Lights W/H Crawlspace		Lights Bridge deck	
Boat Deck Lights		Lights Focsle Deck	
Spare		Heli Bcon Tuner	
Main Deck Lights Port Aft		Focsle Deck Mast Floods	
Main Deck Lights Stbd Aft		Focsle Deck W/h Top	

Panel: Distribution Panel 1E3 115 Volt

Location: Bridge

Gyro Compass		Navigation Radar #2	
Int. Comm System		VHF-FM R/T Set #1 Wing	
VHF-AM R/T Set #1 & #2		Helicopter Beacon	
R/T Alarm Signal		Echo Sounder Stbd	
LF/MF/OF, Rudder Angle		VHF/DF Doppler Log	
2181 Watch Rec, Wind Spd		GPS	
Ice Breaking Siren		Air Whistle	
Tele Exchange Pbex		Eco Sounder Port	
S Band Scanner		Deckhead Digital Gyro	
Cell Phone Recep		Aux Chart Table Recept	

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

Panel: Navigation Aids Panel 1M10 115 Volt

Location: Bridge

Ships Enter System		Sapre	
Prop Sys Rem Con TO Sys		Aft Radar Main Display	
Nav Radar #1		Spare	
TV/AM Antenna System		Loran C	
Aft Looking Radar		VHF-FM R/T Set #2	
W/H Console Recept		Spare	
Spare		HF-SSB R/T Set #2	
Comm Antenna		GRS R/T Set	
Fax System Time Signal		Bow Thruster Control	
Stern Thruster Control		Electric Clock	

Panel: Distribution Panel 1E4 115 Volt

Location: Bridge

W/H Emer Lights		Boat Deck 2 nd Eng.	
Bridge Deck Compass		Foc Deck Pass Stair	
Bridge Deck Compass		Bridge Deck Stbd Aft	
Bridge Deck Compass		Bridge Deck Stbd Mid	
Focsle Deck Work Boat		Bridge Deck Port Aft	
Boat Deck Work Boat		Life Boat Foc Deck	
Sat Tranceiver		Life Boat Boat Deck Port	
PBX UPS		Battery Charger	
Sat C PS		HF PS	

Panel: Distribution Panel 2M5 230 Volt

Location: Bridge

Win Wiper De-icer Port		Win Wiper De-icer Stbd	
Win Wiper De-icer Mid		Win Wiper De-icer Mid	
Win Heaters Port For		Win Heaters Port Aft	
Win Heaters Stbd		Win Heaters Stbd For	
Win Heaters Mid For		Heaters W/H Port For	
Heaters W/H Port Wing		Heaters W/H Stbd For	
Heaters W/H Stbd Wing		Heaters W/H Aft	
Spare		Ctl Pnl Mimic Pnl	
Spare		Dryer Off Washroom	
HVAC W/H Top Aft		HVAC W/H Top For	

Panel: Distribution Panel 1M4 115 Volt

Location: Focsle Deck

Supply Off Senior Eng		Chief Eng Comm Off	
Supply Off Senior Eng		Chief Eng Comm Off	
Chief Off AC Room		Corridor Passage	
Elec Equip Room Batt Rm		Corridor Passage	
Water Cooler		W/H Front Port & Stbd	
Laundry Room Focsle Deck		Am Amplifier Elec Equip	

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Panel: 24 volt Distribution

Location: Electronic Equipment Room

Fire Detection System		Tow Winch Abort	
General Alarm		Fire Door Release	
W/T Door Ind. Panel		Master Clock	
Emer Gen Control Panel		Light on Binnacle	
Quick Close V/V Mimic Pnl		Anschutz Gyro System	

Panel: Distribution Panel 2M1 230 Volt

Location: Boat Deck Stbd.

Elec Rm & Foc Dk Passage		Ch Eng Dayroom	
Foc Dk Chief Off W C		C O Dayroom	
Cadets 2 nd & 3 rd Eng		Supply Off & Sen Eng	
2 Seamen Winchman		2 nd Off Passageway	
2 Q/M Seamen & Q/M		Eng & Log Off Stew Lkr	
Cook/Bosun 2 nd 3 rd Off		Spare	

Panel: Distribution Panel 1M5 115 Volt

Location: Boat Deck Port

Life Boat Davit Heater		Bosun & Cook	
Corridor & Passage		Bosun & Cook	
Corridor & Passage		2 nd Eng & 2 nd Off	
Wman 2 Seaman 2 Q/M		2 nd Eng & 2 nd Off	
Wman 2 Seaman 2 Q/M		2 Cadets 3 rd Eng 3 rd Off	
Stew Lkr Eng & Ship Off		2 Cadets 3 rd Eng 3 rd Off	
Stew Lkr Eng & Ship Off		Gen Strs Void Spt Sys JB	
Open Deck Port & Stbd		Photocopier Recept	
UPS for Computers		Ships Office Computer	

Panel: Distribution Panel 1M9 115 Volt

Location: Galley

Coffee Maker		Food Slicer & Mixer	
Reach In Refer		Heater Mess	
Cold Pan		Garbage Compactor	
Spare		Canteen Refer	
Hot Plate Crews Refer		2 Slice Toaster Crews	
Hot Water Dispensor Off		2 Slice Toaster Off	
Hot Plate Off		D/F Crew/Off Mess	
Coffee maker Off		Milk & Juice Dispensers	
Hot Water Dis Crews Mess		Galley Exhaust Hood	

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Panel: Distribution Panel 1M6 115 Volt

Location: Main Deck Port

2 stew 2 nd Cook/Clerk		Off Mess & Lounge	
2 stew 2 nd Cook/Clerk		Off Mess & Lounge	
2 E/R Watch For W C		Off Mess Projector	
Day Wrk 2 E/R Watch Lkr		Crews Mess Projector	
Winch Laundry Stores		Passage & Corridors	
Aft Dk P QM Port Bosuns		Passage & Corridors	
Aft Dk S QM Stbd Crews		Workshop	
Workshop Canteen		Workshop	

Panel: Distribution Panel 2M2 230 Volt

Location: Main Deck Port

Paint Locker		Off Mess & Central Stairs	
Bosun Stores		Officers Lounge	
Laundry Cleanup		Fem WC 2 Stew 2 Sea 2nd	
Q/M Station Stbd		Cadets Cabin 2 Oilers	
Workshop		Galley	
Crews Lounge		Lavatory Forward	

Panel: Distribution Panel 1E0 115 Volt

Location: Emergency Generator Room

Emer Gen Heaters		Nav Lights Alt Supply	
1E3 to Nav Aids Panel #2		VHF Q/M Station	
E/R Lighting Panel 1E5		Asea battery Charger	
Fire Detection System		1E8 to 24 VDC Distribution	
Spare		W/H Lighting Panel 1E4	

Panel: Emergency Switchboard Main Distribution 600 Volt

Location: Emergency Generator Room

3-15 kva 600/120 Transform		Steering Gear Pump #2	
Spare		Emergency MCC	
Steering Gear Pump #2		Spare	

Panel: Distribution Panel 1M11 115 Volt

Location: Engine Room Auxiliary Flat

Aft Deck Power Pack		For Deck PP Heaters	
Stern Thruster Heaters		Con Power Aft Deck PP	
Cont Power Aft Deck		Con Power Tow Winch	
Tow Winch Heaters		Stbd Shaft Alt Heaters	
Port Shaft Alt Heaters		C2000 Seachest Cath Pro	
For Deck PP Heaters		Con Power For Deck PP	
Therm Fld Trans PP		E/R Gray Water Drains	

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Panel: Distribution Panel 1M7 115 Volt

Location: Control Room

Fan Compartments		S/G Copt Hold Aux Flat	
Lights Boat & Main Deck		S/G Copt Hold Aux Flat	
E/R Port Sewage Com		Feul V/V E/R Stbd Ics Rot	
E/R Port Sew Comp E/R Aft		Under Aux Flat E/r Stbd	
Workshop Recept		Control Room	
Workshop Recept		Mcr Workshop Recept	
Recept Open Deck Stbd		Mcr Recept Under Window	
Recept Open Deck Port		B/T Comp Gen Store	
Asea Console Illum		B/T Comp Stair Pass P & S	
Paint Locker Ex Fan		Spare	

Panel: Distribution Panel 1E5

Location: Control Room

Main Deck Lights		Lower Deck Machinery	
Main Deck Forward		Hold Stern Thr P & S	
Sound Powered Phone		M/C SP E/R Casing W/S	
Steering Gear FARV		Asea Control Console	
Asea Console Receptacles		Asea Control Console	

Panel: Distribution Panel 1M0 115 Volt

Location: Control Room

Nav Lights Main Supply		Dist Panel 1M2 Con Rm	
Lighting Panel W/H 1M3		Lighting Panel Foc Dk 1M4	
Lighting Panel Boat Dk 1M5		Lighting Panel Main Dk	
Lighting Panel E/R 1M7		Spare	
Galley Equipment Panel 1M9		Nav Aids Panel 1M10 W/H	
E/R Dist 1M11 E/R Flat		Spare	

Panel: Distribution Panel 1M2 115 Volt

Location: Control Room

Washer Laundry M/D		Cloths Iron M/D	
Coffee Maker MCR		Hand Dryer Main Deck	
Asea Battery Charger		Control Rm Con 115V Sup	
Control Room Cons		Bow Thr Heater	
Spare		UV Sterilizer and Clourine	
S/S Gen Port Heaters		Washer Laundry	
E/R Space Heater Port		Laundry Cleanup Area Fan	
E/R Space Heater Stbd		Workshop Exh Fan M/D	
Spare		Spare	

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Panel: Distribution Panel 2M0 230 Volt

Location: Control Room

Reheat Panel 2M1		Reheat Panel 2M2 M/D	
Sewage Unit		Old A/C Unit MCR	
Heated Windows Wipers		Bouy Crane Heaters	
SSDG #1 Heater		SSDG #2 Heater	
Emer Gen Block Heater		Incinerator	
Dry Ships Laundry		Electric Heat Tracing	
Crane Base Heater		Sewage Sys Trans PP	
Spare		New A/C MCR	

Panel: Main Distribution Panel 600 Volt

Location: Control Room

M5 3 75 kva Trans		M6 Semi Ess Mcc #1	
M12 Non Ess Mcc #2		M3 Semi Ess Mcc #2	
M13 Ess Mcc #1		Spare	
M14 Ess Mcc #2		M2 Non Ess Mcc #2	
M4 3 37,5 kva Trans		M8 Non Ess Mcc #3	
M11 galley Distribution		M10 Steering Gear #1	
M9 Steering Gear Pump #2		Spare	

Motors

Panel: Motor Control Center

Location: Control Room

#3 M/E Prelube Pump		#3 M/E F/O Boost Pump	
Lower F/O Trans Pump		Out Domestic F/W Pump	
Fresh Water Pump		Upper A/C Cooling Pump	
B/D Accom Fan Slow		B/D Accom Fan Fast	
F/D Accom Fan Slow		F/D Accom Fan Fast	
#4 M/E Prelube Pump		#1 M/E F/O Boost Pump	
Upper F/O Trans Pump		E/G F/O Trans Pump	
Washroom Exh Fan		Lower A/C Cooling Pump	
M/D Accom Fan Slow		M/D Accom Fan Fast	
Galley Exh Fan Slow		Galley Exh Fan Fast	
#1 M/E Prelube Pump		Bildge Pump	
In Domestic F/W Pump		Port Sterntube L/O Pump	
Aft Gearbox Cooling Pump		E/R Exh Fan Port Slow	
E/R Exh Fan Port Fast		#4 M/E F/O Boost Pump	
Port Gearbox Stby L/O		M/E Supply Fan Stbd Slow	
M/E Supply Fan Stbd Fast		E/R Supply Fan Stbd Slow	
E/R Supply Fan Stbd Fast			

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#2 Main Air Comp		#2 M/E Prelube Pump	
General Service Pump		L/O Transfer Pump	
Stbd Sterntube L/O Pump		Foam Pump	
Fwd Gearbox Cooling PP		E/R Exh Fan Stbd Slow	
E/R Exh Fan Stbd Fast		#2 M/E F/O Boost Pump	
Stbd Gearbox L/O Pump		M/E Supply Fan Port Slow	
M/E Supply Fan Port Fast		E/R Supply Fan Port Slow	
E/R Supply Fan Port Fast			
Shaft Turning Gear Port		Sewage Trans Pump	
Sewage Exh Fan Slow		Sewage Exh Fan Fast	
MCR Supply Fan Slow		MCR Supply Fan	
B/T Comp Exh Fan		Chain Locker Bilge Pump	
Jacket Water Trans Pump		Out Sanitary Water Pump	
Stbd Shaft Turning Gear		#1 Hot Water Circ Pump	
#2 Hot Water Circ Pump		In Sanitary Water Pump	
Waste Oil Trans Pump			

Panel: Motor Control Center

Location: Engine Room Auxiliary Flat

#1 Hyd Pump Fwd PP		#2 Hyd Pump Fwd PP	
Hiab Fwd PP		Control Oil Pump Tow	
#1 Hyd Pump Aft PP		#2 Hyd Pump Aft PP	
Stern Thruster Servo #1		Stern Thruster Servo #2	
# 1 Hyd Pump Tow Winch		Bow Thruster Servo Pump	
# 2 Hyd Pump Tow Winch			

Panel: Motor Control Center

Location: Emergency Generator Room

Emer Gen Rad Cooling fan		Emer Fire Pump	
Electric Whistle		Aux Landing Craft	
#1 Main Air Compressor			

Various Motors Throughout Ship

#1 Ship Service Alternator		#2 Ship Service Alternator	
#1 F/O Pur feed Pump		#1 F/O Purifier Motor	
#2 F/O Pur Feed Pump		#2 F/O Purifier Motor	
Thermal FI Boiler Blower		Thermo FI Circ Pump #1	
Thermo FI Circ Pump #2		F/W Dist Pump	
Oily Water Sep Pump		#1 M/E Jcket Water Circ PP	
#2 M/E Jcket Water Circ PP		#3 M/E Jcket Water Circ PP	
#4 M/E Jcket Water Circ PP		L/O Purifier Feed Pump	
L/O Purifier Motor		Port Shaft Generator	
Stbd Shaft Generator		Port CPP System Servo #1	

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Port CPP System Servo #2		Stbd CPP System Servo #1	
Stbd CPP System Servo #2		Stern Thruster	
Port Fwd Steering Pump		Port Aft Steering Pump	
Stbd Fwd Steering Pump		Stbd Aft Steering Pump	
Incinerator Sludge Pump		Lifeboat Davit Winch	
M/D A/C Unit Fan		M/D A/C Unit Compressor	
Refer Comp #1		Refer Comp #2	
Condensor Fan #1		Condensor Fan #1	
Remote Valve Hyd Pump 1		Remote Valve Hyd Pump 2	
Bow Thruster Motor		Bow Thruster Cooling Pump	
Emergency Generator		Bouy Crane Aggr Motor #1	
Bouy Crane Aggr Motor #2		B/D A/C Unit Fan	
B/D A/C unit Compressor		F/D A/C Unit Fan	
F/D A/C unit Compressor		Ice Siren	

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

L-03 BREAKER MAINTENANCE

PART 1: SCOPE:

The intent of this specification item is for Contractor to remove the switchboard breakers for inspection and service by Schneider Electric.

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Contractor to remove the following breakers:

NO.	NAME	PRIMARY (5 YR)	SECONDARY (3 YR)	LOCATION	NOTE
CB-1	Emerg. Gen.	Nov. 2014	Nov. 2012	Emerg. Gen Room	Due for SECONDARY injection
CB-6	#2 S/S	Nov. 2014	June 2012	Main Swbd	Due for SECONDARY injection
CB-9	Stbd Shaft Gen.	Oct. 2012	Oct. 2016	Aft ER swbd	Due for PRIMARY injection
CB-10	Port Shaft Gen to Bus	Oct. 2012	Oct. 2016	Aft ER swbd	Due for PRIMARY injection
CB-11	S. Shaft Gen to Bus	Oct. 2012	Oct. 2016	Aft ER swbd	Due for PRIMARY injection
CB-12	Port Shaft Gen.	Oct. 2012	Oct. 2016	Aft ER swbd	Due for PRIMARY injection
CB-13	Bow Thruster Supply	Oct. 2012	Nov. 2016	Aft ER swbd	Due for PRIMARY injection
CB-14	Stern Thruster Supply	Oct. 2012	Oct. 2016	Aft ER swbd	Due for PRIMARY injection

2. Contractor to ensure that they plan breaker maintenance on a non-interference basis with other spec items requiring ship's power. No claims arising from lack of ships power will be entertained if the cause is breaker maintenance. Contractor shall note that the Vessel will need to go on ship's power while the shore power breaker is removed, the Vessel won't be able to do this while the generator cables are being replaced.
3. Contractor must ensure the breakers are properly tagged as to their locations. Work area must be safely secured prior to the breakers being removed.
4. A time schedule must be worked out with the CGTA, Contractor and Schneider's as to when the breakers will be serviced. As several breakers are required for the operation of the vessel, designated breakers will require work after hours. Contractor to include two evenings (1600 – 2000) in their bid price.

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L-03 BREAKER MAINTENANCE (CONTINUED)

5. Contractor must electrically and mechanically isolate the system to allow the removal of the breakers. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install /remove locks and tags accordingly during the scope of work. CGTA will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the CGTA must be in attendance when all locks/tags are removed.
6. Contractor must include an allowance of \$5,000 to cover the expenses of a Schneider Field Service representative (FSR). This allowance is only for the Schneider FSR expenses, testing, inspection and service of the Breakers. The FSR will be reimbursed for services, authorized travel and living expenses reasonably and properly incurred in the performance of this specified work. The Allowance must form part of the overall bid and will be adjusted through PWGSC 1379 action upon proof of final invoice.

FSR:

Stephen Boutilier

Schneider Electric

3G-110 Chain Lake Drive

Halifax, NS

B3S 1A9

A1N 4N2

E-mail: Stephen.Boutilier@Schneider-Electric.com

Tel: (902) 450-0370

Fax: (859) 334-9910

Mobile: (902) 802-4701

7. Contractor must remove the breakers from the ship and deliver to Schneider Electric (Dartmouth) for inspection, testing and servicing. Contractor must ensure the breakers are protected and secured for transporting, so as not to cause any damage. Contractor is responsible for transportation costs to and from the vessel and must include it in the overall bid. Contractor is responsible for any crane services for removal and reinstallation of the breakers.
8. Upon completion of the specified work performed by Schneider's, the breakers must be transported back to the vessel and re-installed. Contractor must perform a function test in the presence of the Schneider representative.
9. Contractor must obtain test certificates from Schneider's for each breaker and provide the original and 2 copies to the CGTA upon completion of work.
10. All work must be completed to the satisfaction of the CGTA and Schneider's FSR.

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

L-03 BREAKER MAINTENANCE (CONTINUED)

2.2 LOCATION

NO.	NAME	LOCATION
CB-1	Emerg. Gen	Emerg. Gen compartment
CB-6	#2 S/S	Main swbd
CB-7	Shaft Gen Bus Tie	Main swbd
CB-9	Stbd Shaft Gen.	Aft ER swbd
CB-10	Port Shaft Gen to Bus	Aft ER swbd
CB-11	S. Shaft Gen to Bus	Aft ER swbd
CB-12	Port Shaft Gen.	Aft ER swbd
CB-13	Bow Thruster Supply	Aft ER swbd
CB-14	Stern Thruster Supply	Aft ER swbd

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

N/A – INTENTIONALLY LEFT BLANK

3.2 STANDARDS AND REGULATIONS

1. The following Coast Guard Standards and or Technical Bulletins shall be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - Canadian Coast Fleet Safety Manual (DFO 5737)
 - Coast Guard ISM Lock Out/Tag Out Procedures

3.3 OWNER FURNISHED EQUIPMENT

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

L-03 BREAKER MAINTENANCE (CONTINUED)

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. Contractor must remove the breakers from the ship and deliver to Schneider Electric (Dartmouth) for inspection.

4.2 TESTING

1. Contractor must remove the breakers from the ship and deliver to Schneider Electric (Dartmouth) for testing and servicing.
2. FSR shall perform a function test on each breaker upon completion of all work and after reinstallation by Contractor to prove systems operation as per original configuration.

4.3 CERTIFICATION

1. Contractor must obtain test certificates from Schneider's for each breaker and provide the original and 2 copies to the CGTA upon completion of work.

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

N/A – INTENTIONALLY LEFT BLANK

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

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L-04 VARIOUS MOTOR OVERHAULS

PART 1: SCOPE:

The intent of this specification item is for Contractor to remove, open up, inspect, clean, overhaul and re-install the following electric motors listed below;

Motor
Galley Exhaust Fan Motor
Port Fwd Steering Gear Pump Motor
Bilge/Ballast Pump Motor
Aft Gearbox Cooling Water Pump Motor
#1 M/E Pre-lube Pump Motor
#2 M/E Pre-lube Pump Motor
#3 M/E Pre-lube Pump Motor
#4 M/E Pre-lube Pump Motor
Port F/W Tank Circ Pump Motor
Stbd F/W Tank Circ Pump Motor
#1 Hot Water Circ Pump Motor
#2 Hot Water Circ Pump Motor
#1 Domestic Fresh Water Pressure Pump Motor
#2 Domestic Fresh Water Pressure Pump Motor
Miranda davit #1 Motor

PART 2: TECHNICAL DESCRIPTION:

2.1 GENERAL

1. Prior to commencement of work, and upon completion of work, Contractor must take insulation readings (megger) and current readings (both speeds where applicable) on all phases. Contractor must record all readings in a final report and provide two (2) typewritten copies and one (1) electronic copy in PDF format to the CGTA upon completion of work.
2. Contractor to ensure that they plan motor removals on a non-interference basis with other spec items requiring their use. No claims arising from lack of resources will be entertained if the cause is motor maintenance.

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L-04 VARIOUS MOTOR OVERHAULS (CONTINUED)

3. Contractor must electrically and mechanically isolate the motors, fan units and pump systems to allow the removal of the motors. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor must install /remove locks and tags accordingly during the scope of work. CGTA will assist Contractor in identifying the locations to perform the lock outs, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the CGTA must be in attendance when all locks/tags are removed.
4. Each pump / fan motor must be disconnected electrically, unbolted from its respective base / fan casing, and transported to Contractor's facilities for servicing. Contractor must take care to note the use of any alignment shimming materials and record / identify their respective locations.
5. Where required, Contractor must ensure that the lower pump shaft is secured /locked in place before removing the motor to protect the pump seal. All fasteners and weights (washers, etc.) must be marked for location for re-installation in the exact same location when the motor is re-installed.
6. All motors must be disassembled, cleaned and inspected at Contractor's facility. Bearing housings must be measured for wear. Rotors must be checked for loose bars, shafts for trueness and balanced. Seals renewed where fitted. Condition of the end bells and of key ways noted/recorded. All readings must be recorded in a final report, two (2) typewritten copies and one electronic copy in PDF format shall be submitted upon completion of all work to the CGTA. Stators and motor windings must be steam cleaned and air dried. Motor windings must be dip insulating epoxy / varnish that are compatible with the existing coating. Windings must be baked dry. Each motor must be reassembled with new CFM bearings.
7. Motors must be bench tested prior to their installation of the vessel.
8. While carrying out work in-situ, Contractor must take extra safety precautions against letting debris, tools, equipment, etc. from falling through to the decks below. The work site must be kept in a clean and tidy manner.
9. Contractor must take air gap measurements between each unit fan blades and fan casing prior to the removal of each fan unit and upon completion of reinstallation of each unit. Contractor must provide a final report, two (2) typewritten copies and one (1) electronic copy in PDF format of all measurements to the CGTA upon completion of all work.
10. The internals of the ventilation boxes must be vacuumed cleaned of all debris on the air inlet side of the fan tube. Ventilation boxes will be inspected for metal fatigue by CGTA. Contractor must fabricate and install coverings in the ducting while the ventilation fan motors have been removed.

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L-04 VARIOUS MOTOR OVERHAULS (CONTINUED)

11. For fan motor(s), fan blades must be inspected for wear and damage. Fan blades must be cleaned and reinstalled on motor. Fan shall be run and balanced dynamically. Contractor is responsible for removal of any ducting required to remove the fan motors. On completion of the motor work, fans must be fitted back in place and the ducting reinstalled. New CFM gaskets to be fitted.
12. For fan housing and tube, disturbed areas must be power tooled cleaned. All areas must receive 2 coats of Devco Bar-Rust 235 and 2 topcoats of Devcon 229 H white or equivalent coating approved by CGTA. All coatings are CFM. Contractor must allow suitable curing times between coats.
13. Contractor is responsible for all crange and transport of the motors from and to the vessel.
14. Each motor and fan casing must be reassembled and reinstalled in their respective locations with new CFM fasteners, spacers and gaskets (where install as per original configuration). Motor and pump alignment must be checked and made good.
15. Upon completion of all work, each motor must be operationally tested with its associated pump and fan. Vibration readings must be taken and recorded in a final report, two (2) typewritten report and one (1) electronic copy shall be given to the CGTA. Any further balancing must be carried out in situ.
16. All work shall be completed to the satisfaction of the CGTA

2.2 LOCATION

1. Motor are situated in various locations throughout the vessel.

MOTOR	LOCATION
Galley Exhaust Fan Motor	Exterior Boat Deck Port
Port Fwd Steering Gear Pump Motor	Steering Gear Compartment
Bilge/Ballast Pump Motor	Engineroom, stbd
Aft Gearbox Cooling Water Pump Motor	Engineroom, aft
#1 Main Engine Pre-lube Pump Motor	Engineroom, port
#2 Main Engine Pre-lube Pump Motor	Engineroom, port
#3 Main Engine Pre-lube Pump Motor	Engineroom, stbd
#4 Main Engine Pre-lube Pump Motor	Engineroom, stbd
Port Fresh Water Tank Circ Pump Motor	Engineroom, port
Stbd Fresh Water Tank Circ Pump Motor	Engineroom, stbd
#1 Hot Water Circ Pump Motor	Domestic Machinery Space
#2 Hot Water Circ Pump Motor	Domestic Machinery Space
#1 Domestic Fresh Water Pressure Pump Motor	Engineroom, Port
#2 Domestic Fresh Water Pressure Pump Motor	Engineroom, Port
Miranda davit #1 Motor	Boat Deck, Port Exterior, At Miranda Davit

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L-04 VARIOUS MOTOR OVERHAULS (CONTINUED)

2.3 INTERFERENCES

1. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

PART 3: REFERENCES:

3.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

	Galley Exhaust Fan Motor	Port Fwd Steering Gear Pump Motor	Bilge & Ballast Pump Motor
Location	Boat Deck, Exterior Port	Steering Gear Compt., port	Engineroom, port
Manufacturer	Canadian Blower	Baldor	Brook Crompton
Type	EEMAC B Marine Motor	ECP2334T-5	
Model		090371Y638	P-192-C3
Serial		Z1406190090	
Frame	145T	256 T	D200LXD
Insulation		Class F	Class F
HP	2 hp	20 hp	30 kW
Volts	575V	575V / 60Hz / 3ph	575V
Amp		19.2A	38A
Rpm	3600	1755 rpm	1765 rpm
Fan size	15"		

	Aft Gearbox Cooling Water Pump Motor	#1 Main Engine Pre-Lube Pump Motor	#2 Main Engine Pre-Lube Pump Motor
Location	Engineroom, aft center	Engineroom, port	Engineroom, port
Manufacturer	C.G.E.	Etech	Etech
Type		N-BFHN1	N-BFHN1
Model		6320535	6320535
Serial	BE24043501	NB4072-1	NB4072-2
Frame	D1325D		
Insulation	Class F	Class F	
HP	6 kW	1.4 kW	1.4 kW
Volts	575V	575V	575V
Amp	8.8A	2.4A	2.4A
Rpm	1350 rpm	1725 rpm	1725 rpm
Fan size			

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L-04 VARIOUS MOTOR OVERHAULS (CONTINUED)

	#3 Main Engine Pre-Lube Pump Motor	#4 Main Engine Pre-Lube Pump Motor	Port Fresh Water Tank Circ Pump Motor
Location	Engineroom, stbd	Engineroom, stbd	Engineroom, port
Manufacturer	Etatech	Etatech	WEG
Type	N-BFHN1	N-BFHN1	
Model	6320535	6320535	
Serial	NB4072-3	NB4072-8	
Frame			B56C
Insulation			
HP	1.4 kW	1.4 kW	0.75 hp
Volts	575V	575V	575V
Amp	2.4A	2.4A	0.88A
Rpm	1725 rpm	1725 rpm	3440 rpm
Fan size			

	Stbd Fresh Water Tank Circ Pump Motor	#1 Hot Water Circ Pump Motor	#2 Hot Water Circ Pump Motor
Location	Engineroom, stbd	Domestic Machinery Space	Domestic Machinery Space
Manufacturer	WEG	US Electric Motors	US Electric Motors
Type		Unimount 125 Type UT	Unimount 125 Type UT
Model		P63CRA-2888	P63CRA-2888
Serial		M89-7	M89-7
Frame	B56C	56C	56C
Insulation		Class F2	Class F2
HP	0.75 hp	¾ hp	¾ hp
Volts	575V	575V	575V
Amp	0.88A	1.25A	1.25A
Rpm	3440 rpm	1750 rpm	1750 rpm
Fan size			

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L-04 VARIOUS MOTOR OVERHAULS (CONTINUED)

	#1 Domestic Fresh Water Pressure Pump Motor	#2 Domestic Fresh Water Pressure Pump Motor	Miranda davit #1 Motor
Location	Engineroom, Port	Engineroom, Port	Boat Deck, Port Exterior
Manufacturer	Brook Crompton	Brook Crompton	Rotor
Type	DP	DP	
Model			071743 IC411 IM2001
Serial	X996943	X996944	5RN225S04A0
Frame	3KL 184T	3KL 184T	IP56
Insulation	Class F	Class F	Class F
HP	3 hp	3 hp	42.5 kW
Volts	575V	575V	575V
Amp	3.3A	3.3A	53.5A
Rpm	1740 rpm	1740 rpm	1770 rpm
Fan size			

3.2 STANDARDS AND REGULATIONS

1. The following Coast Guard Standards and or Technical Bulletins shall be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - Canadian Coast Fleet Safety Manual (DFO 5737)
 - Coast Guard ISM Lock Out/Tag Out Procedures

3.3 OWNER FURNISHED EQUIPMENT

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

PART 4: PROOF OF PERFORMANCE:

4.1 INSPECTION

1. All motors shall be disassembled for cleaning and inspection at Contractor's facility. Contractor shall notify the CGTA when the motors are ready for inspection so as to allow the CGTA an opportunity to view each motor.

4.2 TESTING

1. Prior to commencement of work, and upon completion of work, Contractor shall take insulation readings and current readings (both speeds where applicable) on all phases.
2. Upon completion of all work, each motor shall be operationally tested with its associated pump and fan.

L-04 VARIOUS MOTOR OVERHAULS (CONTINUED)

4.3 CERTIFICATION

N/A – INTENTIONALLY LEFT BLANK

PART 5: DELIVERABLES:

5.1 REPORTS, DRAWINGS, AND MANUALS

1. Contractor shall supply two (2) typewritten reports and one (1) electronic copy in PDF format upon completion of all work. The report shall at a minimum list all work undertaken, repairs, parts used, results, measurements, readings, recommendations, etc. Copies of the report shall be provided to the CGTA within 24 hours of the completed work.
2. Safety Management System forms and checklists.
3. Transport Canada Survey credit.

5.2 SPARES

N/A – INTENTIONALLY LEFT BLANK

5.3 TRAINING

N/A – INTENTIONALLY LEFT BLANK

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION

T1-1 Scope

The intent of this specification is to replace the current Bridgemaster Radar system and the ECPINS electronic charting system on board the CCGS Earl Grey with an integrated system made by Furuno.

T1-2 Reference Drawings and Documents

Existing Radar and Electronic Chart Precise Integrated Navigation System (ECPINS) drawings (Reference for Removal):

- Dwg. MM678-001-GA (Vessel General Arrangement)
- Dwg. MM678-018-AD (Masts)
- Dwg. MM678-019-BD Sheets 1-3 (X-band and S-band Radar System)
- Dwg. MM678-025-WD (Racal/Decca Aft looking Radar)
- Dwg. MM678-064-WD (Fiber Optic Gyro Navigat 3000)
- Dwg. MM678-033-WD (ECPINS)
- Dwg. MM678-046-Existing (AIS DGPS Distribution and Wiring Diagram)

New Furuno Radar and ECDIS drawings (Reference for Installation):

- Dwg. MM678-073-WD Sheet 1-2 (Furuno Radar and ECDIS)
- Dwg. MM678-050-BD (Bridge Remote Monitors)
- Dwg. 17050-325 (Radar Mounts)
- Dwg. MM678-064-WD (Fiber Optic Gyro Navigat 3000)
- Dwg. MM678-063-WD (ELAC ES5100 ECHO SOUNDER)
- Dwg. MM678-043-WD (Automatic Identification System)
- Dwg. MM678-046-WD (AIS DGPS Distribution and Wiring Diagram)
- Dwg. MM678-062-WD (Naviknot 450D Speed Log)
- Dwg. MM678-033-WD (ECPINS)
- Dwg. MM678-042-BD (Track Plot feed)
- Dwg. MM678-057-BD (IMIC3)
- Dwg. MM678-017-FP (Wheelhouse Arrangement floor plan)

Manuals and Documents

- Earl Grey Radar Mounts Replacement
- IME36240E_FAR3320W
- IME36180E_FAR3230S
- IME36160E_FAR3210
- TIE00160B_1 Installation Handbook
- IME44730F_FMD3200_3300

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

T1-3 Standards

Fleet Safety and Security Manual (DFO/5737)

TP127 – Ship's Electrical Standards

IEEE 45:2002 – Recommended Practice for Electrical Installation on Ships

Specification for the Installation of Shipboard Electronic Equipment (70-000-000-EU-JA-001)

T1-4 Regulations

Canada Shipping Act, 2001

T1-5 Removal of Bridgemaster E Radar system and ECPINS

X & S Band Scanner Units

The S-Band scanner is located on the lower radar platform of the main mast, before any work is performed the power to the S-Band system and scanner must be isolated and locked out. The S-Band system and scanner is fed from panel 1E3 on the bridge, Breaker 17. Open and lock out Breaker 17. The S-Band Transceiver is fed from panel 1M10 Breaker 5, this must be opened and locked out. Disconnect the RF coaxial cable from the scanner. Refer to drawing MM678-019-BD, disconnect the cables listed in table 1 and remove the S-Band scanner, Antenna and coaxial RF cable. Locate the S-Band Antenna rotation safety switch, disconnect cables RDR-B-TUE1 and RDR-B-TUE from the switch and remove the cables and switch. Refer to drawing MM678-018-AD for S-band scanner location on mast.

Table 1 S-Band Scanner

Cable label	Scanner connector
RDR-B-AC4	TSH
RDR-B-PMB	TSC
RDR-B-PMT	SKP

The X-Band scanner is located on the upper radar platform of the main mast, before any work is performed the power to the X-Band system and scanner must be isolated and locked out. The X-Band system and scanner is fed from panel 1E3 on the Bridge, Breaker 2. Open and lock out Breaker 2. Disconnect the RF waveguide from the scanner, do not remove the waveguide as it will be inspected, repaired if required and used with the new system. Refer to drawing MM678-019-BD, disconnect the cables listed in table 2 and remove the X-Band scanner and Antenna. Locate the X-Band Antenna rotation safety switch, disconnect cables RDR-A-MOT and RDR-A-MOT1 from the switch and remove the cables and switch. Refer to drawing MM678-018-AD for X-band scanner location on mast.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

Table 2 X-Band Scanner

Cable label	Scanner connector
RDR-A-MOT1	TSA
RDR-A-PMB	TSC
RDR-A-PMT	SKP
RDR-A-TUE	TSB

X & S Band Transceivers and Inter-switch

The S-Band transceiver is located on the Bridge on the forward side of the Navigation console in the Radar closet. Before any work is performed the power to the S-Band system must be isolated and locked out. The S-Band system and scanner is fed from panel 1M10 on the bridge, Breaker 5. Open and lock out Breaker 5. Disconnect the RF coaxial cable from the transceiver and directional coupler. Refer to drawing MM678-019-BD, disconnect the cables listed in table 3 and remove the S-Band transceiver. The Directional coupler will be removed but will be retained as it will be reused with the new system. Do not remove cable RDR-B-AC2 this will be reused.

Figure 1: Radar Closet



Table 3 S-Band Transceiver

Cable label	Transceiver connector
RDR-B-AC3	TSE
RDR-B-DAT3	TSB
RDR-B-PMB	TSC
RDR-B-PMT	SKP
RDR-B-TUE	TSB
RDR-B-VD1	SKV

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

The S-band scanner control unit located on the bridge directly below the radar transceivers, it is to be removed. Disconnect and remove cables RDR-B-TUE and RDR-B-AC4 from the unit and remove the scanner control unit. Cable RDR-B-AC5 will not be removed, it is to be installed in an outlet box and terminated to a receptacle.

The X-Band transceiver is located on the Bridge on the forward side of the Navigation console in the Radar closet. Before any work is performed the power to the X-Band system must be isolated and locked out. The X-Band system and scanner is fed from panel 1E3 on the bridge, Breaker 3. Open and lock out Breaker 3. Disconnect the rigid RF waveguide from the transceiver. Refer to drawing MM678-019-BD, disconnect the cables listed in table 4 and remove the X-Band transceiver. The Directional coupler, rigid waveguide including the WR-112 twist will be retained as it will be reused with the new system. The waveguide WR-112 to WR-90 transition connected directly to the output of the X band transceiver will be removed. Do not remove cable RDR-A-AC2 this will be reused.

Table 4 X-Band Transceiver

Cable label	Transceiver connector
RDR-A-AC2	TSE
RDR-A-DAT3	TSB
RDR-A-PMB	TSC
RDR-A-PMT	SKP
RDR-A-TUE	TSB
RDR-A-VD1	SKV
RDR-A-MOT	TSA

The 2 X 4 way Inter-switch is mounted on the Bridge on the forward side of the Navigation console in the Radar closet directly above the S-band transceiver. Refer to drawing MM678-019-BD, disconnect and remove the cables listed in table 5 and remove the Inter-switch.

Table 5 Inter-switch

Cable label	Inter-switch connector	System
RDR-A-DAT3	TSTA	X-BAND
RDR-A-VID1	SKTA	X-BAND
RDR-A-TRIG	SKMA	X-BAND
RDR-A-VID	SKVA	X-BAND
RDR-A-DAT2	TSDA	X-BAND
RDR-A-DAT1	TSSA	X-BAND
RDR-B-DAT3	TSTB	S-BAND
RDR-B-VID1	SKTB	S-BAND
RDR-B-TRIG	SKMB	S-BAND
RDR-B-VID	SKVB	S-BAND
RDR-B-DAT2	TSDB	S-BAND
RDR-B-DAT1	TSSB	S-BAND

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

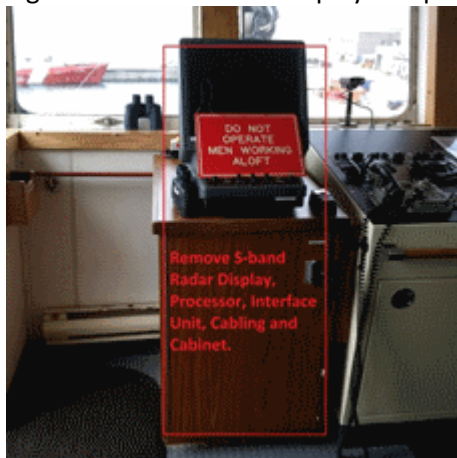
X & S Band Display and Processor Pedestals and associated equipment

The BridgeMaster X and S band Display and Processor Pedestals, monitors, associated equipment and cabling must be removed. The S-Band Radar display and processor unit is located forward on the bridge on the port side of the command steering station. Disconnect the cables listed in Table 6 and remove the Monitor, Processor, Interface unit and the cabinet the S-band display unit is mounted on. The isolation switch and connected AC cabling located behind the S- band display must not be removed, it will be uninstalled from the Radar cabinet prior to its removal and kept for installation once the new S-band pedestal is installed. Disconnect RDR-B-AC3 from the processor and display unit but do not remove the cable. Cables GYC-17, SPDLOG, AIS-23, IMIC3-ARPA-S and RDR-B-GPS must not be removed, they will be retained for installation with the new system. Figure 2 shows the location of the S-band cabinet and S-band display and processor unit.

Table 6 S-Band Pedestal

Cable label	S band system connector
SPDLOG (DL-12)	TSD
GYC-17	TSC
RDR-B-GPS	TSH
AIS-23	TSJ
RDR-B-AC3	TSP
IMIC3-ARPA-S	TSK
RDR-B-TRIG	SKM
RDR-B-VD	SKV
RDR-B-DAT2	TSA
RDR-B-DAT1	TSB

Figure 2: S-band Radar display and processor unit



T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

The X-Band radar display and processor is mounted on the STBD side of the chart table, disconnect the cables listed in Table 7 and remove the Monitor, processor and Interface unit. The isolation switch and connected AC cabling located behind the X-band display is to be left in place and reused with the new system. Disconnect RDR-A-AC3 from the processor and display unit but do not remove the cable. Cables GYC-17, SPDLOG, SC-18, RDR-M1 and RDR-B-GPS will be uninstalled from the X-band display and processor unit and retained for installation with the new system. Figure 3 shows the location of the X-band display and processor unit.

Figure 3: X-band display and processor unit



Table 7 X-Band Pedestal

Cable label	X band system connector
GYC-17	TSC
SPDLOG (DL-9)	TSD
RDR-B-GPS	TSH
SC-18	TSK
RDR-M1	SKW
RDR-A-AC3	TSP
RDR-A-TRIG	SKM
RDR-A-VID	SKV
RDR-A-DAT2	TSA
RDR-A-DAT1	TSB

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

Aft Facing X-band radar

The Aft facing X-band Radar display unit, processor unit, pedestal and interface unit are located on the port side of the bridge on the STBD side of the Port ship control station. Before work is performed the power to the aft facing X-Band system must be isolated and locked out. The X-Band system and scanner is fed from panel 2 1M10 on the bridge, Breaker 4. Open and lock out Breaker 4. Disconnect the cables listed in Table 8 and remove the Monitor, Processor, Interface unit and turning unit complete with 4 foot antenna. The scanner safety switch located on the fire monitor platform beside the ladder must be removed including the connecting cable AR-5. The aft facing radar power isolation switch and connected AC cabling mounted on the aft facing radar Display and Processor pedestal is to be left in place and reused with the new system. Disconnect cable AR2 from the processor and display unit but do not remove the cable. The A/C feed cable from Panel 2 1M10 Breaker 4 will be retained for use with the new system. Cables GYRO, SPLOG, AIS-25, GPS, RM-2 and AR2 will be disconnected from the X-band display and processor unit and retained for installation with the new system. Refer to drawing MM678-025-WD for cable disconnections and labelling. Refer to drawing MM678-001-AD for the location of the aft X-Band scanner and antenna. Figure 4 shows the location of the Aft facing X-band pedestal and display and processor unit.

Table 8 X-Band Aft facing radar system

Cable label	Aft X band radar system connectors
GYRO	TSC (processor)
SPLOG	TSD (processor)
GPS	TSH (Interface unit)
AR2	TSP (processor)
RM-2	SKW
AR1	TSE (scanner unit)
AR-3	TSA (processor) TSB (scanner unit)
AR-3	SKV (processor and scanner unit)
RDR-B-SKY	SKY (processor) TSK(Interface unit)
AR-5	Scanner Safety switch
AIS-25	TSJ (Interface unit)

Figure 4: Aft facing X-band Radar Display and Processor unit and Pedestal

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**



Electronic Chart Precise Integrated Navigation System (ECPINS)

The ECPINS system must be removed, the console is located to the STBD side of the Chart table. The cabinet and all associated equipment and cabling is to be removed, refer to drawing MM678-033-WD. The wind speed feed to the ECPINS from the STBD Young 0626 Marine wind tracker will not be removed. This cable is labelled WND-ECDIS, it will be disconnected from the RS232-422 converter installed in the rear of the ECPINS rack and retained for use with the new ECDIS. Figure 5 shows the location of the ECPINS cabinet. Refer to drawing MM678-033-WD for the removal of the ECPINS.

Figure 5: ECPINS System and Cabinet



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T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Cable Removals

The following cables are to be removed. Refer to drawings MM678-019-BD, MM678-025-WD and MM678-064-WD, the following cables must be removed.

CABLE LABEL	CABLE TYPE	FROM	TO
RDR-B-TUE1	14/3	S-Band Antenna rotation safety switch, located on the Mast.	Scanner Control unit located on aft bulkhead on bridge.
RDR-B-AC4	12/3	S-Band Scanner unit located on the Main Mast, connector TSH.	Scanner Control unit located on aft bulkhead on bridge.
RDR-B-PMB	9261	S-Band Scanner unit located on the Main Mast, connector TSC.	S-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSC.
RDR-B-PMT	89259	S-Band Scanner unit located on the Main Mast, connector SKP.	S-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector SKP.
RDR-B-DAT3	9514	S-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSB.	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector TSTB.
RDR-B-TUE	9318	S-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSB.	Scanner Control unit on the bridge, aft bulkhead.
RDR-B-VID1	82259	S-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector SKV.	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector SKTB.
RDR-B-TRIG	82259	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector SKMB.	Bridgemaster E display 250 PORT side of the bridge, connector SKM.
RDR-B-VID	82259	Interswitch located on the port side of the S-band Radar Pedestal, connector SKVB.	Bridgemaster E display 250 PORT side of the bridge, connector SKV.
RDR-B-DAT2	9514	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector TSDB.	Bridgemaster E display 250 PORT side of the bridge, connector TSA.
RDR-B-DAT1	9514	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector TSSB.	Bridgemaster E display 250 PORT side of the bridge, connector TSB.
RDR-A-MOT1	9312	X-Band Antenna rotation safety switch.	X-Band Scanner unit located on the Main Mast, connector TSA.
RDR-A-MOT	9312	X-Band Antenna rotation safety switch.	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSA.
RDR-A-PMB	9261	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSC.	X-Band Scanner unit located on the Main Mast, connector TSC.
RDR-A-PMT	89259	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector SKP.	X-Band Scanner unit located on the Main Mast, connector SKP.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
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RDR-A-TUE	9318	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSB.	X-Band Scanner unit located on the Main Mast, connector TSB.
RDR-A-DAT3	9514	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSB.	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector TSTA.
RDR-A-AC2	14/3	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector TSE.	Radar Isolation switch located inside the X-band radar pedestal on the bridge.
RDR-A-VD1	82259	X-Band Bulkhead Transceiver unit located in A/C hut on bridge top, connector SKV.	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector SKTA.
RDR-A-TRIG	82259	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector SKMA.	Bridgemaster E display 250 STBD side of the bridge, connector SKM.
RDR-A-VID	82259	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector SKVA.	Bridgemaster E display 250 STBD side of the bridge, connector SKV.
RDR-A-DAT2	9514	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector TSDA.	Bridgemaster E display 250 STBD side of the bridge, connector TSA.
RDR-A-DAT1	9514	Interswitch located on bridge, port side of the S-band Radar Pedestal, connector TSSA.	Bridgemaster E display 250 STBD side of the bridge, connector TSB.
AR1	14/3	Aft Radar Isolation switch	Aft Radar Scanner unit connector TSE
AR-3	9388	Aft Radar Display and Processor unit connector TSA	Aft Radar Scanner unit connector TSB
AR-3	Belden 89259	Aft Radar Display and Processor unit connector SKV	Aft Radar Scanner unit connector SKV
RDR-B-SKY		Aft Radar Display and Processor unit connector SKY	Aft Radar Interface unit connector TSK
AR-5	9218	Aft Radar Scanner safety switch located beside the ladder leading to the fire monitor platform.	Aft Radar Scanner unit connector PLZA
GYC-6	BASC 14/6	Sperry Booster AW132-049 located in electronics room OUT2, L4.	AFT 10KW X-band radar located PORT side of bridge connector TSC.
GYC-8	ALPHA 3SH.TW.PR.#16 AWG	Sperry Booster AW132-049 located in electronics room OUT2, L5.	X-band radar located on Chart table connector TSC.
GYC-10-1		Gyro JB located inside Bridge FWD console STBD side.	JB located in S-band radar cabinet FWD on bridge.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
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GYC-17		JB located in S-band radar cabinet FWD on bridge.	S-Band radar display located FWD on bridge connector TSC
EC-12		Distribution Unit 13B-074 located in electronics room, connector L7.	ECPINS cabinet located to STBD side on Chart table, SIU TB2 Port 2.
S-Band Waveguide	AVA5-50	S-Band Directional Coupler RF output located on the bridge in the Radar closet.	S-band Scanner unit RF input located on the lower platform of the Main Mast.

T1-6 Disposal and Care / Custody of removed equipment

All removed equipment must be returned to the Canadian Coast Guard (CCG) upon completion of this installation. All removed cables are to be properly disposed of.

T1-7 Furuno Radar and Electronic Chart Display and Information system (ECDIS) Installation

X & S Radar Antenna unit pedestals

The existing Radar pedestals including cable transits and cable supports on the main mast for the X and S band Antenna units must be modified and or replaced as per the provided installation specification and drawing (DWG # 17050-325) provided by EYE Marine Consultants. The existing radar pedestal including cable transits and cable supports on the Fire Monitor Platform for the 10KW aft facing X-band scanner unit must be modified and or replaced as per the provided installation specification (Earl Grey Radar Mounts Replacement) and drawing (DWG # 17050-325) provided by EYE Marine Consultants. The contractor is responsible to provide all required materials for the construction, assembly and finishing of the pedestals. The Pedestals will be finished (Primed and Painted) to match their surroundings.

Radar Antenna units installation

X-band Antenna RSB-130N unit installation

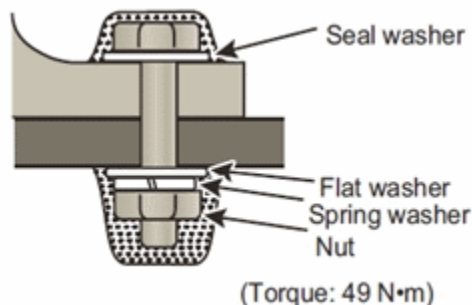
Install the 25KW X-band system Antenna unit P/N: RSB-130N including 6.5 foot antenna P/N: XN20CF/6.5 on the upper radar platform of the main mast on the newly constructed pedestal. The Antenna unit will be fixed to the pedestal using four M12 hex bolts complete with nuts, flat washers and lock washers. The mounting bolts must be installed facing down otherwise they may interfere with the removal of the Antenna units cover. The mounting hardware must be torqued to 49 Nm. The bow mark on the Antenna unit must be facing the bow and must be aligned with the centerline of the ship. An X-band Radar power Isolation Switch will be installed on the Main Mast at the base of the upper Radar platform where the existing Bridgemaster X-Band Antenna rotation safety switch had been located. The waveguide flange on the RSB-130N is in a different location then on the existing Bridgemaster unit. The existing waveguide shall be modified and may have sections added or removed as required for connection to the Furuno Antenna unit. Once the modifications are complete the waveguide must be pressure tested to ensure no leaks are present.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

The waveguide will be sealed at each end using pressure windows, the pressure in the waveguide will be raised to 5p.s.i. Ensure that the pressure doesn't drop below 4p.s.i. within 4 hours. If leaks are found they must be repaired and the pressure test must be performed until successful. All waveguide clamps and supports must be inspected and repaired or replaced as required. See Furuno Chart Radar Installation Manual document IME36240E_FAR3320W sections 1.1.1 and 1.1.2 for specific instructions for assembling, hoisting and mounting the Antenna unit. The Antenna unit must be installed as per the manufactures recommendations.

S-band Antenna unit RSB-131N installation

Install the 30KW S-band system Antenna unit P/N: RSB-131N including 12 foot antenna P/N: SCN36CF on the lower radar platform on the main mast on the newly constructed pedestal. The Antenna unit will be fixed to the pedestal using eight stainless steel M12 hex bolts complete with nuts, flat washers and lock washers. The mounting hardware must be torqued to 49 Nm. The bow mark on the Antenna unit must be facing the bow and must be aligned with the centerline of the ship. An S-band Radar power Isolation Switch will be installed on the Main Mast at the base of the lower Radar platform where the existing Bridgemaster S-Band Antenna rotation safety switch had been located. See Furuno Chart Radar Installation Manual document IME36180E_FAR3230S section 1.1 and subsections for specific instructions for assembling, hoisting and mounting the antenna unit. The Antenna unit must be installed as per the manufactures recommendations.



X-band aft facing Antenna unit RSB-128 installation

Install the 12KW aft facing X-band system Antenna unit P/N: RSB-128 including 4 foot antenna P/N: XN20CF/4 on the aft edge of the fire monitor platform on the newly constructed pedestal. The Antenna unit will be fixed to the pedestal using four M12 hex bolts, nuts, flat washers and lock washers. The mounting bolts must be installed facing down otherwise they may interfere with the removal of the Antenna units cover. The mounting hardware must be torqued to 49 Nm. The bow mark on the Antenna unit must be facing the bow and must be aligned with the centerline of the ship. An Aft Radar power Isolation Switch will be installed on the Port side of the ladder leading to the Fire Monitor platform where the existing Bridgemaster Scanner Safety switch had been located. See Furuno Chart Radar Installation Manual document IME36160E_FAR3210 sections 1.1 for specific instructions for assembling, hoisting and mounting the Antenna unit. The Antenna unit must be installed as per the manufactures recommendations.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

X & S Radar and ECDIS display and processor pedestal mounting bases

The Bridgemaster S-band Radar display and processor unit is mounted on a cabinet to the PORT side of the Command steering station. The Bridgemaster Aft facing X-band Radar display and processor unit is mounted on a pedestal located on the STBD side of the Port Ship control station. The ECPINS system is mounted in a cabinet to the STBD side of the Chart table. These three pedestals or cabinets must be removed as per section 5.1.1 of this document. Refer to floor plan drawing MM678-017-FP for the pedestal locations.

The provided Furuno Radar display and processor pedestals will be installed on the bridge in the 3 locations the above mentioned cabinets and pedestals were removed from. Bases must be fabricated and installed on the bridge deck for the mounting of each pedestal. The mounting base will be of welded steel construction, a minimum of ¼ inch steel plate will be used and it will be finished to match the existing deck. The mounting bases will raise the height of each pedestal by 8 inches and will ensure the vertical surfaces of the new pedestals are parallel with the existing consoles. The dimensions of the mounting surface on the new Pedestal is 600mm x 596.24mm, the mounting base will have the same dimensions. These dimensions are to be confirmed at the time of fabrication and installation. The mounting bases must be welded or firmly bolted to the Bridge deck. A mount will be fabricated inside of each of the mounting bases for the installation of the provided Marine Isolation transformer, the mount and transformer must not interfere with the passage of cables or the installation of the Pedestal complete with equipment. The pedestals will be mounted to the bases using M10 stainless steel hardware through the 10 existing mounting holes in the base of the pedestal. The contractor will be responsible to provide all materials for the construction and finishing of the pedestal mounting bases and for the mounting of the pedestals.

25KW X Band Down mast Transceiver RTR-108 and PSU-014

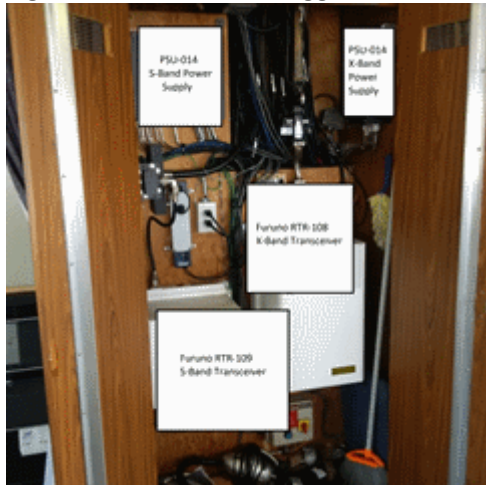
The 25 KW X-band transceiver will be mounted in the Radar Closet in place of the Bridgemaster X-band transceiver. The exact location will be determined at time of installation, the positioning of the X-band transceiver is critical to the connection of the transceiver to the existing WR-112 rigid waveguide. The mounting location inside the Radar Closet must be approved by CCG representative. The RTR-108 transceiver must be positioned so the transceiver output flange couples to the existing waveguide without applying stress to the joint. The transceiver output flange is of a plain type, the mating section of waveguide must be a choke type and the pair of flanges must be coupled with one O-ring, four bolts, spring washers and nuts. The X-band power supply unit PSU-014 will be mounted inside the Radar closet on the bridge. The exact mounting location inside the Radar Closet will be determined at the time of installation and must be approved by CCG representative. M6 hex Stainless steel hardware will be used to mount each unit. Install, label and terminate the remaining cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to figure 6 for suggested locations of power supplies and Radar transceivers. Existing outlets and equipment installed inside the Radar closet may be relocated if required for the installation of the radar power supplies and transceivers.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

30KW S Band Down mast Transceiver RTR-109 and PSU-014

The 30 KW S-band transceiver will be mounted in the Radar Closet in place of the Bridgemaster S-band transceiver. The exact mounting location will be determined at the time of installation and must be approved by CCG representative. The directional coupler removed in section 5.1.1.2 will be reinstalled inside the Radar closet. Connect the provided Coaxial cable P/N: WF-H50-7S from the output of the directional coupler to the input of the S-band antenna unit RSB-131N installed on the lower platform on the main mast. A short length of coaxial cable P/N: WF-H50-7S will be connected from the S-band RTR-109 output flange to the input of the directional coupler. Refer to Furuno TIE00160B_1 Installation Handbook Section 1.3.6 for instructions on terminating the S-band RF coaxial cable. The S-band power supply unit PSU-014 will be mounted inside the Radar closet on the bridge. The exact mounting location inside the Radar Closet will be determined at the time of installation and must be approved by CCG representative. M6 hex Stainless steel hardware will be used to mount each unit. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to figure 6 for suggested locations of power supplies and Radar transceivers. Existing outlets and equipment installed inside the Radar closet may be relocated if required for the installation of the radar power supplies and transceivers.

Figure 6: Radar Closet Suggested Furuno Radar locations



Hub 3000 and Hub 100

The Furuno Intelligent Hub 3000 and Hub 100 will be mounted inside the Radar closet using the provided hardware or four 4x20 Stainless steel screws. Due to the limited space in the Radar closet the exact location will be determined at the time of installation. Install the cable clamp included with the Hub-3000 using the provided hardware. Refer to manual IME36240E_FAR3320W sections 1.8, 1.9 and 2.8 for specific installation and wiring details. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

MC3000S

The MC3000S will be mounted inside the Radar closet using the provided hardware or four 4x20 Stainless steel screws. Due to the limited space in the Radar closet the exact location will be determined at the time of installation. The provided Newmar 115-24-10 24 VDC power supply and the provided 24 VDC fuse block will be installed in the bottom of the Radar closet. An output from the fuse block will supply 24 VDC to the MC3000S. Refer to manual IME FAR3320W sections 2.7.1 and 1.7 for specific installation and wiring details. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2.

Furuno Aft facing Radar Processor

The Aft facing Display and processor is to be installed in the same location as the Bridgemaster aft facing radar had been located. This is to the STBD side of the Port Ship Control Station. The Hatteland 26" display, Furuno EC3000 Radar processor, Always ON UPS and Always ON Battery Bank will be installed in the provided Furuno Pedestal (See section 5.1.3.3). A mounting bracket will be made to firmly fix the UPS and Battery Bank to the lower shelf in the Pedestal. The EC3000 processor will be installed using the factory mounts to the upper shelf in the Pedestal. The Marine isolation transformer will be mounted inside the mounting base fabricated for the mounting of the pedestal. The existing Aft Radar isolation switch will be installed on the Furuno Pedestal in an accessible location that does not interfere with the operation of the Radar. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed.

Mount the trackball/Keypad P/N: RCU-024 in the provided tray on the FHLCOMMPED pedestal, use the provided M4 hardware to secure it in place. Prior to mounting ensure that the optional USB cable is connected and secured to the RCU-024 unit. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed.

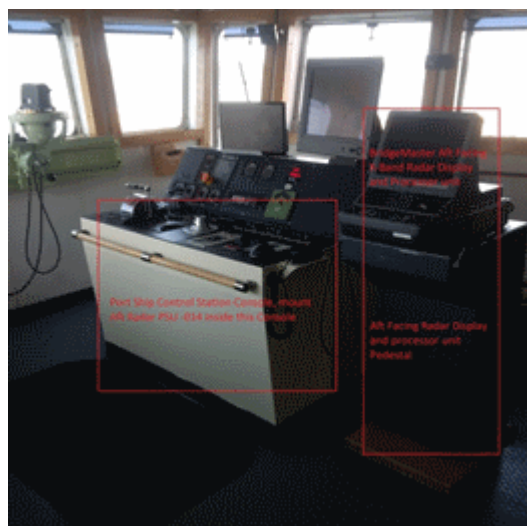
The PSU-014 power supply for the 12KW aft facing Radar will be installed inside the Port Ship Control Station Console. Installation location of the PSU-014 inside of the console is to be determined at the time of installation. The PSU-014 will be firmly fixed in place using the provided hardware. A mounting bracket will be fabricated and installed for the installation of the PSU-014 if required. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to manual IME FAR3320W sections 1 and 2 for specific processor and power supply installation and wiring details.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

Figure 7: Radar/ECDIS Pedestal



Figure 8: Port Ship Control Station and Bridgemaster Aft facing radar locations



T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

Furuno ECDIS Processor

The ECDIS Display and processor will be installed in the location the ECPINS system was removed from. This is to the STBD side of the Chart table. See figure 9 for the ECPINS location. The Hatteland 26" display and Furuno EC3000 Multifunction processor will be installed in the provided Furuno Pedestal (See section 5.1.3.3). The EC3000 processor will be installed using the factory mounts to the upper shelf in the Pedestal. The Marine isolation transformer will be mounted inside the mounting base fabricated for the mounting of the Furuno pedestal. The lower shelf in this pedestal will be used to mount the X-band EC3000 processor (See section 5.1.3.11).

The Always ON UPS and Always ON Battery Bank will be installed in the cabinet below the X-band display on the STBD side Chart table.

Mount the trackball/Keypad P/N: RCU-024 in the provided tray on the FHLCOMMPED pedestal, use the provided M4 hardware to secure it in place. Prior to mounting ensure that the optional USB cable is connected and secured to the RCU-024 unit. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to manual IME44730F_FMD3200_3300 sections 1 and 2 for specific ECDIS processor installation and wiring details.

Figure 9: ECPINS location



Furuno S-Band Radar Processor

The S-Band Radar Display and processor will be installed in the location of the existing Bridgemaster S-band system. This is to the Port side of the Command Steering Station. The Hatteland 26" display, Furuno EC3000 Multifunction processor, Always ON UPS and Always ON Battery Bank will be installed in the provided Furuno Pedestal (See section 5.1.3.3). A mounting bracket will be made to firmly fix the UPS and Battery Bank to the lower shelf in the Pedestal.

T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) INSTALLATION (CONTINUED)

The EC3000 processor will be installed using the factory mounts to the upper shelf in the Pedestal. The Marine isolation transformer will be mounted inside the mounting base fabricated for the mounting of the pedestal. The existing S-Band Radar isolation switch will be installed on the Furuno Pedestal in an accessible location that does not interfere with the operation of the Radar. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed.

Mount the trackball/Keypad RCU-024 in the provided tray on the FHLCOMMPEP pedestal, use the provided M4 hardware to secure it in place. Prior to mounting ensure that the optional USB cable is connected and secured to the RCU-024 unit. See Figure 7 for an example of the Pedestal with Monitor, trackball/keypad, EC3000 processor and UPS installed. Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678-073-WD sheets 1 and 2. Refer to manual IME FAR3320W sections 1 and 2 for specific S-Band Radar processor installation and wiring details.

Furuno X-band Radar Processor

The X-Band Radar Hatteland Display and RCU-024 trackball and Keypad will be installed in the location the Bridgemaster X-band system had been located. The X-band system is located on the STBD side of the Chart Table. The Hatteland 26" display will be mounted on the Chart table top using the provided Hatteland HD TMB SX1-C1 mounting brackets. Mount the trackball/Keypad RCU-024 just forward of the Hatteland display in a location comfortable and convenient for operation of the Radar. The RCU-024 will be mounted using the supplied desk fixing plate. Prior to mounting the RCU-024 ensure that the optional USB cable is connected and secured to the RCU-024 unit.

The Furuno EC3000 X-band radar processor will be installed in the lower shelf of the ECDIS Pedestal located to the STBD side of the Chart table.

The Always ON UPS, Always ON Battery Bank and Marine Isolation transformer will be installed in the bottom of the STBD side Chart table cabinet below the X-band display. The existing X-Band Radar isolation switch will be left in place on the shelf above the Chart table.

Install, label and terminate the cables as per the cable list in section 5.1.5 and drawings MM678073WD sheets 1 and 2. Refer to manual IME FAR3320W sections 1 and 2 for specific X-Band Radar processor installation and wiring details.

Sensor Interfaces

Heading input from Navigat 3000 Fibre Optic Gyro

Refer to drawing MM678-064-WD, the following cables must be removed (already listed in Section 5.1.2 cable removals.)

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Cable Label	From	To
GYC-6	Sperry Booster AW132-049 located in electronics room OUT2, L4.	AFT 10KW X-band radar located PORT side of bridge connector TSC.
GYC-8	Sperry Booster AW132-049 located in electronics room OUT2, L5.	X-band radar located on Chart table connector TSC.
GYC-10-1	Gyro JB located inside Bridge FWD console STBD side.	JB located in S-band radar cabinet FWD on bridge.
GYC-17	JB located in S-band radar cabinet FWD on bridge.	S-Band radar display located FWD on bridge connector TSC
EC-12	Distribution Unit 13B-074 located in electronics room, connector L7.	ECPINS cabinet located to STBD side on Chart table, SIU TB2 Port 2.

An Actisense Buffer P/N: PRO-BUF-1 BAS-R will be installed in the cabinet on the STBD side of the Navigation Console. Cable ALDBN-2 will be disconnected from COM1 of the Aldebaran E-Chart computer and be fed to the input of the Actisense buffer. Cable ALDBN-2 will be relabeled as GYC-Distribution once it has been installed to the Actisense buffer. See the figure 10 below for the suggested location of the Actisense PRO-BUF-1 BAS-R.

Install, label and terminate the Acti-sense PRO-BUF-1 BAS-R cabling as per drawings MM678-064-WD, MM678-063-WD and MM678-073-WD.

Figure 10: Gyro Actisense location



AIS inputs from SAAB J4 AIS terminal box

Refer to drawing MM678-043-WD, cable AIS-21 will be moved from Connector K4 ECDIS in the AIS J4 terminal Box to Connector K3 Pilot.

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Existing Cables AIS-23, AIS-24 and AIS-25 from the Consolidated Technologies Mini-EX will be reused and terminated to the Furuno EC3000 Radar processors as per drawing MM678-073-WD sheets 1 and 2.

A new cable (AIS-ECDIS) will be installed from Connector K4 ECDIS in the J4 AIS terminal box to J3 of the Furuno EC3000 ECDIS processors I/O board located on the STBD side of the Chart table. See Figure 11 for the location of the AIS J4 Terminal box and the Consolidated Technologies Mini-EX.

Figure 11: AIS J4 Terminal Box and Mini Expander



DGPS inputs from SAAB R4 distribution system

Refer to drawing MM678-046-Existing, the Data Distributor labelled DD20 "A" will be removed and replaced with an Actisense Buffer P/N: PRO-BUF-1 BAS-R. The existing cabling connected to DD20 "A" will be retained and terminated as per drawings MM678-046-WD and MM678-073-WD. See the Figure 12 for the location of DD20 "A". The cable connected from DD20 "A" to the ECPINS system will be labelled GPS-ECDIS and used for connection to the Furuno EC3000 ECDIS processor (Connector J5 on the ECDIS EC3000 I/O board). The cables previously used for connection from DD20 "A" to the X (XRDR10), S (SRDR11) and aft BridgeMaster Radars (AR2) will be reused and relabeled as GPS-RDR-X, GPS-RDR-S AND GPS-RDR-AFT. Connect these cables to the EC3000 processors as per drawings MM678-073-WD sheets 1 and 2 and MM678-046-WD.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

Figure 12: DGPS DD20 “A” location



Speed input from the Naviknot 450D Speed Log system

Refer to drawing MM678-062-WD cables DL-9, DL-10, DL-11 and DL-12 must be moved from the 200 P/NM outputs on TB3 to NMEA outputs 2, 3, 4, 5 and 6 on TB3 of the Naviknot Electronics unit. Terminate cables DL-9, DL-10, DL-11 and DL-12 as per drawing MM678-062-WD and MM678-073-WD. See figure 13 for the location of the Naviknot Electronics Unit.

Figure 13: Naviknot Electronics Unit location



Depth input from the ELAC ES5100 system

Refer to drawing MM678-063-WD, Cables ES-RDR-AFT, ES-ECDIS, ES-RDR-S and ES-RDR-X must be installed, labelled and terminated as per drawings MM678-063-WD and MM678-073-WD. The Echo Sounder Expander A shown in drawing MM678-063-WD is located in the Cabinet on the PORT side of the Navigation console, See figure 13.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

Figure 13: Naviknot Electronics Unit location



Wind speed to ECDIS

Refer to drawing MM678-033-WD, cable WND-ECDIS connected from the STBD Young 0626 Marine Wind Tracker to a RS422-232 converter inside the ECPINS cabinet must be disconnected from the RS422-232 converter inside the ECPINS cabinet and retained. This cable will be terminated to the Furuno ECDIS EC3000 processor I/O board connector J8 once it has been installed. Install, label and terminate this cable as per drawing MM678-073-WD.

Radar Track Target data

Refer to drawing MM678-042-BD, Cable SC-18 shall be disconnected from TSK on the Bridgemaster E X-band display and retained. Once the new Furuno X-band EC3000 processor has been installed SC-18 must be connected to I/O board connector J8 of the processor. Install, label and terminate this cable as per drawing MM678-073-WD and MM678-042-BD.

Refer to drawing MM678-057-BD, Cable IMIC3-ARPA-S shall be disconnected from TSK on the Bridgemaster E S-band display and retained. Once the new Furuno S-band EC3000 processor has been installed cable IMIC3-ARPA-S must be connected to I/O board connector J8 of the processor. Install, label and terminate this cable as per drawing MM678-073-WD and MM678-057-BD.

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Bridge Remote Monitor Connection

Refer to drawing MM678-050-BD, the existing Bridge wing monitors, and cabling will be reused with the new Furuno System.

Using a VGA to DVI adaptor the VGA cable RDR-M1 that had been connected to the Bridgemaster X-band Radar display must be connected to DVI2 on the Furuno X-band Radar processor (EC3000) located on the STBD side of the chart table.

Using a VGA to DVI adaptor the VGA cable RM-2 that had been connected to the Bridgemaster X-band Aft looking Radar display must be connected to DVI2 on the Furuno Aft looking X-band Radar processor (EC3000) located on the STBD side of the Port Ship Control Station.

A new VGA cable will be run from the Black Box Video switch model ACL0404A input 3 to DVI2 on the Furuno ECDIS EC3000 processor located to the STBD side of the Chart table. A VGA to DVI adaptor will be used to connect the VGA cable to the DVI2 port on the ECDIS processor.

Grounding

EC-3000 processor units

The EC-3000 processors will be grounded using a green jacketed stranded wire with a minimum size of 14 AWG and appropriately sized ring terminals. The grounding terminal for the processor is located beside DVI2 on the front panel of the processor, run the ground wire from the terminal on the processor to the tray it is installed on.

Hatteland Monitor

Grounding not required when powered from A/C input.

HUB -3000

The HUB-3000 will be grounded using a green jacketed stranded wire with a minimum size of 16 AWG and appropriately sized ring terminals. The grounding terminal is located beside the fuse on the front panel of the HUB-3000. Connect one end of the ground wire to the ground terminal of the HUB-3000, the other end will be connected to the existing ground point in the Radar closet.

HUB-100

The HUB-100 will be grounded using a green jacketed stranded wire with a minimum size of 16 AWG and appropriately sized ring terminals. The grounding terminal is located on the rear panel of the HUB-100. Connect one end of the ground wire to the ground terminal of the HUB-100, the other end will be connected to the existing ground point in the Radar closet.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

PSU-014

Ground the power supplies using flexible #6 green jacketed, stranded copper wire and appropriately sized ring terminals. The grounding terminal is located beside the cable entry on the front panel of the PSU-014. Connect one end of the ground wire to the ground terminal of the PSU-014, the other end will be connected to the existing ground point in the Radar closet.

X & S band transceivers

Ground the transceivers using flexible #6 green jacketed, stranded copper wire and appropriately sized ring terminals. The grounding terminal is located on the mounting rail below the cable entry on the transceiver. Connect one end of the ground wire to the ground terminal of the Transceiver, the other end will be connected to the existing ground point in the Radar closet.

MC-3000S Sensor Adaptor

The MC3000S will be grounded using a green jacketed stranded wire with a minimum size of 16 AWG and appropriately sized ring terminals. The grounding terminal is located on the far right of the front panel of the MC-3000S. Connect one end of the ground wire to the ground terminal of the MC-3000S, the other end will be connected to the existing ground point in the Radar closet.

X & S band Antenna Units

The X & S Antenna units have ground terminals installed on their base plates. The ground wire provided from Furuno with the Antenna unit will be installed from the ground terminal to a ground point on the Pedestal the Units are installed on.

T1-8 Cable Installation

Install, label and terminate the following cables as per drawings MM687-073-WD sheets 1 & 2, MM678-050-BD, MM678-064-WD, MM678-063-WD, MM678-043-WD, MM678-046-WD, MM678-062-WD, MM678-042-BD and MM678-057-BD.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

CABLE LABEL	CABLE TYPE	FROM	TO
RDR-A-AC2	Marine AC 14/3	X-band Antenna Unit and Transceiver Isolation switch located on the Main Mast below the upper platform (X-band).	X-band radar Isolation switch located STBD side of Chart table.
RDR-B-AC2	Marine AC 14/3	S-band Antenna Unit and Transceiver radar Isolation switch located on the Main Mast below the lower platform (S-Band).	S-band radar Isolation switch located on S-band FHLCOMMPEP Pedestal.
RDR-A-AC3	Marine AC 14/3	X-band radar Isolation switch located STBD side of Chart table.	Always ON isolation transformer located inside chart table cabinet below X-band display, AC input.
RDR-B-AC3	Marine AC 14/3	S-band radar Isolation switch located on S-band FHLCOMMPEP Pedestal.	Always ON isolation transformer located inside mounting base for S-Band FHLCOMMPEP Pedestal, AC input.
RDR-A-AC4	Factory AC Power Cable	X-band Always ON isolation transformer located inside chart table cabinet below X-band display, AC output.	X-band GES-102N UPS located inside chart table cabinet below X-band display, AC input.
RDR-B-AC4	Factory AC Power Cable	Always ON isolation transformer located inside mounting base for S-Band FHLCOMMPEP Pedestal, AC output.	S-band GES-102N UPS located inside S-Band FHLCOMMPEP pedestal lower shelf, AC input.
RDR-A-AC5	Marine AC 14/3	X-band PSU-014, located in Radar closet on bridge TB1.	X-band radar Isolation switch located on the Main Mast below the upper platform.
RDR-B-AC5	Marine AC 14/3	S-band PSU-014, located in Radar closet on bridge TB1.	S-band radar Isolation switch located on the Main Mast below the lower platform.
ECDIS-AC1	Marine AC 14/3	AC distribution Panel 1M10 breaker 6, located to Aft of Chart table.	ECDIS Always ON isolation transformer located in void space below ECDIS console, AC input.
ECDIS-AC2	Factory AC Power Cable	ECDIS Always ON isolation transformer located inside mounting base for ECDIS FHLCOMMPEP Pedestal, AC output.	X-band GES-102N UPS located inside ECDIS pedestal on lower shelf, AC input.
RDR-AFT-AC1	MARINE AC 14/3	AFT radar Isolation switch located on AFT facing radar FHLCOMMPEP Pedestal.	Always ON isolation transformer located inside mounting base for Aft facing radar FHLCOMMPEP Pedestal, AC input.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

CABLE LABEL	CABLE TYPE	FROM	TO
RDR-AFT-AC2	MARINE AC 14/3	AFT radar Isolation switch located on AFT facing radar FHLCOMMPEP Pedestal.	Aft Facing X-band Antenna Unit Isolation switch located on the Port side of the Water Monitor Platform ladder.
RDR-AFT-AC3	Factory AC Power Cable	Always ON isolation transformer located inside mounting base for Aft facing radar FHLCOMMPEP Pedestal, AC input.	X-band GES-102N UPS located inside the Aft Radar pedestal on lower shelf, AC input.
RDR-AFT-AC4	MARINE AC 14/3	Aft facing X-band radar PSU-014, located inside of Port Ship Control station, TB1.	Aft Facing X-band Turning Unit Isolation switch located on the Port side of the Water Monitor Platform ladder.
RDR/ECDIS-01	RBA-DETD/10P.75BK	X-Band Turning Unit RSB-130N located on Main Mast upper platform, connectors TB802 & TB803.	X-band Transceiver unit RTR-108 located in Radar closet on bridge, connectors TB802 & TB803.
RDR/ECDIS-02	RBA-DETD/10P.75BK	S-Band Turning Unit RSB-131N located on Main Mast lower platform, connectors TB802 & TB803.	S-band Transceiver Unit RTR-109 located in Radar closet on bridge, connectors TB802 & TB803.
RDR/ECDIS-03	Factory Cable RW-00135	X-band Transceiver unit RTR-108 located in Radar closet on bridge, connectors TB801& J281	X-Band PSU-014 located in Radar closet on bridge, connectors TB131 & J102
RDR/ECDIS-04	Factory Cable RW-00135	S-band Transceiver Unit RTR-109, located in Radar closet on bridge, connectors TB801& J281	S-Band PSU-014 located in Radar closet on bridge, connectors TB131 & J102
RDR/ECDIS-05	CAT 5E (30M max length)	X-band PSU-014, located in Radar closet on bridge, connector J101	EC3000 X-band Processor unit A located on Chart table of Bridge, Connector J16
RDR/ECDIS-06	CAT 5E (30M max length)	S-band PSU-014, located in Radar closet on bridge, connector J101	EC3000 S-band Processor unit C located on STBD side of steering Console, Connector J16
RDR/ECDIS-07	TTYCSCLA-1Q (18 AWG 4 Conductor)	X-band PSU-014, located in Radar closet on bridge, connector TB132.	EC3000 X-band Processor unit A located on Chart table of Bridge, Connector J10.
RDR/ECDIS-08	TTYCSCLA-1Q (18 AWG 4 Conductor)	S-band PSU-014, located in Radar closet on bridge, connector TB132.	EC3000 S-band Processor unit C located on Port side of steering Console, Connector J10.
RDR/ECDIS-11	CAT 5E	EC3000 Processor unit A (X-band), LAN 1.	HUB3000 located in radar closet, Port 1.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

CABLE LABEL	CABLE TYPE	FROM	TO
RDR/ECDIS-12	CAT 5E	EC3000 Processor unit B (ECDIS), LAN 1.	HUB3000 located in radar closet, Port 2.
RDR/ECDIS-13	CAT 5E	EC3000 Processor unit C (S-band), LAN 1.	HUB3000 located in radar closet, Port 3.
RDR/ECDIS-14	Marine A/C 14/3	Furuno HUB3000 A/C input.	AC outlet located in radar closet, fed from distribution panel 1E3, breaker 11.
RDR/ECDIS-15	CAT 5E	EC3000 Processor unit A (X-band) LAN 2.	HUB100 located in radar closet, Port 1.
RDR/ECDIS-16	CAT 5E	EC3000 Processor unit B (ECDIS) LAN 2.	HUB100 located in radar closet, Port 2.
RDR/ECDIS-17	CAT 5E	EC3000 Processor unit C (S-band) LAN 2.	HUB100 located in radar closet, Port 3.
RDR/ECDIS-18	Factory A/C power cable	EC3000 Processor unit A (X-band) A/C input.	X-band GES-102N UPS located inside chart table cabinet below X-band display, AC output.
RDR/ECDIS-19	Factory A/C power cable 20 ft	EC3000 Processor unit B (ECDIS) A/C input.	ECDIS GES-102N UPS located inside chart table cabinet below X-band display, AC output.
RDR/ECDIS-20	Factory A/C power cable	EC3000 Processor unit C (S-band) A/C input.	S-band GES-102N UPS located inside S-Band FHLCOMMPEP pedestal lower shelf, AC output.
RDR/ECDIS-21	Factory cable (DSUB9P-X2-A- L5M)	EC3000 Processor unit A (X-band) COM1.	X-Band Hatteland Display HD 26T21 MMD MA4-FOGA, COM1.
RDR/ECDIS-22	Factory DVI Cable 20ft	EC3000 Processor unit A(X-band) DVI1.	X-Band Hatteland Display HD 26T21 MMD MA4-FOGA DVI.
RDR/ECDIS-23	Factory Cable (part of RCU-024)	EC3000 Processor unit A (X-band), I/O board J12.	RCU-024 Trackball and Keypad J12.
RDR/ECDIS-24	Factory USB cable	EC3000 Processor unit A (X-band) USB.	RCU-024 Trackball and Keypad USB.
RDR/ECDIS-25	Factory USB cable	EC3000 Processor unit B (ECDIS) USB.	RCU-024 Trackball and Keypad USB.
RDR/ECDIS-26	Factory Cable (part of RCU-024)	EC3000 Processor unit B (ECDIS), I/O board J12.	RCU-024 Trackball and Keypad J12.
RDR/ECDIS-27	Factory cable (DSUB9P-X2-A- L5M)	EC3000 Processor unit B (ECDIS) COM1.	ECDIS Hatteland Display HD 26T21 MMD MA4-FOGA COM1.
RDR/ECDIS-28	Factory DVI Cable	EC3000 Processor unit B(ECDIS) DVI1.	ECDIS Hatteland Display HD 26T21 MMD MA4-FOGA DVI.
RDR/ECDIS-29	Factory USB cable	EC3000 Processor unit C (S-band) USB.	RCU-024 Trackball and Keypad USB.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

CABLE LABEL	CABLE TYPE	FROM	TO
RDR/ECDIS-30	Factory Cable (part of RCU-024)	EC3000 Processor unit C (S-band), I/O board J12.	RCU-024 Trackball and Keypad J12.
RDR/ECDIS-31	Factory cable (DSUB9P-X2-A- L5M)	EC3000 Processor unit C (S-band) COM1.	S-Band Hatteland Display HD 26T21 MMD MA4-FOGA COM1.
RDR/ECDIS-32	Factory DVI Cable	EC3000 Processor unit C (S-band) DVI1.	S-Band Hatteland Display HD 26T21 MMD MA4-FOGA DVI.
RDR/ECDIS-33	CAT 5E patch cable	EC3000 Processor unit A (X-band) LAN 3.	EC3000 Processor unit A (X-band), I/O board J15.
RDR/ECDIS-34	CAT 5E patch cable	EC3000 Processor unit C (S-band) LAN 3.	EC3000 Processor unit C (S-band), I/O board J15.
RDR/ECDIS-35	Factory A/C power cable	X-Band Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	X-band GES-102N UPS located inside chart table cabinet below X-band display, AC output.
RDR/ECDIS-36	Factory A/C power cable 20ft	ECDIS Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	ECDIS GES-102N UPS located inside chart table cabinet below X-band display, AC output.
RDR/ECDIS-37	Factory A/C power cable	S-Band Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	S-band GES-102N UPS located inside S-Band FHLCOMMPEP pedestal lower shelf, AC output.
RDR/ECDIS-38	Factory Cable NR203PF-VVS1.25	HUB100 located in radar closet A/C power input.	AC outlet located in radar closet, fed from distribution panel 1E3, breaker 11.
RDR/ECDIS-39	CAT 5E patch cable	HUB100 located in radar closet Port 5.	MC3000S located in radar closet, J3.
RDR/ECDIS-40	Belden 9316	MC3000S located in radar closet, J2 pins 1 & 2.	24 VDC fuse block located in Radar closet.
RDR/ECDIS-41	Belden 9312	Newmar power supply 115-24-10 located in bottom of Radar closet, 24 VDC output.	24 VDC fuse block located in Radar closet.
RDR/ECDIS-42	Factory Cable RW-00135	X-band Turning unit RSB-128 located aft on water monitor platform, connectors TB801& J281.	Aft facing X-Band radar PSU-014 located inside Port ship control station, connectors TB131 & J102.
RDR/ECDIS-43	CAT 5E (30M max length)	Aft facing X-band radar PSU-014 located inside Port ship control station connector J101.	Aft facing X-band radar EC3000 Processor unit D located on STBD side of Port ship control station, I/O board Connector J16.

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

CABLE LABEL	CABLE TYPE	FROM	TO
RDR/ECDIS-44	TTYCSCLA-1Q (18 AWG 4 Conductor)	Aft facing X-band radar PSU-014 located inside Port ship control station, TB132.	EC3000 Processor unit D (Aft facing Radar), I/O board Connector J10.
RDR/ECDIS-45	CAT 5E	EC3000 Processor unit D (Aft facing Radar), LAN 1.	HUB3000 located in radar closet, Port. 4.
RDR/ECDIS-46	CAT 5E	EC3000 Processor unit D (Aft facing Radar), LAN 2.	HUB100 located in radar closet, Port 4.
RDR/ECDIS-47	Factory Cable (part of RCU-024)	EC3000 Processor unit D (Aft facing Radar), I/O board J12.	RCU-024 Trackball and Keypad J12.
RDR/ECDIS-48	Factory USB cable	EC3000 Processor unit D (Aft facing Radar), USB.	RCU-024 Trackball and Keypad USB.
RDR/ECDIS-49	Factory cable (DSUB9P-X2-A-L5M)	EC3000 Processor unit D (Aft facing Radar), COM1.	Aft facing Radar Hatteland Display HD 26T21 MMD MA4-FOGA, COM1.
RDR/ECDIS-50	Factory supplied DVI cable	EC3000 Processor unit D (Aft facing Radar), DVI1.	Aft facing Radar Hatteland Display HD 26T21 MMD MA4-FOGA, DVI input.
RDR/ECDIS-51	Factory A/C power cable	Aft Radar Hatteland Display HD 26T21 MMD MA4-FOGA A/C input.	GES-102N UPS located inside Aft facing Radar FHLCOMMPED pedestal on lower shelf, AC output.
RDR/ECDIS-52	Factory A/C power cable	EC3000 Processor unit D (Aft facing Radar), A/C input.	GES-102N UPS located inside Aft facing Radar FHLCOMMPED pedestal on lower shelf, AC output.
RDR/ECDIS-53	CAT 5E patch cable	EC3000 Processor unit D (Aft facing Radar), LAN 3	EC3000 Processor unit D (Aft facing Radar), I/O board J15
RDR/ECDIS-54	WF-H50-7S (20M)	S-band Transceiver Unit RTR-109, located in Radar closet on bridge, RF Output Microwave coaxial Plug.	S-Band Directional Coupler located inside Radar closet, RF input.
RDR/ECDIS-54-1	WF-H50-7S (20M)	S-Band Directional Coupler located inside Radar closet, RF output.	S-Band Turning Unit RSB-131 located on Main Mast lower platform, RF Input waveguide flange.
AIS-ECDIS	TTYCSLA-4	AIS terminal box J4, located on Port side of Radar closet. connector K4 ECDIS	ECDIS EC3000 Processor unit B, I/O board connector J3
GYC-RDR-X	TTYCSLA-4	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 2	X-band Radar EC3000 Processor unit A, I/O board connector J4

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

CABLE LABEL	CABLE TYPE	FROM	TO
GYC-ECDIS	TTYCSLA-4	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 4	ECDIS EC3000 Processor unit B, I/O board connector J4
GYC-RDR-S	TTYCSLA-4	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 3	S-band Radar EC3000 Processor unit C, I/O board connector J4
GYC-RDR-AFT	TTYCSLA-4	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 5	Aft facing radar EC3000 Processor unit D, I/O board connector J4
ALDBN-2	Belden 9322	Navigat Fiber optic gyro Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 5	Aldebaran Electronic charting computer on the port side of the Navigation Console, Com1, pins 2 and 5.
ES-RDR-X	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 5	X-band Radar EC3000 Processor unit A, I/O board connector J7
ES-ECDIS	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 3	ECDIS EC3000 Processor unit B, I/O board connector J7
ES-RDR-S	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 4	S-band Radar EC3000 Processor unit C, I/O board connector J7
ES-RDR-AFT	TTYCSCLA-1Q	Echo Sounder Actisence PRO-BUF-1 located in cabinet to Port side of Chart table, Output 2	Aft Radar EC3000 Processor unit D, I/O board connector J7
RM-7	VGA cable	Black Box Video Switch input 4. Location is on Chart table shelf STBD side.	EC3000 ECDIS Processor unit B located STBD of Chart table, DVI12

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**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

T1-9 Government Furnished Equipment

Description	Part Number	Quantity
Processor Multifunction	EC3000	4
Furuno Trackball/Keyboard	RCU-024	4
Hatteland 26" display	HD 26T21 MMD MA4-FOGA	4
Mounting Bracket, Hatteland 26" Display	HD TMB SX1-C1	1
Radar Display and Processor Pedestal	FHLCOMMPED	4
Sensor Adapter Interface - Serial	MC3000S	1
Network Switch/Radar Interswitch	HUB3000	1
Sensor Data Network Switch	HUB100	1
25KW X Band Down mast Transceiver	RTR-108	1
30KW S Band Down mast Transceiver	RTR-109	1
Radar Power Supply	PSU-014	3
Cable Assembly, Radar Scanner - 30 Metres, Ethernet	RW-00135	3
25KW X Band Scanner Unit	RSB130N	1
30KW S Band Scanner Unit	RSB-131N	1
10KW X Band Scanner c/w transceiver	RSB-128-105N	1
Antenna unit to TR unit cable	Tricab RBA-DETD/10.75BK	As required
DVI-VGA adaptor	Foxconn CQHC000V-A11	3
Actisense Intelligent Buffer	PRO-BUF-1-BAS-R	3
Always On Marine UPS	GES-102N	4
Always On Battery Bank	BBU-102NA	4
Always On Isolation Transformer	3KVA Isolation Transformer	4
Belden Power Cable (MC3000S)	Belden 9316	30 feet
Newmar Power Supply 24VDC	115-24-10	1
Fuse Block 24VDC	BlueSea 5025	1
Isolation Switch	Moeller P1-25 with Housing	3
S-Band elliptical waveguide	WF-H50-7S (20M)	1
Power Supply to Transceiver connection cable	RW-00135	3
Sensor interface cable	TTYCSLA-1Q	As required
Hatteland Display Brilliance Control Cable	DSUB9P-X2-A-L5M	4
Marine A/C cable	DVA-PVTD/3C2.5BK	As required
Belden Data Cable	Belden 9322	30 feet
Belden Power Cable (Newmar Power supply)	Belden 9312	30 feet
Belden Data cable CAT5E	Belden 1300SB	As required
Video cables	DVI	5
Video cables	VGA	1

Excess cable must be returned to the Canadian Coast Guard (CCG) upon completion of this installation.

**T-01 FURUNO RADAR AND ELECTRONIC CHART DISPLAY AND INFORMATION
SYSTEM (ECDIS) INSTALLATION (CONTINUED)**

T1-10 Material to be supplied by Contractor

- WR-112 waveguide and bends as required for the connection of existing waveguide run to the Furuno X-band RSB-130N Antenna Unit.
- Materials for the construction and finishing of the Antenna Unit Pedestals.
- Materials for the construction and finishing of the FHLCOMMPED Display and Processor pedestal Mounting bases complete with mount for the Always ON Isolation Transformer.
- Mounting Brackets for fixing the Always ON UPS and Battery Bank to the lower shelves of the FHLCOMMPED Display and Processor pedestals.
- Stranded Copper green jacketed grounding wire as specified and required for the grounding of installed equipment.
- All materials required to complete statement of work. All cables are to be properly secured in existing cable trays. In locations where trays do not exist, appropriate hangers are to be installed.

T1-11 Set to Work / Commissioning

The Contractor shall notify the onsite CCG representative in advance as much as possible when the physical installation is complete. The onsite CCG representative will arrange for an OEM authorized field service representative (FSR) to conduct the set to work and commissioning of the Furuno Radar and ECDIS System. The installation will not be considered complete until the system has been commissioned.

T1-12 Documentation

The Contractor shall ensure that the Manuals supplied with the new equipment unit are returned to CCG prior to the acceptance of this item.

VLE-01 MCC UPGRADE

1. IDENTIFICATION

The purpose of this specification item is for the Contractor to remove the identified components on the ship's MCC's and replace with new Contractor supplied units.

2. REFERENCES

2.1 Drawings

Document #	File Name
VNEA2 E-1	Electrical Power Single Line Diagram 1 of 2
VNEA2 E-1	Electrical Power Single Line Diagram 2 of 2

3. TECHNICAL

3.1 General

1. The following list of MCC's units must be removed from the vessel to the contractors shop for upgrading.
2. The upgrade must consist of OEM components supplied by Eaton. Components to be replaced will be the main contactor/contactors, Overloads, all operational buttons including contact blocks, toggle switches including contact blocks and illuminated indication, such as start/stop/standby.
3. The contractor must clean all buckets on each of the listed MCC's prior to commencement of work. The Contractor must visually inspect all bucket components and should components other than those listed in this document show signs of fatigue or failure condition a list must be generated and submitted to the CGTA for review. Additional components requiring replacement will be actioned by submitting a PWGSC Form 1379.
4. Incandescent luminaries must be replaced with LED technology.
5. The circuit breaker in all buckets on each of the listed MCC's must be inspected and tested. Should the breaker fail a new Eaton equivalent will be installed and tested, with the additional components requiring replacement being actioned by submitting a PWGSC Form 1379.
6. Prior to removal from the vessel the contractor must test each MCC bucket identified below in this specification to:
 - a) Ensure proper operation of the control unit; note any operational anomalies prior to removal.
 - b) Identify and note the direction of rotation of those motors related to the appropriate MCC.

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VLE-01 MCC UPGRADE (CONTINUED)

No. 1 Essential MCC

CPP Hydraulic Pump Port	515-3
No 1 Main Engine Prelube Pump	515-6
Stern Tube L/O Pump No 1 Port	515-4
Gearbox Cooling Water Pump (Aft)	516-7
Port Gearbox Stby L/O Pump	515-12

No. 2 Essential MCC

CPP Hydraulic Pump Starboard	516-1
No 2 Main Engine PreLube Pump	516-3
Stern Tube Lube Oil Pump #2	516-5
Gearbox Cooling Water Pump (Fwd)	515-5
Starboard Gearbox Stby L/O Pump	516-13

No. 1 Non-Essential MCC

#1 Main Engine Preheat & Circ Pump	517-4
#2 Main Engine Preheat & Circ Pump	517-6

No. 2 Non-Essential MCC

#3 Main Engine Preheat & Circ Pump	526-2
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No. 3 Non-Essential MCC

#4 Main Engine Preheat & Circ Pump	527-2
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No. 1 Semi-Essential MCC

#3 Main Engine Prelube Pump	522-1
CPP Hyd Pump Port Stby	522-11

No. 2 Semi-Essential MCC

#4 Main Engine Prelube Pump	523-1
CPP Hyd Pump Stbd Stby	523-8

Auxiliary Landing

Port Mooring Winch/Windless Hyd Pump #1	5S1
Stbd Mooring Winch/Windless Hyd Pump #2	5S2

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VLE-01 MCC UPGRADE (CONTINUED)

Emergency Generator Room

Emergency Fire Pump	5E2-4
No. 1 Air Compressor	5E2-6

4. TESTS AND TRIALS

1. Upon completion of the MCC bucket upgrade and installation back into the MCC cabinet, the contractor must demonstrate proper operation of each unit and confirm rotation of motors controlled by the associated updated unit to the satisfaction of the CGTA and TCMSS Surveyor.

5. DELIVERABLES

5.1 Documentation

1. The Contractor must deliver all manuals, instruction sheets provided with the supplied equipment to the CGTA.
2. Documentation of all new parts including “part numbers” and “quantities” used must be provided to the CGTA.
3. The Contractor must provide a service report for each bucket, including test results in accordance with testing procedures in TP127E, components changed, and the final settings for each breaker to the CGTA.

5.2 Drawings

1. The Contractor must revise all “As Fitted” drawings.

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VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)

1. IDENTIFICATION

1. The Contractor must remove the rudders, prepare them for TCMS survey and then re- install the rudders and set them to work.
2. Rudder stocks and rudder trunks are to be refurbished. New carrier bearings and lower housings, new pintle bearings, and new rudder stock bearings are to be installed.
3. The work detailed in this spec is to be carried out on both the port and stbd rudders, rudder stocks, and rudder trunks.
4. Bearing work detailed in this specification must be carried out under the direction of the following FSRs:

THORDON FSR:

Thom Hofmann
Avalon Marine Ltd and Industrial
51 Hampstead Court
Dartmouth, Nova Scotia
B2V 2S3

Email: avalonmarine@ns.sympatico.ca
Tel: (902) 462-2622
Cell: (902) 456-1381
Fax: (902) 462-1004

Contractor must include an allowance of \$15,000.00 to cover the Thordon FSR. The FSR will be reimbursed for services rendered, authorized travel and living expenses reasonably and properly incurred in the performance of the work, at cost without any allowance for the overhead or profit. The Allowance must form part of the overall bid and will be adjusted by PWGSC 1379 action upon proof of final invoice.

JASTRAM FSR:

Charles Brown
Jastram Technologies Ltd.
22 Trider Crescent
Dartmouth, Nova Scotia
B3B 1R6

Email: cbrown@jastram.com
Tel: (902) 468-6450
Cell: (902) 219-3697
Fax: (902) 468-6901
Other Tel: (888) 346-3855

Contractor must include an allowance of \$15,000.00 to cover the JastramFSR. The FSR will be reimbursed for services rendered, the authorized travel and living expenses reasonably and properly incurred in the performance of the work, at cost without any allowance for the overhead or profit. The Allowance must form part of the overall bid and will be adjusted by PWGSC 1379 action upon proof of final invoice.

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VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

5. Contractor must ensure the work detailed in this specification item is completed in conjunction with ED-01 to ensure there is sufficient time to have the carrier bearing and housing work completed by Jastram Engineering.

2. REFERENCES

2.1 EQUIPMENT DATA

Wagner Steering Gear: Model LA216-35-C1B2 Electro Hydraulic Full follow up power steering details in Technical data Package

Drawings and Documents

Drawing	Drawing Name
VNEA2 241-004	Nozzle Arrangement and Details
VNEA2 254-000	Steering Gear Seats
VNEA2 271-000	Rudder and Rudder Stocks
VNEA2 451-004	Steering Gear Compartment Arrangement
VNEA2 452-002	Steering Gear Hydraulic Piping
VNEA2 D-2249	Carrier Radial Bearing

3. TECHNICAL

3.1 GENERAL

1. The Contractor must unship the port and starboard rudders and rudder stocks for inspection by the attending TCMS surveyor for survey credit. Contractor must remove the complete carrier bearing assembly, consisting of the lower housing with packing gland and studs, upper housing with pressed-in radial bearing, and thrust bearing, pack complete unit safe for transport and ship to Jastram Engineering for rebuild.
2. The Contractor must bid on the following work for the port and stbd rudders and rudder trunks:
 1. Renew gudgeon Thordon SXL bearing and pintle stainless steel 316L sleeve.
 2. Renew rudder stock Thordon SXL bearing and rudder stock stainless steel 316L liner.
 3. Renew Remove carrier bearing and housing assemblies (including packing glands and thrust bearings).
 4. Renew stainless steel 316L rudder stock liner in way of packing gland.
 5. Build up and machine rudder stock in way of bearings to original specifications.
 6. Re-face rudder stock palm and rudder palm. Fabricate and install new Aquamet 22 fitted bolts and nuts.
 7. Sandblast and paint rudder trunk area.

VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

3.2 RUDDERS

1. Unshipping of the rudder stocks must include the removal of the rudder follow-up assemblies, disconnecting of the actuating rams from the rudder tiller arms, the rudder stock nuts and locking bars, jumping collars and tiller heads. Any damage to the threads of the rudder stocks during the removal of the nuts, removal, storage or refitting of the rudders and rudder nuts must be corrected by the Contractor to TCMS approval.
2. The Contractor must take and record the port and starboard gudgeon to pintle clearances and the port and starboard rudder stock lower end carrier bearing clearances. Contractor must verify alignment of the rudderstock and pintle bores in all planes. Contractor must verify the alignment of the gudgeon and pintle bores are true with the rudder stock and square with the palms. Copies of the readings must be provided to the TA within 24 hours of the rudders being removed from the vessel.
3. Readings taken by the Contractor must be used to determine if new pintle and gudgeon bearing sleeves need to be machined and installed and if the work under pintle sleeve and bearing replacement will be completed.
4. The Contractor must remove and dispose of all packing from the rudder stock glands. The Contractor must install new GSM packing .
5. The Contractor must remove the drain and vent plugs from each rudder and subject the forward and after sections of both rudders to an air pressure test not in excess of 0.1 bar (1.5 psig). This test must be witnessed and approved by a TCMS surveyor and the CGTA.
6. After testing, the Contractor must float coat the interior sections of both rudders with Contractor supplied "VapCor SeaGuard A". Upon completion of float coating the rudders must be drained and all plugs must be reinstalled.
7. The Contractor must supply and install new 316 Stainless Steel Hex- Socket plugs on both rudders as shown on drawing VNEA2 271-000 . This work must be done prior to the installation of the rudders. All Plugs must have Loctite® PTFE applied to the threads prior to installation.
8. The Contractor must perform MPI examinations of the rudder stock keyways and rudder stock threads. Examinations must be completed by a certified NDT technician.
9. The Contractor must supply all material and labour to repair and replace any missing fairing compound on the rudders, specifically the slot welds and the transition from the forward and aft section of the rudder.

3.3 PINTLE SLEEVE AND BEARING REPLACEMENT

1. The Contractor must break out the component of this section as a separate line item in the bid submission.

VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

2. The Contractor must provide the services of a Thordon FSR or other certified Thordon service representative to oversee the work of this Section.
3. Pintle to gudgeon clearance specifications must be determined by the Thordon FSR. Documentation with the final measured clearance for both port and starboard rudder bearings with reference to the Thordon specified clearance must be provided to the CGTA and to TCMSS for approval.
4. The Contractor must remove the existing Thordon gudgeon bearings and the stainless steel pintle sleeves. New GSM gudgeon bearings and pintle sleeves shall be machined and installed.
5. The machining and fitting of the Thordon material must comply with the specific material application guidelines. The Contractor must supply a Thordon FSR to witness and approve the machining and installation process. The final machining measurements of the bearing and sleeve are to be determined by the Thordon FSR.
6. The Contractor must supply all Thordon bearing materials and all materials necessary to machine and fit the stainless steel sleeves and the Thordon bearing material.
7. Final measurements of the pintle outside diameter and gudgeon inside diameter must be taken and recorded in three places along the length of the bearing (Top, Center and Bottom) in both the Port/Starboard and Fore/Aft directions.

3.4 LOWER RUDDER STOCK SLEEVE AND BEARING REPLACEMENT

1. The contractor must provide the services of a Thordon FSR or other certified Thordon service representative to oversee the work of this section.
2. Rudder stock to Thordon bearing clearance specifications must be determined by the Thordon FSR. Documentation with the final measured clearance for both port and starboard rudder bearings with reference to the Thordon specified clearance must be provided to the CGTA and to TCMS for approval.
3. The Contractor must remove the existing Thordon rudder stock bearings and the stainless steel rudder stock sleeves. New rudder stock bearings and rudder stock sleeves shall be machined and installed. Bearings shall be GFM and sleeves are to be Contractor supplied.
4. The machining and fitting of the Thordon material must comply with the specific material application guidelines. The Contractor must supply a Thordon FSR to witness and approve the machining and installation process. The final machining measurements of the bearing and sleeve are to be determined by the Thordon FSR.
5. The Contractor must supply all Thordon bearing materials and all materials necessary to machine and fit the stainless steel sleeves and to fit the GFM Thordon bearing material.

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VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

6. Final measurements of the rudder stock liner outside diameter and bearing inside diameter must be taken and recorded in three places along the length of the bearing (Top, Center and Bottom) in both the Port/Starboard and Fore/Aft directions. A copy of the final measurements must be provided to the CGTA and TCMSB.

3.5 CARRIER BEARING & HOUSING REPLACEMENT

1. The Contractor must provide the services of a Jastram FSR to oversee the work of this section.
2. Rudder stock to carrier bearing clearance specifications must be determined by the Jastram FSR. Documentation with the final measured clearance for both port and starboard rudder carrier bearings with reference to the Jastram specified clearance must be provided to CGTA and to TCMS for approval.
3. The Contractor must remove the existing port and starboard carrier bearings and housings assemblies. Each assembly consists of a lower housing with packing gland and studs, one upper housing with pressed-in radial bearing, and a thrust bearing, including the packing glands. Contractor must ensure that each assembly is clearly identified as port and starboard, as well as forward and after facing direction.
4. Contractor must properly protect and package, safe for shipping, both assemblies within the first 7 days of contract commencement. Contractor must include return shipping as part of the overall bid.
5. Contractor must ship both assemblies to:

Christophe Simon, P.Eng

135 West Riverside Drive, North Vancouver, BC, Canada, V7H 1T6

604 988 1111 Ext 128

csimon@jastram.com

6. Upon receipt of the refurbished carrier bearing assemblies, the Contractor must reinstall the carrier bearing assemblies using new GFM fasteners.
7. Final measurements of the rudder stock outside diameter and the carrier bearing inside diameter must be taken and recorded in three places along the length of the bearing (Top, Center, and Bottom) in both the Port/Starboard and Fore/Aft directions. Measurements must be provided to the CGTA, TCMSB and Jastram Engineering.

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VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

3.6 RUDDER STOCK LINER IN WAY OF PACKING GLAND

1. Contractor must remove the existing stainless steel 316L liner from the rudder stocks, which is located in the area of the packing gland. Contractor shall must supply, fabricate and install a new liner of the material and dimensions provided on the original rudder stock drawing. Contractor must verify dimensions with the Jastram FSR prior to final machining. This liner is a shrink fit on the rudder stock.

3.7 RUDDER STOCK REFURBISHMENT

1. Contractor must complete a full set of measurements of the rudder stock outside diameters in way of the carrier bearings. Measurements must be taken and recorded in three places along the length of the carrier bearing (Top, Center, and Bottom) in both the Port/Starboard and Fore/Aft directions. Measurements must be provided to the CGTA, TCMSB and Jastram Engineering.
2. Contractor shall must repair the rudder stock in way of the carrier bearing area, from the top edge of the packing gland liner to the beginning of the tiller arm taper, so that the rudder stock OD is 260mm as per original drawing.. Contractor must verify dimensions with the Jastram FSR prior to final machining. Final measurements of the rudder stock outside diameter must be taken and recorded in three places along the length of the carrier bearing (Top, Center, and Bottom) in both the Port/Starboard and Fore/Aft directions. Measurements must be provided to the CGTA, TCMSB and Jastram Engineering.
3. Contractor must bid on a clad weld and machining repair procedure. Actual repair to be determined upon inspection by TCMSB and the CGTA. Repair procedures must be approved by TCMSS and the CGTA.
4. Contractor shall also repair the rudder stock in the area between the packing gland liner and the thordon bearing liner. This area had been previously repaired using Belzona. All old repairs are to be removed and the rudder stock is to be built up and machined back to original drawing dimensions.
5. At final machining, there shall be at least 2 layers of welded material remaining on the rudderstock.
6. NDT testing of the rudder stock shall be performed by a certified NDT technician as follows:
 1. After the machining process
 2. Upon completion of the repairs
 3. After heat treatment
7. Contractor shall provide an engineered welding sequence procedure for the repairs and heat treatment process that will be employed during and after the completion of repairs. Welding procedure is to be approved by CGTA and TCMS.

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VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

3.8 RUDDER TRUNK REFURBISHMENT

1. Following removal of the carrier bearing housing assemblies and the thordon bearing material from rudder trunks, Contractor shall sand blast the internal area of the rudder trunks between the packing gland area and the lower thordon bearing area to a near white standard, SSPC-SP-10.
2. Contractor shall ensure the top opening on the rudder trunks are suitably closed and the steering gear compartment is protected from the ingress of blasting debris and paint.
3. Immediately on completion of sandblasting, rudder trunks are to be given one (1) coat of "Amercoat 238 Black". Paint application to rudder trunk steel affected by "flash" rusting will not be acceptable. Contractor shall be responsible for the cost associated with the prep work required for the paint application if flash rusting occurs. Coating shall be applied to a dry film thickness of 10 mils (single coating) and is to be free of runs and sags. The contractor shall provide a coating data sheet to the CGTA. Area in way of packing gland and lower thordon bearing are to be suitably protected from paint application.
4. Following the proper curing time for the Amercoat 238 Black, the following coatings are to be applied, in the order presented, allowing proper drying time between coats. The contractor shall provide the relevant data sheets on the coatings to the CGTA.

Amercoat 238 Red to a minimum DFT of 10 mils (single coat).

Amercoat 339 C.G. Red to a minimum DFT of 8-10 mils per coat, two (2) coats.

5. All coatings to be applied to the manufacturer's specifications.

3.9 PALM FACE MACHINING & NEW FITTED BOLTS

1. Contractor shall reface the mating surfaces of the rudder palms and the rudder stock palms. Contractor must machine the jumping collar to ensure proper clearance is maintained after refacing the rudder stock palms and rudder palms. Also, the palm bolt and nut landing areas on the rudder palms and the rudder stock palms shall be refaced to ensure a true face on which the bolts and nuts will land.
2. Contractor shall fabricate and install eight (8) new fitted palm bolts and nuts for each rudder as per the original drawings. Contractor must confirm the internal diameter of the palm bolt holes prior to machining to ensure the tolerance fit. Material is Aquamet 22. Rudder stock palms and rudder palms shall be reamed to ensure a proper fit of the new bolts.

VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

3.10 INSTALLATION AND SET TO WORK

1. The Contractor must verify the initial fit of the taper connection between each rudder stock and the associated tiller head. Verification of initial fit must be by machinist bluing process. The acceptable minimum contact area of 80% is to be achieved between the rudder stock taper and tiller head and this is to be evenly distributed. Final fit of the flanges and tapers must be witnessed by the attending TCMS surveyor and the TA.
2. The Contractor must re-install the rudders, rudder tiller arms, rudder stock bolts and nuts, locking bars, hydraulic rams and rudder follow-up assemblies and set the rudders and steering gear to work.
3. The Contractor must ensure the rudders are installed in good order and that the rudder palm bolts, lower gudgeon bolts, nuts and the jumping collar screws are locked using new locking material and to the satisfaction of the CGTA. Final tightening of these bolts are to be witnessed by CGTA.
4. The Contractor must supply and install new 316 stainless steel bolts on the jumping collars as shown on drawing VNEA2 271-000. All holes must be tapped prior to bolt installation and installed with Loctite 242 prior to final securing of the bolts. Contractor must install locking material and hardware as originally fitted.
5. The Contractor must measure and record the fitted clearance between the fitted keys and keyways of the rudder stocks and tiller heads for both the port and starboard rudders.
6. The Contractor must touch up any damaged hull paint in this area.

4. PROOF OF PERFORMANCE

4.1 INSPECTIONS

1. The Contractor must have each rudder inspected by the attending TCMSS surveyor and provide the CGTA with proof of inspection.
2. The Contractor must provide a Quality Assurance report indicating that all parts of the rudder assembly have been inspected by the Contractor's Q.A. department for correct installation and fit.
3. The Contractor must ensure that the rudders are installed in good order and that the tiller nuts, rudder coupling bolts, lower gudgeon bolts, nuts and the jumping collars screws are locked and to the satisfaction of the attending TCMS surveyor.

VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

4.2 TESTING/TRIALS

1. Upon completion of the inspection and final installation of the rudders and rudder stock, the Contractor must perform operational tests on the rudders to ensure that the steering system performs as required. All operational tests must be witnessed by the TA. The Contractor must test and verify the following items with regards to the steering system:
 - 1) The Contractor must verify the proper operation and indication of each rudder's angle indicator system. The Contractor must verify that all local and remote rudder angle indicators indicate the true deflection of the rudder as witnessed in the steering gear compartment. Where necessary, the Contractor must adjust the system to provide correct indication.
 - 2) The Contractor must verify the hydraulic operation of each steering gear pump and that each rudder's hydraulic system operates in a smooth manner. Where air is entrapped in the system, the Contractor must bleed the hydraulic system until all entrapped air has been removed.
 - 3) The Contractor must verify that each rudder has full travel from hard over to hard over when being steered by the hydraulic systems. The Contractor must adjust the hydraulic systems to prevent the rudders from contacting the mechanical stops on either side and to ensure that travel in both directions is equal.
 - 4) The Contractor must verify that both rudders operate and respond to all local and remote steering station inputs.

5. DELIVERABLES

1. The Contractor must provide a report of the findings, work and final condition for the work completed in this specification in accordance with the Inspection, Test and Trials Plan.
2. The Contractor must provide waste and oily-waste disposal certificates to the CGTA prior to the close of the contract.
3. The Contractor must provide the TCMSS survey documentation to the CGTA prior to vessel acceptance.
4. The Contractor must provide final measurements of the gudgeon to pintle clearances.
5. The Contractor must provide final measurements of the rudder stock liner to thordon bearing clearances.
6. The Contractor must provide final measurements of the carrier bearing to rudder stock clearances.

VLE-02 PORT AND STARBOARD RUDDER REFURBISHMENT (SURVEY)
(CONTINUED)

7. The Contractor must provide the final NDT report on the examination of the rudder stock keys, keyways, and rudder stock threads.
8. The Contractor must provide the final NDT report on the rudder stocks before and after repairs are complete.

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VLE-05 MAIN BUOY DECK REPAIRS

1. IDENTIFICATION

The purpose of this specification is for the Contractor to repair steel components located on the main buoy deck.

2. REFERENCES

Document Number	File Name
VNEA2_134-401	General Arrangement as fitted (sheet 2)

3. TECHNICAL

3.1 GENERAL

- Sections 2.2 – Protection of Personnel, Section 2.7 – Welding, and Section 2.8 – Painting must be referred to in conjunction with the work described in this specification item – refer to the Technical Data Package for information. No hot work may be undertaken in the areas of any fuel tank tops (#4 P&S, #3P&S) prior to these tanks being emptied of fuel and being declared safe for hot work by a certified Marine Chemist.
- This work item must be done in conjunction with the following Specification items:
 - All other specification items that require the main deck as a transit route for the removal and installation of equipment.
 - #3 P&S, #4 P&S fuel tank surveys
- A condition survey of the main deck steel has been conducted and the results show no diminution that would result in the need to replace steel deck plate. After the removal of the dunnage and cleaning of the deck steel, the Contractor together with the CGTA must inspect the cleaned steel deck and any areas of concern will be identified. Any UT investigation and subsequent steel insert repair will be addressed by submitting a PWGSC Form 1379.

3.2 STEEL REPAIR

- The triangular machinery mounting plate welded into the raised coaming (forward of #5 P Ballast tank vent frame14,) must have its welds released and the steel under to be inspected as in paragraph 3.1.3
- The steel under the triangular machinery mounting plate must be prepared to SSPC-SP3 Hand and Power Tool Cleaning standards. The steel must be painted according to the paint instruction detailed further in this specification item, prior to the mounting plate being re-welded into position.

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VLE-05 MAIN BUOY DECK REPAIRS (CONTINUED)

3. The coaming of this machinery mounting plate to be given drainage holes as indicated by CGTA prior to the mounting plate being re-welded into position after all painting in the area of the coaming has been completed.
4. Both bolted feet connections of the Stbd side bulwark (Frame 20 and Frame18) must be cropped out and disposed of. The forward stay plate to be cut at a level, which is 2 inches above a developed stress fracture, suitable for blending in steel flat bar for attachment of the stay direct to the deck. The steel deck in way of these bolted connections to be inspected as in paragraph 3.1.3
5. The base of each bulwark stay plate must now be repaired with the use of 3/8" x 5" mild steel flat bar (ASTM A-36) such that the connection to the steel deck is similar to all other stays for the bulwark system on the stbd side of the main deck. Full penetration fillet welding all around must be used for the connection to the deck of each extended stay plate.
6. The bulwark on the stbd side of the main deck connects to an angled plate at its very most forward end termination. This connection at Frame 21.5 was a bolted interface in original condition. The bulwark has since been welded but the bolted attachment point has remained.
7. Contractor must remove the entire bolted connection channel bar and 1 inch thick bolt connection plate at the forward end of the stbd side bulwark. Steel to be disposed of by contractor.
8. The starboard side bulwark angled connection plate must become exposed and must be repaired by steel insert plate method (approximately 3 square feet of ½ inch mild steel plate ASTM-A36). Full penetration fillet welding to be employed to re-attach the insert plate to the deck, ship's side plating and support stiffener. Contractor to provide a drainage hole at the interface of connection between the deck plating and the hull plating.
9. The upper and lower pipe rails of Stbd bulwark to be extended with schedule 80 pipe of appropriate diameter to the angled connection plate to form a welded termination. Insert plate must be fitted to the bulwark between the upper and lower pipe rails to be welded to the angled connection plate. Contractor to weld insert plate into position to match the same appearance as the forward end of the Port side bulwark at Frame 22 of the main deck. All steel in this area must now be fully exposed for coating maintenance.
10. The bulwark on the port side of the main deck connects to an angled plate at its very most forward end termination. The top railing must be cropped and renewed. New railing is approximately 3.8 meters of 4 inch schedule 80 pipe. The new rail must be painted in accordance with the paint spec indicated further in this scope of work, with a top coat of black.
11. Contractor to renew 12 (twelve) of the rubber bumper retention pins on the section of bumper between frames 0-14 on the Starboard side of the vessel, as identified by CGTA. Contractor must remove the locking pins by grinding 24 cap welds from the 12 pins present in the repair area. Welds are positioned at pin ends above and below fender channel exterior surface. When welds are removed, pins must be pushed out.

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VLE-05 MAIN BUOY DECK REPAIRS (CONTINUED)

12. 12 (Twelve) new steel pins must be fabricated and used to secure the fendering. Pins are to be cut at a length suitable for proper cap welding when installed in fendering channel. Approximately 4.0 meters of 25mm steel rod will be required. Pins must be cleaned of all oil and grease and given a solvent swipe with Wasser MC-thinner. Next the pins must be given one (1) coat of MC MIOZINC primer (DFT 3mil) followed by one coat of MC-Ferrox B (DFT 3mil). Topcoat of MC Luster Semi Gloss / Safety Red F1350 (DFT 3mil) must be applied after sufficient curing time is allowed for the previous coats prior to installation.
13. Holes must be drilled in the fender material in order to allow installation of the steel locking pins. New pins must be installed and twenty-four (24) cap welds must be applied to hold pins in place, as per existing retention end cap structure for the pins on this particular fender section.
14. Contractor must provide a unit price per pin to allow for additional pins to be replaced.

3.3 SURFACE PREPARATION

1. All commercial equipment, coatings, chemicals and other materials required for proper application of paint system must be Contractor supplied.

3.4 PRODUCT APPLICATION

1. The following is a list of products to be utilized for the application covering of the main deck. Product manufactures are Wasser High-Tech Coatings and Aqualoc.
 - a) Stripe coat: MC MIO ZINC
 - b) Full Primer: MC MIO ZINC
 - c) Intermediate Coat: MC TAR Black
 - d) 2nd Intermediate Coat: MC TAR Red
 - e) Top Coat for Bulwark steel area: MC LUSTER 100 – CG Red RAL 3000

Please see Technical Data Package for product information of all above listed coatings.

Recommended Distributor for all above products

K&D Pratt Limited
55 Akerley Blvd
Dartmouth NS B3B 1M3
Ph: (902)468-1955
Product representative: Barry Schnare (902) 456-9238cell
Email: barry.schnare@kdpratt.com

VLE-05 MAIN BUOY DECK REPAIRS (CONTINUED)

2. Entire main deck prepared areas must first be given a Stripe coat of MC MIO ZINC (3mils DFT) to all edges, crevices, nuts, bolts, back-to-back angle and weld seams.
3. Entire main deck prepared areas to now receive 2 full primer coats of MC MIO ZINC (3mils DFT per coat) and be allowed to cure.
4. Entire main deck prepared areas to now receive first intermediate coat of MC TAR BLACK (6mils DFT)
5. Entire main deck prepared areas to now receive second intermediate coat of MC TAR RED (6mils DFT).
6. Coating must be applied the machinery mounting plate prior to their re-installation.
7. The steel work area of the Bulwark connection on the Stbd side must receive topcoat of MC-Luster 100 CG RED, RAL 3000 (3mil DFT)

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VLE-09 FOCsLE DECK COVERING RENEWAL

1. IDENTIFICATION

The intent of this specification is for the Contractor to remove all deck flooring material in the designated areas on the Focsle deck of the vessel. It has been identified there is a moisture problem within the mineral fiber insulation on the existing floating floor material and thus needs to be removed and replaced. Steel deck replacement is also required below the windows on this deck.

2. REFERENCES

2.1 REGULATIONS AND STANDARDS

1. The following regulations and standards are applicable to this section:
 - a) Canada Shipping Act 2001;
 - b) TP 11469E Guide to Structural Fire Protection;
 - c) CSA W59-13 – Welded Steel Construction
 - d) CSA W47.1-09 – Certification of companies for fusion welding of steel;
 - e) International Association of Classification Societies (IACS) No. 47 – Shipbuilding and Repair Quality Standard.

DRAWINGS

Document Number	Description
VNEA2 134-401	General Arrangement as fitted (2 sheets)
VNEA2 134-701	Accommodation Layouts
VNEA2 236-001	Main Deck Unit Frames 32-39 Centre
VNEA2 236-003	Main Deck Unit Frames 32-39 P&S
VNEA2 242-006	Focsle Deck and Bulkheads Under
VNEA2 317-008	Sewage and Grey Water Diagram
VNEA2 317-008	Sewage and Grey Water Arrangement
VNEA2 317-008	Arrangement of Sanitary Fixtures 1 to 27
VNEA2 379-000	List of Insulation
VNEA2 400-000	Misc Outfitting Booklet 30 of 52 (Pantry crew mess)
VNEA2 400-000	Misc Outfitting Booklet 31 of 52 (Pantry officer mess)
VNEA2 651-000	Interior Painting
VNEA2 711-000	Joiner Bulkheads & Doors 1 of 4
VNEA2 711-000	Joiner Bulkheads & Doors 2 of 4
VNEA2 711-000	Joiner Bulkheads & Linings 3 of 4
VNEA2 711-000	Joiner Bulkheads & Linings 4 of 4
VNEA2 721-000	Insulation Plan
VNEA2 751-000	Furniture List
VNEA2 751-000	Furniture Sketches Booklet 1 to 33
VNEA2 771-000	Deck Coverings

VLE-09 FOCSE DECK COVERING RENEWAL (CONTINUED)

3. TECHNICAL

3.1 GENERAL

1. The Contractor must ensure all surrounding areas are not disturbed in this specification are protected from any damage. Any damage from the “as delivered” condition of the vessel must be repaired at the Contractor’s expense.
2. The Contractor must remove all existing flooring coverings, cement and floating floor deck covering from the steel deck plating beneath and dispose of in accordance with all Federal, Provincial and Municipal regulations and provide copies of the disposal certificates to the Inspection Authority.
3. Contractor must monitor the air quality of the spaces affected and ventilate to the exterior of the ship if required. Contractor is responsible to provide all additional ventilation equipment required to maintain a suitable work space in accordance with local laws.
4. All measurements provided are for guidance only and should be confirmed by Contractor during the vessel site visit.

3.2 CERTIFICATIONS

1. All deck coverings to replace existing must provide an A-60 fire barrier. All materials used must have either Class or TCMS type approval and suitable for marine use. All material certificates must be submitted to the TA prior to installation.
2. Personnel responsible for taking Ultrasonic readings must provide certificates to the TA and TCMS Inspectors they are certified to a minimum of Level II of Can/CGSB 48.9712-2000.

3.3 ELECTRICAL & PLUMBING ISOLATION

1. The Contractor must use common ship building and repair practices when removing deck covering material. This includes proper lockout and tag out of all associated electrical connections as well as the disconnection of all associated plumbing interfaces. Both electrical and plumbing connections affected during the removal of the floor must be reconnected and demonstrated as operable to the TA prior to the contract end.

4. SCOPE OF REMOVALS AND REPAIRS

1. The Contractor must provide a unit rate price for the removal & installation of the decking materials based on measurements provided.

VLE-09 FOCSSLE DECK COVERING RENEWAL (CONTINUED)

4.1 FOCSSLE DECK

1. The approximate areas of deck covering to be removed and replaced are as follows:

Location	Area (m²)
Passageways	24
Commanding Officer	21
Chief engineer	21
Chief Officer	17
Senior Engineer	12
Logistics Officer	11

4.2 REMOVAL, STORAGE AND INSTALLATION OF CABIN JOINERY

1. The Contractor must remove all cabin joinery that prevents the removal and replacement of the existing flooring, and these items must be handled as Category “B” property. This procedure also applies to any other items that require removal to access, remove and replace the floor covering. All items must be reinstalled prior to vessel acceptance. Any items that require plumbing or electrical disconnection and reconnection must do so in accordance with Section 3.3. Any damage to equipment must be repaired or replaced at the Contractor’s expense.
2. All exposed service connections resulting from the removal of furnishings must be identified and tagged with their service and purpose. These temporary tags must be affixed to the services in such a way that they will remain attached to identify the services throughout the work of this Section of the specification.

4.3 EXISTING SHIP’S SIDE INSULATION RENEWAL

1. The Contractor must remove all interior outboard bulkhead panels on the starboard side of the Focsle Deck from frame 34 forward to frame 42-1/2. The Contractor must remove all interior outboard bulkhead panels on the port side of the Focsle Deck starting from the frame 37, forward to frame 42-1/2.
2. Where there is conflict with electrical outlets the Contractor may choose to leave the bulkhead in place provided that access to the area requiring additional attention can be fully accessed. If access will not be suitable the Contractor must isolate, lock out power and disconnect the outlets prior to removing the bulkhead section.
3. All bulkhead panels removed must be labeled as to their location and orientation and retained for re-installation following completion of the work as Category “B” property. Any damaged panels must be replaced at contractor’s expense.
4. The Contractor must take care to avoid damaging the surface of the panels. The Contractor must remove any surface mounted items carefully and note the location of the items for re-installation.

VLE-09 FOCSE DECK COVERING RENEWAL (CONTINUED)

5. To facilitate the bulkhead removal the Contractor must remove deck head panels as required to access retaining screws. The deck head panels must be labeled and protected from damage for installation following the repair work required as Category “B” property. Any damaged panels must be replaced at contractor’s expense. Removal of deck head panels may require the removal of lighting fixtures.
6. Contractor must remove the structural insulation attached to the ship’s side to a height of 300 mm above the current A-60 decking structure. This bottom section of insulation must be removed along the full length of the deckhouse that has been opened as described in Section 3.3.
7. Following the work to install the new floor as described in this Section of the specification and at such a time that the floor has cured to an acceptable level (Dex-O-Tex FSR agreement) the Contractor must install new foil backed insulation (minimum R40) from the cut insulation line to the new floor surface. The insulation must be packed snugly to the existing cut line, the outer hull or deckhouse plate, support structure and new flooring. Contractor must use reference document TP11469 E Guide to Structural Fire Protection to ensure proper re-insulation of hull and deckhouse plating. The insulation must be secured in place by existing insulation pins (if any) and industrial reinforced foil backed tape specific for insulation.
8. The Contractor must seal all insulation joints and carefully wrap steel support structure to ensure that no cold joints are exposed.
9. Upon completion of the insulation the Contractor must re-install the bulkhead panels, ceiling panels and any items removed during this work. The Contractor must supply new bulkhead panel securing strips that colour match the original bulkhead panels.

4.4 EXISTING FLOORING REMOVAL

1. The Contractor must remove all existing Isolamin floating floor, vinyl floor tiles, baseboards, carpet and leveling cement and epoxy one piece flooring located in the areas noted in Section 3.1. Disposal of these materials will be as Category “C” property. All traces of the existing decking material must be removed to expose the main deck steel deck plating.

4.5 DECK PLATE INSPECTION AND REPAIRS

1. Once all remaining fire insulation and flooring materials are removed, the Contractor must remove all rust and loose paint. The Contractor must prepare deck plate for paint by blasting to SSPC-SP6 or power tooling to a minimum of SSPC-SP3. The Contractor must take care not to contaminate surrounding area due to power tooling action.

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VLE-09 FOCSE DECK COVERING RENEWAL (CONTINUED)

2. Once deck plate is cleaned and prepped the Contractor must provide the TA the opportunity to inspect the condition of the deck plating. During this time 60 ultrasonic readings must be taken. The locations for the Ultrasonic readings must be determined under consultation with the TA and TCMS inspectors. Contractor must supply a report to the TA on the Ultrasonic readings along with a detailed drawing showing each measurement location. This report must be supplied within 24 hours of completing the measurements.
3. The Focse deck has known corrosion of the deck plating due to leakage of the window drains for each cabin. The Contractor must include in the bid a quotation for the replacement of a 300mm wide strip under the superstructure bulkhead as follows:
 - a) Port side from Frame 37 to 42.5;
 - b) Starboard side from Frame 34 to 42.5
4. The Contractor must also include a band of superstructure plating from the deck level to a height of 150mm from the deck in way of the two areas above.
5. The Contractor must perform an extensive survey of all exposed steel deck/bulkhead boundaries to ensure there are no perforations that compromise the fire integrity and water tightness of the decks. The Contractor must provide a report detailing any defects found and proposed repair procedures to the TA with 48 hours of the survey. Should there be issues with the underlying deck plate, the Contractor must produce a repair plan for the deck plate and submit this to the TA and the TCMS inspector prior to commencing further repair work. Any additional work determined by the Contractor and in agreement by the TA must be submitted for approval using a PWGSC Form 1379.
6. All replacement steel must be of the same grade and thickness as shown on the drawings included in the Technical Data Package. Welding must be full penetration fillet welds and must be welded from both sides of the deck plate, in accordance with the original Welding Table in the Technical Data Package.
7. All welding repairs must follow the International Association of Classification Societies (IACS) No. 47 – Shipbuilding and Repair Quality Standard.
8. The Contractor must ensure that all steel plate and sections are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided to the CGTA.
9. The Contractor's welding inspector will complete a visual inspection of all welds prior to arranging inspection by the attending TCMSS surveyor.
10. Full penetration welds to be subject to 100% ultrasonic thickness testing. Technician to be certified to a minimum of Level II under CAN/CGSB 48.9712 – latest edition.
11. The Contractor must confirm all sizes of plating inserts and stiffeners prior to work commencement.

VLE-09 FOC SLE DECK COVERING RENEWAL (CONTINUED)

4.6 UNDERLYING DECK PLATE PAINTING

1. The underlying deck plate must be painted with rust inhibiting epoxy primer similar to International Paint's Intershield 300. The application of this paint must be done in accordance with manufacturers recommendations. Data including film thickness for each coat, number of coats, dew point, temperature and relative humidity must all be given to the TA for their records.
2. This paint must be suitable for use with the replacement flooring noted in Section 4.9. The paint must be suitable for marine use and certification must be given to the CGTA.

4.7 BULKHEAD SUPPORT

1. During the floor removal phase the Contractor must support the Isolamin Panel bulkheads with temporary means in order to preserve the original spacing and panel gaps as well as prevent collapse of the panel system. The Contractor must be responsible for any damage to the bulkhead system as a result of a lack of support.
2. Contractor must fit the new bulkhead supports and tack weld in place ensuring that the Isolamin bulkhead remains true and at the original spacing from the inner steel bulkhead. Bulkhead supports must be fitted at each joint channel such that the required fastening specification is maintained. The Contractor must include and fit supports at any free end of the bulkhead panel and at any point where additional support is required.

4.8 SHOWER STALLS

1. The Contractor must refurbish the shower stalls aboard the vessel as listed below:
 - a) Commanding Officer's cabin
 - b) Chief Engineer cabin
 - c) Chief Officer cabin
 - d) Senior Engineer cabin
 - e) Logistic Officer cabin
2. All fixtures including hand rails, curtain rods, soap dishes, piping brackets, showerheads and control valves shall be removed and retained for reuse. Where fitted, shower stall doors and hardware shall be removed and retained for reuse.
3. The Contractor must remove the deck material within each shower stall to the steel deck. The steel deck must be inspected and prepared in accordance with the instructions in Section 4.9.
4. The Contractor must remove shower drains and renew.

VLE-09 FOCSE DECK COVERING RENEWAL (CONTINUED)

5. The Contractor must install new subfloor and top coat. These must be Dex-O-Tex coatings as follows:
 - a) Dex-O-Tex – A70 Latex Concrete
 - b) Dex-O-Tex Terrazzo “M” (Fine)
6. The coatings are to be installed as per the manufacturer’s instructions and top coat colour must be confirmed in consultation with the TA.
7. Final floor coating shall be applied in such manner as to be a generous radius in all corners and extend up the 150mm flat bar to the base of the Isolamin wall panels. The top edge shall be slightly sloped away from the wall panels and approximately 13mm thick. Reference must be made to drawing VNEA2 771-000 Deck Coverings.
8. Shower stalls shall be fitted with a front sill that is 100mm above the finished floor surface of the shower stall.
9. CFM Shower stall pans shall be fitted to prevent water seepage. CFM Shower water proof membrane shall be installed behind all wall tiles in way of the shower stalls. Membrane shall extend over the shower pan edges to ensure water proof integrity. Deck drains shall be slopped to ensure proper operation.
10. Shower bulkheads shall be finished with CFM panels in colour and size as chosen by the CGTA.
11. All CFM caulking used shall be mold and mildew resistant and colour matched to surfaces requiring application.
12. The Contractor must reinstall all hardware mounted to the bulkheads including hand rails, soap dishes and piping brackets.

4.9 DECK PLATE FIRE INSULATION, SOUND INSULATION AND FLOORING INSTALLATION

1. The Contractor must replace the existing floating floor with a trowelled on composite flooring like Dex-O-Tex or similar. The composite flooring must have an A-60 fire rating. The new flooring must extend to the outboard deck / hull intersection and to any deck / interior steel bulkhead intersection thus providing a complete fire barrier within each area the flooring is replaced.
2. The Contractor must ensure the A-60 flooring is suitable for marine use with either Class or TCMS approval. Certificates for the material must be provided to both the TA and TCMS inspector. Contractor must ensure the new flooring is installed as per the manufacturer’s recommendations and that the weight of the material is kept to a minimum within these recommendations.

VLE-09 FOCSE DECK COVERING RENEWAL (CONTINUED)

3. The general layup to be used (for guidance only);
 - a) Steel main deck plate
 - b) Epoxy Primer (rust inhibitor) International Paint-Intershield 300
 - c) Bonder
 - d) Acoustic damping underlayment
 - e) A-60 Fire Insulation
 - f) Top Coat
4. The top coat will consist of three alternative finishes according to the application. For dry spaces defined as: the Passageways and all Cabins, the top coat must consist of 3mm Vinyl flooring. The Vinyl flooring must be roll type with welded seams. The colours must be confirmed with samples provided to the TA for approval prior to installation. The Vinyl must be suitable for marine use with Class or TCMS approval and installed as per manufacturers recommendations. The Contractor must supply any sealant or protective coatings recommended by the manufacturer of the Vinyl flooring, and apply it in accordance with the manufacturer's recommendations.
5. The top coat for wet spaces defined as: Lavatories the flooring must consist of a seamless epoxy top coat similar to Terrazzo M supplied by Dex-O-Tex. This epoxy top coat must be similar in colour to the existing flooring. Colour flake and an anti-slip agent must be added to improve the appearance and traction of the product within these wet spaces. The seamless floor must extend up the walls in accordance with the Deck Covering drawing and the finish level must be above the bottom of the side bulkhead. This is necessary to provide additional wall support and seal the bulkhead panels.
6. The Contractor must ensure all floor coatings are installed by or under consultation with a certified service representative to ensure product cures properly and the application will meet an A-60 fire rating. Contractor must involve TCMS inspectors during this process to ensure regulatory compliance.
7. Contractor must carefully remove residual contact cement from the baseboard area of the bulkheads and supply and install new flexible PVC baseboard skirting in all dry areas.

4.10 FLOOR AND GREY WATER DRAINS

1. All pipe penetrations must be fully welded, ground and coated with rust inhibitive paint in accordance with Section 4.6 prior to installing new flooring.
2. All Grey water drains exposed by the decking removals in this Section shall be removed and replaced with new material. The Contractor shall supply new stainless steel deck drains to be used for all deck drains. New drains shall be welded to the steel deck prior to the new flooring being installed.

VLE-09 FOCSE DECK COVERING RENEWAL (CONTINUED)

3. Sink drains shall be removed and disposed of and renewed during the floor renewal stage of this refit as noted on drawing VNEA2 317-008. Sink drains shall be renewed up to the P-traps for each sink above the deck. Drains shall be re-plumbed into existing piping.
4. TCMS inspectors shall inspect these penetrations prior to covering and contractor shall be responsible for full compliance with all TCMS regulations. Contractor shall take care to install proper galvanic isolation.
5. All drain piping shall consist of galvanized schedule 80 seamless pipe. All piping shall be welded using proper CWB and TCMS regulations as well as proper ship building practices.

5. DELIVERABLES

5.1 CERTIFICATES

1. The Contractor must provide the TA with all required certificates for the persons responsible for taking the Ultrasonic readings.
2. Copies of all disposal certificates must be provided to the TA.
3. The Contractor must provide to the TA the original written acceptance report from TCMS regarding the A-60 fire insulation boundary for the main deck.
4. The contractor shall provide all documentation to the TA showing all products used are suitable for the marine industry and the intended application.

5.2 REPORTS

1. The Contractor must supply a technical report for the ultrasonic thickness measurements. Reports must be presented to the TA in the allotted time frame and provided in both hard copy and PDF electronic copy.
2. A detailed drawing must be provided with the ultrasonic testing report showing the exact locations of each test point taken. This drawing must be plotted on an ISO size A1 paper and provided to the TA in both hard copy and PDF electronic copy. Along with this drawing must be an MS-Excel spreadsheet table identifying the test points by position on the drawing, steel thickness found, original thickness and percent wastage for each point.

5.3 DRAWINGS

1. The Contractor is responsible for updating all "As Fitted" drawings.

VLE-09 FOC SLE DECK COVERING RENEWAL (CONTINUED)

5.4 MANUALS

1. The Contractor must supply three sets of product literature for the new deck flooring that includes detailed data on the following:
 - a) Cleaning;
 - b) Maintenance;
 - c) Repair;
 - d) Specifications;
 - e) Cautions and Limitations;
 - f) WHMIS.
2. The maintenance and repair literature is to be that which the O.E.M. distributes to the authorized service centers for use by their technicians.
3. The Contractor must also supply product literature on the epoxy primer used on the steel decking.

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VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL

1. IDENTIFICATION

The intent of this specification is for the Contractor to remove all deck flooring material in the area on the main deck of the vessel. It has been identified there is a moisture problem within the mineral fiber insulation on the existing floating floor material and thus needs to be removed and replaced.

2. REFERENCES

2.1 REGULATIONS AND STANDARDS

1. The following regulations and standards are applicable to this section:
 - a) Canada Shipping Act 2001;
 - b) TP 11469E Guide to Structural Fire Protection;
 - c) CSA W59-13 – Welded Steel Construction
 - d) CSA W47.1-09 – Certification of companies for fusion welding of steel;
 - e) International Association of Classification Societies (IACS) No. 47 – Shipbuilding and Repair Quality Standard.

DRAWINGS

Document Number	Description
VNEA2 134-401	General Arrangement as fitted (2 sheets)
VNEA2 236-001	Main Deck Unit Frames 32-39 Centre
VNEA2 236-003	Main Deck Unit Frames 32-39 P&S
VNEA2 317-008	Sewage and Grey Water Diagram
VNEA2 317-008	Sewage and Grey Water Arrangement
VNEA2 379-000	List of Insulation
VNEA2 651-000	Interior Painting
VNEA2 711-000	Joiner Bulkheads & Doors 1 of 4
VNEA2 711-000	Joiner Bulkheads & Doors 2 of 4
VNEA2 711-000	Joiner Bulkheads & Linings 3 of 4
VNEA2 711-000	Joiner Bulkheads & Linings 4 of 4
VNEA2 721-000	Insulation Plan
VNEA2 753-002	Galley and Mess Arrangement
VNEA2 771-000	Deck Coverings

3. TECHNICAL

3.1 GENERAL

1. The Contractor must ensure all surrounding areas are not disturbed in this specification are protected from any damage. Any damage from the “as delivered” condition of the vessel must be repaired at the Contractor’s expense.

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VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

2. The Contractor must remove all existing flooring coverings, cement and floating floor deck covering from the steel deck plating beneath and dispose of in accordance with all Federal, Provincial and Municipal regulations and provide copies of the disposal certificates to the Inspection Authority.
3. Contractor must monitor the air quality of the spaces affected and ventilate to the exterior of the ship if required. Contractor is responsible to provide all additional ventilation equipment required to maintain a suitable work space in accordance with local laws.
4. All measurements provided are for guidance only and should be confirmed by Contractor during the vessel site visit.

3.2 CERTIFICATIONS

1. All deck coverings to replace existing must provide an A-60 fire barrier. All materials used must have either Class or TCMS type approval and suitable for marine use. All material certificates must be submitted to the TA prior to installation.
2. Personnel responsible for taking Ultrasonic readings must provide certificates to the TA and TCMS Inspectors they are certified to a minimum of Level II of Can/CGSB 48.9712-2000.

3.3 ELECTRICAL & PLUMBING ISOLATION

1. The Contractor must use common ship building and repair practices when removing deck covering material. This includes proper lockout and tag out of all associated electrical connections as well as the disconnection of all associated plumbing interfaces. Both electrical and plumbing connections affected during the removal of the floor must be reconnected and demonstrated as operable to the TA prior to the contract end.

3.4 FUEL TANKS

1. If steel repairs are required following inspection of the galley deck, welding may be necessary above the Fuel Oil Day & Settling tanks.
2. If necessary, the Contractor must arrange with the ship's crew to transfer all fuel in these tanks to other onboard fuel tanks. The Contractor must ask crew to leave the final 10% (volume) in each fuel tank (approximately 3000 litres in each tank). The Contractor must remove the remaining fuel from the tanks and dispose of it using proper disposal methods in accordance with Federal, Provincial and Municipal regulations and provide copies of the disposal certificates to the Inspection Authority. Day tank will already be empty as part of spec ED-03.
3. The Contractor must clean and gas free each fuel tank and provide certificates to the TA from a certified marine chemist prior to any welding on the tank top.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

4. SCOPE OF REMOVALS AND REPAIRS

1. The Contractor must provide a unit rate price for the removal & installation of the decking materials based on measurements provided.

4.1 MAIN DECK

1. The approximate areas of deck covering to be removed and replaced are as follows:

Location	Area (m²)
Galley	30

2. The Main Deck has had previous repairs performed to the deck coverings. The port passageway from the stair tower (Frame 35) forward to the forward edge of the air conditioning unit (Frame 38), from the passageway outboard to half way into the Officer's Mess and Lounge has had steel deck replacement, subfloor and deck materials replaced. The Contractor must remove the deck coverings up to this area to allow for careful inspection to determine if the repaired area will need to have the coverings replaced or if the new coverings can allow for a seamless transition to the repaired area. The Contractor must consult with the TA and TCMS to determine the course of action.

4.2 REMOVAL, STORAGE AND INSTALLATION OF GALLEY EQUIPMENT

1. The Contractor must remove all galley equipment that prevents the removal and replacement of the existing flooring, and these items must be handled as Category "B" property. This procedure also applies to any other items that require removal to access, remove and replace the floor covering. All items must be reinstalled prior to vessel acceptance. Any items that require plumbing or electrical disconnection and reconnection must do so in accordance with Section 33.3.3. Any damage to equipment must be repaired or replaced at the Contractor's expense.
2. All exposed service connections resulting from the removal of furnishings must be identified and tagged with their service and purpose. These temporary tags must be affixed to the services in such a way that they will remain attached to identify the services throughout the work of this Section of the specification.
3. All galley bulkhead panels must be removed and labeled as to their location and orientation and retained for re-installation following completion of the work as Category "B" property. Any damaged panels must be replaced at contractor's expense.
4. The Contractor must take care to avoid damaging the surface of the panels. The Contractor must remove any surface mounted items carefully and note the location of the items for re-installation.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

5. To facilitate the bulkhead removal the Contractor must remove deck head panels as required to access retaining screws. The deck head panels must be labeled and protected from damage for installation following the repair work required as Category "B" property. Any damaged panels must be replaced at contractor's expense. Removal of deck head panels may require the removal of lighting fixtures.
6. Upon completion of the new floor installation the Contractor must re-install the bulkhead panels, ceiling panels and any items removed during this work. The Contractor must supply new bulkhead panel securing strips that colour match the original bulkhead panels.

4.3 EXISTING FLOORING REMOVAL

1. The Contractor must remove all existing Isolamin floating floor, vinyl floor tiles, baseboards and leveling cement located in the areas noted in Section 4.1. Disposal of these materials will be as Category "C" property. All traces of the existing decking material must be removed to expose the main deck steel deck plating.
2. In areas where the new flooring is to meet old flooring (ie. between the galley and the crew's mess), flat bar must be spot welded to the steel deck in order to retain the remaining floating floor areas and prevent collapse of the panel system.

4.4 DECK PLATE INSPECTION AND REPAIRS

1. Once all remaining fire insulation and flooring materials are removed, the Contractor must remove all rust and loose paint. The Contractor must prepare deck plate for paint by blasting to SSPC-SP6 or power tooling to a minimum of SSPC-SP3. The Contractor must take care not to contaminate surrounding area due to power tooling action.
2. Once deck plate is cleaned and prepped the Contractor must provide the TA the opportunity to inspect the condition of the deck plating. During this time 20 ultrasonic readings must be taken. The locations for the Ultrasonic readings must be determined under consultation with the TA and TCMS inspectors. Contractor must supply a report to the TA on the Ultrasonic readings along with a detailed drawing showing each measurement location. This report must be supplied within 24 hours of completing the measurements.
3. The Contractor must perform an extensive survey of all exposed steel deck/bulkhead boundaries to ensure there are no perforations that compromise the fire integrity and water tightness of the decks. The Contractor must provide a report detailing any defects found and proposed repair procedures to the TA with 48 hours of the survey. Should there be issues with the underlying deck plate, the Contractor must produce a repair plan for the deck plate and submit this to the TA and the TCMS inspector prior to commencing further repair work. Any additional work determined by the Contractor and in agreement by the TA must be submitted for approval using a PWGSC Form 1379.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

4. All replacement steel must be of the same grade and thickness as shown on the drawings included in the Technical Data Package. Welding must be full penetration fillet welds and must be welded from both sides of the deck plate, in accordance with the original Welding Table in the Technical Data Package.
5. All welding repairs must follow the International Association of Classification Societies (IACS) No. 47 – Shipbuilding and Repair Quality Standard.
6. The Contractor must ensure that all steel plate and sections are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided to the TA.
7. The Contractor's welding inspector will complete a visual inspection of all welds prior to arranging inspection by the attending TCMS surveyor.
8. Full penetration welds to be subject to 100% ultrasonic thickness testing. Technician to be certified to a minimum of Level II under CAN/CGSB 48.9712 – latest edition.
9. The Contractor must confirm all sizes of plating inserts and stiffeners prior to work commencement.

4.5 UNDERLYING DECK PLATE PAINTING

1. The underlying deck plate must be painted with rust inhibiting epoxy primer similar to International Paint's Intershield 300. The application of this paint must be done in accordance with manufacturers recommendations. Data including film thickness for each coat, number of coats, dew point, temperature and relative humidity must all be given to the TA for their records.
2. This paint must be suitable for use with the replacement flooring noted in Section 4.8. The paint must be suitable for marine use and certification must be given to the TA.

4.6 BULKHEAD SUPPORT

1. During the floor removal phase the Contractor must support the Isolamin Panel bulkheads with temporary means in order to preserve the original spacing and panel gaps as well as prevent collapse of the panel system. The Contractor must be responsible for any damage to the bulkhead system as a result of a lack of support.
2. Contractor must fit the new bulkhead supports and tack weld in place ensuring that the Isolamin bulkhead remains true and at the original spacing from the inner steel bulkhead. Bulkhead supports must be fitted at each joint channel such that the required fastening specification is maintained. The Contractor must include and fit supports at any free end of the bulkhead panel and at any point where additional support is required. Please refer to sections 3.4 prior to welding over tanks.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

4.7 HVAC UNIT SEATS

1. The Contractor must install a seamless epoxy floor under the HVAC unit located on main deck. This epoxy floor must be sloped toward a new deck drain installed during this refit (please refer to Specification VLE-09 Section 4.10). Due to the new sloped floor the Contractor is required to install fixed steel seats for the HVAC unit to sit on providing a level base. The new steel seats may be adapted to fit onto the existing steel seats to avoid welding to the top of the Fuel Oil Day Tank.
2. The Contractor must ensure the new seats are welded in accordance with TCMS regulations. Rubber isolation must be installed between the steel seats and the HVAC unit. This rubber isolation must be in the form of 3mm-6mm thick industrial rubber matting cut to match the units footing layout. The new seats must be painted using the same epoxy primer used on the main deck, see Section 4.8.3. The Contractor must perform this work in conjunction with Section VLE-13 HVAC Upgrade.

4.8 DECK PLATE FIRE INSULATION, SOUND INSULATION AND FLOORING INSTALLATION

1. The Contractor must replace the existing floating floor with a trowelled on composite flooring like Dex-O-Tex or similar. The composite flooring must have an A-60 fire rating. The new flooring must extend to the outboard deck / hull intersection and to any deck / interior steel bulkhead intersection thus providing a complete fire barrier within each area the flooring is replaced.
2. The Contractor must ensure the A-60 flooring is suitable for marine use with either Class or TCMS approval. Certificates for the material must be provided to both the TA and TCMS inspector. Contractor must ensure the new flooring is installed as per the manufacturer's recommendations and that the weight of the material is kept to a minimum within these recommendations.
3. The general layout to be used (for guidance only);
 - a) Steel main deck plate
 - b) Epoxy Primer (rust inhibitor) International Paint-Intershield 300
 - c) Bonder
 - d) Acoustic damping underlayment
 - e) A-60 Fire Insulation
 - f) Top Coat
4. The top coat will consist of two alternative finishes according to the application.
5. The area below the HVAC unit flooring must consist of a seamless epoxy top coat similar to Terrazzo M supplied by Dex-O-Tex. This epoxy top coat must be similar in colour to the existing flooring. Colour flake and an anti-slip agent must be added to improve the appearance and traction of the product within these wet spaces. The seamless floor must extend up the walls in accordance with the Deck Covering drawing and the finish level must be above the bottom of the side bulkhead. This is necessary to provide additional wall support and seal the bulkhead panels.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

6. The Galley flooring top coat must consist of quarry tile. The tiles must be similar in colour to the existing Terra-Cotta colour and be installed in accordance with the manufacturer's recommendations and following the guidance given in the Deck Covering drawing. The Contractor must supply any sealant or protective coatings recommended by the manufacturer of the quarry tile flooring, and apply it in accordance with the manufacturer's recommendations.
7. The Contractor must ensure all floor coatings are installed by or under consultation with a certified service representative to ensure product cures properly and the application will meet an A-60 fire rating. Contractor must involve TCMS inspectors during this process to ensure regulatory compliance.
8. Contractor must carefully remove residual contact cement from the baseboard area of the bulkheads and supply and install new flexible PVC baseboard skirting in all dry areas.

4.9 FLOOR AND GREY WATER DRAINS

1. The work in this Section should be done in conjunction with the work in H-01 GREY WATER PIPING MODIFICATIONS.
2. In the wet areas located under the HVAC unit and within the galley the seamless epoxy flooring must be graded towards the deck drains to be installed in accordance with manufacturer's recommendations. All pipe penetrations must be fully welded, ground and coated with rust inhibitive paint prior to installing new flooring.
3. All Grey water drains in the mess areas exposed by the decking removals in this Section shall be removed and replaced with new material. The Contractor shall supply new stainless steel deck drains to be used for all deck drains. New drains shall be welded to the steel deck prior to the new flooring being installed.
4. Sink drains shall be removed and disposed of and renewed during the floor renewal stage of this refit as noted on drawing VNEA2 317-008. Sink drains shall be renewed up to the P-traps for each sink above the deck. Drains shall be re-plumbed into existing piping.
5. TCMS inspectors shall inspect these penetrations prior to covering and contractor shall be responsible for full compliance with all TCMS regulations. Contractor shall take care to install proper galvanic isolation.
6. All drain piping shall consist of galvanized schedule 80 seamless pipe. All piping shall be welded using proper CWB and TCMS regulations as well as proper ship building practices.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

5. Deliverables

5.1 CERTIFICATES

1. The Contractor must provide the TA with all required certificates for the persons responsible for taking the Ultrasonic readings.
2. Copies of all disposal certificates must be provided to the TA.
3. The Contractor must provide to the TA the original written acceptance report from TCMS regarding the A-60 fire insulation boundary for the main deck.
4. The contractor shall provide all documentation to the TA showing all products used are suitable for the marine industry and the intended application.

5.2 REPORTS

1. The Contractor must supply a technical report for the ultrasonic thickness measurements. Reports must be presented to the TA in the allotted time frame and provided in both hard copy and PDF electronic copy.
2. A detailed drawing must be provided with the ultrasonic testing report showing the exact locations of each test point taken. This drawing must be plotted on an ISO size A1 paper and provided to the TA in both hard copy and PDF electronic copy. Along with this drawing must be an MS-Excel spreadsheet table identifying the test points by position on the drawing, steel thickness found, original thickness and percent wastage for each point.

5.3 DRAWINGS

1. The Contractor must be responsible for updating all “As Fitted” drawings.

5.4 MANUALS

1. The Contractor must supply three sets of product literature for the new deck flooring that includes detailed data on the following:
 - a) Cleaning;
 - b) Maintenance;
 - c) Repair;
 - d) Specifications;
 - e) Cautions and Limitations;
 - f) WHMIS.

VLE-10 GALLEY AND MAIN DECK HVAC RENEWAL (CONTINUED)

2. The maintenance and repair literature is to be that which the O.E.M. distributes to the authorized service centers for use by their technicians.
3. The Contractor must also supply product literature on the epoxy primer used on the steel decking.

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

VLE-11 BOAT DECK COVERING RENEWAL

1. IDENTIFICATION

The intent of this specification is for the Contractor to remove all deck flooring material in the designated areas on the Boat deck of the vessel. It has been identified there is a moisture problem within the mineral fiber insulation on the existing floating floor material and thus needs to be removed and replaced.

2. REFERENCES

2.1 REGULATIONS AND STANDARDS

1. The following regulations and standards are applicable to this section:
 - a) Canada Shipping Act 2001;
 - b) TP 11469E Guide to Structural Fire Protection;
 - c) CSA W59-13 – Welded Steel Construction
 - d) CSA W47.1-09 – Certification of companies for fusion welding of steel;
 - e) International Association of Classification Societies (IACS) No. 47 – Shipbuilding and Repair Quality Standard.

DRAWINGS

Document Number	Description
VNEA2 134-401	General Arrangement as fitted (2 sheets)
VNEA2 134-701	Accommodation Layouts
VNEA2 241-008	Boat Deck and Bulkheads Under
VNEA2 317-008	Sewage and Grey Water Diagram
VNEA2 317-008	Sewage and Grey Water Arrangement
VNEA2 317-008	Arrangement of Sanitary Fixtures 1 to 27
VNEA2 379-000	List of Insulation
VNEA2 651-000	Interior Painting
VNEA2 711-000	Joiner Bulkheads & Doors 1 of 4
VNEA2 711-000	Joiner Bulkheads & Doors 2 of 4
VNEA2 711-000	Joiner Bulkheads & Linings 3 of 4
VNEA2 711-000	Joiner Bulkheads & Linings 4 of 4
VNEA2 721-000	Insulation Plan
VNEA2 751-000	Furniture List
VNEA2 751-000	Furniture Sketches Booklet 1 to 33
VNEA2 771-000	Deck Coverings

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

3. TECHNICAL

3.1 GENERAL

1. The Contractor must ensure all surrounding areas are not disturbed in this specification are protected from any damage. Any damage from the “as delivered” condition of the vessel must be repaired at the Contractor’s expense.
2. The Contractor must remove all existing flooring coverings, cement and floating floor deck covering from the steel deck plating beneath and dispose of in accordance with all Federal, Provincial and Municipal regulations and provide copies of the disposal certificates to the Inspection Authority.
3. Contractor must monitor the air quality of the spaces affected and ventilate to the exterior of the ship if required. Contractor is responsible to provide all additional ventilation equipment required to maintain a suitable work space in accordance with local laws.
4. All measurements provided are for guidance only and should be confirmed by Contractor during the vessel site visit.

3.2 CERTIFICATIONS

1. All deck coverings to replace existing must provide an A-60 fire barrier. All materials used must have either Class or TCMS type approval and suitable for marine use. All material certificates must be submitted to the TA prior to installation.
2. Personnel responsible for taking Ultrasonic readings must provide certificates to the TA and TCMS Inspectors they are certified to a minimum of Level II of Can/CGSB 48.9712-2000.

3.3 ELECTRICAL & PLUMBING ISOLATION

1. The Contractor must use common ship building and repair practices when removing deck covering material. This includes proper lockout and tag out of all associated electrical connections as well as the disconnection of all associated plumbing interfaces. Both electrical and plumbing connections affected during the removal of the floor must be reconnected and demonstrated as operable to the TA prior to the contract end.

4. SCOPE OF REMOVALS AND REPAIRS

1. The Contractor must provide a unit rate price for the removal & installation of the decking materials based on measurements provided.

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VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

4.1 BOAT DECK

1. The approximate areas of deck covering to be removed and replaced are as follows:

Location	Area (m ²)
Passageways (Starboard)	26
Boatswain	12
Chief Cook	12
2 nd Engineer	12
3 rd Engineer	11
Oilers	11
Engineers Office	8

4.2 REMOVAL, STORAGE AND INSTALLATION OF CABIN JOINERY,

1. The Contractor must remove all cabin joinery that prevents the removal and replacement of the existing flooring, and these items must be handled as Category "B" property. This procedure also applies to any other items that require removal to access, remove and replace the floor covering. All items must be reinstalled prior to vessel acceptance. Any items that require plumbing or electrical disconnection and reconnection must do so in accordance with Section 3.3. Any damage to equipment must be repaired or replaced at the Contractor's expense.
2. All exposed service connections resulting from the removal of furnishings must be identified and tagged with their service and purpose. These temporary tags must be affixed to the services in such a way that they will remain attached to identify the services throughout the work of this Section of the specification.

4.3 EXISTING SHIP'S SIDE INSULATION RENEWAL

1. The Contractor must remove every second interior outboard bulkhead panel on the starboard side of the Boat Deck from frame 34 forward to frame 46.
2. Where there is conflict with electrical outlets the Contractor may choose to leave the bulkhead in place provided that access to the area requiring additional attention can be fully accessed. If access will not be suitable the Contractor must isolate, lock out power and disconnect the outlets prior to removing the bulkhead section.
3. All bulkhead panels removed must be labeled as to their location and orientation and retained for re-installation following completion of the work as Category "B" property. Any damaged panels must be replaced at contractor's expense.
4. The Contractor must take care to avoid damaging the surface of the panels. The Contractor must remove any surface mounted items carefully and note the location of the items for re-installation.

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

5. To facilitate the bulkhead removal the Contractor must remove deck head panels as required to access retaining screws. The deck head panels must be labeled and protected from damage for installation following the repair work required as Category "B" property. Any damaged panels must be replaced at contractor's expense. Removal of deck head panels may require the removal of lighting fixtures
6. Contractor must remove the structural insulation attached to the ship's side to a height of 300 mm above the current A-60 decking structure. This bottom section of insulation must be removed along the full length of the hull that has been opened as described in Section 4.1.
7. Following the work to install the new floor as described in this Section of the specification and at such a time that the floor has cured to an acceptable level (Dex-O-Tex FSR agreement) the Contractor must install new foil backed insulation (minimum R40) from the cut insulation line to the new floor surface. The insulation must be packed snugly to the existing cut line, the outer hull or deckhouse plate, support structure and new flooring. Contractor must use reference document TP11469 E Guide to Structural Fire Protection to ensure proper re-insulation of hull and deckhouse plating. The insulation must be secured in place by existing insulation pins (if any) and industrial reinforced foil backed tape specific for insulation.
8. The Contractor must seal all insulation joints and carefully wrap steel support structure to ensure that no cold joints are exposed.
9. Upon completion of the insulation the Contractor must re-install the bulkhead panels, ceiling panels and any items removed during this work. The Contractor must supply new bulkhead panel securing strips that colour match the original bulkhead panels.

4.4 EXISTING FLOORING REMOVAL

1. The Contractor must remove all existing Isolamin floating floor, vinyl floor tiles, baseboards, carpet and leveling cement and epoxy one piece flooring located in the areas noted in Section 4.1. Disposal of these materials will be as Category "C" property. All traces of the existing decking material must be removed to expose the main deck steel deck plating.
2. In areas where the new flooring is to meet old flooring (ie. where the starboard passageway meets the forward cross-alleyway), flat bar must be spot welded to the steel deck in order to retain the remaining floating floor areas and prevent collapse of the panel system.

4.5 DECK PLATE INSPECTION AND REPAIRS

1. Once all remaining fire insulation and flooring materials are removed, the Contractor must remove all rust and loose paint. The Contractor must prepare deck plate for paint by blasting to SSPC-SP6 or power tooling to a minimum of SSPC-SP3. The Contractor must take care not to contaminate surrounding area due to power tooling action.

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

2. Once deck plate is cleaned and prepped the Contractor must provide the TA the opportunity to inspect the condition of the deck plating. During this time 60 ultrasonic readings must be taken. The locations for the Ultrasonic readings must be determined under consultation with the TA and TCMS inspectors. Contractor must supply a report to the TA on the Ultrasonic readings along with a detailed drawing showing each measurement location. This report must be supplied within 24 hours of completing the measurements.
3. The Contractor must perform an extensive survey of all exposed steel deck/bulkhead boundaries to ensure there are no perforations that compromise the fire integrity and water tightness of the decks. The Contractor must provide a report detailing any defects found and proposed repair procedures to the TA with 48 hours of the survey. Should there be issues with the underlying deck plate, the Contractor must produce a repair plan for the deck plate and submit this to the TA and the TCMS inspector prior to commencing further repair work. Any additional work determined by the Contractor and in agreement by the TA must be submitted for approval using a PWGSC Form 1379.
4. The boat deck has known corrosion of the deck plating due to water saturation of the floating floor material. The Contractor must include in the bid a quotation for the replacement of 10m² insert of 6.5mm steel plate in the starboard inboard area of the Boatswain and Chief Cook cabins, extending into the passageway. The area of steel to be replaced extends between Frames 38 to 35.
5. All replacement steel must be of the same grade and thickness as shown on the drawings included in the Technical Data Package. Welding must be full penetration fillet welds and must be welded from both sides of the deck plate, in accordance with the original Welding Table in the Technical Data Package.
6. All welding repairs must follow the International Association of Classification Societies (IACS) No. 47 – Shipbuilding and Repair Quality Standard.
7. The Contractor must ensure that all steel plate and sections are clean and free of scale. All surfaces must be coated with a weldable primer prior to fabrication. Material certificates for all steel must be provided to the TA.
8. The Contractor's welding inspector will complete a visual inspection of all welds prior to arranging inspection by the attending TCMS surveyor.
9. Full penetration welds to be subject to 100% ultrasonic thickness testing. Technician to be certified to a minimum of Level II under CAN/CGSB 48.9712 – latest edition.
10. The Contractor must confirm all sizes of plating inserts and stiffeners prior to work commencement.

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

4.6 UNDERLYING DECK PLATE PAINTING

1. The underlying deck plate must be painted with rust inhibiting epoxy primer similar to International Paint's Intershield 300. The application of this paint must be done in accordance with manufacturers recommendations. Data including film thickness for each coat, number of coats, dew point, temperature and relative humidity must all be given to the TA for their records.
2. This paint must be suitable for use with the replacement flooring noted in Section 4.9. The paint must be suitable for marine use and certification must be given to the TA.

4.7 BULKHEAD SUPPORT

1. During the floor removal phase the Contractor must support the Isolamin Panel bulkheads with temporary means in order to preserve the original spacing and panel gaps as well as prevent collapse of the panel system. The Contractor must be responsible for any damage to the bulkhead system as a result of a lack of support.
2. Contractor must fit the new bulkhead supports and tack weld in place ensuring that the Isolamin bulkhead remains true and at the original spacing from the inner steel bulkhead. Bulkhead supports must be fitted at each joint channel such that the required fastening specification is maintained. The Contractor must include and fit supports at any free end of the bulkhead panel and at any point where additional support is required.

4.8 SHOWER STALLS

1. The Contractor must refurbish the shower stalls aboard the vessel as listed below:
 - a) 2nd/3rd Engineer
 - b) 2nd/3rd Officer
 - c) Bosun/Chief Cook
2. All fixtures including hand rails, curtain rods, soap dishes, piping brackets, showerheads and control valves shall be removed and retained for reuse. Where fitted, shower stall doors and hardware shall be removed and retained for reuse.
3. The Contractor must remove the deck material within each shower stall to the steel deck. The steel deck must be inspected and prepared in accordance with the instructions in Section 4.5
4. The Contractor must remove shower drains and renewed as per Section 4.10.
5. The Contractor must install new subfloor and top coat. These must be Dex-O-Tex coatings as follows:
 - a) Dex-O-Tex – A70 Latex Concrete
 - b) Dex-O-Tex Terrazzo "M" (Fine)

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

6. The coatings are to be installed as per the manufacturer's instructions and top coat colour must be confirmed in consultation with the TA.
7. Final floor coating shall be applied in such manner as to be a generous radius in all corners and extend up the 150mm flat bar to the base of the Isolamin wall panels. The top edge shall be slightly sloped away from the wall panels and approximately 13mm thick. Reference must be made to drawing VNEA2 771-000 Deck Coverings.
8. Shower stalls shall be fitted with a front sill that is 100mm above the finished floor surface of the shower stall.
9. Shower stall pans shall be fitted to prevent water seepage. Shower tile water proof membrane shall be installed behind all wall tiles in way of the shower stalls. Membrane shall extend over the shower pan edges to ensure water proof integrity. Deck drains shall be slopped to ensure proper operation.
10. Shower bulkheads shall be finished with panels as per existing in colour and size as chosen by the Technical authority.
11. All caulking used shall be mold and mildew resistant and colour matched to surfaces requiring application.
12. The Contractor must reinstall all hardware mounted to the bulkheads including hand rails, soap dishes and piping brackets.

4.9 DECK PLATE FIRE INSULATION, SOUND INSULATION AND FLOORING INSTALLATION

1. The Contractor must replace the existing floating floor with a trowelled on composite flooring like Dex-O-Tex or similar. The composite flooring must have an A-60 fire rating. The new flooring must extend to the outboard deck / hull intersection and to any deck / interior steel bulkhead intersection thus providing a complete fire barrier within each area the flooring is replaced.
2. The Contractor must ensure the A-60 flooring is suitable for marine use with either Class or TCMS approval. Certificates for the material must be provided to both the TA and TCMS inspector. Contractor must ensure the new flooring is installed as per the manufacturer's recommendations and that the weight of the material is kept to a minimum within these recommendations.
3. The general layout to be used (for guidance only);
 - a) Steel main deck plate
 - b) Epoxy Primer (rust inhibitor) International Paint-Intershield 300
 - c) Bonder
 - d) Acoustic damping underlayment
 - e) A-60 Fire Insulation
 - f) Top Coat

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

4. The top coat will consist of three alternative finishes according to the application. For dry spaces defined as: Passageways, all Cabins, Engineering Offices, the top coat must consist of 3mm Vinyl flooring. The Vinyl flooring must be roll type with welded seams. The colours must be confirmed with samples provided to the TA for approval prior to installation. The Vinyl must be suitable for marine use with Class or TCMS approval and installed as per manufacturers recommendations. The Contractor must supply any sealant or protective coatings recommended by the manufacturer of the Vinyl flooring, and apply it in accordance with the manufacturer's recommendations.
5. The top coat for wet spaces defined as: Lavatories the flooring must consist of a seamless epoxy top coat similar to Terrazzo M supplied by Dex-O-Tex. This epoxy top coat must be similar in colour to the existing flooring. Colour flake and an anti-slip agent must be added to improve the appearance and traction of the product within these wet spaces. The seamless floor must extend up the walls in accordance with the Deck Covering drawing and the finish level must be above the bottom of the side bulkhead. This is necessary to provide additional wall support and seal the bulkhead panels.
6. The Contractor must ensure all floor coatings are installed by or under consultation with a certified service representative to ensure product cures properly and the application will meet an A-60 fire rating. Contractor must involve TCMS inspectors during this process to ensure regulatory compliance.
7. Contractor must carefully remove residual contact cement from the baseboard area of the bulkheads and supply and install new flexible PVC baseboard skirting in all dry areas.

4.10 FLOOR AND GREY WATER DRAINS

1. The Contractor shall supply new stainless steel deck drains to be used for all deck drains. New drains shall be welded to the steel deck prior to the new flooring being installed.
2. Sink drains shall be removed and disposed of and renewed during the floor renewal stage of this refit as noted on drawing VNEA2 317-008. Sink drains shall be renewed up to the P-traps for each sink above the deck. Drains shall be re-plumbed into existing piping.
3. TCMS inspectors shall inspect these penetrations prior to covering and contractor shall be responsible for full compliance with all TCMS regulations. Contractor shall take care to install proper galvanic isolation.
4. All drain piping shall consist of galvanized schedule 80 seamless pipe. All piping shall be welded using proper CWB and TCMS regulations as well as proper ship building practices.

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

5. Deliverables

5.1 CERTIFICATES

1. The Contractor must provide the TA with all required certificates for the persons responsible for taking the Ultrasonic readings.
2. Copies of all disposal certificates must be provided to the TA.
3. The Contractor must provide to the TA the original written acceptance report from TCMS regarding the A-60 fire insulation boundary for the main deck.
4. The contractor shall provide all documentation to the TA showing all products used are suitable for the marine industry and the intended application.

5.2 REPORTS

1. The Contractor must supply a technical report for the ultrasonic thickness measurements. Reports must be presented to the TA in the allotted time frame and provided in both hard copy and PDF electronic copy.
2. A detailed drawing must be provided with the ultrasonic testing report showing the exact locations of each test point taken. This drawing must be plotted on an ISO size A1 paper and provided to the TA in both hard copy and PDF electronic copy. Along with this drawing must be an MS-Excel spreadsheet table identifying the test points by position on the drawing, steel thickness found, original thickness and percent wastage for each point.

5.3 DRAWINGS

1. The Contractor must be responsible for updating all “As Fitted” drawings in Specification.

5.4 MANUALS

1. The Contractor must supply three sets of product literature for the new deck flooring that includes detailed data on the following:
 - a) Cleaning;
 - b) Maintenance;
 - c) Repair;
 - d) Specifications;
 - e) Cautions and Limitations;
 - f) WHMIS.

VLE-11 BOAT DECK COVERING RENEWAL (CONTINUED)

2. The maintenance and repair literature is to be that which the O.E.M. distributes to the authorized service centers for use by their technicians.
3. The Contractor must also supply product literature on the epoxy primer used on the steel decking.

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

VLE-12 GALLEY REFIT

1. IDENTIFICATION

The intent of this specification is for the Contractor to remove and replace all listed galley equipment.

2. REFERENCES

2.1 GUIDANCE DRAWINGS/NAMEPLATE DATA

- a) C14-40-601-02-R0 Galley Modification
- b) C14-40-512-01-04 HVAC General Arrangement Main Deck and Galley Details
- c) VNEA2_732-000_STEEL DOORS HATCHES & MANHOLES
- d) VNEA2_711-000_JOINER BULKHEADS & DOORS
- e) VNEA2_711-000_JOINER BULKHEADS & LININGS

2.2 STANDARDS AND REGULATIONS

- a) Lloyd's Class Notification 100A1 Ice Class 1A Super LMC Arctic Class 2 vessel
- b) Fleet Safety and Security Manual (DFO/5737)
- c) CSA W59-08(R2008) –Welded Steel Construction
- d) CSZ W47.1-09–Certification of Companies for Fusion Welding of Steel
- e) TP 11469 - Guide to Structural Fire Protection
- f) TP 127 – Ships Electrical Standards
- g) Canada Labour Code – Maritime Occupational Health and Safety Regulations
- h) Nova Scotia Health Protection Act – Food Safety Regulations

2.3 GOVERNMENT FURNISHED EQUIPMENT

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

3. TECHNICAL

3.1 GENERAL

1. The contractor must electrically isolate the equipment by performing a lock out of the IM9 115V distribution panel and the #200 230V distribution panel.
2. The Contractor must maintain lighting system and fire detection system.
3. All removed equipment is categorized as Category "A" as per the technical data package. .
4. Upon completion of all hot work, any coating that has been disturbed by hot work or new steel must be prepared to SSPC-SP3 standard and then given 2 coats of Contractor supplied Wasser MC-Miozinc 100 primer. Contractor must apply a topcoat of paint to colour match the existing colour scheme of the work area, and conform to the vessel's Paint Schedule.

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VLE-12 GALLEY REFIT (CONTINUED)

3.2 REMOVALS

1. Equipment to be removed from the galley:

- a) Clean dish table, with sinks, faucets and pre-rinse unit, right of dishwasher
- b) Soiled dish table with dish rack shelves, left of dishwasher
- c) Dishwasher
- d) Booster tank
- e) Hot food table
- f) Refrigerated countertop display case
- g) 1150mm work table
- h) 1500mm work table (must be kept onboard)
- i) Fryer
- j) Range
- k) Grill
- l) Grill cabinet
- m) Work table, right of grill
- n) Exhaust hood
- o) Exhaust hood control cabinet
- p) Fire suppression system
- q) Refrigerator
- r) Freezer
- s) Laminate wood cabinet over sink
- t) Laminate wood cabinet over counter
- u) Laminate wood closet

EQUIPMENT PICTURES:



Clean dish table

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VLE-12 GALLEY REFIT (CONTINUED)



Soiled dish table



Dishwasher and Booster tank

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VLE-12 GALLEY REFIT (CONTINUED)



Hot food table



Refrigerated counter top display case

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VLE-12 GALLEY REFIT (CONTINUED)



1150mm Work table



1500mm Work table

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VLE-12 GALLEY REFIT (CONTINUED)



Fryer



Range

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VLE-12 GALLEY REFIT (CONTINUED)



Grill, grill cabinet and work table



Exhaust hood

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VLE-12 GALLEY REFIT (CONTINUED)



Exhaust hood control cabinet and fire suppression system



Refrigerator and Freezer

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VLE-12 GALLEY REFIT (CONTINUED)



Laminate wood closet



Laminate wood cabinet

VLE-12 GALLEY REFIT (CONTINUED)



Laminate wood cabinet

3.3 REMOVAL ROUTE #1

3.3.1 GENERAL

1. Small equipment must transit via route #1. Equipment exits the galley via the starboard side mess door. It enters the stair well to go up one deck. Equipment is then taken out onto boat deck via the starboard side stair well door.
2. No lining or doors are to be removed for this route.
3. Equipment has been treated as crated boxes for the routing. Width, length and height do not refer to the actual shape or footprint of the equipment.

3.3.2 EQUIPMENT TO BE REMOVED VIA ROUTE #1:

a) Fryer	457 x 876 x 1111mm
b) Refrigerated display case	584 x 775 x 1219mm
c) Soiled dish table	455 x 650 x 910mm (approx.)
d) Grill	572 x 610 x 610mm (approx.)
e) Grill cabinet	572 x 610 x 610mm (approx.)
f) Work table	400 x 610 x 910mm (approx.)
g) Exhaust hood control cabinet	178 x 762 x 813mm
h) Chemical fire suppression system	190 x 420 x 597mm
i) Laminate wood closet & cabinets	misc.

VLE-12 GALLEY REFIT (CONTINUED)

3.4 REMOVAL ROUTE #2

3.4.1 GENERAL

1. Larger equipment must transit via route #2. Equipment exits the galley via the forward galley door leading to the domestic machinery room stairs. It goes down the machinery room stairs and enters the escape trunk. The equipment must be hoisted up the escape trunk through the stores hatch located on the forecastle deck.

3.4.2 GALLEY FORWARD DOOR MODIFICATION

1. The galley front door must be removed.
2. The magnetic catch must be removed.
3. Cold room indicator lights located above front door must be dismantled.
4. Forward galley door clear opening must be cut to 1000mm x 2025mm.

3.4.3 TRUNK ACCESS MODIFICATION

1. Domestic machinery space trunk access must be cut to 2025mm high.
2. Trunk cutout must be painted following painting procedure in section 3.1 paragraph 4.

3.4.4 ESCAPE TRUNK MODIFICATION

1. Escape trunk ladder must be removed.
2. Ladder brackets must be cut.
3. Ballast tank valve must be locked and tagged out.
4. Ballast tank stiffener located in the truck access must be removed.
5. The plate surrounding the stores hatch coaming on top of the access trunk has to be cut to create a clear opening of 1040 x 1150. This operation is needed for the routing of the main deck HVAC unit.

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SEPTEMBER 2017, DRY-DOCKING AND REFIT

VLE-12 GALLEY REFIT (CONTINUED)

3.4.5 EQUIPMENT TO BE REMOVED VIA ROUTE #2:

a) Dishwasher	743 x 889 x 1753mm
b) Clean dish table*	610 x 910 x 2300mm
c) Hot food table	710 x 915 x 1500mm
d) Range*	807 x 870 x 1524mm
e) Exhaust hood*	711 x 1334 x 2769mm
f) Refrigerator*	762 x 1295 x 1828mm
g) Freezer*	762 x 1295 x 1828mm
h) Work table	710 x 914 x 1150mm

1. Equipment with a * are to be dismantled in order to fit in the route. Procedure is detailed below.

3.5 REMOVAL PROCEDURE

1. Counter Equipment

Counter and wall equipment like toaster, electric slicer, mixers, french fry cutter, etc., must be removed and stored properly until their re-installation.

2. Fryer

Frying pan must be emptied and cooking grease disposed of in accordance with all provincial and municipal regulations. A copy of the disposal certificate must be submitted to the TA.

Fryer must be cleaned to avoid any oil spill during transport.

Electrical wire must be properly secured.

3. Refrigerated countertop display case

Glass doors, shelves and electrical wire must be secured for transport.

Containing refrigerant fluid, the Contractor must reclaim the refrigerant from the display case and supply the TA with all halocarbon disposal records.

4. Grill

Electrical cable must be disconnected.

The grill must be properly cleaned to avoid any grease spill during transport.

Cooking grate, cover plates and electrical wire should be properly secured.

VLE-12 GALLEY REFIT (CONTINUED)

5. Grill Cabinet

Grill cabinet's drawer must be secured for its carriage.

6. 400mm Worktable

The worktable beside the grill must have its door and shelves secured for its transport.

7. 1150mm Worktable

The small worktable on starboard side must have its door and shelves secured for its transport.

8. 1500mm Worktable

The large worktable on starboard side must be removed and properly stored in the crew mess until its re-installation.

9. Chemical Fire Suppression System

The chemical fire suppression system must be dismantled by a qualified technician.

As it contains chemicals, the fire suppression system must be properly recycled and the Contractor must supply the TA with copies of the disposal certificates.

10. Dishwasher

Water supply, drain and electrical wire must be disconnected.

The dishwasher must be cleaned to avoid any water or detergent spill during transport.

Door and electrical wire must be properly secured for transport.

11. Clean Dish Table

Water supplies and drains must be disconnected.

Faucets and pre-rinse must be removed.

Front wall and cabinet doors must be separated from counter top for transport.

VLE-12 GALLEY REFIT (CONTINUED)

12. Hot Food Table

Hot food table must be emptied to avoid any water spill.

Electrical wire must be disconnected.

Sneeze guard, pans and wells must be removed.

Electrical wire and doors must be properly secured for transport.

13. Range

The range must be cleaned to avoid any grease spill.

Electrical wire must be disconnected.

Legs and back guard must be removed in order to fit in the route. Parts must be marked and attached to the range for transport.

Cooking grates, electrical wire and oven doors must be properly secured for transport.

14. Exhaust Hood Control Cabinet

The auto clean system pipes and controls for the exhaust hood must be dismantled.

Water supply and electrical cable must be disconnected.

Control cabinet must be cleaned to avoid any water or soap spill.

Door and electrical wire must be properly secured for transport.

15. Exhaust Hood

Cleaning water pipes, drain and electrical wire must be disconnected.

Fire extinguishing nozzles must be dismantled by a qualified technician.

The exhaust hood must be cut in two 1500mm sections in order to fit in the route.

VLE-12 GALLEY REFIT (CONTINUED)

16. Refrigerator

Refrigerant gas must be removed and properly disposed of by a qualified technician. Refrigerant disposal certificates and documentation must be provided to the TA.

The refrigerator must be cut in two or more sections in order to fit in the route.

17. Freezer

Refrigerant gas must be removed and properly disposed of by a qualified technician. Refrigerant disposal certificates and documentation must be provided to the TA.

The freezer must be cut in two sections in order to fit in the route.

18. Laminate Wood Cabinets

Cabinets must be taken off the bulkheads.

Cabinets can be dismantled for their carriage.

3.6 HVAC ROUTING

3.6.1 GENERAL

1. Before bringing any new galley equipment in place, the main deck HVAC unit must be routed through the emptied galley. See HVAC report for detailed information, and Specification item VLE-13.
2. Portside galley door steel cutout must be removed and cutout modified as per description below.
3. Once HVAC unit is onboard and positioned, the opening will be completely closed.

3.6.2 PORTSIDE GALLEY DOOR

1. The portside galley door must be removed.
2. The magnetic catch must be removed and reprogrammed on its control panel.
3. Exhaust hood auto-clean control cabinet must be removed.
4. The wet chemical fire system control cabinet must be removed.
5. Galley door clear opening width must be cut to 900mm.

VLE-12 GALLEY REFIT (CONTINUED)

3.6.3 Galley Door Closing

IMPORTANT: Main deck HVAC unit has to be brought in place before performing these operations.

1. New plate and stiffeners must be welded in place following C14-40-601-02-R0 to completely close the portside galley door.
2. New bulkhead must be painted on both sides following painting procedure in section 3.1 paragraph 4.
3. The bulkhead lining will be completed after galley drains modification as per drawing VNEA2_711-000_JOINER BULKHEADS & LININGS.

3.7 Electrical system

1. Galley's electrical panel and wire must be reconfigured to meet the new equipment requirements.
2. All electrical works must be done following C14-40-306-01 R0 Load Analysis.

Panel #200, 230V

Circuit 201 - Range

- a) Breaker must be raised to 150 amps.
- b) Wire must be changed for 3C 2/0.

Circuit 202 – Convection/steamer oven

- a) Breaker must be raised to 80 amps.
- b) Wire must be changed for 3C5.

Circuit 203 - Fryer

- a) Breaker must be raised to 80 amps.
- b) Wire must be changed for 3C5.

Circuit 204 – Food waste disposer

- a) New 3C14 wire must be installed leading to food waste disposer location for future installation.

Circuit 208 – Dishwasher booster tank

- a) Breaker must be raised to 50 amps.
- b) Wire must be verified and need to be replaced if smaller than 3C6.

Circuit 209 – Toaster, aft plug

- a) Breaker must be raised to 30 amps.
- b) Wire must be changed for 2C10.

VLE-12 GALLEY REFIT (CONTINUED)

Circuit 210 – Toaster, fwd plug

- a) Breaker must be raised to 30 amps.
- b) Wire must be changed for 2C10.

Circuit 211 – Hot food table

- a) Breaker must be raised to 40 amps.
- b) Wire must be changed for 3C10.

Circuit 213 - Dishwasher

- a) Breaker must be verified and need to be replaced if not 50 amp capacity.
- b) Wire must be verified and need to be replaced if smaller than 3C6.

Panel IM9, 115V

Circuit IM9-12 – Microwave oven

- a) Breaker must be raised to 40 amps.
- b) Wire must be changed for 2C10.

3.8 GREY WATER SYSTEM

3.8.1 GENERAL

1. The grey water system of the galley must be modified to match the new equipment requirements.
Reference drawing: C14-40-601-02.
2. Convection Oven, Exhaust Hood and Sink Drains
Passageway lining must be removed.
3. Diameter of spool 2-WC-24 must be changed to 50mm.
4. Diameter of spool 2-WC-23 must be changed to 50mm.
5. New 50mm diameter spools are to be added:
 - a) 2-WC-23B
 - b) 2-WC-23C
 - c) 2-WC-23D
 - d) 36-WC-5
6. Spool 2-WC-23B must pass through passageway bulkhead.
7. Spool 2-WC-23D must pass through deck.
8. Welding on bulkhead and deck must be painted on both sides following the painting procedure in section 3.1 paragraph 4.
9. Connect original 2-WC-23A sink drain to new 2-WC-23C.

VLE-12 GALLEY REFIT (CONTINUED)

10. Spool 36-WC-5 must be connected to 36-WC-4.
11. Lining panels must be reinstalled.
12. Dish Table Drains
 1. Dishwasher and clean dish table drains must be reconfigured as per drawing.
 2. New spool 2-WC-21A must be connected to original 2-WC-21.
13. Hot Food Table Drain
 1. The hot food table needs a drain connected to the sewage system. Its position must be verified on the equipment specification document.
14. Mess lining panels must be removed.
15. Spool 1-WC-22B must pass through mess bulkhead.
16. Spool 1-WC 22A must pass through deck.
17. Spool 1-WC 22A must be connected to 1 WC-22.
18. Welding on bulkhead and deck must be painted on both sides following painting procedure in section 3.1 paragraph 4.
19. Lining panels must be reinstalled.

3.9 HOT AND COLD WATER SUPPLY

3.9.1 GENERAL

1. Hot and cold water supply system must be refitted as per drawing C14-40- 601-02.
2. Clean Dish Table

Faucets must be supplied with hot and cold water.
Pre-rinse unit must be supplied with hot and cold water.
3. Dishwasher

Equipment must be supplied with hot and cold water.
4. Soiled Dishtable

Pre-rinse unit must be supplied with hot and cold water.
Additional cold water connection must be installed under the table for food waste disposer re-installation.

VLE-12 GALLEY REFIT (CONTINUED)

5. Hot Food Table
Equipment must be supplied with cold water.
6. Convection/Steamer Oven
Equipment must be supplied with cold water.
7. Exhaust Hood Control Cabinet
Auto-clean system and fire system must be supplied with hot water.

3.10 LIST OF NEW GALLEY EQUIPMENT

- a) Clean dish table, sinks, faucets, pre-rinse unit and cabinet doors right of dishwasher
- b) Soiled dish table, mounted with food waste disposer sink, pre-rinse, dish rack shelf and cabinet door, left of dishwasher.
- c) Dishwasher
- d) Anti-splash wall
- e) Refrigerated countertop display case
- f) 1660mm work table
- g) 1500mm work table (old one to be re-installed)
- h) Fryer
- i) Range
- j) Convection/steamer oven
- k) Stationary oven stand
- l) Hot food table
- m) Exhaust hood and fire suppression system
- n) Make-up air plenum
- o) Exhaust hood control and wash down cabinet
- p) Refrigerators (2)
- q) Freezer
- r) Stainless steel shelf
- s) Microwave oven shelf
- t) Closet cabinet
- u) Wall mounted storage cabinet
- v) Wall mounted cookie sheets cabinet
- w) Drawers cabinet

3.11 NEW EQUIPMENT ROUTING

3.11.1 GENERAL

1. Main deck HVAC unit has to be routed in place before any galley equipment routing.
2. All stainless steel equipment, cabinet and shelves must be measured in place before ordering.

VLE-12 GALLEY REFIT (CONTINUED)

3. Equipment has been treated as boxes for the routing. Width, length and height do not refer to the actual shape and footprint of the equipment.

3.11.2 EQUIPMENT BROUGHT IN VIA ROUTE #1

a) Fryer	457 x 876 x 1111mm
b) Refrigerated countertop display case	584 x 775 x 1219mm
c) 1660mm worktable	610 x 915 x 1016mm
d) Stationary oven stand	483 x 781 x 838mm
e) Exhaust hood control cabinet	178 x 762 x 813mm
f) Chemical fire suppression system	190 x 420 x 597mm
g) Closet cabinet	350 x 750 x 1750mm
h) Microwave oven shelf	75 x 540 x 650mm
i) Stainless steel shelf	75 x 307 x 1200mm
j) Wall mounted storage cabinet	300 x 600 x 675mm
k) Wall mounted cookie sheets cabinet	375 x 675 x 700mm
l) Drawers cabinet	915 x 700 x 375mm

3.11.3 EQUIPMENT BROUGHT IN VIA ROUTE #2

a) Dishwasher	743 x 889 x 1753mm
b) Range	807 x 870 x 1524mm
c) Convection/steamer over	781 x 838 x 845mm
d) Soiled dish table	762 x 914 x 1143mm
e) Clean dish table	762 x 914 x 1600mm
f) Hot food table	610 x 914 x 1524mm
g) Exhaust hood (2 section)	914 x 991 x 1500mm
h) Refrigerator (2)	687 x 749 x 1991mm
i) Freezers (2)	687 x 749 x 1991mm

4. The range's back guard and legs must be removed in order to fit in the route.

3.12 AFTER ROUTING REBUILD

3.12.1 FORWARD GALLEY DOOR

1. Steel cutout must be brought back to original dimension following VNEA2 732-000 Steel doors, Hatches & Manholes plan.
2. New steel must be painted on both sides following painting procedure in section 3.1 paragraph 4.
3. New door must be installed as per VNEA2_711-000_JOINER BULKHEADS & LININGS.
4. Cold room indicator lights must be reinstalled.

VLE-12 GALLEY REFIT (CONTINUED)

5. Door's magnetic catch must be reinstalled.

3.12.2 ESCAPE TRUNK

1. Ballast tank stiffener must be welded back in place.
2. Ballast tank stiffener must be painted in the escape trunk and inside the ballast tank. The paint inside the ballast tank must follow the coatings in Section 3.1 of this Specification.
3. Ballast tank valve must be unlocked.
4. Ladder brackets have to be welded back in place.
5. All exposed metal after welding are to be painted following painting procedure in section 3.1 paragraph 4.
6. Ladder must be reinstalled.
7. Stores hatch must be reinstalled.

3.12.3 NEW EQUIPMENT INSTALLATION DETAILS

1. All galley equipment must be tested and demonstrated to TA or IA.

3.12.4 DISHWASHER

1. Located on aft galley bulkhead.
2. Electrical power, hot and cold supply water must be properly connected to the dishwasher following the equipment specification document.
3. Height must be adjusted to match soiled and clean dish tables.
4. Legs must be secured to the floor.
5. Water hammer arrestor meeting ASSE-1010 standard or equivalent must be supplied by the contractor, in common water supply line at service connection.
6. For convenience when cleaning, water tap must be installed near machine with heavy duty hose and squeeze valve.
7. This is a pumped rinse machine. Pressure regulating valve is not necessary on hot or cold lines.

VLE-12 GALLEY REFIT (CONTINUED)

3.12.5 CLEAN DISH TABLE

1. Located to the right of the dishwasher on aft galley bulkhead.
2. Final measurements must be taken in place before ordering.
3. Faucets, pre-rinse and drains must be properly connected to respective circuits.
4. Height must be adjusted to match soiled dish table and dishwasher.
5. The dish table must be correctly secured to bulkhead and floor.
6. Cabinet doors must be installed, adjusted and tested for suitable operation.

3.12.6 SOILED DISH TABLE

1. Located left of the dishwasher on aft galley bulkhead.
2. Final measurements must be verified in place for approval before ordering.
3. Pre-rinse must be properly connected to hot and cold supply.
4. Height must be adjusted to match dishwasher and clean dish table.
5. The dish table must be correctly secured to bulkhead and floor.
6. Cabinet door must be installed, adjusted and tested for suitable operation.
7. The sink must be selected to be able to install a of food waste disposer in the future. Fittings will be necessary to match the 7" drain opening of the drain pipe.

3.12.7 ANTI-SPRAY WALL

1. A 13mm thick Plexiglas wall must be installed between the soiled dish table and the electrical panels to prevent any water splatter.

3.12.8 EXHAUST HOOD AND FIRE SUPPRESSION SYSTEM

1. Located aft of the center galley wall.
2. The hood must be recessed 150mm in the ceiling.

VLE-12 GALLEY REFIT (CONTINUED)

3. The hood must be correctly mounted as per manufacturer recommendations, including:
 - a) Two low proximity sloped back shelf hood.
 - b) Backsplash
 - c) Side splash
 - d) Stand-off
 - e) Quarter-end panels
 - f) Wall mounted utility cabinet
 - g) CORE fire protection systems
4. Exhaust hood must be properly installed following supplier documentation ASIZE-Master-CanadianCoastGuardShip-R4 (1).pdf.
5. Exhaust hood has to be connected to HVAC system as per drawing C14-40-512-01-04 HVAC General Arrangement Main Deck and Galley Details.

3.12.9 EXHAUST HOOD CONTROL AND WASH-DOWN CABINET

1. Located on the portside galley bulkhead, in front of the clean dish table.
2. Cabinet must be correctly fixed to bulkhead.
3. Chemical fire suppression system must be properly installed following supplier documentation ASIZE-Master-CanadianCoastGuardShip-R4 (1).pdf.
4. Duct must be connected to air extraction system.
5. Electrical power and water supply must be connected to control cabinet.
6. Cleaning water and fire protection system must be connected to hood.
7. Drain must be properly connected.

3.12.10 MAKE-UP AIR PLENUM

1. Located in front of the exhaust hood.
2. Plenum must be installed flush to the ceiling.
3. Make-up air plenum has to be properly installed following supplier documentation ASIZE-Master-CanadianCoastGuardShip-R4 (1).pdf.
4. Make-up air plenum has to be connected to HVAC system as per drawing C14-40-512-01-04 HVAC General Arrangement Main Deck and Galley Details.

VLE-12 GALLEY REFIT (CONTINUED)

3.12.11 FRYER

1. Located on portside, aft of the center galley wall.
2. Electrical power must be properly connected following the equipment specification document.
3. The fryer must be secured to the floor.

3.12.12 RANGE

1. Located right of the fryer, aft of the center galley wall.
2. Back guard and legs must be re-assembled.
3. Electrical power must be properly connected following the equipment specification document.
4. The range must be secured to the floor.

3.12.13 STATIONARY OVEN STAND

1. Located right of the oven, aft of the center galley wall.
2. The stationary oven stand must be secured to the floor.

3.12.14 CONVECTION/STEAMER OVEN

1. Installed on the stationary oven stand, aft of the center galley wall.
2. Electrical power, water and drain are to be properly connected following the equipment specification document.
3. Equipment must be secured to its stand.

3.12.15 FREEZER

1. Located on the starboard side galley bulkhead, sided to aft galley bulkhead.
2. Old toe plate must be completely removed.
3. A new base must be built to raise the equipment as high as possible.
4. Electrical power must be properly connected following the equipment specification document.
5. The freezers are to be secured to the bulkhead and/or the floor.

VLE-12 GALLEY REFIT (CONTINUED)

3.12.16 REFRIGERATOR

1. Located on the fore galley bulkhead, sided to portside galley bulkhead.
2. Old toe plate must be completely removed.
3. A new base must be built to raise the equipment as high as possible.
4. Electrical power must be properly connected following the equipment specification document.
5. The refrigerators must be secured to the bulkhead and/or the floor.

3.12.17 1660MM WORKTABLE

1. Located on the starboard side galley bulkhead, right of the freezer.
2. Final measurements must be taken in place before ordering.
3. The final length of this work table must be taken in place considering refrigerators, 1500mm work table and hot food table in place before ordering.
4. Height must be adjusted to match the 1500mm worktable.
5. The table must be correctly fixed to bulkhead and floor.
6. Cabinet doors and drawers must be installed, adjusted and tested for suitable operation.

3.12.18 1500MM WORKTABLE

1. Located right of the 1660mm worktable on starboard side galley bulkhead.
2. This worktable is the old one that has been removed and stored.
3. The worktable must be correctly secured to bulkhead and floor.
4. Cabinet doors and drawers must be adjusted and tested for suitable operation.

3.12.19 REFRIGERATED COUNTERTOP DISPLAY

1. Counter mounted on the 1500mm worktable.
2. The refrigerated countertop display must be installed on the 1500mm worktable.
3. The right side of the display must be aligned with the right end of the table.

VLE-12 GALLEY REFIT (CONTINUED)

4. Electrical power must be properly connected following the equipment specification document.
5. Legs must be secured to the worktable.

3.12.20 HOT FOOD TABLE

1. Located on the starboard side galley bulkhead, left of the crew mess door.
2. The hot food table must be correctly secured to bulkhead and floor.
3. Electrical power, supply water and drain must be properly connected following the equipment specification document.
4. Cabinet sliding doors must be installed, adjusted and tested for suitable operation.

3.12.21 STAINLESS STEEL SHELVES

1. Mounted on forward side of the center galley wall, on portside, over the sink.
2. Final measurements must be taken in place before ordering.
3. The shelf must be properly mounted to the wall.

3.12.22 MICROWAVE OVEN SHELVES

1. Located on the starboard side galley bulkhead, sided to the freezer.
2. Final measurement must be taken on the microwave oven before ordering.
3. The shelf must be properly mounted to the bulkhead.

3.12.23 CLOSET CABINET

1. Located on the forward galley bulkhead, right of the refrigerators.
2. Final measurements must be taken in place before ordering.
3. The cabinet must be properly secured to the floor and the bulkhead.
4. Closet hinged doors must be installed, adjusted and tested for suitable operation.

VLE-12 GALLEY REFIT (CONTINUED)

3.12.24 WALL MOUNTED STORAGE CABINET

1. Located on the starboard side galley bulkhead, sided to the microwave oven shelf.
2. The cabinet must be properly fixed to the bulkhead.

3.12.25 DRAWERS CABINET

1. Located on the portside galley bulkhead, centered between the clean dish table and the fryer.
2. The cabinet must be properly secured to floor and bulkhead.
3. Cabinet hinged doors must be installed, adjusted and tested for suitable operation.

3.12.26 WALL MOUNTED COOKIE SHEETS CABINET

1. Located on the portside galley bulkhead, over the drawers cabinet.
2. The cabinet must be properly mounted to bulkhead.
3. Cabinet sliding doors must be installed, adjusted and tested for suitable operation.

3.12.27 TOE PLATES

1. If necessary, all ceramic covered toe plates must be adjusted or re-built to match new equipment.
2. Measurements must be taken on site.

4.0 PROOF OF PERFORMANCE

4.1 INSPECTION

1. All work must be witnessed by the TA and IA and the attending TCMS surveyor.
2. The contractor must give access to a Captive Aire technician for the inspection of the exhaust hood system.
3. Items to be verified by operation or commissioning by certified technicians:
 - a) CORE fire system
 - b) Energy management system
 - c) Exhaust fan
 - d) Hood
 - e) Self-cleaning system

VLE-12 GALLEY REFIT (CONTINUED)

4.2 TESTING

1. The Contractor must perform functional tests of the new galley equipment as per the manufacturer's recommendations for commissioning.

4.3 CERTIFICATION

1. Equipment and component certificates including all test reports and CSA and / or ULC certificates of compliance must be supplied to the TA and TCMS.
2. The Contractor must provide the services of a certified fire protection service company to obtain certificates for the CORE firefighting system.

4.4 DELIVERABLES

1. All documentation supplied with the galley equipment must be delivered to the TA.

4.5 TRAINING

1. The Contractor must be responsible to give 2 ship's staff any necessary training to operate all new galley equipment.
2. The Contractor must give access to a Rational technician for the start-up training of the convection / steamer oven. The contractor must be responsible for the arrangements between the supplier and the ship's staff.

VLE-13 HVAC UPGRADE

1. IDENTIFICATION

The intent of this specification is for the Contractor to replace the main deck HVAC unit with a GFE replacement unit.

2. REFERENCES

2.1 DRAWING AND DOCUMENTS SUPPLIED IN TECHNICAL DATA PACKAGE

- a) HVAC Report – P201404001-A1
- b) Humidification Report – P201404001-A2
- c) VNEA2 761-014 HVAC System – Main deck and Boat deck: Sheet 2 of 2
- d) VNEA2 761-015 A/C Equipment Room
- e) C14-40-512-00 HVAC Bill of Material
- f) C14-40-512-01 HVAC General Arrangement
- g) C14-40-512-02 HVAC Elevations and details – Boat and Main decks
- h) C14-40-512-05 Self-Contained unit – Main deck

2.2 STANDARDS AND REGULATIONS

- a) TP 11469E – Guide to Structural Fire Protection
- b) International Maritime Organization – SOLAS
- c) IEEE 45 – Recommended Practice for Electrical Installations on Shipboard
- d) SNAME Technical and Research Bulletin No. 4-7
- e) SNAME Technical and Research Bulletin No. 4-16
- f) SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) – HVAC Duct Construction Standards, Metal and Flexible (2005)
- g) ANSI/ASHRAE Standard 151:2010 - Practices For Measuring, Testing, Adjusting, And Balancing Shipboard HVAC&R Systems

2.3 OWNER FURNISHED EQUIPMENT

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

3. TECHNICAL

3.1 GENERAL

1. Before proceeding with any dismantling work, the contractor must lock out and tag out the respective electric distribution panels serving the HVAC equipment listed in the following section.

VLE-13 HVAC UPGRADE (CONTINUED)

2. Equipment has been treated as crated boxes for routing purposes. Width, length and height do not refer to the actual shape or footprint of the equipment.
3. The TA must be provided with copies of Halocarbon recovery and disposal records for all equipment removed from service. The TA must also be provided copies of Halocarbon service records for all new equipment installed aboard the vessel.
4. Upon completion of all hot work, any coating that has been disturbed by hot work, disturbed steel work or new steel must be prepared to SSPC-SP3 standard and then given 2 coats of Contractor supplied Wasser MC-Miozinc 100 primer. Contractor must apply a topcoat of paint to colour match the existing colour scheme of the work area, and conform to the vessel's Paint Schedule.

3.2 LIST OF HVAC EQUIPMENT TO BE REMOVED

1. One (1) Carrier 90MA008 self-contained cooling unit (Main Deck) including associated thermostats, sensors and control wiring.

3.3 REMOVED EQUIPMENT ROUTING

1. The Carrier 90MA008 Self-contained unit located on main deck will have to be completely dismantled in order to be carried out by the stair well and taken out on boat deck via the starboard side stair well door.

3.4 REMOVAL PROCEDURE

CARRIER 90MA008 SELF-CONTAINED UNIT (MAIN DECK)

1. Refrigerant (R22, 4.54 kg) in the unit must be recovered using the appropriate pressure-rated recovery cylinder relative to the refrigerant in the system. This task must be performed by a certified refrigeration technician.
2. All electrical cables to be disconnected from the units and the wiring for power must be removed to the nearest disconnect box. Remove all low voltage wiring associated with the thermostat.
3. Remove and dispose of all sensors and thermostats related to the unit.
4. All water piping must be isolated using existing valves and disconnected from the unit.
5. Condensate line must be disconnected from units.
6. Remove and dispose of the water regulating valve.
7. Fresh air and supply ducts must be dismantled where required as per drawing C14-40-512-01.

VLE-13 HVAC UPGRADE (CONTINUED)

8. Dismantle and dispose of units in a proper manner. Recycle items whenever possible. These items are classed as Category “C” property.

3.5 NEW HVAC EQUIPMENT

3.5.1 NEW EQUIPMENT ROUTING

ROUTING

1. Refer to Specification item VLE 12 Section 3.4.4 Escape Trunk Modification for the complete information about the main deck self-contained unit routing. Contractor must coordinate this work with Specification item VLE-12.

3.6 EQUIPMENT SIZE

3.6.1 NEW EQUIPMENT INSTALLATION DETAILS

GENERAL NOTES

1. All equipment must be lifted according to Manufacturer’s instructions with slings or other suitable and secure means. The Contractor must be responsible for all handling and any damage incurred must be rectified at Contractor expense.
2. Openings on the different pieces of equipment must be covered during storage, handling and installation in order to eliminate the risk of foreign body contamination.
3. The Contractor must be responsible to readjust ceiling panels and finishing tiles around the Main deck self-contained units in order to provide a clean finish. Damaged panels must be replaced by the Contractor.
4. The Contractor must be responsible to remove ceiling panels as well as to replace any ceiling panels damaged during the contract.

SELF-CONTAINED UNITS (MAIN DECKS)

5. Prior to the installation of the new self-contained units, the Contractor must complete the work detailed in Specification item VLE-10 section 4.7 – HVAC Unit Seats.
6. All surfaces must be cleaned prior to the installation of the new unit.
7. The self-contained units must be mounted in place and secured as indicated on the installation drawings.

VLE-13 HVAC UPGRADE (CONTINUED)

8. Existing water pipes must be modified as indicated on the installation drawings in order to adapt to the new units.
9. Electrical power must be connected to the unit following drawings C14-40-512-04 and C14-40-512-05 in conjunction with the manufacturer's installation manual.
10. Temperature controller and sensors must be installed at the location indicated on the drawings C14-40-512-01 and C14-40-512-02 and must be wired to units following drawings C14-40-512-04 and C14-40-512-05 in conjunction with the manufacturer's installation manual.
11. Existing supply duct must be modified as indicated on the installation drawings in order to connect to the unit supply opening.
12. Existing fresh air duct must be modified as indicated on the installation drawings.

4. ACCEPTANCE TEST PROCEDURE

4.1 PURPOSE AND SCOPE

1. The HVAC system acceptance test procedure must be performed once the HVAC equipment has been installed, connected and started on the vessel and is ready to be operated under normal conditions.
2. This procedure verifies the functional operation of the HVAC equipment and controls system supplied by the vendor.

4.2 ACCEPTANCE CRITERIA

1. The equipment under test must meet all requirements of the test procedure in order to be deemed to be operating as per the required design parameters.
2. The Contractor must provide a written test procedure for each of the following systems. These procedures will be reviewed and approved by the TA prior to conducting the test.
3. Once approved, any deviation from this procedure is considered to be in non-conformance and must be reviewed by the TA in order to be accepted.
4. Acceptance test procedures to be provided include:
 1. Air conditioning unit and controls test procedure for the RTUs and SCUs.

VLE-13 HVAC UPGRADE (CONTINUED)

5. TEST PROCEDURE AND DOCUMENTATION

1. The test record sheet must be completed as the test is being performed. A copy must be provided to the TA and IA within 10 days of completing the test. It must be signed by the tester or a designated authority.
2. The TA must be advised prior to test to ensure that power and water services are available and to allow the TA and IA to witness the tests.
3. Prior to conducting the tests, ensure that all test equipment and tools are properly calibrated and have valid certificates where applicable. Include the list of test equipment and tools used on the test record sheet.
4. ONLY QUALIFIED AND/OR CERTIFIED PERSONEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE OR SERVICE THE HVAC EQUIPMENT.

5.1 AIR BALANCE AND REPORT

1. Upon successful start-up and operation of the HVAC equipment, the Contractor must perform an air balance for the accommodation decks (Main deck,). The air balance must be performed for all rooms that are served by the HVAC equipment as identified on the ducting arrangement drawings C14-40-512-01 and C14-40-512-02.
2. Airflow in each room must be within +/- 10% of the design parameters identified on the drawings C14-40-512-01 and C14-40-512-02. Total airflow per system (each RTU or SCU) must be within +/- 5% of the design parameters.
3. The air balance must be performed by a NEBB certified technician. A tabulated air balance report must be provided within 10 days of completing the field measurements. The report must comply with NEBB standards and be delivered to the TA and IA.

5.2 INSPECTION

1. All work must be subject to witness by the TA and the attending TCMS surveyor.

6. DELIVERABLES

6.1 GENERAL

1. All documentation supplied with the HVAC equipment must be handed to the Technical Authority.
2. The TA must be provided with copies of Halocarbon recovery and disposal records for all equipment removed from service. The TA must also be provided copies of Halocarbon service records for all new equipment installed aboard the vessel

VLE-13 HVAC UPGRADE (CONTINUED)

6.2 INSTRUCTION MANUALS

1. The contractor must provide the instruction manuals for all supplied equipment together with parts lists necessary to maintain provided equipment and accessories.

6.3 CERTIFICATION

1. The contractor must provide equipment and component certificates including all test reports and CSA and / or ULC certificates of compliance.

6.4 AIR BALANCING AND COMMISSIONING

1. A tabulated air balance report which complies with NEBB standards must be provided to the TA.