



Fisheries and Oceans
Canada

Canadian Coast Guard

Pêches et Océans
Canada

Garde côtière canadienne

CANADIAN COAST GUARD



REFIT SPECIFICATION CCGS EDWARD CORNWALLIS

SPECIFICATION NO. 15-E007-005-1

AUGUST 5 – SEPTEMBER 11, 2015



This page is intentionally left blank.

CCGS Edward Cornwallis
August, 2015 Refit
Index of Specifications

1	General Notes	1
2	Services	7
3	Production Chart & Contractor Allowances	12
HD-01	Drydocking	14
HD-02	Hull Inspection & Welding	17
HD-03	Underwater Hull Inspection & Painting	19
HD-04	Cathodic Protection	25
HD-05	Ballast Tanks	27
HD-06	Potable Water Tanks	30
HD-07	Fuel Tanks	35
HD-08	Void Tanks	38
HD-09	Rudder Survey	41
HD-10	Propeller Boss Anodes	45
HD-11	Sea Chest & Sea Bay Inspection	47
HD-12	Sea Water Piping	52
HD-13	Sea Bay Anodes	55
HD-15	Seawater Outlet Piping (Coolers)	58
H-01	Berthing	61
H-02	Galley Deck Repairs	63
H-03	Galley Deck Tiles	68
H-04	Galley Equipment	71
H-05	Cabin Flooring	78
H-06	Washroom Decks	81
H-07	Hydraulic Room Door	84
H-08	Upper Fan Room Plenum	86
H-09	Bilge Cleaning	89
H-10	Condensate Cooler	91
H-11	Copper Drain Repairs	93
H-12	Main Mast Painting	95
H-13	Forward A-Frame Painting	98
H-14	Aft A-Frame Painting	101
H-15	Sewage Compartment Grating & Bilge	104
ED-01	Sea Valves	106
ED-02	De-Icing Valve Lines	112
ED-03	Central Cooling Water Pump Strainer Renewal	115
ED-04	Bowthruster Oil Change	120
ED-05	Ballast Tank Transducer Installation	123
ED-06	Starboard Tailshaft	125
ED-07	Stern Tube Seal	131
ED-08	Stern Tube Weardown	134

CCGS Edward Cornwallis
August, 2015 Refit
Index of Specifications

ED-09	Cancelled	
E-10	Sea Water Pump Valves	137
E-01	Potable Water Chlorine Injection System	139
E-02	Thrust Blocks	143
E-03	Sewage Vent Renewal	146
E-04	Accommodation Vent Door Repairs	150
E-05	Ventilation Duct Cleaning	154
E-06	Engine Room Exhaust Repairs	159
E-07	Barge Davit Survey	162
E-08	Miranda Davit Inspection & Motor	169
E-09	Lifeboat Davit Inspection	172
E-10	Liferaft Annual Inspection	180
E-11	Starboard Mooring Winch	182
E-12	Aviation Gas System Valves	185
E-13	Fixed Firefighting System	188
E-14	Foam Firefighting System	191
E-15	Incinerator Replacement	194
E-16	Boiler Control Panel Upgrade	203
E-17	Sewage Media Tank Wet Well	211
E-18	Fire Main Valve	215
E-19	Fire Extinguishers	217
L-01	Propulsion Multifunction Relay (MFR) Upgrade	219
L-02	Cancelled	
L-03	Fire Alarm Pullstations	221
L-04	A-Frame Searchlight	224
L-05	Sea Water Pump Motors	226
T-01	Fleet Broadband 500	229
	Appendix A – Fixed Firefighting Suppression Systems	232
	Appendix B – FM200 Fire Suppression System	233
	Appendix C – Portable Fire Extinguishers	235
	Appendix D – Amerlock Paint Spec & Product Datasheets	238
	Appendix E – Incinerator Installation Notes	249
	Appendix F – Fleet Broadband 500 Drawings	316

General Notes

1. **ON-SITE PROJECT OFFICER:**

All the specified work, as well as all work arising, shall be completed to the satisfaction of the On-site Project Officer who, unless otherwise advised, will be the vessel's **Chief Engineer**, or his/her designated representative. Upon completion of each item of the specification, the Chief Engineer shall 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 Chief Engineer 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 Branch (TCMSB), Public Works and Government Services Canada (PWGSC) or Health Canada (HC).

2. **SAFETY:**

Vessel shall be under the Contractor's Safety Management program while under their Care & Custody. Potential Contractors shall include with their bids the name of their Safety Manager or Supervisor who will ensure that these requirements for workplace safety are met. While under CCG Care & Custody the ISM Safety annex shall 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 shall provide a Production Gantt Chart or Schedule showing commencement and completion dates for each item in this specification. This document shall highlight any critical dates and be capable of showing the effects of late completion date of the work package. Contractor shall provide updated Production Schedules to the Chief Engineer, Vessel Maintenance Manager and PWGSC Inspector immediately, at any point the schedule is revised.

5. **SAFE WORK CERTIFICATES:**

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 requirements and all relevant provincial legislation. Certificates shall clearly state the type of work permitted and are to be renewed as required by the regulations. Contractor and his 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.

General Notes

6. **WELDING:**

All hotwork and welding procedures shall be done in accordance with Canadian Coast Guard Welding Specification:

Document # **CT-043-EQ-EG-001-E** (English), or **CT-043-EQ-EG-001-F** (French).

Contractor must ensure that welding is performed by a welder certified by the Canadian Welding Bureau (CWB) in accordance with the requirements of the following Canadian Standards Association (CSA) standards:

- (a) **CSA W47.1, Certification for Companies for Fusion Welding of Steel Structures (Minimum division level 2.0); and**
- (b) **CSA W47.2-M1987 (R2003), Certification for Companies for Fusion Welding of Aluminum (Minimum division level 2.1).**

7. **HOTWORK & FIRE WATCHES:**

Contractor shall abide by their Safety Management Program when performing Hot-work. Contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such heating and until the work has cooled. Ship's extinguishers shall **not** be used except in an emergency. Should Contractor have to use ship's extinguishers in an emergency, they shall be recharged and re-certified by a local facility, of CCG's choice, at Contractor's cost.

8. **SERVICE CONDITIONS:**

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

In areas that are exposed to the elements:

- outside air temperature of minus (-) 40⁰ C to plus (+) 35⁰ C;
- wind velocity of 50 knots;
- water temperature of minus (-) 2⁰ C to plus (+) 30⁰ C;
- shock loading of 2.5g horizontal, 1.5g vertical.

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

9. **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 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.

General Notes

10. **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, a PWGSC Representative and Captain (or Representative) in attendance.

As part of the initial turnover, digital photographs will be taken by the Owner's Representative 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 PWGSC Inspector and shall be accepted as representative of the condition of the vessel at turnover.

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

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 Chief Engineer.

Contractor shall be 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 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.

11. **ENCLOSURES AND HEATING:**

Contractor shall 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.

12. **RELOCATIONS:**

Any piping, manholes, parts and/or equipment requiring temporary relocation to carry out specified work, or to gain access, shall be refitted upon completion with new jointing, anti-seize compound, clamps and brackets as applicable (Contractor supply). All equipment and systems, so disturbed, shall be tested to prove correct function and fluid integrity upon completion. Defects shall be corrected at Contractor's cost. **NOTE:** It is Contractor's responsibility to identify equipment and systems that shall be tested to verify correct function, prior to being disturbed for required work.

General Notes

13. **HOTWORK VENTILATION AND CONTAINMENT:**

During all known work and work arising that involve hotwork Contractor shall ensure that all dust, debris, gas and smoke generated by the work is evacuated from the vessel by the most direct method possible.

Each item that involves hotwork shall have a defined zone which shall 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 shall be indicated in the items contained within the known work package. All extra work arising where hotwork is involved shall have a zone determined using the same logic. The zone shall 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 shall be erected to minimize ingress of the contaminants into occupied areas. A ventilation extraction point shall 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 shall be sealed off to prevent all containments from getting in. Passageway branches that connect to the zone shall be sealed off. Contractor shall completely clean all surfaces and fabrics within a compartment that are not suitably protected.

14. **LIGHTING:**

Temporary lighting and/or temporary ventilation required by Contractor to carry out any item of this specification shall be supplied, installed and maintained in safe working condition by Contractor and removed on completion of the related work. Naked light bulbs or tubes shall not to be used as temporary lighting inside the vessel. All lights used in the vessel shall be supplied with approved guards.

15. **CLEANUP:**

Contractor shall 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 shall be removed to the garbage container(s) each day. The costs associated with the removal of dirt, debris, and garbage shall be included in the quote.

General Notes

16. **INSPECTION:**

Contractor shall be responsible for calling in the services of TCMSB, PWGSC and HC Inspectors when and as required for survey and inspection items. All TCMSB surveyors called in by Contractor are to sign-off the Chief Engineer's Inspection Log Book for all items surveyed.

17. **CORRESPONDANCE & REPORTS:**

Unless otherwise agreed upon, all correspondence with CCG vessel maintenance personnel shall be in English.

All reports shall be typewritten, and provided in **English**. Duplicate copies may be submitted in French.

All reports shall be completed in a timely manner and provided to the Chief Engineer immediately following their completion, and shall continue as required throughout each component's respective specification of work.

Upon delivery of the vessel, a compilation of all reports and correspondence shall be provided on a CD or DVD to Vessel Maintenance Manager.

18. **PAINTING:**

Unless specified otherwise, replacement and/or disturbed steelwork shall be given a minimum of two (2) coats of Intershield 300 Aluminum Pure Epoxy, each coat to be of contrasting colour. **Lead-based paints shall not be used under any circumstance.** Prior to painting, all new and disturbed steelwork shall be power tool cleaned to SSPC.SP3 standard as a minimum standard of surface preparation. Contractor shall arrange for the PWGSC Inspector shall be notified 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 shall result in another coat being applied at the Contractor's expense.

19. **MATERIALS & TOOLS:**

All materials, unless otherwise specified, shall 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 shall 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.

20. **MEASUREMENTS:**

All dimensional measurements shall be taken and recorded in inches. Unless otherwise specified, the dimensions shall be taken and reported in thousandths of an inch (0.000"). All measuring devices shall be described on the submitted reporting sheets. All reported dimensions shall be either typed or printed in a neat legible manner, and shall include the name of the person who took the readings.

General Notes

21. **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 shall 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.

22. **SMOKING:**

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

23. **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 washrooms, Officers' and Crew's Messes and Lounges. Contractor s shall ensure that no workers bring meals onboard the ship.

24. **INSPECTION & GUIDANCE:**

During this contract, Ship's Crew and Regional Staff will be onboard conducting inspections and providing guidance to Contractor personnel.

25. **ASBESTOS:**

There may be locations having asbestos containing materials (ACM). The latest Asbestos Assessment Report is available upon request.

2 – Services

GENERAL:

All services as described in this section shall be supplied, fitted and/or connected upon formal handover to Contractor, maintained throughout the period that the ship is under Contractor's control, and removed upon return to CCG Custody.

Contractor shall supply all material to point of onboard connection and all cranes/scaffolding required for connection/disconnection.

Contractor shall be responsible for any additional disconnections and re-connections required if and when the ship is moved between dock, slipway and any berth at Contractor's premises.

Daily rates and unit costs, where applicable, shall be quoted. The bid price shall be broken down by item.

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 security arrangements as required to safeguard CCG and DFO equipment and material that remain onboard during the contract period.

DOCKING:

Contractor shall be responsible for coordination of 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 shall be maintained between the vessel's Commanding Officer and the Contractor's Docking Officer.

PRICES:

Contractor shall quote a global price and daily or unit cost rates for all services supplied to the vessel during the refit period.

BERTHAGE:

During refit, while not in dry-dock, the vessel shall be berthed at the 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. The Contractor shall include in quote all costs for initial tying up, any movement of the vessel during refit and slipping of lines from Contractor's wharf on departure of vessel from yard upon completion of the refit.

2 – Services

GANGWAYS:

Contractor shall 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 shall be installed in such a manner that they provide separate routes for escape in the event of fire. Chief Engineer shall advise of specific locations.

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

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

ELECTRIC POWER:

Contractor shall connect and quote on supplying electrical power at 600 VAC, 3 PH, 60 Hz at 400 Amp rating upon ship's arrival at Contractor's facilities.

Contractor shall bid on the supply of 4000 kWh per day for refit period. The actual consumption shall be pro-rated up or down as per power used as indicated by vessel's kWh meter. The power meter shall be read and recorded by Chief Engineer and Contractor's Representative together at the start and end of contracted period. The kWh unit price shall be quoted for PWGSC 1379 adjustment purposes. Cost of connection and disconnection shall be included in the quote.

The vessel's shore cable shall not be used.

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

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

STAGING & CRANAGE:

Contractor shall provide all necessary staging, shoring, and rigging that will be required to carry out all specified work as well as the transportation of all materials that are required. These shall be removed from the vessel on completion of work. Bidders shall allow 5 lifts in the bid for carnage, for loading and unloading ships stores.

In addition, Contractor shall quote an hourly rate for carnage, and a per lift rate. This rate shall include the crane, operator and all other required personnel. Final cost shall be increased or decreased to suit actual usage at refit completion via PWGSC 1379 action.

2 – Services

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 1000 cubic meters shall be supplied for duration of the contract by the contractor. This volume of water shall NOT be used for the flushing and filling of the freshwater tanks by the contractor as per the fresh water tank specifications.

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 with a current date of testing and its' source.

WASTE MANAGEMENT:

A garbage dumpster/container shall be provided on the Well Deck for ship's garbage only. Refuse shall be removed daily from the ship; quotation shall indicate a per-diem charge for garbage removal only.

Provisions shall be made for any recycling mandated by local authorities; any receptacles specifically required to meet these requirements shall be provided by the Contractor at no cost; the Contractor shall quote removal costs only. The Contractor shall also quote on removal costs (per unit volume/quantity) for:

- Newsprint/bond paper
- Corrugated cardboard
- Beverage containers

FIRE MAIN:

During the dry-docking period only, Contractor shall provide shore water connections to ship's fire main, 80 PSI, 2½" diameter. Two independent & separate connections shall be supplied at extremities of the vessel, as directed by the Owner's representative. Pressure shall be maintained at all times.

2 – Services

PROTECTION:

Contractor shall supply and fit ¼ inch thick Masonite to protect the ship's interior decks for the duration of the refit. Placement of Masonite shall be as directed by the Owner's representative. At a minimum, areas shall be protected will be in the Main, Upper & Boat Deck alleyways, and shall include decking, stair treads in the corresponding sections of the stair tower, and the lower 125cm of all bulkheads.

Contractor shall bid on supplying and installing 4500M² and provide unit cost for the supply and installation per M². All seams and edges shall be duct taped in place to prevent movement of the sheets and the ingress of dirt. Upon completion of all work, the Contractor shall remove all Masonite and clean the areas that were covered by the Masonite.

Bulkheads and deckheads in the accommodation areas shall be protected where temporary services are run or where there is a possibility of damage as a result of the performance of contracted work.

TELEPHONE SERVICE:

Two independent and private telephone lines shall be supplied and connected to the ship's phone system connections located on the Officers' Deck. The cost of connection, unlimited local service and removal shall be included in bid price. All telephones shall be active 24 hours a day for the duration of the contract. Lines shall have long distance dialing capabilities. The cost of long-distance calls shall be dealt with using PWGSC 1379 action. Contractor shall be responsible for giving notice for connection/disconnection times to the Telephone Company as required for any ship movements during the dry-docking period. Should regular landlines not be available, the Contractor shall provide 3 cellular phones, with unlimited local service.

Contractor shall supply a listing of shipyard contacts, fire, police and emergency telephone numbers to Chief Engineer when vessel arrives at Contractor's facilities. Contractor shall ensure the Chief Engineer is notified of any "on call personnel" and their contacts during non-working hours and days.

FLUIDS REMOVAL

Contractor shall bid on the removal and disposal, in accordance with provincial requirements, of 5,000 litres of waste oil and 20,000 oily water mixtures (25% oil/75% water) from the ship's waste oil tanks and bilges. Quote unit cost per each additional removal and disposal of 5,000 litres of each.

Contractor is responsible for the disposal of all grey and black water according to provincial regulations.

2 – Services

COOLING WATER:

Contractor shall provide a 30 psi SW or FW cooling for the duration of the refit for the auxiliary machinery cooling. Contractor may use the temporary fire main supply as a feed for the sea water or fresh water. Approximately 75 cubic metres of water per day shall be supplied via the cooling water supply connection.

OVERBOARD DISCHARGE:

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

Central Cooling System Overboard (Fr. 95 (P)

Reverse Osmosis Discharge Overboard

Sewage Treatment Tank Overboard Fr. 20(P)

Aux Gen Overboard (for air conditioning system cooling water)

Contractor shall include the cost of disposal for 10 cubic meters per day and provide a unit cost per cubic meter for adjustment purposes.

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

CLEANING:

Contractor shall 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. The cost of clean-up work shall be included in the quote for each specification item.

PARKING:

Sufficient parking for DFO/CCG and PWGSC representatives shall be provided conveniently close to the berthed or docked vessel. Contractor shall provide five (5) clearly designated "for DFO/CCG and PWGSC use only" parking spaces for the duration of the docking period.

3 – Production Chart & Subcontractors Allowances

1: SCOPE:

The intent of this specification shall be to provide a means for tracking the overall progress of the refit.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall supply three copies of a detailed gantt chart showing the planned work schedule for the ship's refit.
2. This bar chart shall show, for each spec. item, the start date, the manpower loading, the duration and the completion date. The chart shall also highlight any critical paths.
3. The production chart shall 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.
4. The production chart shall clearly indicate the arrival/departure dates of any Subcontractors/Field Service Representatives.
5. The production chart shall include the status and production on each 1379 arising.
6. Three copies of the production chart shall be given to the Chief Engineer the day prior to each Production Meeting. A copy shall be emailed to the Vessel Maintenance Manager (VMM), Todd Smith (todd.smith@dfo-mpo.gc.ca) the day prior as well.
7. A copy of the original bar chart shall be provided via email to the PWGSC contracting Officer and VMM before the close of business on the day of the ships arrival at the Contractors premises.
8. The Contractor shall provide a weekly update of the hours billed by the subcontractors along with their hourly rates, to Chief Engineer, VMM, and PWGSC Contracting Officer.
9. The results shall be tabulated in an excel spreadsheet clearly indicating the Subcontractor, date(s), hours worked and hourly rate for the hours worked.
10. The update is to be emailed to, PWGSC Contracting Officer and VMM the day prior to the weekly scheduled Progress Meeting.

2.2 Location

N/A

2.3 Interferences

N/A

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

3.2 Standards and Regulations

3 – Production Chart & Subcontractors Allowances

N/A

3.4 Owner Furnished Equipment

N/A

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

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

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-01 – Drydocking

1: SCOPE:

Contractor shall 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. A vessel docking plan (Dwg # 978-02) onboard the vessel shall be made available to Contractor.

2: TECHNICAL DESCRIPTION:

2.1 General

1. NOTE: The vessel has a duct keel from frames 96 – 165. Docking blocks shall be placed so that each block picks up the offset girder and the centreline in an alternating pattern. The vessel shall not be blocked in this area using centre line keel blocks only, unless they are of sufficient width to pick up the offset girders.
2. Dry docking shall be under the direct supervision of a Certified Docking Master. Prior to docking the vessel, Contractor shall present to Canadian Coast Guard their plan to effect a safe docking. This will include, but not be limited to, an explanation of block loading, dock preparation, tide-wind-tug issues, manpower arrangements and communications. Contractor shall 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 will be present for docking and undocking.
3. Contractor shall supply the services of divers to confirm that the vessel is setting evenly on the bilge and keel blocks.
4. Contractor shall quote a unit daily service day cost on dock. This cost shall form part of the overall quote. This quote shall include any tug and/or pilotage service cost.
5. Docking shall be undertaken during the first two days of refit. If necessary, Contractor shall prepare the dock in advance of the ship's arrival and the official start date of the contract period. If premium time is required for evening shifts or weekend work to meet this objective, Contractor shall identify this and include all costs in the quotation.
6. The vessel shall not be placed in the same dock with any other ship for any part of the contract period.
7. Ship's personnel will be responsible for all line handling onboard the vessel only during the docking and undocking operations. Contractor shall supply personnel on the dock walls and ashore for all line handling.
8. Contractor shall ensure that docking blocks are clear of transducer faces and sea bay access covers.
9. Two gangways shall be supplied and set up by Contractor while the vessel is drydocked. These gangways shall be set up and rigged from the wharf onto the buoy deck, complete with safety net. Gangways shall be safe, well lit and structurally sufficient to support passage of Contractor's workmen and ship's crew.

CCGS Edward Cornwallis
August, 2015 Refit
HD-01 – Drydocking

10. During undocking Contractor shall ensure that sufficient personnel are in attendance throughout the ship's spaces to monitor for leakage around the numerous sea connections, stern tubes, sea chests, and any other areas in communication with the underwater area of the vessel that were disturbed during dry docking, and to correct any deficiencies that may arise.
11. In addition, Contractor's bid shall include cost for one additional and separate dry docking. This quote shall include the connection and disconnection for services as outlined in Spec Item H-2 as well as daily unit cost. This quotation shall be included in Contractor's price and form part of the evaluated bid price.
12. Contractor shall quote a unit cost on the removal of keel blocks as well as a unit cost on the insertion of keel blocks. This quote shall be included in the overall bid.

2.2 Location

N/A

2.3 Interferences

N/A

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Vessel Docking Plan – Dwg # 978-02

3.2 Standards and Regulations

N/A

3.4 Owner Furnished Equipment

N/A

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-01 – Drydocking

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-02 – Hull Inspection & Welding

1: SCOPE:

In conjunction with spec item for Dry-docking, and for the Underwater Hull Cleaning and Painting, the entire hull will be given an inspection by the Technical Authority and attending Transport Canada Marine Safety (TCMS) Surveyor.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall be responsible for all inspections and shall consult with TCMS, prior to commencement of work, to determine an inspection schedule. At each inspection point, the Contractor shall advise the Owner's representative, in advance, to allow his/her attendance.
2. Any required staging will be covered under section H-XX.XX; areas requiring detailed examination will be determined at the time of the initial inspection by TCMS. In lieu of staging, the Contractor may provide the use of a certified man-lift (with operator) for two working days. An allowance of \$500 shall be quoted for the man-lift and operator; this cost will be adjusted by 1379.
3. Contractor shall quote separately on proper preparation and repairs to 100 linear feet of butt and seam welding on the ship's hull. Each linear foot shall be quoted as 15 passes on Grade "E" steel, for a total of 1500 bead feet. The quote shall include any staging or man lifts required for the repairs.
4. Contractor shall provide a quotation per bead foot of welding, as well as per additional linear foot of gouging – this unit cost shall include any staging or man lifts required for the repairs.
5. Any gas-freeing, certification as Gas Free, safe for personnel to enter, fuel residue removal and safe for hot work will be by PWGSC1379 action.
6. Contractor shall not apply any underwater hull coatings until TCMS surveyor has completed the required inspection. Contractor shall notify the Owner's representative and TCMS surveyor prior to the application of any coatings.

2.2 Location

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

2.3 Interferences

1. No known interferences. It is Contractor's responsibility to identify any interference items for the known scope of work during the vessel's bidder's meeting.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Shell Expansion drawing (555-H-0001)

CCGS Edward Cornwallis
August, 2015 Refit
HD-02 – Hull Inspection & Welding

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 CCG Technical Authority.
Canadian Coast Fleet Safety Manual (DFO 5737)
Coast Guard ISM Lock Out/Tag Out Procedures
2. All hotwork shall be done in accordance with CCG Welding Specification CT-043-EQ-EG-001

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. All work shall be carried out to the satisfaction of the Owner's Representative and attending TCMSB surveyor.

4.2 Testing

1. Contractor shall include the cost of 10 non-destructive tests on the new welds; these tests shall be as directed by the attending TCMS Surveyor. Contractor shall provide a unit cost for each additional x-ray and the cost shall include travel expenses for the NDT testing company.

4.3 Certification

1. Contractor shall contact TCMSB and arrange for all required inspections in order to gain surveyor certification for Division 3 survey item 3LL040.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A computer generated report shall be provided in digital format to the Chief Engineer. This report shall include a listing of all welds performed, and locations and results of all tests performed.

5.2 Spares

N/A

5.3 Training

N/A

HD-03 – Underwater Hull Cleaning & Painting

1: SCOPE:

The intent of this specification is to clean the ship's underwater hull, properly prepare the surfaces, and recoat as necessary with a high performance icebreaker coating. This work shall be carried out in conjunction with all other dry-docking items.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Within two hours of docking, the entire underwater hull, including the areas above the waterline up to the top of the bulwarks, rudders, propellers and the thruster tube shall be cleaned by high pressure fresh water washing (10000 PSI minimum) to remove all marine growth and allow a preliminary hull inspection.
2. All marine growth, salts, and surface contaminants shall be removed and disposed in accordance with local regulations. Contractor responsible for removal and costs associated with the growth.
3. Prior to commencing hydroblasting, all hull mounted equipment and openings shall be fully protected from physical and water damage. This includes (but is not limited to): anodes (4), reference electrodes (2), echo sounders (2), speed log (1), etc. shall be suitably protected against damage during cleaning of the hull, abrasive blasting and application of new coatings.
 - a. Masonite, greases and mastic compounds shall not be used.
 - b. Contractor shall include in the quote the cost of supply and install hull filler putty around the echo sounder plates, speed logs, anodes and cathodes. International Interguard 822 shall be used as the filler putty.
 - c. All protective coverings shall be removed upon completion of all work.
 - d. Contractor will be responsible for repair/replacement of any damaged items to the satisfaction of the Chief Engineer, at the expense of the Contractor.
4. The Owner's representative and the attending TCMS Surveyor shall inspect the entire hull.
5. Contractor shall include an allowance of \$5,000 to cover expenses of an International Paint Representative FSR. The FSR will be reimbursed by the Contractor from this allowance, for his services, authorized travel and living expenses reasonably and properly incurred in the performance of the work. The allowance shall form part of the overall bid and shall be adjusted by PWGSC 1379 action upon proof of final invoice.
6. Contractor shall inspect the Anodes and Reference cells as per HD-04.
7. An Owner's representative and a representative of PWGSC shall view the ship and agree upon the total area of the underwater hull which shall be grit blasted and touched up.
8. Contractor shall take precautions to ensure that no damage, unnecessary cleaning, or repairs shall accrue from abrasive blasting and/or the application of coatings.
9. Grit used for blasting shall not be allowed to enter any part of the vessel or its exposed equipment, and where such ingress may occur, the equipment shall be suitably protected.

HD-03 – Underwater Hull Cleaning & Painting

10. Prior to grit blasting the hull, Contractor shall temporarily mark the original location of each hull symbol so that the owner supplied decals can be applied, upon completion of all work, in their subsequent original locations.
11. Contractor shall plug deck scuppers and discharges, as well as taking other measures necessary to prevent any liquids from contaminating areas being prepared or coated.
12. Measures shall 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. Contractor is responsible for removing any over spray on the vessel as a result of this work, at the Contractor's expense. Deck machinery and other gear, susceptible to damage by grit or coating material, is also to be protected as necessary.
13. Areas of obvious concern include but are not limited to:
 - a. stern tubes
 - b. sea bay and chests
 - c. overboard discharge valves
 - d. machinery spaces
 - e. funnel outlets
 - f. searchlights
 - g. navigation equipment
 - h. air intake plenums and air intake and exhaust trunking;
 - i. accommodations air intake and exhaust plenums and trunking
 - j. barge, lifeboat, FRC
 - k. deck machinery including crane and winches
 - l. exposed steel wires for davits, winches, etc.
 - m. rudder trunk void
14. Sea bay grids shall be protected during application of all coatings. Orifice diameters shall be verified by Contractor as original before undocking (i.e. not blocked or reduced). Scuppers and overboard discharges in use shall be fitted with extension tubes to prevent liquid run off onto the ship's hull while coatings are curing.
15. After grit blasting, but prior to hull coating, any slot welds in the stern post or rudder requiring fairing shall be filled flush with Inerta putty.
16. Contractor shall be responsible and liable for ensuring that the hull is clear and clean prior to, during, and immediately after the coating application.
17. All staging, crange, screens, lighting and any other support services, equipment, paint and materials necessary to carry out these specifications shall be Contractor-supplied.
18. If, due to steel and air temperature, enclosures and forced air heaters are required, Contractor shall allow \$15,000 to supply and install/remove, which will be adjusted up or down by 1379 action upon completion of all items in this specification.

HD-03 – Underwater Hull Cleaning & Painting

UNDERWATER HULL

19. Ship's underwater hull and anchor pocket area is approximately 2,100 square meters and painting is broken down into two parts. Part A is the Keel to Ice Belt and Part B is the Ice Belt.
20. The underwater area of the ship's hull and rudder is presently coated with International Intershield 300 coating from the keel to the Ice Belt. The ice belt then continues from the anchor pocket. The current coating on the Ice Belt is Inerta 163.
21. New coatings shall be applied with atmospheric and steel conditions acceptable to paint manufacturer and Chief Engineer. Application conditions shall be recorded by Contractor and/or paint manufacturer's representative for inclusion in Report to be submitted to Chief Engineer.

Part A – KEEL TO ICE BELT

22. The underwater hull area is defined as the area from the keel to the 4.7m draft mark (forward and aft) shall be prepared and painted as follows:
 - a. Contractor shall bid on dry abrasive blasting to bare steel condition of SSPC-SP10 standards, the entire underwater hull (Approximately 2000 square metres).
 - b. 100% of the total underwater hull area (Approximately 2000 square metres) shall be prepared and painted. Contractor shall quote on a unit price per square meter for adjustment purposes.
 - c. The hull shall be swept clean of all traces of grit with compressed air. The surface profile shall have a minimum roughness of 3 mils.
 - d. Paint the entire underwater hull are with Black Inerta 160 as per International Paint Rep recommendations, to 20 mils DFT in all areas.

PART B – ICE BELT INCLUDING ANCHOR POCKET – Part B Underwater Hull

23. "Ice belt" is defined as the area between the draft marks of 7.2m to 4.7m (forward) following along the hull in a line to the aft draft marks of 7.2m and 4.2m (aft).
24. Contractor shall prepare and paint an ice belt strip as follows:
 - a. Contractor shall bid on dry abrasive blasting to bare steel condition of SSPC-SP10 standards, all shell areas containing loose paint and/or bared steel.
 - b. For bidding purposes, approximately 400 square meters (50% of the total ice belt area) shall be prepared as required in section 2.1.24.a and painted. Contractor shall quote on a unit price per square meter for adjustment purposes.
 - c. All coating edges shall be feathered back a minimum of 300mm. The hull shall be swept clean of all traces of grit with compressed air. The surface profile shall have a minimum roughness of 3 mils.
 - d. Non damaged areas shall receive an additional hard grit sweep to produce a 3 mils surface profile.

HD-03 – Underwater Hull Cleaning & Painting

- e. Paint the ice belt and anchor pocket with Coast Guard Red Inerta 160 as per International Paint Rep recommendations:
 - i. 20 mils DFT to all areas of bared steel (400 m²);
 - ii. 10 mils DFT in way of intact coatings (400 m²)
- 25. Contractor shall ensure all coatings are applied in strict accordance with the manufacturer's instructions and FSR recommendations.
- 26. Contractor shall quote a unit rate per square meter for both Part A and Part B painting coverage for adjustment purposes.

ABOVE WATERLINE HULL AREAS

- 27. Ship's above water hull area is approximately 825 square meters, and is defined as all hull areas above the 7.2m draft mark, minus the anchor pocket.
- 28. The entire above waterline hull shall be cleaned by high pressure fresh water washing (10,000 PSI minimum).
- 29. Contractor shall remove the helicopter deck net and stanchions, and fit temporary stanchions to helicopter deck and fit rope to protect yard/ship personnel from falling overboard.
- 30. Contractor shall grit blast and paint all the 27 stanchions as per upper hull painting scheme. Upon completion of all work, all painted stanchions and associated net shall be fitted to the ship, using new stainless steel fasteners. Fishplate apron is 22 inches wide x 120 feet long for an approximate area of 75 square meters. The hull shall be swept clean of all traces of grit with compressed air. Contractor shall provide a unit price for adjustment purposes.
- 31. The above waterline hull from the water line to the top of the bulwarks as well as the fishplate apron shall be inspected by CGTA, and all identified deficiencies shall be sand swept to SSPC-SP7 standards having a minimum profile of 3 mils in preparation for application of coatings as follows:
 - a. Two coats of Interprime 234 – Alkyd Primer (Red) to all areas that were deficient and blasted to SSPC-SP7. Apply coating to yield 2 mils DFT, per coat.
 - b. One full coat of Interlac 665 Alkyd Marine Enamel (RAL 3000) to the entire above water hull. Apply the coating to yield 2 mils DFT, per coat.
- 32. Contractor shall install the four Coast Guard supplied hull symbol decals.
- 33. Contractor shall quote on the painting the hull symbols on by hand. This quote shall form part of the overall bid. Draft marks, load lines, thruster symbols, and all government symbols and icons shall be painted white using Intergard FP Series -513-101 Marine (White). Apply two coats at 2 mils DFT per coat.
- 34. All traces of grit used for blast cleaning shall be removed by Contractor. Contractor shall be responsible for ensuring that the hull is clear and clean prior to, during, and immediately after the coating application.
- 35. Contractor shall remove all protective materials from the machinery, equipment and hull openings on completion of the coating work. All grit, dirt, debris, rust, scale, etc shall be removed from all decks and areas of accumulation and disposed of ashore by Contractor

HD-03 – Underwater Hull Cleaning & Painting

36. All staging, cranes, screens, lighting and any other support services, equipment, paint and materials necessary to carry out these specifications shall be Contractor supplied, installed, and removed upon completion of all work.
37. Suitable storage facilities shall be provided close to the work site by Contractor for the material and equipment, to ensure they will be maintained at the recommended temperature of the coating manufacturer for ease of preparation and proper application. All coatings shall be applied in strict accordance with the manufacturer's instructions and recommendations.

2.2 Location

1. Ship's outer hull

2.3 Interferences

1. Contractor is responsible for the identification of any interference items.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Recommended FSR:
 - a. Nicole Hart, Technical Sales
 - b. AkzoNobel Coatings, Ltd.
 - c. (902) 468-1401
 - d. nicole.hart@akzonobel.com

3.2 Standards and Regulations

1. Contractor to be responsible and liable for ensuring that the hull is clear and clean prior to, during, and immediately after the coating application.
2. Suitable storage facilities shall be provided close to the work site for the material and equipment, to ensure they will be maintained at the recommended temperature of the coating manufacturer for ease of preparation and proper application.

3.4 Owner Furnished Equipment

1. All staging, craneage, screens, lighting and any other support services, equipment, paint and materials necessary to carry out these specifications shall be Contractor-supplied. If, due to steel and air temperature, enclosures and forced air heaters are required, the Contractor shall allow \$15,000 to supply and install/remove, which will be adjusted up or down by 1379 action.
2. Unless otherwise specified, all labour, materials, and equipment required to complete all tasks required in this specification shall be Contractor supplied.

HD-03 – Underwater Hull Cleaning & Painting

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall follow the inspection regime outlined in General Notes, and provide documentation to support all inspections and tests performed.

4.2 Testing

1. Contractor and/or paint manufacturer's representative shall take sixty (60) wet film thickness measurements; thirty (30) per side, in areas where hull has been cleaned to bare steel. The measurements shall be witnessed by the PWGSC Inspector and recorded with locations referenced to the attached shell expansion drawing. Unwitnessed measurement shall not be accepted.
2. Using a calibrated DFT gauge, fifteen (15) measurements per 100 square ft. shall be taken and recorded, at an agreed upon consistency with the Chief Engineer.

4.3 Certification

1. Contractor shall provide certification for all hull coatings applied.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall maintain a Quality Assurance reporting program, which shall at minimum include the following points:
 - a. The areas on the ice belt and above waterline hull that were repaired.
 - b. Which areas were blasted and indicate the blast media type and air pressure
 - c. Which areas were coated, with what product, and the volume of coating used.
 - d. Provide a list of batch numbers with corresponding dates of manufacture.
 - e. Record the quantity and type of any solvent added.
 - f. Measure and record all ambient conditions (Temperature, Humidity, Barometric pressure).
 - g. Hull temperature
 - h. Record all details of spray tips and pressures.
 - i. All WFT and DFT readings taken as prescribed in section 4.2 of this specification.
2. All recorded information shall be typewritten in English and three (3) copies shall be given to the Chief Engineer.

5.2 Spares

N/A

5.3 Training

N/A

HD-04 – Cathodic Protection

1: SCOPE:

Four (4) Impressed Current Anodes and Two Reference Cells located on the exterior of the hull shall be inspected for damage. The anodes are located at frames 106 and 31, Port and Starboard, and the reference cells are at frames 69-70, P&S. Pockets for each anode and reference cell shall be opened up inside the vessel and the cabling checked for water ingress.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The four (4) impressed current anodes and two (2) reference electrodes located on the exterior of the hull shall be inspected for damage. The anodes are located at frames 106 and 31, Port and Starboard, and the recessed reference electrode assemblies are located Port and Starboard at the turn of bilge, frames 69-70.
2. Other than the work specified in item 2.1.4, any damage requiring parts replacement, in way of anodes or reference electrodes shall be repaired under the direction of an authorized "CORRINTEC" service representative. Cost of repairs will be negotiated by PWGSC 1379 action.
3. On Completion of inspections, Contractor shall supply and install a sufficient quantity of Corroshield Epoxy Mastic to fill and fair any cavities in way of anode/electrode mounting studs or around the outer perimeter edges of their recessed housings.
4. The impressed current anodes require an additional thickness of hull coating over an oval area 1.5 m beyond the perimeter of each anode recess. The minimum dry thickness of this area (known as the Dielectric Shield) shall be minimum 60 mils.
5. Care should be exercised throughout inspection, repairs and painting to ensure that anode elements and reference electrodes are not damaged or contaminated. On no account should paint solvents be applied to anodes
6. Cathodic protection system shall be calibrated and functionally tested following completion of inspection/repairs. This work shall be done with the vessel undocked.
7. System information will be available on board the vessel. Copies of calibration/ megger readings / test results shall be given to and approved by the Chief Engineer.
8. Disposal of all removed materials shall be the responsibility of Contractor.
9. All cramage shall be the responsibility of Contractor.
10. All final measurements shall be the responsibility of Contractor.
11. All work shall be carried out to Chief Engineer's satisfaction.

2.2 Location

3L038	Void Space, port	Fr 106-117	#12, via #37 in Cargo Hold, port side
3L039	Void Space, stbd	Fr 106-117	#11, via #38 in Cargo Hold, stbd side
3L040	Void Space, port	Fr 117-126	#37, Port side of Cargo Hold
3L041	Void, Space, stbd	Fr 117-126	#38, Stbd side of Cargo Hold

CCGS Edward Cornwallis
August, 2015 Refit
HD-04 – Cathodic Protection

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Eastern Canadian Representative for Corrintec / Cathelco is:
Jastram Technologies Ltd., 22 Trider Crescent, Dartmouth, Nova Scotia,
Attn: Mark Starratt, Telephone: 902-468-6450, Fax: 902-468-6901, e-mail:
jastramtech@ns.aliantzinc.ca.

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 CCG Technical Authority.
Canadian Coast Fleet Safety Manual (DFO 5737)
Coast Guard ISM Lock Out/Tag Out Procedures

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

Report detailing inspection results, repairs required and completed.

4.2 Testing

Details of inspection procedures used and results obtained.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

FSR's report detailing inspections, tests and results obtained, repairs completed and parts used.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-05 – Ballast Tanks

1: SCOPE:

The intent of this specification item shall be to open up the following tanks for cleaning, inspection, testing and to cover the continuous survey for Transport Canada Marine Safety (TCMS). These tanks are considered as confined spaces under the Coast Guard's Safety Management System.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall provide a method to have the tanks gas freed, and certified Gas Free, safe for personnel to enter and safe for hot work. Certificates shall be forwarded to the Owner's representative and a copy shall be posted in a conspicuous location near the entrance to each tank.
2. Tanks shall be pumped down as low as possible by ship's staff. Approximately eight (8) tonnes total residue will remain in the tanks, which shall be removed by the Contractor. All docking plugs and locking bars for the above tanks shall be removed by Contractor to permit the draining of the ballast tanks listed above. All plugs shall be given to the Chief Engineer until required for reinstallation. Tanks without docking plugs shall be pumped down by the Contractor. Contractor shall supply all pumps, hoses, hardware, and personnel to carry out these operations.
3. Contractor shall provide each 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 as well as airborne dust and debris shall not be allowed to enter the vessel.
4. Manhole covers shall be removed. The tanks shall be thoroughly cleaned; all scale, dirt and debris shall be removed ashore and disposed of by Contractor.
5. Cleaning shall be carried out using freshwater hydro blasting at 2,000 psi minimum. Tank internals shall be inspected by the Chief Engineer and a Marine Safety Inspector. Rusty and bare areas shall be power tool cleaned to SSPC-SP3 standard, and sufficiently feathered to existing coatings.
6. All power tool cleaned areas shall be coated with 2 coat of Intershield 300 (Bronze) to 11 mil DFT and a final coating of Intershield 300 (Aluminum) of 5 mil DFT.
7. Contractor shall quote on power tool cleaning and touching up 100 M² for each tank and provide a unit cost for preparing and touching up of each square meter. Upon project completion, the final total for this work shall be adjusted up or down by PWGSC 1379 action.
8. Contractor shall quote on the supply and installation, complete with brackets, M24 sacrificial zinc anodes. The total shall be 10 anodes per each tank in the list below for a total of 80 anodes. Anodes shall be affixed in locations as per the Chief Engineer's instructions. Contractor shall provide a quote for supply and installation of one anode for adjustment purposes.

CCGS Edward Cornwallis
August, 2015 Refit
HD-05 – Ballast Tanks

9. Sounding pipes, suction pipes, and vents shall be proven clear; blockage removals shall be considered unscheduled work.
10. The Owner's representative (or designate) shall be present when the manhole covers are reinstalled. Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gaskets. Anti-seizing compound shall be used on all threads. Contractor shall quote separately the unit cost per stud to replace any broken manhole securing studs.
11. The docking plugs and locking bars shall be installed upon completion of draining. Each docking plug shall be installed using new packing. All locking bars shall be welded in place and adjacent areas shall be wire brushed, primed, and painted as per the hull coating.

2.2 Location

FIELD #	TANK	LOCATION	CPTY(M3)	AREA(M2)
3L001	Fore Peak Tank	Fr 175 - Bow C/L	85.8	550
3L018	Aft Peak Tank	Fr. 1-13 C/L	109.4	750
3L021	Fwd DB WB Tank	Fr. 126-152 P	51.6	350
3L022	Fwd DB WB Tank	Fr. 126-152 S	51.6	350
3L019	Aft DB WB Tank	Fr. 54-70 P	51.9	350
3L020	Aft DB WB Tank	Fr. 54-70 S	51.9	350
3L023	Fwd Wing WB Tank	Fr. 152 to 163 P	50.5	290
3L024	Fwd Wing WB Tank	Fr. 152 to 163 S	50.5	290

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - 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. Contractor shall refer to General Notes for other applicable standards and regulations.

CCGS Edward Cornwallis
August, 2015 Refit
HD-05 – Ballast Tanks

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall be responsible for all inspections and shall consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor shall advise the Owner's representative, in advance, to allow his/her attendance.
2. Upon completion of all repairs and testing, the Contractor and the Owner's representative (or designate) shall conduct a final inspection and ensure all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.

4.2 Testing

1. The attending TCMS Surveyor shall determine the test method. All tests shall be witnessed by the attending TCMS Surveyor and the CGTA.
2. For bidding purposes, Contractor shall bid on the pneumatic testing of each individual tank, and provide a unit price for hydrostatic testing each tank. The quote shall 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) shall also be included in this quote.

4.3 Certification

1. Contractor is responsible to ensure the TCMS 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.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall 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 shall provide a copy of all test certificates to Chief Officer.
3. Safety Management System forms and checklists shall be provided to Chief Officer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-06 – Potable Water Tanks

1: SCOPE:

The intent of this specification is to inspect, clean and re-coat the Fresh Water Tanks.
This work shall take place in conjunction with E-01 - Potable Water Chlorine Injection System.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The following fresh water tanks shall be opened up for cleaning, inspection and painting:

a. TANK	CPTY. (m3) / AREA (m2)	LOCATION
b. Port Potable Water	38.5 / 97	Frame 30-41
c. Stbd. Potable Water	58.5 / 147	Frame 30-41
2. NOTE: To allow for complete curing of coatings, work on this specification shall be started no later than the beginning of the third day of the contract period.
3. Contractor shall cover all equipment in work area near the fresh water tank access openings to prevent damage during tank maintenance and repairs.
4. Contractor shall blank off the suction and filling lines and tag where each blank is located. Tanks shall be isolated from the filling main for the duration of the work.
5. Filling main shall be kept pressurized from shore supply to provide water directly to the ship's domestic FW piping system.
6. Both Potable water tanks may be worked on simultaneously.
7. The tanks shall be pumped down as low as possible by the ship's staff leaving approximately two tonnes of residue that shall be removed by the Contractor. Contractor shall remove manhole covers from each tank.
8. The Contractor shall provide each tank with a mechanical ventilation system, vented to the outside of the ship, in accordance with ISM Confined Space Entry requirements. Tanks shall be certified safe for personnel to enter prior to work being carried out internally as per Coast Guard Safety Management System. Copies of certificates shall be posted adjacent to points of entry, and copies given to the Chief Engineer. A valid certificate shall be maintained at all times while work is in progress.
9. Tank internals shall be washed down before they have dried off from draining with non-toxic cleaning solution then hosed down with fresh water. MSDS and product application sheet for the cleaning chemical used shall be provided to the Owner's Representative for approval prior to use of the chemical inside the Fresh Water Tanks.
10. The tank shall be dried out prior to commencing remainder of work. Care shall be taken to protect tank-sounding transducers and sight glasses for the duration of all work in the tanks. The tank level transmitter opening shall be reamed out and proven clean and clear. The bottom sight glass connection shall be inspected and cleaned from inside the tank.

HD-06 – Potable Water Tanks

11. Each tank shall be inspected by the Chief Engineer or his designate in the company of the Contractor's Representative in order to establish and agree on tank surfaces requiring repair due to corrosion or other damage.
12. Any damaged coatings shall be power tool cleaned to bare metal (SSPC-SP-3 standard), and re-coated as described below. The specified areas shall include a generous overlap (minimum 15cm) in way of all bared edges.
13. Contractor shall quote on preparing and coating 25 m² of steel surfaces in each of the two tanks, 50 m² total. Contractor shall quote a unit rate for surface preparation and painting, which shall be used for final cost calculation via PWGSC 1379 action.
14. Prior to painting, the entire internal surfaces of the tanks shall be wiped down using clean lint free rags. All grit/debris shall be vacuumed and removed ashore.
15. Upon completion of coating repair preparation, the contractor shall apply one coat of Interline 925 @ 18 mils WFT minimum to the total specified area of tanks. This shall include the back side of each manhole cover. WFT gauge readings to be taken on a regular basis during application. Using a calibrated DFT gauge, 15 measurements per 100 square ft. shall be taken and recorded. All readings shall be tabulated in the final report.
16. Contractor shall supply and maintain good ventilation during all stages of work in compliance with manufacturer's requirements. Exhaust fans must be explosion proof, draw vapours from the lowest point of the tank, and exhaust to atmosphere at a location that is not dangerous to personnel.
17. Contractor shall supply and maintain heating equipment to obtain a tank surface temperature of 18 to 20 degrees Celsius on steel requiring coating during periods of drying and curing. The tanks shall be allowed to cure for seven days under these conditions prior to being sealed and filled.
18. After coating has thoroughly cured, each tank shall be inspected by Owner's Representative. Coating adhesion and condition must be acceptable to the Owner's Representative.
19. Sounding pipes, suction and fill pipes, sight glass openings and tank vents shall be proven clear prior to sealing up tanks. Tanks shall be closed and sealed using new gasket material (1/4" neoprene), cut from sheet to match shape of manhole with center removed.
20. Any manhole cover studs broken during the refit period shall be renewed. Contractor shall include the cost to replace 10 studs and shall quote unit cost for PWGSC 1379 adjustment purposes.
21. The port and starboard tanks shall be flushed with fresh water and sterilized as per Health Canada requirements. Contractor shall ensure water supply for filling and flushing tanks is from an approved source of potable water. Contractor shall supply suitable sterilized and clean hoses to fill tanks.
 - a. Tanks shall be drained of first fresh water flush by Contractor.
 - b. Tanks shall be refilled to overflowing using fresh water including a hypochlorite solution of 100 ppm free chlorine, Contractor Supply. Solution shall sit for minimum 8 hours.Note: during this period Ships Crew may be taking suction from the tanks to run the

HD-06 – Potable Water Tanks

hyper-chlorine solution through the ship's potable water piping for mixing as this work must be completed first by the Contractor for the Chlorine injection system Specification.

- c. Tanks shall then be drained by Contractor, and the liquid solution disposed of in accordance with Provincial Regulations.
- d. A third and final fresh water fill and flush shall be made and disposed of by the Contractor.
- e. Tanks shall be refilled with fresh potable water.
- f. Contractor shall be responsible for covering all costs associated with the filling and flushing of the potable water tanks. This includes all equipment and disposal trucks necessary for removal of the water after chlorination and neutralization, as well as the supply of the water to the tanks. Contractor shall ensure they are adhering to all Federal and Provincial and Local regulations regarding the disposal of this treated water.
- g. The water supply required for this specification shall NOT be added to the ship's potable water daily use. If Contractor uses the same potable water supply and same meter as that required in Services for general ships usage, the volume required for this specification shall be deducted from the ship's potable water consumption meter when calculating overall usage for Services billing.

2.2 Location

1. The hatch for each of the Potable Water tanks is readily accessible from the engine room level in the Propulsion Motor Room.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - 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

3.4 Owner Furnished Equipment

CCGS Edward Cornwallis
August, 2015 Refit
HD-06 – Potable Water Tanks

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall allow adequate time and availability for inspection whenever required by this specification.
2. Contractor shall follow the manufacturer's application processes.
3. Contractor shall obtain the services of an independent certified NACE International (NACE) inspector with a minimum certification of Coating Inspector Program Level 2, to verify the work as specified throughout the process and can provide assurance to the CCG Technical Authority that the Contractor has followed the correct application procedures. Copy of the NACE inspector qualifications shall be given to the CGTA and PWGSC.
4. In the overall quote, Contractor shall allow \$5,000 for services of a certified NACE inspector Field Service Representative. This FSR allowance shall cover travel and living expenses only. The FSR shall 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 overhead or profit. The final cost shall be adjusted accordingly by PWGSC 1379 action upon receipt of invoice. Contractor shall make all necessary arrangements for the procurement of the FSR's services.
5. Contractor shall ensure that all new equipment be used for the application of the coating, including but not limited to: hoses, spray guns, brushes, etc. This requirement is important to ensure zero contamination from solvents, which may be introduced inadvertently by used equipment that has subsequently been cleaned with solvents of any kind.
6. The re-use of pumps may be permitted, provided that prior to use the contractor demonstrates draining plus sufficient flushing of the equipment with a product NSF 61 certified for use in potable water tanks and that the pumps are absent of any solvents. The product used for flushing shall not be used on the potable water tanks.

CCGS Edward Cornwallis
August, 2015 Refit
HD-06 – Potable Water Tanks

4.2 Testing

1. After the final fill of the tanks, five water samples shall be collected and labelled for laboratory testing. The collection of the potable water samples (one from each tank, one from galley tap, one from wheelhouse tap and one from Officer's Lounge tap) for laboratory testing shall be witnessed by Owner's Representative. To maintain the bacteriological validity of the collected samples, they shall be immediately transported to the qualified laboratory facility in thermally insulated outer containers.
2. Contractor shall ensure that the water testing has a baseline of 28 parameters for the water quality test, and shall be performed as per section 7.A.12 of the Fleet Safety Manual. After the super chlorination procedures, and in addition to the Fleet Safety Manual, another 28 parameter test shall be performed three days after the baseline test with the water in the tank remaining stagnant.
3. All costs associated with all the water sampling, containers, testing, shipping, and reporting fees shall be Contractor's responsibility. The cost shall be included in the overall bid.
4. A total of 10 water tests (28 parameter) shall be completed throughout the scope of this work.

4.3 Certification

1. Contractor shall expeditiously provide to the Owner test certificates of water samples (chemistry and bacteriological) from a Provincially H&W approved laboratory that certifies that the water in the tanks is "fit to drink". The tests shall be carried out for bacteria as per the Canadian Drinking Water Guidelines. The Chemistry Testing shall examine all parameters as per the Guidelines for Canadian Drinking Water Quality including pH, TDS, Elements and Organic Compounds.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall 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 shall provide a copy of all test certificates to Chief Officer.
3. A paint report shall be prepared, and provided to VMM and Chief Engineer.
4. Safety Management System forms and checklists shall be provided to Chief Officer.
5. All water test reports shall be provided to VMM, Chief Officer, and Chief Engineer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-07 – Fuel Tank Survey

1: SCOPE:

The intent of this specification item shall be to open up several fuel tanks for cleaning, inspection and testing, as per Transport Canada Division 3 requirements. These tanks are considered as confined spaces under the Coast Guard's Safety Management System.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall provide a method to have the tanks gas freed, and certified Gas Free, safe for personnel to enter and safe for hot work. Certificates shall be forwarded to the Owner's representative and a copy shall be posted in a conspicuous location near the entrance to each tank.
2. Contractor shall be responsible for all environmental requirements for disposal of tank residues.
3. The ship's crew shall pump the tanks down to the suction levels, leaving approximately 2 cubic meters of residue diesel fuel oil per tank, which shall be removed and disposed of by Contractor.
4. Contractor shall quote a cost per litre of fuel disposal; the total will be adjusted by 1379 action.
5. Contractor shall be responsible for removal and reinstallation of a pipe and all associated brackets located above the drains tank; removal is required in order to gain access the drains tank manhole. Upon reinstallation, Contractor shall install the pipe with new gaskets and fasteners.
6. Manhole covers shall be removed.
7. Tanks shall be hot water cleaned to ensure biological contaminants are killed. Required temperature: 70 degrees C / 158 degrees F (minimum). Contractor shall arrange its own supply of hot water and fresh flushing water.
8. Tanks shall be flushed with fresh water. All fluids used in the cleaning and flushing process shall be removed ashore and disposed of by Contractor.
9. The tanks shall be thoroughly cleaned to SSPC.SP2 standard. Any rusty areas shall be power tool cleaned to SSPC.SP3 standard. All scale, dirt and debris shall be removed ashore and disposed of by Contractor.
10. Following the cleaning of the tanks, the tanks shall be inspected by the Owner's representative and the attending TCMS Surveyor.
11. Sounding pipes, suction pipes, and vents shall be proven clear; blockage removals shall be considered unscheduled work.
12. The Owner's representative (or designate) shall be present when the manhole covers are reinstalled. The Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gaskets. Anti-seizing compound shall be used on all threads.

CCGS Edward Cornwallis
August, 2015 Refit
HD-07 – Fuel Tank Survey

13. Any manhole cover studs broken during the refit period shall be renewed. Contractor shall include the cost to replace 10 studs and shall quote unit cost for PWGSC 1379 adjustment purposes.

2.2 Location

FIELD #	FUEL TANK	LOCATION	M ³	MANHOLE LOCATION
3L002	#1 Fuel Oil Tank	Fr. 163 to 175 P	52.9	#19 at forward E/R bulkhead
3L003	#2 Fuel Oil Tank	Fr. 163 to 175 S	52.9	#19 at forward E/R bulkhead
3L004	#3 Fuel Oil Tank	Fr. 152 to 163 P	112.5	#15 at forward E/R bulkhead
3L005	#4 Fuel Oil Tank	Fr. 152 to 163 S	112.5	#15 at forward E/R bulkhead
3L028	Fuel Drains Tank	Fr. 70 to 72 C/L	1.9	#25 at aft E/R bulkhead center
3L012	Fuel oil day tank	Fr. 50-59 S	24.9	E/R Starboard
3L013	Fuel oil Sett tank	Fr. 54-59 S	29.5	E/R Starboard

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - 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

3.4 Owner Furnished Equipment

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

CCGS Edward Cornwallis
August, 2015 Refit
HD-07 – Fuel Tank Survey

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall be responsible for coordination of all inspections with TCMS Surveyor, and produce an inspection schedule prior to commencement of work.
2. Contractor shall provide the Owner's representative a minimum of four hours' notice of each inspection, to allow his/her attendance.
3. Upon completion of all repairs and testing, the Contractor and the Owner's representative (or designate) shall conduct a final inspection and ensure all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.

4.2 Testing

1. The attending TCMS Surveyor shall determine the test method. All tests shall be witnessed by the attending TCMS Surveyor and the CGTA.
2. For bidding purposes, Contractor shall bid on the pneumatic testing of each individual tank, and provide a unit price for hydrostatic testing each tank. The quote shall include the installation and removal of blanks for suctions, 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) shall also be included in this quote.

4.3 Certification

1. Contractor is responsible to ensure the TCMS 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.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall 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 shall provide a copy of all test certificates to Chief Officer.
3. Safety Management System forms and checklists shall be provided to Chief Officer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-08 – Void Space Survey

1: SCOPE:

The intent of this specification item shall be to open up several ballast tanks for cleaning, inspection and testing, as per Transport Canada Division 3 requirements. These tanks are considered as confined spaces under the Coast Guard's Safety Management System.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall provide a method to have the tanks gas freed, and certified Gas Free, safe for personnel to enter and safe for hot work. Certificates shall be forwarded to the Owner's representative and a copy shall be posted in a conspicuous location near the entrance to each tank.
2. Contractor shall provide each 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 as well as airborne dust and debris shall not be allowed to enter the vessel.
3. Manhole covers shall be removed. The tanks shall be thoroughly cleaned; all scale, dirt and debris shall be removed ashore and disposed of by Contractor. Any rusty areas shall be power tool cleaned to SSPC.SP3 standard. Care must be taken so as not to wet existing steam piping insulation that may exist in some void spaces.
4. Tank internals shall be inspected by the Chief Engineer and a Marine Safety Inspector. Rusty and bare areas shall be power tool cleaned and sufficiently feathered to existing coatings.
5. All power tool cleaned areas shall be coated with 2 coat of Intershield 300 (Bronze) to 11 mil DFT and a final coating of Intershield 300 (Aluminum) of 5 mil DFT.
6. Contractor shall quote on power tool cleaning and touching up 10 M² for each tank and provide a unit cost for preparing and touching up of each square meter. Upon project completion, the final total for this work shall be adjusted up or down by PWGSC 1379 action.
7. Each level alarm shall be tested for correct operation. Ship's personnel shall verify that each alarm has been activated.
8. Sounding pipes, suction pipes, and vents shall be proven clear; blockage removals shall be considered unscheduled work.
9. The Owner's representative (or designate) shall be present when the manhole covers are reinstalled. Contractor shall clean the sealing surfaces around the manhole and cover and install the cover using new ¼ inch thick neoprene gaskets. Anti-seizing compound shall be used on all threads. Contractor shall quote separately the unit cost per stud to replace any broken manhole securing studs.

CCGS Edward Cornwallis
August, 2015 Refit
HD-08 – Void Space Survey

2.2 Location

FIELD #	TANK	LOCATION	AREA(M2)
3L042	Port Sonar Comp.	Fr 126-130 P	8
3L043	Stbd Sonar Comp.	Fr 126-130 S	8
3L047	Pipe Tunnel	Fr 102-163 C/L	108

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - 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. Contractor shall refer to General Notes for other applicable standards and regulations.

3.4 Owner Furnished Equipment

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

CCGS Edward Cornwallis
August, 2015 Refit
HD-08 – Void Space Survey

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall be responsible for all inspections and shall consult with TCMS, prior to commencement of work, to determine an inspection schedule; at each inspection point, the Contractor shall advise the Owner's representative, in advance, to allow his/her attendance.
2. Upon completion of all repairs and testing, the Contractor and the Owner's representative (or designate) shall conduct a final inspection and ensure all tanks, covers, vents and piping connections have been returned to operating conditions and the attending TCMS Surveyor has completed all inspections.

4.2 Testing

1. The attending TCMS Surveyor shall determine the test method. All tests shall be witnessed by the attending TCMS Surveyor and the CGTA.
2. For bidding purposes, Contractor shall bid on the pneumatic testing of each individual tank, and provide a unit price for hydrostatic testing each tank. The quote shall 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) shall also be included in this quote.

4.3 Certification

1. Contractor is responsible to ensure the TCMS Surveyor signs off all surveyed tanks in the vessel's Hull and Machinery Survey Record Book and Division 3 report under field numbers 3L042, 3L043, 3L047, as identified in section 2.2 of this specification.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall 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 shall provide a copy of all test certificates to Chief Officer.
3. Safety Management System forms and checklists shall be provided to Chief Officer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-09 – Rudder Survey

1: SCOPE:

Within eight (8) hours following docking of the ship, Contractor shall remove rudder fairwater plates and take readings of all bearing and pintle clearances. Potential Contractors shall bid this work at Premium Time Rates if required due to meet the tight time constraints required.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall back-gouge each of the fairwater plates for removal to access the pintle bearings. Note: the fairwater plates shall not be sectioned for ease of removal; they shall be removed in complete sections.
2. Rudder stock wear-down readings shall be recorded in way of bearings. Report shall be provided to Chief Engineer, as per section 5.1 – Deliverables.
3. Rudder drain plug shall be removed in the presence of the Chief Engineer. Checks shall be carried out to confirm the absence of internal leakage. Contractor shall pressurize internal area of rudder with one psi of air and apply soap solution to all areas. Contractor shall note the time of test, test duration, and any deficiencies found. Any leaks discovered shall be corrected by PWGSC 1379 action.
4. Rudder gland and tiller head (1.25 tonnes, approximately.) shall be disconnected in steering flat, and set aside in an area that does not interfere with any work operations and protected from damage.
5. In preparation for rudderstock being unshipped:
 - a. Steering gear rams shall be let go and supported (7.7 tonnes, approximately).
 - b. Rudder jump collar clearance shall be checked.
 - c. Rudder steady bearing shall be removed from its base in the rudder trunk.
6. Contractor shall make fast steady bearing to rudderstock once steady bearing foundation bolts are removed. Note: Rudder stock and steady bearing shall be unshipped together.
7. Rudderstock / palm bolts shall be removed from rudder. Rudder (12 tonnes, approximately) shall be unshipped from the rudder stock with pintles in place.
8. Care must be exercised during the entire operation, preventing any damage to the pintles.
9. All pintles and bearings shall be gauged for wear (with results recorded), and inspected by TCMSB for survey credit under division 3 field # 3HH010.
10. If deemed necessary to remove the pintles, Contractor shall use the fitted pilgrim nuts to remove pintles, three (3) in numbers, in accordance with manufacturer's specifications. The travel of the hydraulic piston must not exceed the specified limit to avoid damage to the tube when removing and replacing the pintles.
11. Contractor shall assume the Pintles require removal, and shall provide a unit cost to remove pintles for PWGSC 1379 adjustment purposes. This price shall be included in the overall bid.

CCGS Edward Cornwallis
August, 2015 Refit
HD-09 – Rudder Survey

12. Contractor shall quote on renewing each of the three GSM pintle bushings. This shall also include the rudder rubbing pads on the aft end of the rudder post. This quote shall form part of the overall bid.
13. Rudder trunk shall be abrasive blasted and re-coated as per Specification Item HD-03.
14. Zinc anodes in the rudder trunk shall be inspected for wastage. Contractor shall quote on the renewal of 12 x M40 Contractor supply zinc anodes fitted in the rudder trunk. Contractor shall also quote a unit cost per anode. This work shall be carried out in conjunction with the rudder survey as well as hull coating. New anodes shall be protected during hull coating. Quotes shall form part of the overall bid.
15. Steady bearing (Thordon Bush) shall be measured with feeler gauges in 4 directions, and examined for wear. Report shall be provided to Chief Engineer, as per section 5.1 – Deliverables.
 - a. Bearing clearances shall be taken and recorded when the rudder is in each of the following positions:
 - i. Hard to Port
 - ii. Hard to Stbd.
 - iii. Midships
16. During the 2005 docking, abrasion resistant coating Amercoat 238 and Amercoat 339 was applied to the rudder stock in way of the steady bearing. This area has been inspected in 2010, and shall be re-inspected by both Chief Engineer and TCMSB surveyor.
 - a. If repairs are required, Contractor shall profile the top coat and damaged areas. Damaged areas (bare steel) shall have one coat of Amercoat 238 applied.
 - b. Entire stock shall have three coats of Amercoat 339. Between each coat, the paint shall be allowed to harden, to allow sanding of the surface in order to maintain an even concentric surface. The stock must be repositioned between coats to prevent any excessive build-up of paint on one side.
 - c. Measurements shall be taken to ensure sufficient operating clearance exists between the stock and the steady bearing.
17. Brass liner on stock shall be examined and cleaned up and measured in 4 directions. Thrust bearing to be checked for wear, measured and recorded. Report shall be provided to Chief Engineer, as per section 5.1 – Deliverables.
18. All grease ways to be proven free and clear. All internal areas shall be cleaned and prepared for re-installation of rudder stock.
19. Rudderstock shall be reinstalled in ship with jump collar clearances re-established, rudder re-hung and pintles re-installed. Rudder stock shall be re-connected to tiller head as per original position of rudder.
20. Rudder gland to be repacked with approximately 5 meters (4 turns) of "Kohinoor" 1" square packing, (actual packing diameter shall be determined when rudder stock removed). Drawing specifies manilla hemp material for the packing.

CCGS Edward Cornwallis
August, 2015 Refit
HD-09 – Rudder Survey

21. The drain plug shall then be reinstalled and locked. Pintle and palm bolts shall be reinstalled, checked for tightness and secured as per original. Contractor shall quote on 2 pneumatic pressure tests for the rudder.
22. Steering gear assembly and rudder stock tiller arm final set-up to be performed by an authorized Wagner Steering Gear Service Representative to ensure that all limits are properly set prior to returning ship to water.
23. Contractor shall include \$10,000.00 in bid price for Wagner Representative in attendance for final placement of tiller head onto rudderstock, connection of steering rams, and final set up of autopilot and controls on steering gear. Invoice shall be provided and final cost shall be adjusted via PWGSC 1379 action.
24. Cost of staging required to carry out specified work shall be included in the bid price.
25. Contractor shall quote on supplying 2 new Rudder Fairwater plates fabricated out of Lloyds Grade "A" 25mm thick plate. The radius of the curved section is approximately 250 mm. This quote shall form part of the overall bid.
26. Rudder fairwater plates to be fitted in good order. Plates shall be painted as per Hull paint specification HD-03
27. Damaged areas of paint shall be prepared and re-coated as per Specification Item HD-03.

2.2 Location

1. All work for this specification shall be carried out in the steering gear compartment and the void/docking space below.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Reference Ship's Drawing 228-01, 228-02 & 228-03
2. Specialized tools available aboard vessel:
 - a. Rudder Pintle removal tool 2040-21-TAG-8739
 - b. Rudder Thordon rudder rubbing pads
 - c. Rudder Thordon pintle bushing
 - d. Rudder Thordon steady bearing bushing
3. **Note** – Steady bearing bushing cannot be changed unless the bronze sleeve is removed – the bronze sleeve is a larger outside diameter than steady bearing bore

CCGS Edward Cornwallis
August, 2015 Refit
HD-09 – Rudder Survey

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

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall arrange with TCMSB Surveyor for inspection and certification for Division 3 field # 3HH010.

4.2 Testing

1. Upon completion of all work and refloating the vessel, the rudder and steering gear shall be thoroughly tested for operation. No hydraulic or seawater leaks shall be detected during this test.

4.3 Certification

1. As per 4.1.1, Transport Canada Marine Safety Branch Surveyor shall provide certification for division 3 field # 3HH010.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Copies of all hand-written notes and measurements shall be provided to the Chief Engineer immediately.
2. Computer generated copies of the same measurements shall be provided to the Chief Engineer within forty-eight (48) hours of their being taken.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-10 – Propeller Boss Anodes

1: SCOPE:

The intent of this specification shall be to remove the two propeller boss anodes, and replace with new material.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall install one (1) zinc ring anode on each propeller boss (total of two). Existing anodes shall be removed and disposed of as directed by Chief Engineer. Fasteners shall be retained for reuse with new anodes.
2. Size of new Zinc anodes are: 36" O.D., 31" I.D., 2" thick, 33.5" P.C.D. with eight (8) 3/4" Dia. holes equally spaced. Anodes shall be 99% pure zinc, each supplied in two (2) halves.
3. Actual Pitch Circle Diameter (P.C.D.) shall be checked while ship is out of water.
4. Anodes shall be Coast Guard Supplied. Anodes do not have the bolt holes drilled in them. Contractor shall drill and secure the Anodes.
5. Contractor shall install new anodes using retained fasteners. Fasteners shall be wire locked when the zinc rings installed.

2.2 Location

1. The boss anodes are located on the port and starboard propellers.

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.

CCGS Edward Cornwallis
August, 2015 Refit
HD-10 – Propeller Boss Anodes

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other relevant standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment, and transportation required to complete all requirements of this specification shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

HD-11 – Sea Bay & Sea Chest Inspections

1: SCOPE:

The intent of this specification is to detail the work required to open up and clean the Sea Chests and the Seabay; this work shall be carried out in conjunction with Item HD-XX, Underwater Hull Cleaning and Painting.

2: TECHNICAL DESCRIPTION:

2.1 General

SEA BAY STRAINER BOXES PORT & STARBOARD

1. The sea strainers boxes, port & starboard shall be opened up; this involves disconnecting the sea strainer vents & drains. Both strainer baskets shall be removed ashore, cleaned, and inspected. Both strainer baskets shall have the holes reamed to their original diameters.
2. Contractor shall quote on the renewal of 2 tear-drop shaped zinc anodes in each sea strainer (total of 4) as per existing arrangement. Contractor shall quote on the renewal of 1 M-24 zinc anode on each sea strainer cover (total of 2) as per existing arrangement. This quote shall form part of the overall bid. Contractor shall mechanically clean the strainer internal and cover to SSPC-SP3 standards.
3. One coat of Intertuf 203 Aluminium and 1 coat of Interspeed 640 Red anti-fouling paint shall be applied to all strainer box internal surfaces, including the underside of each strainer cover. A suitable drying time shall be incorporated between coats as per the paint manufacturer's guidelines
4. Contractor shall remove the strainer cover gaskets. Contractor shall supply and install new gaskets of equivalent size and material as original.
5. After inspection by the Owner's representative (or designate), the sea strainer covers shall be replaced; anti-seize compound shall be used on all fasteners. Vents and drain piping shall be reconnected.

SEACHESTS

6. NOTE: There shall be no welding or hot work operations carried out on the forward and aft bulkheads of the sea chests and seabays. These bulkheads are common with fuel tanks.
7. Contractor shall note that access to the sea chests is only available via removable shell grids (one per chest). Contractor shall note the location of shell grids when planning blocking arrangements for dry docking.
8. The grids and manhole covers shall be removed from all Sea Chests and Seabays for cleaning and inspection. The grids and inlet areas shall be cleaned and grid holes shall be mechanically reamed to the original diameter.

HD-11 – Sea Bay & Sea Chest Inspections

9. The seachests and seabay shall 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 shall be given to the Chief Engineer prior to men entering the tank and a copy of each certificate shall be posted in a conspicuous location in close proximity to the manhole cover for each tank. Spaces shall be tested each day that personnel shall be in the tanks.
10. Contractor shall provide the spaces 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 as well as airborne dust and debris shall not be allowed to enter the vessel.
11. The Contractor shall inform the Owner's representative when the Sea Chests are opened up, prior to cleaning. The Sea Chests shall then be inspected by the Owner's representative and a Marine Safety Inspector.
12. Contractor shall thoroughly clean the Sea Chests using high pressure water jets; minimum pressure shall be 5000 PSI. Contractor shall then hand scrape any loose areas of coating. All debris shall be removed and disposed of ashore by the Contractor. Copies of invoices detailing disposal of the debris shall be given to the Chief Engineer. Contractor shall bid on hand scraping 60 M³ of the sea chests.
13. Contractor shall inspect the sacrificial zinc anodes mounted in the Sea Chests and renew as directed. Contractor shall bid on total and unit price to fit 78 x M24 zinc anodes.
14. Anode configurations in the sea chests are as follows:
 - a. High Sea Chests
M24 anodes
Ea. 20
 - b. Low Sea Chests
M24 anodes
Ea. 16
 - c. Distiller Sea Chest
M24 anodes
Ea. 2
 - d. Aft Sea Chest
M24 anodes
Ea. 4

Total = GSM 78 Anodes
15. All anodes shall be suitably protected using plastic or paper wrap and tape during cleaning and painting activities. All protective wraps shall be removed prior to closing the sea chest. Contractor shall not coat anodes with any form of grease or mastic.
16. Contractor shall follow all coating manufacturer's recommendations and procedures when applying the coatings outlined below. Contractor shall allow sufficient curing times as outlined

HD-11 – Sea Bay & Sea Chest Inspections

by the manufacturer during the application of all coatings. Contractor shall take random mils thickness readings between coats with the Chief Engineer in attendance.

17. After inspection by the Owner's representative and TCMS inspector, each space shall be given two coats of Intertuf 203 anti-corrosive (Aluminium), applied to yield 4 mils DFT per coat; followed by one coat of Interspeed 640 anti-fouling (red), applied to yield 5 mils DFT per coat. Each coat shall be witnessed by the Owner's representative (or designate). The tanks shall not be closed up until the paint is dry and have been inspected by the Contractor and the Owner's representative.
18. Upon completion of cleaning and coating, the grids shall be installed in good order. Locking arrangements shall be installed on all fasteners as per original. Stainless steel lock wire shall be used and adjacent bolts shall be locked in pairs only. Contractor shall quote on the unit cost for replacement of defective stainless fasteners. Assume standard stainless ¾ inch capscrews.

SEA BAY

19. The locking bar and docking plug shall be removed by Contractor to allow the sea bay to drain. Docking plug is located at frame 97 approximately 2 meters to the starboard side of the centreline of the ship. Contractor shall provide the docking plug to the Chief Engineer until required for close up. The manhole cover (Fr. 96, Fwd engineroom tank top) shall be removed. All sea bay spaces shall be thoroughly cleaned.
20. Contractor and Chief Engineer shall examine the zinc anodes for wastage. Contractor shall quote on the replacement of 32 x M24 zinc anodes; including removal, material supply, and installation. Actual requirements shall be decided after inspection and negotiated via PWGSC 1379 action.
21. All anodes shall be suitably protected using plastic or paper wrap and tape during cleaning and painting activities. All protective wraps shall be removed prior to closing the sea bay. Contractor shall not coat anodes with any form of grease or mastic.
22. The space shall be thoroughly cleaned using high pressure water jets with a minimum pressure of 2000 PSI. Contractor shall then hand scrape any loose areas of coating. All debris shall be removed ashore at the completion of each day's work. Contractor to bid on hand scraping 70 M³ of the sea bay.
23. After inspection by the Owner's representative and TCMS inspector, the Main Seabay shall be given two coats of Intertuf 203 anti-corrosive (black), applied to yield 4 mils DFT per coat, followed by one coat of Interspeed 640 anti-fouling (red), applied to yield 5 mils DFT per coat. Each coat shall be witnessed by the Owner's representative (or designate).
24. Upon completion of inspection, coating, and repair work, Contractor shall install all docking plugs, locking bars, and manhole cover in good order using new Contractor supplied Neoprene jointing on the manhole cover. Contractor shall quote on the renewal of 6 manhole cover studs for bid purposes. Any defective studs shall be renewed, the final cost of which shall be negotiated via PWGSC 1379 action.

HD-11 – Sea Bay & Sea Chest Inspections

25. The Sea bay shall be hydrostatically tested (filled to overflow the vent for a static head test) on dock with the test being witnessed by the Chief Engineer and a Marine Safety Inspector. Contractor shall remove and replace the vent head to carry out the test. During vent head installation, Contractor shall use a new gasket and stainless fasteners.
26. Should it be found necessary to drain the sea bay for the purposes of hull coating or touch-up, the docking plug shall be removed and on completion of all work, the docking plug shall be reinstalled with the locking bar welded over as per original. Contractor shall quote on the unit cost per additional removal/installation.

2.2 Location

1. The Sea Chests / Sea Bays are located as follows:

Propulsion Generator Room

- a. High Sea Chest (P) – Fr 96-106
- b. High Sea Chest (S) – Fr 96-106
- c. Low Sea Chest (P) – Fr 96-106
- d. Low Sea Chest (S) – Fr 96-106
- e. Distiller Sea Chest (S) – Fr 102-106

Propulsion Motor Room

- f. Aft Sea Chest (P) – Fr 51-54

2.3 Interferences

35T

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

35T

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 CCG Technical Authority.
 - 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. Contractor shall refer to General Notes for any other relevant standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment, and transportation required to complete all requirements of this specification shall be Contractor supply.

HD-11 – Sea Bay & Sea Chest Inspections

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor is responsible for arranging all inspections and to ensure that TCMS inspects the space and signs off all applicable items in the vessels Division 3 survey. Prior to commencement of work, Contractor shall determine an inspection schedule by TCMS and at each inspection point the Contractor shall advise the Owner's representative in advance to allow his/her attendance.

4.2 Testing

1. At undocking, the Contractor shall carry out leakage inspections and check for any ingress of water. Any leakage shall be corrected immediately, prior to undocking the vessel.

4.3 Certification

1. Contractor shall ensure TCMSB inspector provides certification for all tanks inspected, in ship's division 3 report, field #s 3L025, 3L026 and 3L027.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-12 – Sea Water Piping

1: SCOPE:

Contractor is to thoroughly remove and clean marine growth and paint the inside and outside of the pipe from the specified sea water pipe work at the forward end of the Main Generator Compartment. Contractor is responsible for ensuring that the engine room bilge is kept dry and clean during this procedure.

This specification shall be completed in conjunction with specification ED-01 – Sea Valves.

2: TECHNICAL DESCRIPTION:

2.1 General

1. In conjunction with ED-01 – Sea Valves, the first four pipes listed shall be removed to gain access to the sea valves.
2. Pipes shall be removed from the Sea Bay to the Sea Water pumps strainer.
 - a. 350 mm DIA. pipes from the high and low Sea Chest suctions to the strainers and then to the Sea Bay, Port side (approximately 3 m in length).
 - b. 250 mm DIA. pipe from the high and low recirculation to the sea bay, port side (approximately 3 m in length).
 - c. 350 mm DIA. pipes from the high and low Sea Chest suctions to the strainers and then to the Sea Bay, Starboard side (approximately 3 m in length).
 - d. 250 mm DIA. pipe from the high and low recirculation to the sea bay, Stbd. side approximately 3 m in length).
 - e. 300 mm DIA pipes from the sea bay to the sea strainer inlet (port and starboard) approximately 1.5m in length
3. These pipes shall be transported ashore to the contractor's facility for cleaning, inspection and painting.
4. Contractor shall brush off blast the inside of the piping to SSPC.SP7 standard, in order to remove marine growth and any loose particles. Contractor shall inspect each section of the piping to determine its condition. Owner's representative shall be present during the inspection.
5. Contractor shall mechanically clean each flange of the sections of pipe to SSPC-SP3 standard.
6. All debris removed from pipes and strainers shall be contained and promptly removed from the ship by the Contractor.
7. Contractor shall prepare and paint the inside of the piping with two coats of Apexior 3 coating system, in accordance with paint manufacturer's recommendations.
8. Contractor shall prepare and paint the outside of the pipe with two coats of marine paint (white) in accordance with paint manufacturer's recommendations.
9. Contractor shall supply and install new jointing for re-connection of all disturbed joints, as well as new fasteners, after completion of cleaning and installation of the pipes.
10. Prior to reassembly of any cleaned piping, it shall be made available for inspection by the Chief Engineer and the PWGSC Inspector.

CCGS Edward Cornwallis
August, 2015 Refit
HD-12 – Sea Water Piping

2.2 Location

1. Main Engine Room, Tank Top Level

2.3 Interferences

1. The removal and re-installation of any deck plates required for access to piping is Contractor's responsibility.
2. Contractor is responsible for the removal and re-installation of any valves or fittings required to gain access to the pipe work.
3. Contractor is responsible for the identification of any interference items, their temporary removal and storage and refitting to the vessel.
4. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. All hotwork shall be done in accordance with CCG Welding Specification CT-043-EQ-EG-001
3. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment, and transportation required to complete all requirements of this specification shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall arrange with TCMSB for a surveyor to be available whenever required, as identified by this specification as well as Surveyor's own inspection/testing requirements.

4.2 Testing

1. Upon reassembly, a pressure test shall be performed to prove no leaks in the system.

4.3 Certification

1. TCMSB Surveyor shall provide certification in the ship's division 3.

CCGS Edward Cornwallis
August, 2015 Refit
HD-12 – Sea Water Piping

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A report shall be provided indicating all testing and repairs completed, paint quality reports, etc associated with this specification.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
HD-13 – Anodes in Sea Chests

1: SCOPE:

In conjunction with HD-11, Seabays and Seachests, a total of 8 marine growth and corrosion control anodes shall be inspected by a qualified FSR. The FSR must visually inspect these 8 anodes with a Coast Guard representative. If the anodes have wasted more than 50%, they shall be replaced by Contractor.

The old Anodes shall be returned to the vessel and signed off by the Owner's representative.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Prior to commencing any work, Contractor shall tag and lock out the anode supply. Contractor shall supply and install their own locking devices and keep possession of all keys during the scope of this work.
2. Contractor shall arrange for the services of a qualified FSR to oversee this work as well as the hull anodes. Contractor shall schedule the contracted work so that the FSR is available for both jobs and thereby avoid multiple visits. In the overall quote, Contractor shall allow \$10,000 for the services of a Cathelco FSR. The FSR allowance shall cover travel and living expenses only. 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 overhead or profit. The final cost shall be adjusted accordingly by PWGSC 1379 action upon receipt of invoice.
3. Chief Engineer shall indicate the location of the anodes and provide any relevant drawings.
4. Contractor shall check the 8 anode cables for continuity and insulation breakdown. If a megger is used, Contractor shall ensure that the cables are isolated from the electronic controls, and use a test voltage of 50V or less.
5. Ship's Electrical Officer shall assist in the location of the various components.
6. Contractor shall quote a unit cost per anode replacement, and include the cost to replace all eight anodes in the evaluated bid. Adjustments to the total number of renewed anodes shall be via PWGSC 1379 action.
7. All work shall be completed to the satisfaction of the Owner's representative. Note: There are 2 types of anodes, 4 of each type for a total of 8. Each anode shall be replaced with its corresponding type of anode.
8. Anodes shall be GSM, as per the table in section 3 of this specification.
9. Where anode replacement is required, Contractor shall install the nylon insulating washers and the torque securing nuts are set 70 ft/lbs. The FSR shall witness the installation to ensure correct assembly. Upon completion of anode renewal, the anode connection box caps shall be filled with a non-conductive grease to prevent the ingress of water.
10. The FSR shall be present during the commissioning of the system when the vessel is re-floated to ensure the readings on the Impressed Current Control Panel are accurate.

CCGS Edward Cornwallis
August, 2015 Refit
HD-13 – Anodes in Sea Chests

2.2 Location

The anodes are located within the sea chests opened in specification HD-11.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

- | | |
|---------------------------|-------------------------|
| 1. <u>Description</u> | <u>Ship Inventory #</u> |
| Copper Seachest anodes | 5340-21-TAP-1576 |
| Aluminium Seachest anodes | 5340-21-TAP-1575 |

2. Suggested FSR:
Jastram Technologies
214 Wright Ave. Dartmouth, NS
902-468-6450

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 CCG Technical Authority.
 - 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

3.4 Owner Furnished Equipment

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

CCGS Edward Cornwallis
August, 2015 Refit
HD-13 – Anodes in Sea Chests

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Inspection and testing shall be performed to the satisfaction of FSR.
2. All testing indicated in the specification above shall be a minimum requirement.

4.2 Testing

1. See Inspection section above.

4.3 Certification

1. FSR shall provide certification of operation and accuracy of ICCP control panel indication.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. FSR shall provide a report of all anodes inspected, and their respective wear down.
2. If any anodes were replaced, a report shall be provided indicating the replacement procedure and test values.
3. An inspection report shall be provided indicating continuity of cables in milliohms, insulation readings of the cables in megaohms, and a calibration report of the Impressed Current Control Panel.

5.2 Spares

1. All unused spares shall be returned to ship's inventory.

5.3 Training

N/A

HD-15 – Seawater Outlet Piping from Coolers

1: SCOPE:

The existing Cupronickel (CuNi) pipe is leaking at the stub ends at the cooler, and requires replacement.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the section of CuNi piping and stub ends on the cooler outlets from the engine room and deliver to contractor's facility. The pipe shall be jigged, the existing stub ends shall be removed from pipe, and new GSM be assembled, fitted and welded as per existing arrangement.
2. Piping, including flanges, eccentric reducers, elbow and Tee are made of CuNi. Material consists of 70/30 CuNi piping Class 200. Contractor shall weld the sections of CuNi as per welding standards and procedures for CuNi piping.
3. Contractor shall remove the existing butterfly valves and spool pieces to the plate coolers. Contractor shall supply and fabricate new spool pieces of the same dimensions as the existing spool pieces, including the spigot for the drain valve and temperature connections.
4. Contractor shall remove the temperature and drain fittings and install new contractor supplied brass fittings on the new spool pieces in the same location as removed. Contractor shall fabricate and machine to flange ends for the spool pieces. Schedule 80 seamless piping shall be used for the spool pieces. All fittings shall be re-installed with new contractor supplied stainless fasteners. The butterfly shall be re-used with the new spool pieces.
5. All used spool pieces shall be returned to the Owner's Representative.
6. Contractor shall apply two coats of Apexior 3 to the inside of the spool pieces. The new spool pieces shall be given two coats of Amercoat (white).
7. Contractor shall mechanically clean all existing mating flanges of the remainder of pipe prior to installation of the renewed section of CuNi piping.
8. Contractor shall install the renewed section of CuNi piping with new gaskets and new stainless steel fasteners (nuts, flat washers and bolts) of the same size and grade as those removed.

2.2 Location

1. The section of pipe is located in the forward port side engine room. It is the TEE piping from the main sea water outlet from the fore and aft plate coolers.

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.

HD-15 – Seawater Outlet Piping from Coolers

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

35T

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. All hotwork shall be done in accordance with CCG Welding Specification CT-043-EQ-EG-001.
3. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment, and transportation required to complete all requirements of this specification shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

35T

4.2 Testing

1. Prior to installation aboard the vessel, Contractor shall perform a hydrostatic test of the new section of CuNi piping for 30 minutes at 100 psi. This pressure test shall be witnessed by the CGTA. Contractor shall fabricate steel blanks for the hydrostatic test. Contractor shall include in their quote the cost of supplying these blanks. These blanks shall be given to the vessel upon completion of the testing.
2. Upon completion of the work, all affected pipe work shall be given a functional pressure test after the ship had been re-floated.

4.3 Certification

1. Contractor shall provide certification for all materials used, and tests performed to Chief Engineer.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

35T

5.2 Spares

35T

HD-15 – Seawater Outlet Piping from Coolers

5.3 Training

35T

CCGS Edward Cornwallis
August, 2015 Refit
H-XX – Berthing

1: SCOPE:

During the contract period at Contractor's facilities, while not in dock, the vessel shall 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.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The vessel will be delivered to the Contractor's facility under its own power.
2. Contractor shall include in the overall quote, 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.
3. Maneuvering of the vessel into and out of Contractor's docking facilities shall be done under the direction of Contractor. Costs for tugs and pilots required for any movements of the vessel during the contract period shall be included in the bid price quoted, but shown separately as well.
4. Contractor shall include in their bid the cost of a tug if required for movement of the vessel while tying up at the contractor facilities before and after and the docking.
5. Two gangways shall be supplied and set up by Contractor while alongside the Contractor's jetty. These gangways shall be set up and rigged from the wharf; one onto the buoy deck, and the other at the aft upper deck. Both gangways shall be complete with safety net. Gangways shall be safe, well lit and structurally sufficient to support passage of Contractor's workmen and ship's crew.

2.2 Location

N/A

2.3 Interferences

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-XX – Berthing

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

Vessel Particulars:

Length Overall	83.00 m
Length B.P	75.00 m
Breadth Moulded	16.20 m
Depth Moulded	7.75 m
Design Draft	5.75 m
Extreme Draft Aft	6.00 m
Displacement	4,662 tonnes @ design draft

3.2 Standards and Regulations

N/A

3.4 Owner Furnished Equipment

N/A

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-02 – Galley Deck Repairs

1: SCOPE:

1. The Galley had experienced corrosion in and around the forward galley deck areas. Temporary repairs were carried out to allow the continued operation of the vessel in 2011 with doublers plates. A Permanent repair is now scheduled for this dry-docking.
2. The specification is to be completed in conjunction with galley deck tile repairs.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall crop out of the section of the existing deck and replace with a new insert (10 mm thickness plate- Lloyd's Class A Material). Contractor shall provide proof of certification for all steel used. Equivalency or substitutions may be provided pending prior approval by Marine Safety.
2. This work shall be completed in conjunction with H-03 – Galley Deck Tile repairs and H-04 – Galley Equipment Renewal.
3. Contractor shall remove the insulation in way of deck insert welding for Hot-Work in Dry Stores, Lobby, Engine room, and Workshop.
 - a. Contractor shall take special precautions around the main fore and aft cable tray below galley while work is being carried out.
 - b. Upon completion of steel and painting, Contractor shall re-install insulation, including steel mesh, back to as "Original condition".
 - c. Contractor shall include in their quote the cost of replacing damaged insulation in the Dry Stores room and in the Engineroom and Workshop.
 - d. Contractor shall include in their quote the cost of removal of interference items to allow the scope of work to be carried out.
4. For galley deck doubler forward of galley stoves, frames 104-106, indicated in Orange in Section 3.1, Figure 1 – Contractor shall remove the existing a 48" x 96", 3/8" doubler plate and original underneath plating.
5. For galley deck doubler inboard & forward of galley stoves, frame 103-109, indicated in Blue in Section 3.1, Figure 1 – Contractor shall remove the existing 48" x 96", 3/8" doubler plate and original underneath plating. Contractor may be required to notch doubler around transit to allow for removal.
6. For galley deck doublers inboard & Aft of galley stoves, approximately frames 100-103, indicated in Green in Section 3.1, Figure 1 – Contractor shall remove the remaining 3/8" doubler plate (Approximately 50ft² combined) and original underneath plating.
7. Contractor shall remove both stainless steel insulated panels, inboard of removed 'True' upright freezer. Contractor shall remove the aftermost SS panel longitudinally and box support underneath to allow the doubler plating to be removed and new inserts to be welded in place. Contractor shall fabricate and install new box supports for panels and the cable transit. New

CCGS Edward Cornwallis
August, 2015 Refit
H-02 – Galley Deck Repairs

insert plate shall line up with the electrical transit. Contractor shall reconnect all electrical systems that may have been disconnected or removed as a result of from this scope of work. Contractor shall include in their quote the cost of removal of the wiring from Electrical Panel F-209 through the transit into the Dry Stores Room during the insert plate installation. Contractor shall also the cost of new transit watertight glands for the electrical cables upon installation. Contractor is responsible for all lock out / tag out associated with this wiring.

8. Contractor shall include in their quote the cost of removal, re-installation, and re-certification of the Wet Chemical Galley Suppression system bottle for the scope of this work.
9. Once deck section has been cropped, Contractor shall suitably prepare all edges of the ship's structure as well as those of the new inserts for a continuous weld or a full penetration weld on both sides of the new inserts depending on Marine Safety Inspector approval method.
10. After removal is completed, TCMS surveyor shall be brought in for final inspection prior to installation of the new insert plates.
11. Lloyds's Register Grade "A" 10 mm plate shall be used for all new inserts.
12. For bidding purposes the contractor shall bid on removing, replacing, and welding a total area of 150ft² of deck plating, and provide a unit cost per ft², for adjustment purposes up or down in the overall bid price.
13. For bidding purposes, Contractor shall bid on fully welding a total of 90 linear feet of seams, and provide a unit cost per foot, for adjustment purposes up or down in the overall bid price. Each linear foot of seam shall include two passes at deck level, and two overhead passes from below, for a total of four welding passes as per CCG Welding Specification.
14. After installation is completed, TCMS surveyor shall be brought in for final inspection.
15. The entire new exposed steel deck, transit and exposed steel shall have surface preparation to SSPC.SP11, and coated with PPG Amercoat 235 Buff Colour (a proven marine epoxy), in full accordance with the manufacturer's Product Data/Application Instructions. The bottom side of the deck shall have 2 coats of marine grade primer and 2 coats of International or equivalent fire retardant white.
16. Contractor shall ensure tie ins of the new deck flooring shall be as seamless as possible, in level and joining to prevent further deterioration of substrates. The above deck insulation and layers are "known work".
17. Contractor shall be responsible for all slinging, cranes, welding, and modifications required to perform the scope of work, including removal of old plates, and installation of new steel plates. Contractor shall be responsible for determining the best route for transportation of said plates. Any damage caused by this will be the responsibility of Contractor.

2.2 Location

This work will take place in the ship's galley and surrounding compartments.

CCGS Edward Cornwallis
August, 2015 Refit
H-02 – Galley Deck Repairs

2.3 Interferences

1. Contractor shall include in their cost the removal and re-installation in good order, any interference items that may interfere with the scope of the work.
2. Interference items include, but are not limited to panelling, lighting, fridges, electrical wiring, galley mixers, wire trays and fixtures.
3. The shelving in the dry Stores will have to removed and reinstalled by the contractor.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

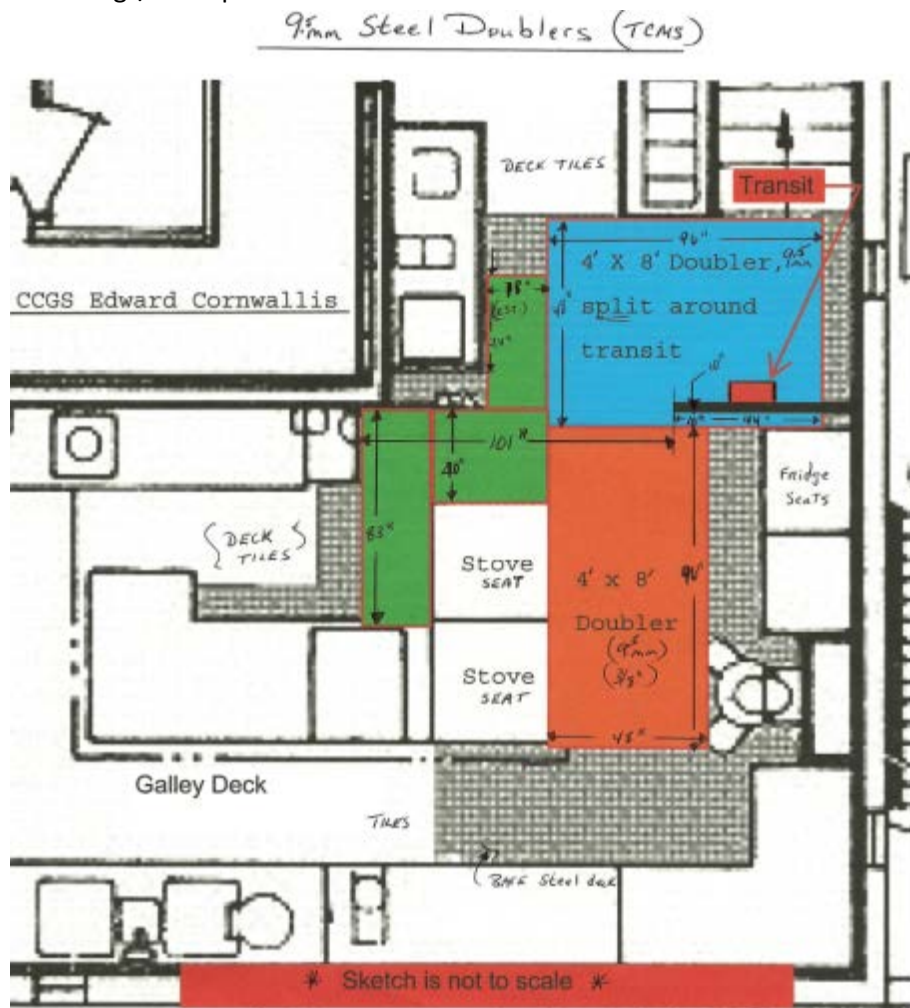


Figure 1 - Deck insert plates in Galley

1. Chief Engineer shall make copies of the UT gauging report of the galley deck available to Contractor.

CCGS Edward Cornwallis
August, 2015 Refit
H-02 – Galley Deck Repairs

3.2 Standards and Regulations

1. Contractor is required to abide by the Fleet Safety and Security Manual provisions for Hot Work, Confined Safe Entry and Fall Protection and/or follow an equivalent safety management system. Task Hazard assessments will be performed prior to work commencing each working day.
2. Any necessary welding shall be performed to CWB 47.1 and visually inspected by a qualified welding supervisor.
3. Any item of work involving the use of heat in its execution requires that Contractor shall advise Chief Engineer before starting such heating and upon its completion.
 - a. Contractor shall provide suitable fire retardant coverings to protect wire ways, cables, equipment and structure from welding slag, splatter etc. in all surrounding areas.
 - b. Contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such heating and until the work has cooled.
 - c. The Ship's extinguishers shall **not** be used except in an emergency.
 - d. Contractor shall service and shall refill any ship's extinguisher used under such conditions.
4. Prior to installation of new inserts, Contractor shall provide to TCMS and CGTA a copy of the welding procedure for the scope of this work. This welding procedure **MUST** be approved by TCMS.
5. Temporary lighting and/or temporary ventilation required by Contractor to carry out any item of this specification shall be supplied, installed and maintained in safe working condition by Contractor and removed on completion.
6. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe for hot work certificates.
7. Contractor shall provide the spaces 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 spaces. Vapours as well as airborne dust and debris shall not be allowed to enter the remainder of the vessel.
8. Contractor shall ensure that all spaces, compartments, and areas are left in as clean a condition as found.
 - a. The cost of removing dirt, debris, and associated materials shall be included in the quotation.
 - b. Contractor shall ensure protection to sensitive equipment within the area and the scope of work are maintained for the duration of this work.
 - c. All area affected shall be suitable protected with fire blankets and/ protective coverings.
 - d. Contractor shall supply suitable fire protection in the control room, sewage compartment, storeroom, galley, officer's mess surrounding areas, and engine room to protect all machinery, piping, wiring, and electrical devices.

3.4 Owner Furnished Equipment

1. Unless otherwise noted, all materials shall be Contractor supplied.

CCGS Edward Cornwallis
August, 2015 Refit
H-02 – Galley Deck Repairs

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall arrange for TCMS Surveyor to inspect the galley decking after all old materials have been cropped and removed.
2. Contractor shall arrange for TCMS Surveyor to inspect the galley decking after all welding has been completed, prior to application of any coatings.

4.2 Testing

1. N/A

4.3 Certification

1. Contractor shall arrange with TCMS Surveyor to update vessel's current data report under Field # 220016 to reflect repaired deck plating.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-03 – Galley Deck Tile

1: SCOPE:

This specification is for the removal and instillation of new tiles in the galley, to be completed in conjunction of H-02 – Galley Deck Repairs.

2: TECHNICAL DESCRIPTION:

2.1 General

1. This specification shall be completed in conjunction with the Steel deck repairs. The tiles and underlayment must be removed to obtain access to the steel work under the flooring and replaced with new underlayment and tiles once work is completed.
2. Contractor shall remove all quarry tiles and underlayment from the Galley. The total area the flooring is roughly 400 ft². Contractor shall verify measurements of new flooring. Contractor shall provide a cost per ft² for PWGSC 1379 adjustment up or down if the total area is different than the estimated 400 ft².
3. All the deck edging tiles will be removed when the floor quartz tiles are removed and be replaced with new materials in place of original and any missing tiles. An estimated 80ft of edging shall be replaced in this way. Contractor shall provide cost per linear foot for replacement materials and labour, which shall be used for PWGSC 1379 adjustment up or down at end of refit. Contractor shall verify measurement for bidding purposes.
4. All debris shall be removed and disposed of on a daily basis.
5. Contractor is responsible for removal, disposal, and replacement of all damaged tiles or Sub-Coat flooring that may require replacement in addition to the originally specified amount.
6. Contractor shall refer to “Dex-O-Tex Marine” Application Specification for “Decklite” underlay, and follow all instructions for proper application to meet A-60 requirements as per Transport Canada Approval. Contractor shall supply and install all materials required in the Dex-O-Tex Decklite Specification.
7. Contractor shall note the camber of the deck for installation of the new underlayment and tiles. Camber shall be similar to existing arrangement, bearing in mind the minimum thickness required to maintain A-60 requirements.
8. Contractor shall install an acceptable underlayment and the new tile system in the galley, as per tile manufacturer’s recommendations.
9. Colour and style of the tile flooring shall be picked by the Chief Engineer or his designated Representative. All tiles shall be the same color and size.
10. Products shall be approved as per Marine Equipment Directive 96/98 EC and conforms to IMO Resolutions for floor coverings with “low flame-spread characteristics”. No substitutions will be considered without prior approval of the Chief Engineer. Certificates of materials compliance shall be given to the Chief Engineer for all flooring materials used.
11. Contractor shall ensure the Galley area is thoroughly cleaned prior to acceptance.

CCGS Edward Cornwallis
August, 2015 Refit
H-03 – Galley Deck Tile

2.2 Location

1. All specified work shall take place in the ship's galley.

2.3 Interferences

1. None identified.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Dex-O-Tex Marine Decklite A-60 Underlayment
 - a. Application Specification –
<http://www.dexotexmarine.com/uploads/files/pro130117155739.pdf>
 - b. Product Description –
<http://www.dexotexmarine.com/uploads/files/pro130326104810.pdf>
 - c. TC Certificate of Approval –
<http://www.dexotexmarine.com/uploads/files/pro101005084601.pdf>

3.2 Standards and Regulations

1. Deck Underlayment must meet Transport Canada A60 Requirements.

3.4 Owner Furnished Equipment

1. Unless otherwise noted, all materials, labour, and equipment shall be Contractor supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Final acceptance shall be to the satisfaction of the Chief Engineer.

4.2 Testing

N/A

4.3 Certification

1. Deck Underlayment shall meet or exceed A-60 fire rating, as per Transport Canada requirements.

CCGS Edward Cornwallis
August, 2015 Refit
H-03 – Galley Deck Tile

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. An installation report shall be provided to Chief Engineer, including installation notes and all tests performed.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-04 – Galley Equipment

1: SCOPE:

The intent of this specification is to replace the existing galley equipment with a combination of GSM and Contractor supply equipment. Some equipment is too large for the doors aboard the vessel, so a temporary opening shall be cut and reinstalled in the front of the superstructure to allow this specification to be completed.

This specification shall be completed in conjunction with H-02 – Galley Deck Repairs, and H-03 Galley Deck Tiles.

2: TECHNICAL DESCRIPTION:

2.1 General

1. As soon as the contract is awarded (Before the vessel arrives at shipyard), Contractor shall order all equipment identified as Contractor Supply in section 3.4 below. Contractor shall provide PWGSC and VMM with order information and estimated delivery time. Contractor shall allow \$35,000 for ordering all equipment, which shall be adjusted via PWGSC 1379 action upon final invoice.
2. All Contractor supply equipment shall be securely stored inside at Contractor's facility, until the vessel is ready for installation.
3. Contractor shall schedule this work in accordance with the Production Chart and all work shall be completed no later than week 5 of refit. Contractor shall be responsible for covering any additional cost associated with delays in reopening the galley.
4. Contractor shall prepare an area in front of the superstructure to allow an opening to be cut in the front to allow access for the removal and the delivery of the galley components. This opening may also serve as an access port while work is being performed in H-02 – Galley Deck Repairs.
5. Contractor shall note the area to be cut is located on the starboard side of the vessel. Contractor shall prepare an opening of suitable size to allow the passage of the largest of the galley equipment.
6. Contractor shall remove the upper deck to main deck (starboard side) stairways and starboard tugger lines shall be disconnected and capped and plugged with approved hydraulic fittings. Contractor shall remove the installed hose protector guards IWO of the hoses to allow a suitable opening to be cut. Contractor shall secure the hoses out of the way of the proposed opening.
7. Contractor shall remove and replace all the existing fitted hose "Stauff" hose clamps that have been affected during the hoses being shifted out of the area of the opening. Contractor shall bid on replacing 20 as fitted Stauff hose clamps and anchoring system. Contractor shall bid on unit cost per Stauff fitted clamp.
8. After the work is completed contractor shall install all removed clamps, hoses guards and lines to the starboard tugger winch. Contractor shall re-install the stairway using new stainless steel fasteners.

CCGS Edward Cornwallis
August, 2015 Refit
H-04 – Galley Equipment

9. Contractor shall remove the two existing upright fridges in the galley and relocate to a location that does not interfere with the cutting of the opening in front of the superstructure.
10. Contractor shall remove all panelling on the forward bulkhead behind the two existing fridges. This shall include the deck head paneling, front paneling, insulation, sheathing, electrical, and mechanical and interference items. Contractor shall include in their quote the cost of removal and reinstallation of an existing fire main behind the panelling. It is unknown if the fire main will be an interference item; Contractor shall allow for this interference in the quote, which may be removed via PWGSC 1379 if removal is not required.
11. If the fire main is disconnected, it shall be isolated. Once the section of pipe is removed, a blank flange shall be installed in order to allow the fire main to be operational during the refit period. Contractor shall make the necessary fabrications to the removed and fitted sections of pipe to allow reinstallation at project completion.
12. Contractor shall be responsible for obtaining a hot work permit and a Gas free certificate by a Marine Chemist and maintaining the validity of the certificate for the duration of the job.
13. Contractor shall mark the proposed area of the opening on the forward bulkhead and the inside area of the bulkhead including stiffeners and stringers as to the proposed location. Contractor shall obtain the services of an Engineer and/or Marine Architect to oversee and approve the method and procedure for cutting the bulkhead from the buoy deck into the galley. This proposed a scope of work for the opening should be in consultation with CGTA and the Marine Chemist.
14. The area of the opening shall be large enough to allow all appliances being removed and installed to safely pass through, with minimum 6" clearance on all sides. Contractor shall verify the measurements of the old and new galley equipment for the proposed opening and work ability.
15. Contractor shall cut an opening in the bulkhead with the intent of reusing the section of removed bulkhead plating for re-installation. Contractor shall mark and note the direction of orientation of the plating.
16. Contractor shall construct a shelter of wood framing with a suitable canvas covering for protection of the area for the duration of the scope of work. Contractor shall remove this shelter at the completion of the scope of work. While the opening is not in use for transiting materials and equipment, Contractor shall ensure it remains weather tight at all times.
17. Upon completion of all work requiring the opening, Contractor shall re-install the removed plate, including all stiffeners and stringers, using approved welding practices, as per CWB and CCG Welding Specification.
18. Contractor shall paint any areas of disturbed steel with two coats of Amercoat 235 Marine Primer (white).
19. Contractor shall be responsible for re-installation of all interference items that was removed and the installation of new insulation on the bulkheads.
20. Contractor shall note the removal and re-fitting or re-configuration of any panel, deckhead or ventilation trucking that was removed and needs to be re-fitted in a different configuration for the scope of the work.

H-04 – Galley Equipment

21. Contractor shall be responsible for the rigging, fitting, and crange for removal and installation of the galley equipment. The new GSM galley equipment shall be located in the Helicopter Hanger.
22. Contractor shall electrically and mechanically disconnect all galley equipment listed in Section 3.4 and remove this equipment from the vessel. These items shall be secured on pallets and securely stored inside Contractor's facility until the end of refit. At the end of refit, this equipment shall be returned to the vessel, and loaded in the cargo hold with the assistance of the vessel's crew.
23. Contractor shall replace all electrical line wire from the Electrical Panel F-209 to the new galley equipment. Contractor shall remove old existing wire. This wire shall be replaced with new contractor supplied marine approved cable as per TP127 Electrical standards. The size of wire shall be determined by the rating of the galley equipment and size of breaker. Contractor shall replace breakers on the panel of the new equipment with new contractor supplied 240 VAC/3 Pole, 3 phase breakers of the correct size and capacity. The steamer breaker supply shall be removed and the proper blanks shall be installed in its place on the panel as the new combination oven and steamer are one unit. A \$1500 allowance shall be given for the new breakers. This allowance will be adjusted with the receipt of the final invoice. This item may be completed while removing and installing deck plates as per Specification H-02.
24. The currently installed dish rack shall be removed for installation of the new combination oven and steamer; it may or not may not fit upon the re-installation. Contractor shall include in their bid the cost of modification of the dish rack to allow it to be fitted either in part or whole.
25. Contractor shall remove the existing water supply lines and drain lines to the deck level for the removed dishwater system and removed steamer system. Contractor shall supply and installed new valves and piping for the installation of the new equipment as per the manufacturer's or FSR requirements.

CCGS Edward Cornwallis
August, 2015 Refit
H-04 – Galley Equipment

26. Contractor shall provide an FSR for the Cleveland combination convection/steamer. An allowance of \$5000 shall cover living expenses and cost associated with the final installation and setup of the unit to the satisfaction of the FSR. A report shall be presented to the CGTA on the commissioning of the unit. This amount shall be adjusted up/down upon final invoice via 1379. Contractor shall schedule the FSR as per the production chart. In addition, FSR shall assist Contractor with the following scope of work:
- a. Installation of the GSM Claris Water Treatment System
 - b. Installation of GSM Easy Touch Control
 - c. Installation of the GSM Automatic Cleaning System
 - d. Final installation of GSM of flanged feet on the unit
 - e. Fabrication and installation of the ventilation duct from the oven/ steamer to the existing ventilation trunking. Contractor shall use stainless steel ducting and be constructed and installed to the satisfaction of the FSR rep.
 - f. Final water supply and drainage hook-up
 - g. Final electrical hook-up and testing
27. Recommended Cleveland FSRs:
- a. Garland (Combi Oven) Steven Donnelly
 - i. e-mail – stevndonnelly@gmail.com
 - ii. Phone – (902) 999-7631
 - b. Walkers Electric (Combi Oven) Kelly Ambrose
 - i. e-mail – kelly@walkers-electrica.ca
 - ii. Phone – (902) 454-0291
28. Contractor shall allow a \$5000 allowance to supply the services of Hobart FSR for the final installation, commissioning, and final report of the Dishwater. This amount shall be adjusted up/down upon final invoice via 1379. Contractor shall schedule the FSR as per the production chart. A report shall be presented to the CGTA on the commissioning of the unit. In addition, FSR shall assist Contractor with the following scope of work:
- a. Installation of the piping for the water supply and drains including the safety valve and pressure regulator
 - b. Set up of the control panel for booster heater and program of the dishwasher
 - c. Set up the washing and rinse agent as per manufacturers guidelines
 - d. Replacing and or modification to the existing pipe for the new dishwasher
 - e. Final water supply and drainage hookup
 - f. Final electrical hook-up and testing
29. Recommended Hobart FSR:
- a. Terry Pratt
 - i. Email – terry.pratt@hobart.ca
 - ii. Phone – (902) 468-5535 ext 1522

H-04 – Galley Equipment

30. Contractor may provide a local FSR for the above contacts, however approval must be provided by CGTA and Contractor shall provide verification from the FSR that the company is trained and certified for installation and commissioning the equipment.
31. The remainder of the new galley equipment shall be installed as per the manufacturer's guidelines.
32. Interference items shall be re-installed after completion equipment installation.
33. Contractor shall ensure the Galley area is thoroughly cleaned prior to acceptance.
34. All final measurements are the responsibility of Contractor.

2.2 Location

1. All work shall take place on the main deck, in the galley and well deck.

2.3 Interferences

1. Contractor shall include in their cost the removal and re-installation in good order, any interference items that may interfere with the scope of the work.
2. Interference items may be common with those identified in H-02 and H-03. Contractor shall ensure interference items are relocated a minimum amount of times to complete all specifications in order to prevent unnecessary work and cost.
3. Interference items include, but are not limited to panelling, lighting, electrical wiring, galley mixers, wire trays and fixtures.

CCGS Edward Cornwallis
August, 2015 Refit
H-04 – Galley Equipment

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Refer to product manuals for installation guidelines.

3.2 Standards and Regulations

1. Contractor is required to abide by the Fleet Safety and Security Manual provisions for Hot Work, Confined Safe Entry and Fall Protection and/or follow an equivalent safety management system. Task Hazard assessments will be performed prior to work commencing each working day.
2. Any necessary welding shall be performed to CWB 47.1 and visually inspected by a qualified welding supervisor.
3. Any item of work involving the use of heat in its execution requires that Contractor shall advise Chief Engineer before starting such heating and upon its completion.
 - a. Contractor shall provide suitable fire retardant coverings to protect wire ways, cables, equipment and structure from welding slag, splatter etc. in all surrounding areas.
 - b. Contractor shall provide sufficient suitable fire extinguishers and a fire watch during any such heating and until the work has cooled.
 - c. The Ship's extinguishers shall **not** be used except in an emergency.
 - d. Contractor shall service and shall refill any ship's extinguisher used under such conditions.
4. Temporary lighting and/or temporary ventilation required by Contractor to carry out any item of this specification shall be supplied, installed and maintained in safe working condition by Contractor and removed on completion.
5. Contractor is responsible for arranging for a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe for hot work certificates.
6. Contractor shall provide the spaces 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 spaces. Vapours as well as airborne dust and debris shall not be allowed to enter the remainder of the vessel.
7. Contractor shall ensure that all spaces, compartments, and areas are left in as clean a condition as found.
 - a. The cost of removing dirt, debris, and associated materials shall be included in the quotation.
 - b. Contractor shall ensure protection to sensitive equipment within the area and the scope of work are maintained for the duration of this work.
 - c. All area affected shall be suitable protected with fire blankets and/ protective coverings.
 - d. Contractor shall supply suitable fire protection in the control room, sewage compartment, storeroom, galley, officer's mess surrounding areas, and engine room to protect all machinery, piping, wiring, and electrical devices.

CCGS Edward Cornwallis
August, 2015 Refit
H-04 – Galley Equipment

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment shall be Contractor supply.
2. The following items shall be Government Supplied Material:
 - a. Garland Deep Fryer Model # E24-31F Weight 90 lbs 12" X 189" X 29"
 - b. True Stand-up refrigerator Model T-19 Weight 240 lbs 75" X 27" X 24"
 - c. True Stand-up freezer Model T-19F Weight 250 lbs 75" X 27" X 24"
 - d. Cleveland Combination convection oven-steamer Model OES-10.10 Weight 475 lbs 41" X 34" X 45". This replaces the individual two pieces of equipment.
3. The following items shall be Contractor Supply:
 - a. Garland Range Model # 36ER38 Weight 600 lbs 36" X 36" X 34", including the marine hand rail, deck fasteners, oven door latch, drip trap stop , Power 220 VAC/3/60
 - b. Garland Range Model # 36ER39 Weight 600 lbs 36" X 36" X 34" ", including the marine hand rail, deck fasteners, oven door latch, drip trap stop , Power 220 VAC/3/60
 - c. Hobart Dishwasher Model # AM15-2 with booster heater, Weight 387 lbs 32" X 21" X 71", includeing single point connection, 3 Phase only, Flanged or seismic feet, ¾ " pressure reducing valve , Power 220VAC/3/60

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. All new galley equipment shall be inspected to ensure it is wired, mounted, fitted and secured as per manufacturer's guidelines.

4.2 Testing

1. All new galley equipment shall be tested and proven to work in the presence of the CGTA on site and the FSR for two of the mentioned items in the specification.
2. All bulkhead welds shall be dye tested to ensure no leaks through the welds. Any leaks detected shall result in a failing mark and be re-welded at contractor's expense.

4.3 Certification

1. For all equipment requiring FSR, the FSR shall provide certification of installation.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A welding report shall be provided including all welds performed, and test results to confirm watertight integrity.
2. All equipment manuals and product materials shall be turned over to Chief Engineer.

5.2 Spares

1. All spare parts provided with the equipment shall be returned to Chief Engineer.

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-05 – Cabin Flooring

1: SCOPE:

The intent of this specification item shall be to have existing floor covering (carpet) in cabins removed and replaced with floor tiles similar to existing tiles in cabins. Existing tiles are AB Colors Plus, Fortress CFE-2093 (12"x12"x1/8").

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall bid on sufficient tiles to cover area of cabin deck, taking into account any cut tiles as required.
2. Existing rubber cove/carpeting/baseboard along perimeter of deck to be removed from the bulkhead panels and discarded. Care shall be exercised during cove removal so as not to damage any exposed surfaces of the bulkhead vinyl covering.
3. All interference items shall be removed as necessary, and re-installed and secured as per direction of Chief Engineer upon completion of deck work. Contractor shall note that securing points for interference items may have to be altered due to difference in height of new decking, and allow for this in the quote.
4. All areas of exposed underlay shall be inspected for loose, cracked, damaged, or broken sections. Loose, cracked, damaged, or broken sections of underlay material shall be removed to sound substrate and replaced with new material. Dex-o-tex Subcote No. 1 shall be used, and installed as per manufacturer's recommendations. Contractor's quote shall include removal and renewal of 44 m² of underlay material to a depth of 3cm.
5. Entire quoted deck surfaces shall then be inspected and treated as necessary with a 'skin' coat of underlay material to ensure a smooth level surface, free from dips, humps, etc., prior to installation of the new flooring.
6. New flooring shall be installed as per manufacturer's instructions using an approved adhesive. New flooring shall provide clean tight edges on all associated bulkheads, corners, and door thresholds.
7. New rubber coving shall be installed along perimeter of deck on bottom of the bulkhead panels similar to existing in alleyways.
8. Upon completion of tile installation, tiles shall be cleaned.
9. Following cleaning, three (3) coats of approved sealer to be applied as per manufacturer's instructions.
10. After sealer, three (3) coats of approved wax to be applied to tiles as per manufacturer's instructions.

CCGS Edward Cornwallis
August, 2015 Refit
H-05 – Cabin Flooring

2.2 Location

<u>CABIN #</u>	<u>LOCATION</u>	<u>AREA(M2)</u>
U-15 (Day)	Upper Deck (S)	14
U-16	Upper Deck (P)	12
U-19	Upper Deck (P)	12
U-24 (Day)	Upper Deck (S)	14
U-29	Upper Deck (P)	12
U-36	Upper Deck (P)	12
U-39	Upper Deck (P)	12
U-44	Upper Deck (S)	12
B-3 (Day)	Boat Deck	15
B-6 (Day)	Boat Deck	18

2.3 Interferences

1. All interference items shall be removed from cabins by contractor and refitted after completion of tiling. Items include but not limited to desk, lockers, and dressers.
2. Removed items shall be suitably stored and protected for duration of work.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

3.2 Standards and Regulations

1. Refer to General Notes.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all specified work shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

N/A

4.3 Certification

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-05 – Cabin Flooring

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

H-06 – Washroom & Shower Deck Repairs

1: SCOPE:

Several washrooms require new deck surfaces.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Prior to starting each space, Contractor shall seal the surrounding area from contamination by dust and debris. After all other tasks in this scope have been completed; Contractor shall remove all sealing materials ashore and dispose of them in a Contractor supplied refuse container. Container shall be removed from Crown property upon completion of work. Contractor shall return the surfaces of all washrooms, showers, surrounding areas, and fixtures that have been exposed to dust and debris back to their original condition.
2. Existing deck surfaces, coaming, shower sill tops, and all underlayment materials shall be removed to bare steel, and cleaned to SSPC.SP3 standard. Contractor shall base quote on the removal of 2.5cm thick underlayment. Differences in this thickness will be corrected by 1379 action.
3. All debris from the washrooms and showers shall be removed and disposed in a Contractor supplied refuse container ashore. Container shall be removed from Crown property upon completion of work.
4. The water pipes and vacuum pipes shall be securely plugged off and covered. Toilets shall be removed and after new flooring has been laid, refitted with new GSM Toilets. Contractor is responsible for the mounting and securing arrangements, the vacuum connection, and new water connections to the toilet.
5. Steel surfaces shall be prepared for “Dex-o-tex Décor Floor”
6. Colour of quartz aggregate shall be selected by Owner’s Rep - Contractor shall provide colour samples to select from.
7. Flooring material shall be trowel - forming a baseboard edge around each wash room and shower up to the height of the existing coaming.
8. Shower surface shall have a slight sloped (down) toward the fitted drain. Shower surface shall have a light broadcast for a non-skid surface.
9. Deck surface shall have a slight sloped (down) toward the fitted scupper drain.
10. All removals to access the work surface/area are Contractor’s responsibility to remove and must be put back in good order after work has been completed.
11. The cost to work each compartment shall be clearly identified. This timeline of the vessels departure may result in some of the work not being completed. Areas not completed will be adjusted by 1379 action.
12. A schedule of when each compartment is started shall be decided upon by the Chief Engineer.

H-06 – Washroom & Shower Deck Repairs

2.2 Location

1. The following washrooms and showers require new deck surfaces. The below listed deck areas and linear dimensions of the shower coamings and perimeter coamings are for guidance only. Contractor shall be responsible for verifying all dimensions.

Upper Deck

Name	Area M2
Chief Engineer's Cabin	4
Senior Engineer's Cabin	4

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

3.2 Standards and Regulations

1. Contractor shall refer to General Notes for applicable standards and regulations.

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Acceptance shall be based on inspection performed by Chief Engineer.

4.2 Testing

N/A

4.3 Certification

N/A

H-06 – Washroom & Shower Deck Repairs

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

H-07 – Hydraulic Room Door Replacement

1: SCOPE:

The existing Lifeboat Hydraulic Room door is of an older style weather-tight door and shall be replaced with a modern style Aluminium door of similar characteristics.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall install one new Government Supplied Weather-tight Door (Steel frames/aluminium door)
 - a. Supplier: Joiner Systems Ltd.
 - b. Drawing # 9245-001
2. Contractor shall be responsible for obtaining a "Safe for Hot Work" certificate from a marine chemist, and shall be responsible for the removal of any interference items required for Safe for Hot Work Permit.
3. All Hot Work shall be in accordance with "CCG Standard Welding Procedure".
4. The existing door/frame shall be cropped out. Contractor shall be responsible to ensure the cutting is done close to the existing door frames, to allow fitting of the new door frame without adding any new metal bulkhead plating. All bare edges shall be ground smooth prior to the installation of new door.
5. While the door is removed, Contractor shall provide protection against entry of any inclement weather in Hydraulic Room.
6. Door/frame shall be installed in accordance with manufacturer's instructions. Welding sequence shall be such that it minimises any distortion effects to the door/frame. All welds shall be continuous and on both sides of the frames.
7. All disturbed surfaces shall be coated with two coats of Marine Primer (Contractor Supply) and one coat of CCG White topcoat paint (CCG Supply). White coat of paint is only required on the exterior surfaces.
8. Nameplates on the Hydraulic Room Door shall be carefully removed before original doorframe is cut out. Nameplates shall be re-mounted in place after the new door/frame are installed, using a bonding agent appropriate for the materials involved and all weather conditions.
9. Interior insulation and sheet metal coverings around the door frame shall be cut away to allow access to the work areas. New insulation (2 1/2" thick) and perforated 1/8" thick sheet metal of similar pattern to original shall be re-installed around the doorframe after the new door/frame is mounted.
10. All final measurements are the responsibility of Contractor.
11. Disposal of all removed materials is the responsibility of Contractor.

2.2 Location

1. The lifeboat hydraulic room is located on the bridge deck, aft of the funnel.

H-07 – Hydraulic Room Door Replacement

2.3 Interferences

1. Contractor is responsible for the identification of any interference items, their temporary removal and refitting to the new guard rail system.
2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.
3. Contractor shall be responsible for removal and disposal ashore of the old sections of piping and the general clean-up of the area after the work is completed.
4. Fire Blankets shall be used on the wood deck and surrounding areas in way the welding.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Joiner Systems Drawing 9245-001

3.2 Standards and Regulations

1. Refer to General Notes for all applicable Standards.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all specified work shall be Contractor Supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. See testing below.

4.2 Testing

1. Contractor shall be responsible for contacting TCMS Surveyor and arrange for inspection and testing as required.
2. If acceptable by TCMS Surveyor, a functional hose test shall be performed using the ship's fire hoses and fire pump on the completed job, to confirm no leaks present for TCMS certification.

4.3 Certification

1. TCMS Surveyor shall provide certification credit under the vessel's division 3.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A computer generated report of all testing carried out shall be provided to the Chief Engineer

5.2 Spares

N/A

5.3 Training

N/A

H-08 – Upper Fan Room Plenum Repairs

1: SCOPE:

The intent of this spec is to remove, fabricate and install a new section of the transformer room intake plenum (43" X 51" and 30" deep) and elbow section (35" X 39" X 59") to the ducting.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the existing transformer room intake plenum.
 - a. Contractor shall electrically isolate and remove the transformer room fan motor which is housed in a Novenco fan casing. This casing is a flanged connection and the bolts shall be removed to allow easier access for the removal of the plenum.
 - b. Contractor shall note the two different sizes of the gaskets used for the fan casing.
 - c. In addition, Contractor shall remove the expansion joint casing and the direction control flow louver. Contractor shall note the direction or orientation of the louver control for re-assembly.
2. Contractor shall unbolt the section of the supply plenum and its associated gasket from the bulkhead and remove. In addition, Contractor shall remove the elbow plenum section and its associated gasket.
3. Contractor shall remove the sections of plenum from the Fan room to the contractor facility. Contractor shall fabricate a new plenums of the similar dimensions and sheet metal thickness with a drilled hole frame. Contractor can use the pre-existing plenums as templates. Contractor shall dispose of the old plenums.
4. All areas that have been affected by this work on the bulkhead shall be mechanically cleaned to SSPC-SP-3 standards to determine the condition of the existing frame of the plenum and shall be given 2 coats of contractor supply Amerlock 83 HS Buff Resin Primer and 2 topcoats of Amerlock 2 Coast Guard white. Contractor shall allow suitable curing times between coats.
5. Contractor shall supply a new gasket material for the plenum frame to the bulkhead and new fasteners shall be used to attach the plenum to the bulkhead.
6. The new sections of plenum shall be installed with new gaskets, and given 2 coats of contractor supply Amerlock 83 HS Buff Resin Primer and 2 topcoats of Amerlock 2 Coast Guard white. Contractor shall allow suitable curing times between coats.
7. Contractor shall install the remaining sections of the louver control, expansion flange joints and the Novenco fan housing along with new contractor supplied gaskets of the same thickness and dimensions as the ones removed. The fasteners may be reused.
8. Contractor shall reconnect the fan motor and perform rotation testing to confirm correct operation.
9. Contractor shall be responsible for the cleaning of dust of debris when working on the vents and areas affected as a result of the work.

H-08 – Upper Fan Room Plenum Repairs

2.2 Location

1. The upper fan room is located on the bridge deck, aft of the funnel.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. None available.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Hotwork Procedures
 - c. CCG Standard Welding Specification
 - d. Lock out/ Tag out Procedures
2. Refer to General Notes for any other relevant standards or regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all specified work shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

1. After all work is completed, a functional test shall be performed to confirm correct operation of fan and louvers.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

H-08 – Upper Fan Room Plenum Repairs

1. A computer generated report shall be provided to Chief Engineer, detailing all tasks completed, and all test results.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-09 – Bilge Cleaning

1: SCOPE:

The intent of this specification shall be to remove steel deck plating in the engine room, clean the bilges, and replace the steel plating in their original locations.

Main Engine compartment bilges shall be pressure washed and cleaned by Contractor prior to installation of the steel plating. The work shall be completed towards the end of refit.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the existing steel deck plates in the main engine room. The bilges shall be cleaned from the tank top to the steel deck level in the engine room.
2. Contractor shall ensure that steel deck plating locations are identified during removal and re-installation for location and fit.
3. The steel deck plating has a combined surface area of approximately 2500 ft². Contractor shall verify all measurements.
4. Contractor shall remove any debris from the bilges.
 - a. All bilge wells and frames shall be cleaned to SSPC-SP-2 specifications by hand prior to the pressure washing.
 - b. Bilges shall be pressure washed and cleaned by an accredited company.
 - c. Contents of the bilges shall be removed by contractor for disposal by an accredited company for proper disposal.
 - d. The bilges shall be inspected prior to the cleaning with a pressure washer by the Owner's representative.
5. After cleaning is complete, the deck plates shall be re-installed, and two coats of Amercoat 235 (Haze Grey) shall be applied to engine room deck plates.

2.2 Location

1. All work will take place in the ship's engineering spaces.

2.3 Interferences

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

CCGS Edward Cornwallis
August, 2015 Refit
H-09 – Bilge Cleaning

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)

3.4 Owner Furnished Equipment

1. Unless otherwise noted, all materials, labour, and equipment shall be Contractor supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-10 – Condensate Drains Cooler

1: SCOPE:

The Condensate Drains Cooler shall be surveyed for TCMS credit.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The cooler shall be cleaned, inspected, pressure tested, and surveyed by TCMS.
2. The cooler shall be let go from the hotwell and transported ashore to the contractor's facility.
3. All interference items shall be removed and replaced upon completion.
4. Pipework in way of the removed cooler shall be blanked off. Note: Rags stuffed into openings are NOT acceptable.
5. Pipe flanges shall be cleaned and new gaskets suitable for the intended fluid shall be supplied and installed.
6. Coolers shall be dismantled, chemically cleaned, and pH neutralised.
7. TCMS, PWGSC, and CE shall be notified when the cooler is ready for a visual inspection after cleaning.
8. Cooler shall be reassembled using new "O" rings and gaskets.
9. The cooler shall be pressure tested for one hour at 10 psi. TCMS, PWGSC, and CE are to be notified when the pressure test is ready to be witnessed. Test certificate shall be supplied.
10. Cooler to be returned to the vessel upon completion and reinstalled as per its original location.
11. Work area to be cleaned upon completion. All dirt and debris etc. shall be removed ashore and disposed of properly by the contractor.
12. Contractor to provide all materials, craneage, labour, equipment, and transportation to accomplish this work.
13. Contractor to call TCMS and PWGSC inspection services when required. Chief Engineer to be notified when inspections are to be done.
14. All work shall be to the satisfaction of Owner's Representative, TCMS, and PWGSC.

2.2 Location

1. The Condensate Cooler is located in the Engine Room, Starboard of the boilers.

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.

CCGS Edward Cornwallis
August, 2015 Refit
H-10 – Condensate Drains Cooler

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. No information available.

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

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all specified work shall be Contractor Supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. See Testing.

4.2 Testing

2. For quotation purposes, proof of performance shall be based on the Condensate Cooler being filled with Distilled water, and holding for a minimum of 2 hours without any signs of leak.
3. TCMS Surveyor shall prescribe an approved testing procedure which Contractor shall perform on the Condensate Cooler, which shall satisfy TCMS Surveyor's requirements for certification in the vessel's Division 3.

4.3 Certification

1. TCMS Certification required.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A testing report shall be provided with all test results

5.2 Spares

N/A

5.3 Training

N/A

H-11 – Grey Water Copper Drain Repairs

1: SCOPE:

An existing section of Copper piping has developed leaks and needs to be replaced with a new section of copper pipe and fittings. The intent of this specification is for the contractor to renew this section of pipe with union fittings that will allow removal of the section of pipe for any future repairs.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall note that this section of pipe is used for the galley drains and this work shall be completed in conjunction with the Galley floor renewal. Galley drains shall have signage installed to prevent personnel from using the drains.
2. The section of copper piping is approximately 6 feet long. It consists of a number of fittings that require replacement including: 3"-3"-1" Ys, 3"-2" adapters, 1" couplings / unions, straight run of 3" pipe and 2" pipe. The copper pipe also a section of 2" PVC pipe.
3. Contractor shall remove the section of pipe as marked and replace with the new fittings while joining to the existing section of copper pipe and PVC pipe. This includes a transition piece from copper to PVC that will require replacement. PVC fittings require replacement include, but are not limited to: 2"-2"-1" Y, 2"-2"-2" Y, 2" clean outs, 2" and 1" elbows and couplings, unions and section of 2" PVC pipe. Contractor shall verify all measurements and fittings used. Copper fittings shall be welded together using brazing rods. PVC fittings are glued together using a primer and solvent cement.

2.2 Location

1. The section of copper pipe is located in the engine room workshop and runs outside the workshop into the upper landing of the engine room (Port side).

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-11 – Grey Water Copper Drain Repairs

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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

3.4 Owner Furnished Equipment

1. Unless otherwise stated, Contractor shall provide all materials, labour, and equipment required to complete all requirements of this specification.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

1. Upon completion of the work, all affected pipe work shall be given a functional test once the draining piping has been installed and witnessed by the CGTA.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-12 – Main Mast Painting

1: SCOPE:

The intent of this specification is to renew the paint coating on the Main Mast, including platforms and extensions. This work will involve protecting the electrical fixtures, blasting the structure to bright metal, renewing corroded cable clamps, brackets and securing arrangements, and applying contractor supplied coating system.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall coordinate with ship's crew in order to ensure that all electrical circuits for equipment and devices mounted on the Main Mast are de-energized; locked out and tagged out.
2. Contractor shall take photographs of arrangements details, label tag, protectively wrap and dismount fixtures from their corroded mountings.
3. Contractor shall rig protective tarps and provide sufficient protection from blasting medium, paint overspray, or any other potential hazard to devices and equipment in the area of work.
4. Should the Contractor perform the work in stages, horizontal tarpaulins shall be rigged to provide protection to all newly coated surfaces from damage from blasting of adjacent areas.
5. Contractor shall include in the bid price all costs associated to renew 100 cable clips with corrosion resistant replacements and to renew mounting brackets for 10 watertight receptacles and 20 water-tight junction boxes. Contractor shall also include the cost to renew 6 bronze water-tight junction boxes; 20 water-tight corrosion resistant cable glands and 4 marine bronze water-tight receptacles; Kondu grade or equivalent. Bidders are to include in their bid the cost of supplying 100 – 6" cable tray hangers. The 100 cable clips noted in the specification are to include the studs.
6. Contractor shall allow \$2,500 for replacement of additional hardware, as deemed necessary by Chief Engineer or designate. Actual cost to be adjusted by 1379 on proof of detailed invoice.
7. After all protections and renewals, Contractor shall blast clean or power tool clean the surfaces of the mast, attachments and platforms to bright metal and apply a Contractor supplied coating system, as detailed below. Application shall conform to the current editions of the Manufacturer's Product Data/Application Instruction sheets, for the respective system components. Contractor shall bid on preparing and coating an area of approximately 150 sq meters of mast.
8. All oil and grease contamination shall be removed according to the requirements of SSPC-SP1-82 Solvent Cleaning with Amercoat #65 or Detergent Power Wash Amercoat Prep 88.
9. First primer coat shall be Amerlock 2 epoxy Grey or Ivory, applied by brush, roller or spray application to a dry film thickness of 4-6 mils to all bare areas.
10. Mid coat shall be Amerlock 2 epoxy Coast Guard Buff, applied by spray application to a dry film thickness of 4-6 mils to entire mast.

H-12 – Main Mast Painting

11. Top Coat shall be Amercoat 5450 Coast Guard Buff, applied by spray application to a dry film thickness of 3-5 mils to entire mast. This Coat shall be applied to the Mid-Coat epoxy while “Thumb print soft” to ensure good bond.
12. Contractor shall remove the temporary protection from the dismantled appliances, fixtures and cable and re-install them in good order to the refurbished or new mountings. The electrical cables shall be re-secured to the mast with sufficient new cable clamps and studs to protect them from movement.
13. The electrical circuits shall be de-isolated and with CG SEW and crew assistance each circuit and device mounted on the Main Mast shall be proven operational.
14. Contractor shall supply all craneage, lifting hardware, staging, personnel, fall restraint equipment, etc to carry out this work in a safe manner.

2.2 Location

1. Main mast, wheelhouse top.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Ship's Drawing # 224-02 shows the original structure and details of the Mast. Chief Engineer shall provide a copy of this drawing upon request.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Hotwork Procedures
 - c. Coast Guard ISM Fall Protection Procedures
 - d. Coast Guard ISM Lock Out/Tag Out Procedures
 - e. Transport Canada TP127

3.4 Owner Furnished Equipment

1. Unless otherwise stated, Contractor shall provide all materials, labour, and equipment required to carry out the specified work.

CCGS Edward Cornwallis
August, 2015 Refit
H-12 – Main Mast Painting

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. The coatings and re-installations shall be visually inspected. The Contractor shall correct any defects in workmanship at Contractor's expense.

4.2 Testing

1. After completion of work, each device and appliance on Main Mast shall be proven operational.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

2. Contractor shall provide a Quality Assurance (QA) report indicating that all areas as defined in the specification have been inspected by the Contractor's QA Department and that all areas of defects established by this survey have been identified for remedial action.

5.2 Spares

N/A

5.3 Training

N/A

H-13 – Forward A Frame Painting

1: SCOPE:

The intent of this item shall be to renew the paint coating on the Forward A Frame including platforms and extensions. The work will involve protecting the electrical fixtures, blasting the structure to bright metal, renewing corroded cable clamps, brackets and securing arrangements, and applying contractor supplied coating system.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall with ship's crew ensure that all electrical circuits for equipment and devices mounted on the Forward A Frame are de-energized; locked out and tagged out.
2. Contractor shall take photographs of arrangements details, label tag, protectively wrap and dismount fixtures from their corroded mountings.
3. Contractor shall rig protective tarps to ensure that debris from blasting does not harm devices mounted on the mast.
4. Contractor shall wrap sufficient protection to ensure that there is no damage from blasting medium.
5. Should the work be performed in stages, Contractor shall rig horizontal tarpaulins to protect all newly coated surfaces from damage from blasting of adjacent areas.
6. Contractor shall include in the bid price all costs associated to renew 100 cable clips with corrosion resistant replacements and to renew mounting brackets for 10 watertight receptacles and 10 water-tight junction boxes. Contractor shall also include the cost to renew 3 bronze water-tight junction boxes; 10 water-tight corrosion resistant cable glands and 2 marine bronze water-tight receptacles; Kondu grade or equivalent. Bidders shall include in their bid the cost of supplying 100 – 6" cable tray hangers. The 100 cable clips noted in the specification shall include supply and installation of the mounting studs.
7. Contractor shall allow \$2,500 for replacement of additional hardware, as deemed necessary by Chief Engineer or designate. Actual cost to be adjusted by 1379 on proof of detailed invoice.
8. After all protections and renewals, Contractor shall blast clean or power tool clean the surfaces of the forward A frame, attachments and platforms to bright metal and apply a coating system, Contractor supplied, as detailed below. Application shall conform to the current editions of the Manufacturer's Product Data/Application Instruction sheets, for the respective system components. Contractor to bid on preparing and coating approximately 120 sq meters of area.
9. All oil and grease contamination shall be removed according to the requirements of SSPC-SP1-82 Solvent Cleaning with Amercoat #65 or Detergent Power Wash Amercoat Prep 88.
10. First primer coat shall be Amerlock 2 epoxy Grey or Ivory, applied by brush, roller or spray application to a dry film thickness of 4-6 mils to all bare areas.
11. Mid coat shall be Amerlock 2 epoxy Coast Guard Buff, applied by spray application to a dry film thickness of 4-6 mils to entire Forward A Frame.

H-13 – Forward A Frame Painting

12. Top Coat shall be Amercoat 5450 Coast Guard Buff, applied by spray application to a dry film thickness of 3-5 mils to entire mast. This Coat is to be applied to the Mid-Coat epoxy while Thumb print soft to ensure good bond.
13. Contractor shall remove the temporary protection from the dismantled appliances, fixtures and cable and re-install them in good order to the refurbished or new mountings. The electrical cables will be re-secured to the mast with sufficient new cable clamps and studs to protect them from movement.
14. The electrical circuits shall be de-isolated and with CG SEW and crew assistance each circuit and device mounted on the Forward A Frame shall be proven operational.
15. Contractor shall supply all craneage, lifting hardware, staging, personnel, fall restraint equipment, etc to carry out this work in a safe manner.

2.2 Location

1. The Forward A-Frame is located on the Foc'sle Deck.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Ship's Drawing # 224-03 shows the original structure and details of the Forward A Frame.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Hotwork Procedures
 - c. Coast Guard ISM Fall Protection Procedures
 - d. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied

H-13 – Forward A Frame Painting

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. The coatings and re-installations shall be visually inspected. The Contractor shall correct any defects in his workmanship at his expense.

4.2 Testing

1. Each device and appliance on Forward A Frame shall be proven operational.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide a Quality Assurance (QA) report indicating that all areas as defined in the specification have been inspected by the Contractor's QA Department and that all areas of defects established by this survey have been identified for remedial action.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
H-14 – Aft A-Frame Painting

1: SCOPE:

The intent of this specification shall be to renew the paint coating on the Aft “A” Frame, including its platforms and extensions. The work will involve protecting the electrical fixtures, blasting the structure to bright metal, renewing corroded cable clamps, brackets and securing arrangements, and applying contractor supplied coating system.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall coordinate with ship’s crew to ensure that all electrical circuits for equipment and devices mounted on the Aft A Frame are de-energized; locked out and tagged out.
2. Contractor shall take photographs of arrangements details, label tag, protectively wrap and dismount fixtures from their mountings.
3. Contractor shall rig protective tarps and provide sufficient protection from blasting medium, paint overspray, or any other potential hazard to devices and equipment in the area of work.
4. Should the Contractor perform the work in stages, horizontal tarpaulins shall be rigged to provide protection to all newly coated surfaces from damage from blasting in adjacent areas.
5. Contractor shall include in the bid price all costs associated to renew 30 cable clips with corrosion resistant replacements and to renew mounting brackets for 5 watertight receptacles and 10 water-tight junction boxes. Contractor shall also include the cost to renew 2 bronze water-tight junction boxes; 10 water-tight corrosion resistant cable glands and 2 marine bronze water-tight receptacles; Pauluhn 3100B-125 or equivalent. Bidders are to include in their bid the cost of supplying 100 – 6” cable tray hangers. The 30 cable clips noted in the specification are to include the studs.
6. Contractor shall allow \$2,500 for replacement of additional hardware, as deemed necessary by Chief Engineer or designate. Actual cost to be adjusted by 1379 on proof of detailed invoice.
7. After all protections and renewals, Contractor shall blast clean or power tool clean the surfaces of the aft “A” Frame, attachments and platforms to bright metal and apply a Contractor supplied coating system, as detailed below. Application shall conform to the current editions of the Manufacturer’s Product Data/Application Instruction sheets, for the respective system components. Contractor shall bid on preparing and coating an area of approximately 40 sq meters.
8. All oil and grease contamination shall be removed in accordance with the requirements of SSPC-SP1-82 Solvent Cleaning with Amercoat #65 or Detergent Power Wash Amercoat Prep 88.
9. First primer coat shall be Amerlock 2 epoxy Grey or Ivory, applied by brush, roller or spray application to a dry film thickness of 4-6 mils to all bare areas.
10. Mid coat shall be Amerlock 2 epoxy Coast Guard Buff, applied by spray application to a dry film thickness of 4-6 mils to entire Aft A Frame.

H-14 – Aft A-Frame Painting

11. Top Coat shall be Amercoat 5450 Coast Guard Buff, applied by spray application to a dry film thickness of 3-5 mils to entire mast. This Coat shall be applied to the Mid-Coat epoxy while “Thumb print soft” to ensure good bond.
12. Contractor shall remove the temporary protection from the dismantled appliances, fixtures and cable and re-install them in good order to the refurbished or new mountings. The electrical cables shall be re-secured to the mast with sufficient new cable clamps and studs to protect them from movement.
13. The electrical circuits shall be de-isolated and with CG SEW and crew assistance each circuit and device mounted on the Aft A Frame shall be proven operational.
14. Contractor shall supply all craneage, lifting hardware, staging, personnel, fall restraint equipment, etc to carry out this work in a safe manner.

2.2 Location

1. Aft A-Frame, top of upper fan room.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Ship's drawing # 1477-30101, sheets 1 and 2 show the original structure and details of the Aft A Frame. Chief Engineer shall provide a copy of this drawing upon request.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Hotwork Procedures
 - c. Coast Guard ISM Fall Protection Procedures
 - d. Coast Guard ISM Lock Out/Tag Out Procedures
 - e. Transport Canada TP127

3.4 Owner Furnished Equipment

1. Unless otherwise stated, Contractor shall supply all materials, labour, and equipment required to complete all specified work.

CCGS Edward Cornwallis
August, 2015 Refit
H-14 – Aft A-Frame Painting

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. The coatings and re-installations shall be visually inspected. The Contractor shall correct any defects in workmanship at Contractor's expense.

4.2 Testing

1. After completion of work, each device and appliance on the Aft A-Frame shall be proven operational.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide a Quality Assurance (QA) report indicating that all areas as defined in the specification have been inspected by the Contractor's QA Department and that all areas of defects established by this survey have been identified for remedial action.

5.2 Spares

N/A

5.3 Training

N/A

H-15 – Sewage Compartment Grating & Bilge

1: SCOPE:

The intent of this specification is to remove steel deck gratings in the sewage compartment, clean and replace in original locations. Sewage Compartment bilge shall be pressure washed and cleaned by contractor prior to installation of the steel grating.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the existing steel deck gratings from the sewage compartment, which shall be sent ashore.
2. Contractor shall ensure that steel grating locations are identified during removal and re-installation for location and fit.
3. The steel deck grating has a combined surface area of approximately 130ft². Contractor shall verify all measurements.
4. Steel grating shall be cleaned to and prepared to SSPC-SP10 standards.
5. After preparation, steel gratings shall be painted with two coats of Ameron Amercoat 235 (Haze Grey), in accordance with Ameron application specifications.
6. Contractor shall remove any debris from the bilges. All bilge wells and frames shall be cleaned to SSPC-SP-2 specifications. Contents of the bilges shall be removed by contractor for disposal by an accredited company for proper disposal.

2.2 Location

1. The sewage compartment is the aft most compartment of the Tank Top level.

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.
3. All materials, paint, labour, craneage are to be contractor supplied.
4. All work shall be carried out to the satisfaction of the Chief Engineer. All materials and equipment, unless specified, are contractor supply.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

3.2 Standards and Regulations

H-15 – Sewage Compartment Grating & Bilge

1. The following Coast Guard Standards and or Technical Bulletins must be adhered to in the course of executing this specification. Copies of these standards and bulletins can be obtained from the CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Chief Engineer shall inspect bilges prior to installation of the steel deck grating.

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-01 – Sea Valve Survey

1: SCOPE:

The intent of this item shall be to open up the attached list of valves and their associated steam de-icing valves for cleaning, inspection and maintenance as per the quadrennial survey required by Transport Canada Marine Safety Branch (TCMSB) Division 3 items 3LL090 and 3LL110.

2: TECHNICAL DESCRIPTION:

2.1 General

1. All valves and associated items shall be removed ashore to the Contractor's workshop.
2. Aside from installation and removal work, valves shall not be worked on in situ.
3. All valves and associated steam valves, where applicable, shall be suitably tagged such that they may be reinstalled in their original respective locations.
4. Contractor shall remove all the overboard valves listed (including bodies), as well as their respective steam clean out valves. Spindles shall be removed from the valve bonnets, cleaned and laid out for inspection. The internals of the valve bodies, valves, and sealing surfaces shall be thoroughly cleaned.
5. All butterfly valves shall have its respective operating gearbox removed, opened, disassembled, cleaned, and inspected. Each gearbox shall be identified to prevent inadvertent swapping with other units. All motion components shall be proven free and operational.
 - a. Upon completion of all work, each gearbox shall be reassembled in good order and installed on its original respective valve spindle.
 - b. Each gearbox shall be lubricated and repacked with Contractor supply grease.
 - c. A new cover gasket shall be supplied and installed by Contractor.
6. Metal to metal seated valves shall be lapped to provide a watertight seal. Contractor shall provide a bench test method to insure that a watertight seal is maintained between the valve and valve seat.
7. Upon the completion of all work and satisfactory testing, all valves shall be assembled with new gland packing, applicable to the valves service environment. Each valve shall be installed in its original respective location aboard the vessel, using new jointing applicable to the valves service conditions.
8. Contractor shall supply all material required to carry out the specified work. All work shall be to the satisfaction of the Chief Engineer and Marine Safety Board Inspector.
9. Upon completion of inspection, each valve shall be refitted and re-installed using new packing, gasket materials, and "never seize compound" on all fasteners and gaskets.
10. All valves shall be lapped in to their respective seats.
11. Contractor shall bid on supplying and installing two (2) complete overhaul kits (not including seats) for each size of butterfly valve (Keystone Model F1020, trim 200). Butterfly valves shall be opened up and inspected and spindle gland to be proved free and well lubricated. Valve interiors shall be given two (2) coats of DEVOE Bar- Rust 235.

CCGS Edward Cornwallis
August, 2015 Refit
ED-01 – Sea Valve Survey

12. Discharge elbows (4-Of) from Sea Chests to Sea Bay shall be removed and cleaned for inspection. All marine growth shall be scraped from pipe internals. Pipe internals shall be given three (3) coats of Bar-Rust 235. Each successive coat shall be a different colour.
13. On completion of inspection, all Sea Connection valves shall be closed up in good order using new packing and jointing.
14. All Ship Side valves shall be lapped in to their respective seats. Valve interiors shall be given two (2) coats of Bar-Rust 235. Each successive coat shall be a different colour.
15. Any De-Icing valves that are condemned by TCMSB shall be replaced with new valves of similar construction (Bronze Body and Trim, Bolted Bonnet, Flanged, 150P ASA) by the Contractor. For bidding purposes, Contractor shall bid on replacing (supply and install) ten (10) De-Icing valves, plus a unit rate for PWGSC adjustment purposes.
16. On completion of inspection, De-Icing valves shall be closed up in good order using new Contractor-supplied packing, jointing, studs and fasteners.

CCGS Edward Cornwallis
August, 2015 Refit
ED-01 – Sea Valve Survey

2.2 Location

Sea Connection Valves				
V/V#	Description	Type	Size	Location
1	Upper Seachest Inlet	Butterfly	16"	Engine Rm. Fwd. – Port
2	Lower Seachest Inlet	Butterfly	16"	Engine Rm. Fwd. – Port
3	Seachest Strainer to Seabay	Butterfly	16"	Engine Rm. Fwd. – Port
4	Seachest Strainer Recirc.	Butterfly	12"	Engine Rm. Fwd. – Port
5	Upper Seachest Recirc.	Butterfly	12"	Engine Rm. Fwd. – Port
6	Lower Seachest Recirc.	Butterfly	12"	Engine Rm. Fwd. – Port
7	Upper Seachest Inlet	Butterfly	16"	Engine Rm. Fwd. – Stbd
8	Lower Seachest Inlet	Butterfly	16"	Engine Rm. Fwd. – Stbd
9	Seachest Strainer to Seabay	Butterfly	16"	Engine Rm. Fwd. – Stbd
10	Upper Seachest Recirc.	Butterfly	12"	Engine Rm. Fwd. – Stbd
11	Lower Seachest Recirc.	Butterfly	12"	Engine Rm. Fwd. – Stbd
12	Seachest Strainer Recirc.	Butterfly	12"	Engine Rm. Fwd. – Stbd
13	High Sea Chest Vent	SDNR	4"	Engine Rm. Fwd. – Stbd
14	Sea Bay Vent	A-SDNR	4"	Engine Rm. Fwd. – Stbd
15	Lower Sea Chest Vent	A-SDNR	4"	Engine Rm. Fwd. – Stbd
16	Distiller Sea Chest Vent	A-SDNR	4"	Engine Rm. Fwd. – Stbd
17	High Sea Chest Vent	SDNR	4"	Engine Rm. Fwd. – Port
18	Lower Sea Chest Vent	A-SDNR	4"	Engine Rm. Fwd. – Port
19	Sea Bay Vent	A-SDNR	4"	Engine Rm. Fwd. – Port
20	Fire Pump Suction	A-SDNR	4"	Engine Rm. Fwd. – Stbd
21	Aux. Gen. Emerg Suction	A-SDNR	3"	Engine Rm. Fwd. – Stbd
22	Distiller Sea Chest Suction	A-SDNR	3"	Engine Rm. Fwd. – Stbd
23	Distiller Sea Chest Suction	A-SDNR	2"	Engine Rm. Fwd. – Stbd
24	After Sea Chest Suction	A-SDNR	4"	Aft Motor Rm. – Port
25	After Sea Chest Vent	A-SDNR	4"	Aft Motor Rm. – Port
26	Aft. Sea Chest (stern tube)	A-SDNR	2"	Aft Motor Rm. – Port
A	Sterntube ByPass Cooling	A-SDNR	3"	Port Side ER (Aft #3 SW-p)
B	Sterntube Bypass Cooling	A-SDNR	3"	Aft #2 and #3 ME

CCGS Edward Cornwallis
August, 2015 Refit
ED-01 – Sea Valve Survey

Ship Side Valves				
V/V#	Description	Type	Size	Location
27	Central Cooling Disch.	SDNR	10"	Engine Rm. Fwd – Port
28	Bilge & Ball. Pump Disch.	SDNR	4"	Engine Rm. Fwd – Stbd
29	Bilge & Ballast P/P Disch.	SDNR	4"	Engine Rm. Fwd – Stbd
30	Foam Pump Disch.	SDNR	3"	Engine Rm. Fwd – Stbd
31	Fire/Gen. Serv. P/P Disch.	SDNR	3"	Engine Rm. Fwd – Stbd
32	Ship Service Emerg Disch	SDNR	3"	Engine Rm. Aft – Stbd
33	Distiller Discharge	SDNR	3"	Engine Rm. Aft – Stbd
34	Reverse Osmosis Disch.	SDNR	3"	Engine Rm. Aft – Stbd
35	Sewage Discharge	SDNR	3"	Sewage Compt. – Port
36	Stern Tube Cooling Disch	SDNR	2"	Motor Rm. – Port
37	Stern Tube Cooling Disch	SDNR	2"	Motor Rm. – Stbd
38	O.W.S. Discharge	SDNR	1.5"	Motor Rm. – Port
39	Steering Gear Bilge Pump	SDNR	2"	Steering Gear – Stbd
40	Forecastle Bilge Pump	SDNR	2"	Forecastle – Stbd
41	Boiler Blowdown	Cock	1.5"	Engine Rm. Fwd – Port
De-Icing Valves				
V/V#	Description	Type	Size	Location
28a	Bilge & Ballast Discharge	SDNR	¾"	Engine Rm. Fwd – Stbd.
29a	Bilge & Ballast Discharge	SDNR	¾"	Engine Rm. Fwd – Stbd.
27a	Central Cooling Discharge	SDNR	¾"	Engine Rm. Fwd – Port
42a	Submers. Fire P/P Discharge	SDNR	¾"	Aft Motor Rm. – Port
30a	Foam Pump Discharge	SDNR	¾"	Engine Rm. Fwd – Stbd.
31a	Fire & Gen.Serv.P/P Disch.	SDNR	¾"	Engine Rm. Fwd – Stbd.
38a	OWS Pump Discharge	SDNR	¾"	Aft Motor Rm. – Port
34a	Reverse Osmosis Discharge	SDNR	¾"	Engine Rm. Fwd – Stbd.
35a	Sewage P/P Discharge	SDNR	¾"	Sewage Compt – Port
33a	Distiller Discharge	SDNR	¾"	Engine Rm. Fwd – Stbd.
32a	Ship Service Emerg Disch.	SDNR	¾"	Engine Rm. Aft – Stbd.
39a	Strg. Gear Bilge P/P Disch.	SDNR	¾"	Strg.Gear Compt.– Stbd.
40a	Forecastle Bilge Discharge	SDNR	¾"	Foc'sle. Compt. – Stbd.
5a	Upper Sea Chest Discharge	SDNR	¾"	Engine Rm. Fwd. – Port
6a	Lower Sea Chest Discharge	SDNR	¾"	Engine Rm. Fwd. – Port
10a	Upper Sea Chest Discharge	SDNR	¾"	Engine Rm. Fwd.– Stbd.
11a	Lower Sea Chest Discharge	SDNR	¾"	Engine Rm. Fwd.– Stbd.
22a	Distiller Sea Chest Discharge	SDNR	¾"	Engine Rm. Fwd.– Stbd.
24a	After Sea Chest Discharge	SDNR	¾"	Aft Motor Room – Port

CCGS Edward Cornwallis
August, 2015 Refit
ED-01 – Sea Valve Survey

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall contact Transport Canada Marine Safety Branch (TCMSB) and arrange for Marine Surveyor to be present for all testing and inspections required for all items listed under Division 3 field # 3LL090 and 3LL110.

4.2 Testing

1. All testing shall be in accordance with section 2 of this specification. If TCMSB surveyor requests a higher standard of testing, that standard shall be met.

4.3 Certification

1. Upon completion of all work, survey credit for Division 3 field number 3LL090 and 3LL110 shall be provided.

CCGS Edward Cornwallis
August, 2015 Refit
ED-01 – Sea Valve Survey

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A computer generated report containing test certificates for all valves shall be provided to Chief Engineer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-02 – De-Icing Valve Lines

1: SCOPE:

Two steam de-icing valves shall have their service line pipe connections from the valve to the hull proven clear while the valves are removed for inspection.

Any noted defects which indicate deterioration of the pipe or its welded joints shall be indicated to the Chief Engineer or his delegate and then repairs shall be negotiated as work arising.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The outlet ¾" schedule 80 pipe for each valve to the hull shall be cleared of all obstruction and inspected for any defects.
2. Contractor shall install a flanged connection in way of each removed de-icing valve to facilitate use of pressurized air or water to assist in clearing obstructions from the valve outlet flange to the hull. Pressure applied to the steam pipe line shall be limited to 100 psi of air or water pressure.
3. The use of any tube brushes or flexible steel drain augers shall be permitted. Contractor shall clearly demonstrate that no pieces of such equipment remain in the line after pipe has been cleaned of obstructions. Contractor shall remove sections of the piping and flanged connection in order to facilitate the cleaning and proving of the lines. Contractor shall re-install using contractor supplied steam approved gaskets and new fasteners for the flanges.
4. After the valves for each of the steam services as described in "ED-01 – Sea Valves" have been re-installed, Contractor shall remove the Leslie steam reduction by-pass valve for the entire De-icing Steam Service (located on the forward bulkhead of the main engine room, Stbd side, between #1 Bilge and Ballast pump and the General Service/ Fire pump) and pressurize the entire system to 50 psi air pressure.
5. Contractor shall open all valves required to allow air pressure to reach each of the two steam de-icing valves listed below.
6. Upon completion of testing, contractor shall close all valves which had been opened for the purpose of testing.
7. Contractor shall provide the removal of any grating to facilitate entry into the distiller sea chest and the upper sea chest – stbd to allow the air flow test to be properly observed.

2.2 Location

Valve #	Description	Type	Size	Location	Qty.
10a	Stbd Upper Sea Chest	SDNR	¾"	Engineroom Stbd	1
22a	Stbd Distiller Sea Chest Discharge	SDNR	¾"	Engineroom Stbd	1

2.3 Interferences

CCGS Edward Cornwallis
August, 2015 Refit
ED-02 – De-Icing Valve Lines

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Steam System Drawing – 465-03

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other relevant standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment, and transportation required to complete all requirements of this specification shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

1. Each of the two de-icing valves shall be tested separately for flow of air to the hull connection. Each test shall be witnessed by the Chief Engineer or his delegate.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A final report shall be provided to Chief Engineer, detailing all cleaning equipment used, purging pressures, test pressures, and tests performed.

5.2 Spares

N/A

5.3 Training

CCGS Edward Cornwallis
August, 2015 Refit
ED-02 – De-Icing Valve Lines

N/A

ED-03 – Central Cooling Water Pump Strainer Renewal

1: SCOPE:

The intent of this specification is to replace two central cooling system seawater circulation pump suction strainers, including strainer baskets, all of which are in an advanced state of corrosion. This work shall be carried out while the vessel is dry-docked.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The contractor shall clean and prep the work area for hot work. Once the work area has been prepped, the contractor shall arrange for a Marine Chemist to visit the ship and issue certificates for hot work upon completion of successful testing. The contractor is responsible for preparing the Engine Room work area for hot work. Any additional cleaning, washing down, material and equipment cover ups, etc shall be the responsibility of the contractor. A safe fire watch shall be conducted by the contractor's personnel as per section of the Refit Spec General Notes.
2. The contractor shall remove all applicable deck plates to access the strainers. The contractor shall remove each strainer ashore for use as templates, and disposal. It may be necessary to crop stringers to permit the removals of these units. These stringers are to be replaced by the contractor once the work is completed.
3. The contractor shall use the existing strainers as a guide for fabricating replicas. The new baskets shall be made of stainless steel with a similar hole configuration and be removable as per original. The strainers shall have removable covers complete with handles. The covers shall be bolted in place using stainless steel fasteners. Prefab units of the same scantlings are acceptable as well, provided the materials are resistant to seawater corrosion, and the strainer baskets are stainless with the same hole configuration as original. Please note, the rough sketches identified in section 2.1 for dimension purposes only. Contractor shall supply and install a two (2) pound zinc anode to the basket and to the underside of the top cover. These strainers shall be hot dip galvanized after fabricating.
4. The new strainers shall be fabricated such that the covers and flange nuts are elevated above the deck plates for easy access as per original.
5. The new units, with the exception of the strainer and fasteners, shall be coated internally with 3 coats of Apexior Number 3 paint (preferred) (Dampney Co, Ph 617-389-2805, Fx 617-389-0484, www.dampney.com) or (alternately) Amercoat 78 HB Coal Tar Epoxy. Contractor shall ensure that the build-up of the new coatings permit the strainer baskets to fit. The exterior of the strainer shall be 2 coats of Amerlock 32 HS Buff resin primer and 2 topcoats of Amerlock 2 (white). Contractor shall ensure all coatings are applied as per manufacturer's recommendations, and allow sufficient curing times between coats.
6. Upon completion of fabrication/supply of the 2 strainer units, each strainer shall be installed using stainless fasteners. All new gaskets for flanges and covers shall be used and shall be seawater resistant.

ED-03 – Central Cooling Water Pump Strainer Renewal

7. Each cover shall be fitted with a 1/2" NPT vent hole. The contractor shall supply and install stainless steel fittings and a vent valve (stainless steel ball valve) similar to original. A new removable guard shall be fabricated and fitted over each vent valve to protect the valve from damage. Contractor shall fabricate and weld two (2) new ½" diameter steel handles as per original to the top cover. Each strainer shall be hydrostatically tested to 40 psi and witnessed by the Chief Engineer.
8. The contractor shall install all deck plate stringers as well as all other items moved for removed to carry out this work.
9. All disturbed steel work shall be mechanically cleaned to bare metal and given 2 coats of contractor supply primer.
10. All materials shall be contractor supply.
11. All work shall be to the satisfaction of the Chief Engineer.

2.2 Location

1. Both strainers are located in the forward end of the main engine room.

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.

ED-03 – Central Cooling Water Pump Strainer Renewal

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data



Figure 1 - Both Strainers, forward strainer with cover removed.

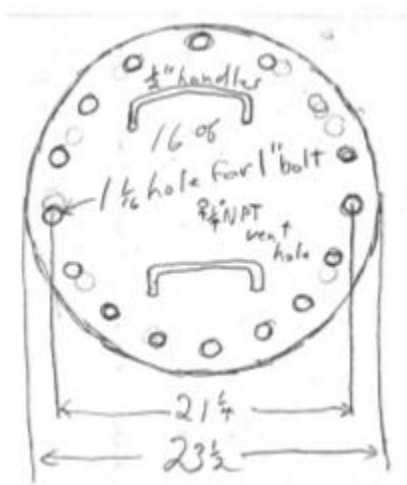


Figure 2 - Strainer Cover dimensions



Figure 3 - Strainer Basket

ED-03 – Central Cooling Water Pump Strainer Renewal

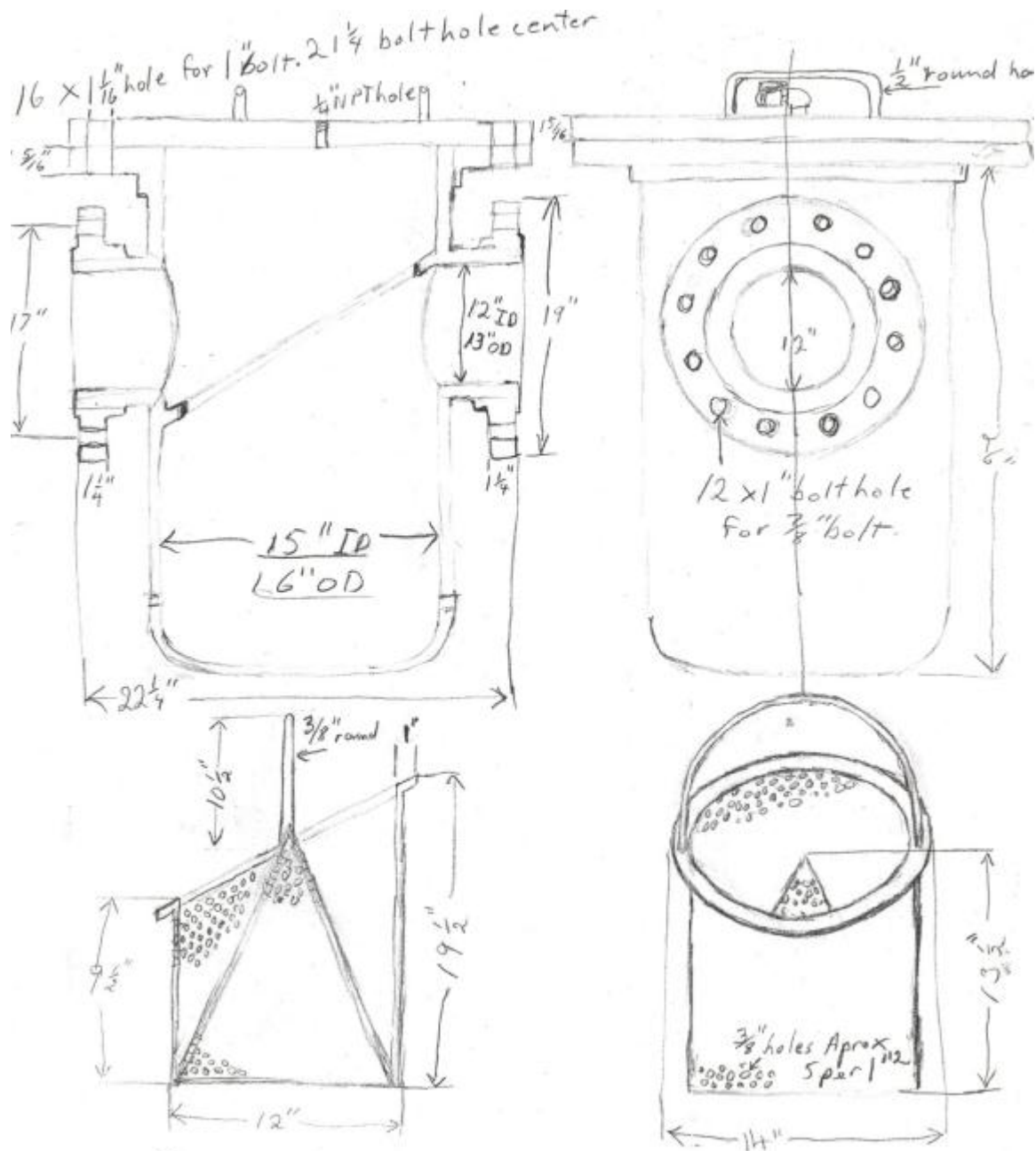


Figure 4 - Strainer Dimensions

ED-03 – Central Cooling Water Pump Strainer Renewal

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 CCG Technical Authority.

Canadian Coast Fleet Safety Manual (DFO 5737)

Coast Guard ISM Lock Out/Tag Out Procedures

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

1. Each strainer shall be hydrostatically tested to 40 psi and witnessed by the Chief Engineer.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A computer generated report detailing the results of all tests performed shall be provided to Chief Engineer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-04 – Bowthruster Oil Change

1: SCOPE:

The intent of this specification is to change the oil on the bow thruster's propeller gearbox while the vessel is on dock.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall erect and remove the necessary staging to access the bow thruster tunnel guard. The guard shall be cleanly cut away to allow access to the drain plugs on the thruster propeller gear box.
2. Contractor shall remove the securing bar and drain plugs and collect a sample of oil in a clean container for oil analysis purposes. Samples shall be passed on to Chief Engineer. The remainder of the oil shall be drained and collected by Contractor for disposal as per local environmental requirements. Copies of invoices detailing disposal of the oil shall be given to the Chief Engineer. Contractor shall renew a flat bar locking the oil housing drain plug in place.
3. Contractor shall open up the header tank located in the foc'sle. Tank shall be wiped clean of all dirt and sludge. Contractor shall verify during the draining of the system that the level switch activates and sets off the alarm in the ECR. Upon completion of all work, the tank cover shall be installed by Contractor using new gasket material and the drain plugs shall be installed using new o-rings. The system shall be filled via the header tank with Contractor supplied oil, and purged of air, with new oil.
4. The tunnel guards shall be installed and prepared for painting in conjunction with the HD-x Hull Painting – Below Water section.

2.2 Location

N/A

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.

CCGS Edward Cornwallis
August, 2015 Refit
ED-04 – Bowthruster Oil Change

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

Thruster Data:

Manufacturer: Ulstein
Model: 900TT
Type: Tunnel Thruster
Oil type: Petrocanada Traxon XL 75W90
Oil quantity: 300 liters

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 CCG Technical Authority.

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

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

1. Contractor shall verify during the draining of the system that the level switch activates and sets off the alarm in the ECR.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall collect a sample of oil in a clean container for oil analysis purposes. Samples shall be passed on to Chief Engineer.
2. Copies of invoices detailing disposal of the oil shall be given to the Chief Engineer.

5.2 Spares

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-04 – Bowthruster Oil Change

5.3 Training
N/A

ED-05 – Transducer Installation

1: SCOPE:

The intent of this specification shall be to have the following tanks fitted with new GSM transducers. All work shall be carried out conjunction with HD-05 – Ballast Tanks.

2: TECHNICAL DESCRIPTION:

2.1 General

1. For the purpose of installing a transducer, each tank shall be fitted with a ¾" schedule 80 3" welded nipple. A hole shall be penetrated into the top of the tank, and welded. If the pressure test required in HD-05 is carried out on the tanks prior to installation of the transducer and gland, the nipple shall be capped for the test.
2. The new tank transducer installation will require the wire to be run from the transducer mounted at the bottom of each tank (at the location of the sounding tube) up the inside tank wall and out of the tank via the watertight gland.
3. A new stainless steel water tight gland, sized for the PSM wire size and new tank penetration, will be used. This shall be contractor supplied.
4. Contractor shall bid on welding 10 new wire hangers (stud and clamp arrangement sized to support the wire) per tank. A "unit price" per hanger shall be given for adjustment purposes in the event the actual number of hangers required is different.
5. A GSM sensor support bracket shall be welded near the bottom of each of the identified tanks, mounting shall be in accordance with manufacturers' recommendations. The bracket may be viewed on the vessel during the bidder's meeting. Contractor is responsible for any material required to adapt the new bracket to the tank.
6. All disturbed surfaces external to tanks shall be cleaned to SSPC.SP2 standard, and receive two (2) coats of primer compatible with existing paint in surrounding area if outside of tanks.
7. All disturbed surfaces internal to a tank, the surface shall be cleaned to SSPC.SP3 standard, primed and coated with a suitable and compatible product as per surrounding surface.
8. Final location of transducers and wire glands shall be agreed upon by Contractor and Chief Engineer.
9. Final wiring of tank transducer to ship's A&M system shall be completed by ship's Electrical Officer.

2.2 Location

FIELD #	TANK	LOCATION	CPTY(M ³)	AREA(M ²)
3L018	Aft Peak Tank	Fr. 1-13 C/L	109.4	750
3L021	Fwd DB WB Tank	Fr. 126-152 P	51.6	350
3L022	Fwd DB WB Tank	Fr. 126-152 S	51.6	350
3L019	Aft DB WB Tank	Fr. 54-70 P	51.9	350
3L020	Aft DB WB Tank	Fr. 54-70 S	51.9	350
3L023	Fwd Wing WB Tank	Fr. 152 to 163 P	50.5	290
3L024	Fwd Wing WB Tank	Fr. 152 to 163 S	50.5	290

ED-05 – Transducer Installation

2.3 Interferences

1. These tanks are considered as confined spaces under the Coast Guard's Safety Management System.
2. Contractor shall note that aft peak tank transducer location is difficult to access as framing in bottom of this tank is very narrow.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

3.2 Standards and Regulations

N/A

3.4 Owner Furnished Equipment

1. All materials shall be Contractor supplied unless otherwise specified.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall complete this specification prior to TCMSB Surveyor inspection of each associated tank.

4.2 Testing

1. The integrity of wire glands to be proven during tank testing as per HD-05 – Ballast Tanks.

4.3 Certification

1. TCMSB certification is required for each tank, as per HD-05 – Ballast Tanks.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

ED-06 – Tailshaft Inspection and Measurements

1: SCOPE:

The intent of this specification is to remove the starboard tailshaft and propeller, and perform the trueness and measurements of the tailshaft for TCMSB.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the propeller, propeller cones, rope guards, ring anodes, and associated fasteners and locks. Contractor shall scribe proof marks on the propellers and tail shafts. Chief Engineer shall view the proof marks prior to Contractor moving the propeller. Propellers shall be removed to the dock floor.
2. The propeller is held on with a Pilgrim nut. The owner shall supply special tools for the removal of the Pilgrim nut. The contractor shall supply all equipment and gear for lifting the propeller and shaft including any brackets, slings, etc that may require fabrication for this work as well as all associated labour. The propeller and cone shall be thoroughly cleaned and examined for defects. The contractor shall renew the propeller o-ring. It will be necessary to procure 6 m x 15 mm diameter o-cord for the propeller as well as a sufficient supply of Loctite 404 to glue (bond) the ends.
3. Instruction guide lines for the Pilgrim nut will be supplied by the owner.
4. Note: The drive ring travel shall never exceed ½ inch at a time to prevent permanent damage to the nitrile tyre.
5. Upon completion of all work, the propeller cone shall be filled with contractor supplied preservative and fitted to the propeller. All securing nuts shall be locked in position as per original installation using stainless steel locking materials. Cone bolt recesses shall be filled with cement and faired flush with the cone surfaces.
6. The tail shaft shall be let go at the shaft coupling, motor end. Coupling flanges, nuts, and fitted-bolts shall be proof marked to ensure subsequent replacement in their respective original positions. The turning gear and brake assembly located in the motor room on the shaft shall be removed to gain access to the pilgrim nut so as to permit shaft removal. The Pilgrim nut shall be removed and the coupling shall be jacked from the shaft. Contractor shall ensure the coupling and shaft are properly supported at all times. The shaft is not to be lifted or contacted in the resin coating area at any time.
7. Contractor shall quote a unit price on chasing the threads on a fitted bolt and nut set.
8. Contractor shall quote on a unit price of fabricating a fitted nut and bolt set.
9. John Crane mechanical stern tube seal (Magneseal Type MD) shall be disassembled prior to the shaft removal to prevent damage to the seal components. All internal components shall be cleaned and checked for wear and defects as per the manufacturer's recommendations.
10. Contractor shall measure the wear down at the aft end of the sterntube using feeler gauges. Once the John Crane Marine seal has been disassembled at the forward end of each sterntube,

ED-06 – Tailshaft Inspection and Measurements

Contractor shall take sterntube stave wear/tear readings at various points using feeler gauges. These readings shall be recorded in the final report.

11. Upon completion of seal removal, the tail shaft shall be withdrawn and removed ashore to the Contractor's shop. The shafts shall be properly supported at all times and not contacted in the shaft coating areas.
12. It will be necessary to open up the aft void space. Manhole cover is located in the steering flat on the deck. Contractor shall ensure that the space is certified safe for personnel to enter and for hot work to be carried out. Certificates shall be issued and posted at the work site. Contractor shall weld lifting eyes as required on the hull of the ship to facilitate removal and installation of the shaft. A fire watch shall be placed in the aft void tank during all hot work operations. No hot work operations shall be carried out on the hull forward of frame 12. Upon completion of all work, the pads shall be removed, the hull ground flush, and all disturbed paint work shall be primed and coated as per the hull.
13. The shaft shall be thoroughly cleaned and checked for wear and defects. Particular attention to be paid to the following areas:
 - a. Forward and aft key ways on shaft tapers.
 - b. Forward and aft shaft tapers
 - c. Forward and aft ends of each of the two liners where they meet the tail shaft.
 - d. Fwd and aft pilgrim nuts and threads on shafting.
 - e. Liner wear in way of staves and condition of staves.
 - f. Fwd end of fwd liner in way of John Crane Marine seal.
 - g. Shaft resin coating between liners.
14. Inspection of the key ways and shaft taper areas shall include crack detection inspection using dye penetrant. Contractor shall ensure that the dye penetrant test is conducted by a certified NDT technician. All materials shall be supplied by the contractor for testing. Inspection of the shaft resin coating shall consist of thoroughly cleaning the resin coating but not to include any cutting, peeling, or otherwise disturbing the coating in situ.
15. It is IMPERATIVE that the shaft be set in a lathe capable of supporting the shaft without damage for the undertaking of this work. Only machining with the proper tools bits shall be considered. Sanding disks, grinder set ups, etc. shall not be suitable. If Contractor does not possess the proper and adequate machinery for carrying out this process, then Contractor shall include in their bid, a quote to transport the shaft and seal components to a facility that is capable of carrying out this work. This quote shall form part of the overall bid. The quote shall include all necessary labour, materials, equipment, and transportation fees to get all components to subcontractor's facilities and back. The quote shall also include the cost of machining all components as well as labour and equipment as required at the subcontractor's facilities. All work shall be scheduled to prevent time delays.
16. Phyllyclad coating shall not be removed in the areas for the steady rest(s) and the shaft cleaned to provide proper running surface(s) for accurate machining.

ED-06 – Tailshaft Inspection and Measurements

17. Tail shaft shall be set in a lathe and checked for trueness. Contractor shall supply 4 copies of the run out readings on the shaft and a drawing showing the extent of grooving on each shaft. Shafting measurements shall be taken along the full length of the shafting (horizontal and vertical) while the shaft is set up in the lathe. In addition, the lathe steady is not to be located so as to interfere with the shaft surface in way of the brass liners. Every effort shall be made to prevent the lathe steady from grooving the shaft.
18. Contractor's bid shall include the requirement for the complete replacement/recoating of the shafts. Contractor supplied Philadelphia Resin (Phillyclad) 1775/620TS shall be used to wrap the shafts. On completion of the application, Contractor shall conduct a Hi-Pot Test (Holiday Pore Test) by a certified technician on the tail shafts to ensure that the resin coatings are sound. Contractor shall allow a \$5,000 Allowance for the travel and living expenses. 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 shall form part of the overall bid and shall be adjusted by 1379 action upon proof of final invoice
19. Contractor shall allow a \$5,000 allowance for dressing both shaft keys as well as the corresponding keyways in the propeller and the forward coupling. This shall include the polishing of the forward coupling bores. Magnaflux testing shall be carried out on each of the keyways as part of the allowance.
20. The allowance shall form part of the overall quoted bid.
21. Both inner and outer stern tube bearings shall be cleaned and inspected for wear and defects. Internal measurements shall be taken at 4 positions over the length of the stern tube bearings. Contractor shall record the measurements in type written record form and these shall be given to Chief Engineer.
22. Cooling water lines to the stern tube shall be proven clear and water flow to the stern tube to be proven adequate.
23. The stern tube area between the brass stave liners shall be mechanically cleaned to an SSPC-SP-3 standard and coated with one coat of Amercoat 78 HB Coal Tar Epoxy or equivalent. Coating shall be applied to yield 8 mils DFT. Each stern tube area is approximately 5 meters long x 0.65 meters diameter. All staves shall be suitably protected during this work and the inner tube opening into the Motor Room shall be closed over to prevent the ingress of dirt and debris. All pits and holes in this area shall be suitably prepared and filled with Belzona or equivalent prior to painting.
24. The contractor shall quote separately on the supplying and applying 6 kilograms of Belzona compound for application to each stern tube.
25. Upon completion of inspection and repairs, Contractor shall install the shafting, turning gear, brake, propeller, mechanical seal and couplings and propeller as per manufacturer's recommendations, in good running order and to satisfaction of the Owner's Representative and attending Marine Safety Inspector.

ED-06 – Tailshaft Inspection and Measurements

26. Contractor's bid shall include the cost for three separate fits of each propeller on the tail shafts. Contractor shall provide a quotation for the unit cost of each additional fit.
27. After the shaft has been installed, and prior to the installation of the seal, Contractor shall once again take readings at both ends of the sterntubes and record these.
28. Survey credits shall be obtained for each applicable item. The shafting system shall be test run under load for 1 hour after the vessel is afloat.
29. Upon completion of shaft installation, Contractor shall take an additional set of stern tube clearances at the aft end of the stern tubes. These clearances shall be recorded and given to Chief Engineer in report form.
30. Contractor shall install owner supply circular sacrificial zinc ring anodes on the aft end of each stern tube. It will be necessary for Contractor to measure and drill holes in the new anodes to correspond with the existing fastener holes on the aft end of each stern tube. Stainless steel fasteners complete with stainless locking wire shall be installed. Fasteners shall be locked in adjacent pairs only.
31. CCG shall supply Contractor with 2 steel jigs. These jigs shall be used for drilling matching bolt holes in each circular sacrificial zinc anode to permit bolting to the aft end of each stern tube. Upon completion of all work, the jigs shall be returned to the vessel.
32. Owner's representative and the Marine Safety Inspector shall witness the final installation of the propeller on the shaft to ensure that the propeller is properly aligned with the original proof marks and that the travel is equivalent.

2.2 Location

1. Starboard Propulsion shaft.

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.

ED-06 – Tailshaft Inspection and Measurements

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Tailshaft Data:
 - a. Length overall 14.513 meters
 - b. Diameter 510 mm
 - c. Weight 24,644 kilograms
2. Propeller Data:
 - a. Type Propeller Superstone 70
 - b. Configuration 4 blades @ 2.825 mm pitch
 - c. Diameter 3600 mm
 - d. Weight 6775 kilograms

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. All Inspections, testing, and certification is outlined in the General Notes above.

4.2 Testing

1. See above.

4.3 Certification

1. See above.

ED-06 – Tailshaft Inspection and Measurements

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. All reports required in General Notes shall be provided within 24 hours of their initial recording, and a final computer generated (typed) report shall be provided upon completion of this specification.

5.2 Spares

1. All unused spares shall be returned to Chief Engineer.

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-07 – Stern Tube Seal

1: SCOPE:

Starboard stern tube seal assemblies (JOHN CRANE MANESEAL TYPE MD) including base ring (bolted to bulkhead) shall be opened up for cleaning and inspection.

This work shall be performed in conjunction with Specification Item ED-06, Tail Shaft Survey and ED-08 – Stern Tube Wear-down.

2: TECHNICAL DESCRIPTION:

2.1 General

1. In the overall quote, Contractor shall allow \$20,000 for services of a John Crane Marine Seal Field Service Representative. This FSR allowance shall cover travel and living expenses only. The FSR shall 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 overhead or profit. The final cost shall be adjusted accordingly by PWGSC 1379 action upon receipt of invoice. Contractor shall make all necessary arrangements for the procurement of the FSR's services.
2. Coast Guard suggests the following Company:
Wartsila Canada Inc.
Dartmouth, Nova Scotia, or St. John's, NL
Tel: 902.468.1264 or 709. 747 4600
3. Seal compression distance shall be measured prior to disassembly and removal of stern tube seals.
4. Tailshaft and liner in way of the seal shall be polished to remove all traces of rust and salt.
5. Contractor shall pressure test the inflatable seal prior to removal. Upon completion of all work, the seal shall again be tested to prove its integrity.
6. Contractor shall provide the Chief Engineer with a copy of the final dimensions of the reassembled stern tube seals.
7. Contractor shall install the seal in good order as per the maker's specs. Clearances shall be taken and seals adjusted as per maker's specs.
8. Contractor shall quote on taking the brass seat to their facilities for machining to an RMS 32 finish (Ra 0.8 micro-meters). Machining shall be as per the maker's recommendations. This quote shall form part of the overall bid.

2.2 Location

1. The stern tubes are located in the propulsion motor room.

2.3 Interferences

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

CCGS Edward Cornwallis
August, 2015 Refit
ED-07 – Stern Tube Seal

2. Contractor is responsible for protecting surrounding area and equipment while carrying out this work.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

- a. Coast Guard shall provide "Service Kit 'A'", including the following parts for replacement purposes:
 - b. Split face seal inserts and sealing strips
 - c. "O" Cord
 - d. Bellows assembly
 - e. Neoprene guard
 - f. Pins
2. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Inspection shall be performed as required in section 2.1, and during the testing of the tailshaft as per ED-06 2.1 section 28.

4.2 Testing

1. Testing shall be performed as required in section 2.1, and during the testing of the tailshaft as per ED-06 2.1 section 28.

4.3 Certification

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-07 – Stern Tube Seal

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide a report detailing all measurements performed in accordance with section 2.1. In addition to the data collected, the report shall include the date and time each reading was taken.

5.2 Spares

1. All spares shall be returned to Chief Engineer

5.3 Training

N/A

ED-08 – Stern Tube Bearing Weardown

1: SCOPE:

The intent of this spec is to measure the wear down on the stern tube staves in way of each propeller tailshaft. Both port and starboard rope guards shall be removed to gain access to each stern tube.

This specification shall be performed in conjunction with ED-06 – Starboard Tailshaft and ED-07 – Stern Tube Seal.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Stern tube bearing wear down readings shall be taken on the Port and Starboard stern tubes within 8 hours of dry docking the ship. Both poker gauge, Owner supply, and feeler gauges shall be used to take readings. Readings shall be recorded and tabulated in two typewritten reports and given to Chief Engineer. Failure to have the readings taken with the allotted time will result in a credit to the Coast Guard.
2. Contractor shall supply and erect staging as required to access both sterntubes to carry out the readings. This staging shall also be used by Chief Engineer to inspect the propellers and rudder. Upon completion of all work, staging shall be removed.
3. Contractor shall fabricate new rope guards for both port and stbd shafts Rope guards are made from ASTM A-36 steel
 - a. Material sizes (approximate) are as follows:
 - b. A-36 steel 1635 mm length x 200 mm width x 20 mm thick, quantity 4
 - c. A-36 steel 1635 mm length x 160 mm width x 20 mm thick, quantity 4
 - d. Backing bar A-36 steel 1534 mm length x 60 mm width x 3 mm thick, quantity 4
 - e. Backing bar A-36 steel 250 mm length x 60 mm width x 3 mm thick, quantity 4
4. Contractor shall roll the steel sections to form rope guard halves.
5. Drawing 464-11, sheet 4 of 7 shall be made available for Contractor to copy
6. Actual sizes shall be measured by Contractor and adjusted to allow proper fitting of rope guards.
7. Contractor shall separately quote on the cost of fabricating new guards in the event the original ones are re-used by the contractor for a credit.
8. Upon completion of all work and in conjunction with ED-06 – Starboard Tailshaft removal, both new rope guards shall be installed in good order. Poker gauge plugs shall be installed and locked in place.
9. All disturbed paintwork shall be mechanically cleaned to bare metal, primed, and coated as per HD-03 Hull Cleaning & Painting.

2.2 Location

1. The stern tubes staves are located forward of the propellers. .

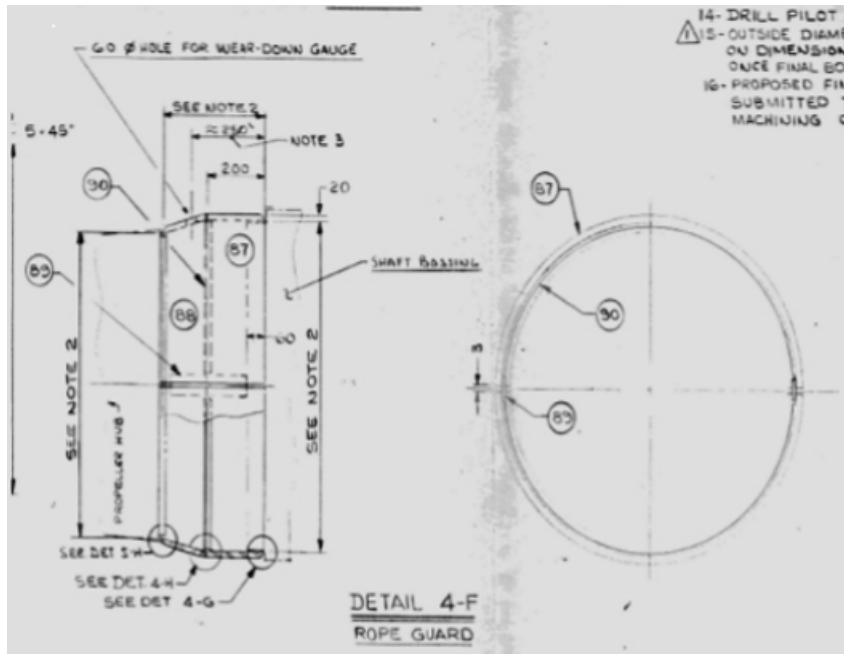
ED-08 – Stern Tube Bearing Weardown

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data



1. Drawing is available from Chief Engineer upon request.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

ED-08 – Stern Tube Bearing Wear-down

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Inspection shall be performed as required in section 2.1.

4.2 Testing

1. Testing shall be performed as required in section 2.1.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide a report detailing all measurements performed in accordance with section 2.1. In addition to the data collected, the report shall include the date and time each reading was taken.

5.2 Spares

1. Poker Gauge shall be returned to Chief Engineer

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
ED-10 – Sea Water Pump Valves

1: SCOPE:

The existing Sea Water butterfly valves are too stiff to operate and require replacement with new valves. This work shall be completed in conjunction with ED-09 – Sea Water Pumps and L-05 – Sea Water Pump Motors.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The SW Pumps suction and discharge 8” butterfly valves shall be removed and associated spool piece and be replaced with new GSM Butterfly valves.
2. All disassembly and re-assembly work shall be carried out on one Pump unit at a time. Contractor shall be responsible for the removal of SW from the bilges as a result from the removal of the valves.
3. Flange faces on the piping shall be cleaned and examined by the Owner’s representative prior to installation of the new butterfly valves. Valves and spool pieces shall be fitted as per manufacturer’s instructions. New gaskets and stainless steel fasteners shall be supplied and fitted.
4. All spool pieces (short section of pipe) shall be removed, cleaned, inspected for corrosion, and painted with two coats of Apexior 3.
5. Upon completion of all above work, valves and spool pieces shall be reassembled and installed in their original location.

2.2 Location

1. The Sea Water Pump Butterfly Valves are all located in the Main Engine Room.

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.

CCGS Edward Cornwallis
August, 2015 Refit
ED-10 – Sea Water Pump Valves

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Valves are an 8" Keystone butterfly valve.
2. More information is available from Chief Engineer, upon request.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

1. On completion of the work, all affected pipe work is to be given a functional pressure test once the ship had been re-floated.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Upon successful completion of all specified work, contractor shall provide the Chief Engineer with three (3) typewritten copies of a service report. This report shall detail all work carried out, any defects found and repaired, and all readings obtained during the course of the work detailed herein.

5.2 Spares

N/A

5.3 Training

N/A

E-01 – Potable Water Chlorine Injection System Installation

1: SCOPE:

A new Chlorine Injection System and associated components shall be installed in the engine room. This work shall be carried out after opening the FW Tanks as required in spec item “HD-06 – Potable Water Tanks”.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The system consists of a water circulation pump installed in the motor room near domestic water pressure tank. The pump will be supplied from a new Contractor installed suction line and circulate water back to the tank through new Contractor installed discharge pipe. Both FW tanks will have a similar installation based on the individual location.
2. A chlorine analyzer is installed at the pump discharge to continually monitor the residual free chlorine in the circulating water. Based on the chlorine readings, the chlorine injection pump will inject chlorine into the discharge piping, downstream of the analyzer.
3. A chlorine injection pump is installed at the same location as the header tank. The Chlorine injection pumps on both tanks will be supplied chlorine from the common header tank.
4. This work involves the supply and installation of the supply and return piping to both the port and starboard fresh water tanks, and installation of two main circulating pumps.
5. Each pump shall have suction/discharge isolation valves, air vent/priming connections and pressure gauges.
6. Each Circulating pump shall have suction and a discharge lines fitted to its respective FW Tank. These lines shall penetrate the tank at locations agreed to by the Chief Engineer. The tank end of the suction and discharge pipes shall be as far apart as possible in the tank to promote effective circulation.
7. Two additional penetrations are required on the port fresh water tank to accommodate relocation of lower gauge glass six (6) inches forward, to make room for new tank suction. The sight glass shall be installed with new gauge glass valves.
8. A Contractor supplied foot valve shall be installed on the suction lines to prevent loss of suction water. Each pump discharge side isolation valve fitted shall be a non-return valve. All piping shall be 1 ¼ inch stainless steel.
9. Contractor shall quote on supplying 150 feet of pipe and the required fittings (location can be seen during viewing). Additionally, Contractor is quote a unit price per foot for the pipe for adjustment purposes (increase or decrease). All piping and valves are Contractor supply.
10. Contractor shall remove the currently fitted circ pump suction and discharge piping. Piping shall be disconnected where pipes are teed into system fill and suction lines. Where piping removed, properly sized Contractor supplied isolation valves and pipe plugs shall be installed.

E-01 – Potable Water Chlorine Injection System Installation

11. Contractor shall remove the piping that was used to supply the UV steriliser which has been removed. Piping shall be disconnected where they are teed into system and replaced with direct pipe section.
12. The Chlorine analyzer shall draw a sample from the discharge side of each circulating pump, installed by Contractor before chlorine injection, using the proper tubing and fitting supplied by the vessel.
13. The chlorine injection line shall be fitted into the piping after the analyzer sampling point by Contractor using the proper injection fitting supplied by the vessel.
14. Contractor shall install four transitions through the deck for piping, as per existing. All piping shall be secured using contactor supplied pipe hangers, as required.
15. All disturbed surfaces shall be given two coats of appropriate marine grade primer, compatible with the current paint used in the area.

2.2 Location

1. Work required for completion of this specification will primarily take place in the propulsion motor room.

2.3 Interferences

1. It is Contractor's responsibility to identify any interference items not identified in this specification, and with Chief Engineer's approval, ensure they are safely removed, stored, and reinstalled in working order as required.

3: REFERENCES:

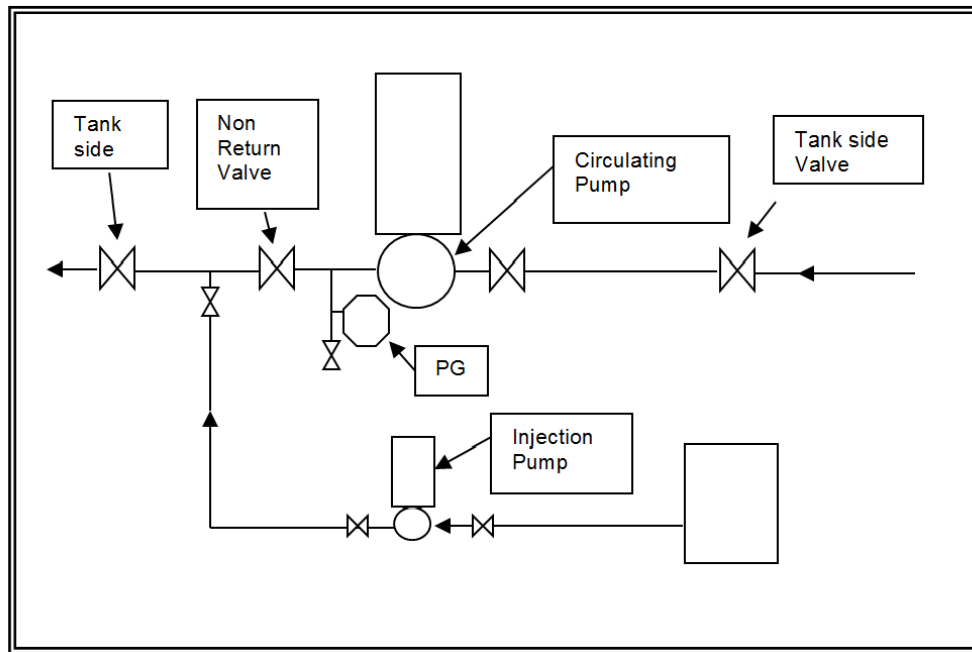
3.1 Guidance Drawings/Nameplate Data

1. Chief Engineer shall provide technical manuals for the equipment to the successful bidder upon request.
2. Further Technical information and inspection before commissioning can be provided by the equipment supplier:

Paul Saulnier
Atlantic Purification Systems
10 Ferguson Rd.
Dartmouth, NS
(902)-469-2806 ext. 116

E-01 – Potable Water Chlorine Injection System Installation

CCGS E. Cornwallis: Line Diagram - Chlorine Injection



3.

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

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. All inspection items have been identified in section 2 of this specification.

4.2 Testing

1. Upon completion of all work, all piping shall be verified to be leak free, and the circulation system shall be commissioned.

4.3 Certification

1. After all inspections and testing is completed, the system shall be certified under all applicable TCMSB and Health Canada fields.

E-01 – Potable Water Chlorine Injection System Installation

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-02 – Thrust Blocks

1: SCOPE:

The intent of this item shall be to open up the Port & Starboard Thrust Blocks for TCMSB inspection and to change the forward and aft shaft oil seals.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall isolate, disconnect and remove all wiring trays, piping, rails, sensors, brackets, and any other equipment that may be damaged while completing the specified work. All items shall be put back in good working order upon the completion of all work.
2. Contractor shall disconnect all associated wiring in each of the terminal boxes from the thrust blocks.
3. Oil deflectors and access plugs shall be removed in preparation for measuring journal wear down and axial clearance readings. These measurements shall be measured using the owner supply wear down micrometer depth gauges.
4. Contractor shall remove the axial access plugs. Contractor shall jack the shafts onto the forward thrust face for the purpose of measuring the axial clearance reading. These reading shall be recorded. The axial access plugs shall be refitted on completion.
5. Contractor shall take journal clearance readings via the after oil deflection holes.
6. Contractor shall carry out the following procedures on each housing prior to attempting to raise the casing tops:
 - a. Remove the top cover and oil scraper.
 - b. Withdraw the journal bush remote temperature element from the casing bottom. Remove all clips securing cable to casing bottom and temporarily secure the cable and element to casing top
 - c. Remove the oil seal retaining plates from ends of bearing, and withdraw the oil seals along the shaft
 - d. Withdraw the remote temperature element from the thrust pads, and allow it to hang loosely around the casing top. It should not be necessary to remove cable clips if care is taken while handling and supporting elements.
 - e. 3 remote cables shall be disconnected from junction boxes on top casing, and set aside.
 - f. Grounding brush on shaft to be released from holder and set aside.
7. Contractor shall remove the casing joint bolts and raise the casing a maximum of 10 inches so as to expose the electrical plug/socket connections on the inboard side of the thrust shoes. Plugs shall be removed from the sockets to disconnect the load cell wiring between the shoes and the casing.
8. Oil shall be removed from thrust blocks and disposed of ashore by Contractor in an environmentally safe manner.
9. The oil sumps shall be wiped clean using lint-free rags.

CCGS Edward Cornwallis
August, 2015 Refit
E-02 – Thrust Blocks

10. The 12 thrust pads per block shall be removed, cleaned, and prepared for inspection. Special care shall be taken to ensure that markings on pads are noted. Shaft shall be supported and blocked to prevent axial movement while the thrust pads are removed. Following the TCMSB inspection, the pads shall be replaced in their respective original position and orientation.
11. Lower journal bearing shells shall be rolled out for inspection. Upper journal bearing shell is secured in the top cover. It will be necessary to support the weight of the shaft from the lower journal bearing shell slightly, by jacking, in order to permit rolling out the lower journal half bearing.
12. Contractor shall take clearance measurements between the shaft and top half bearings. This can be accomplished by replacing the upper journal bearing shell and top cover with the internal thrust pad support bracket removed. When the top cover is torqued down, a feeler gauge may be used to measure the clearance. Top cover shall be subsequently removed to replace the thrust pad support bracket and thrust pads.
13. Both shaft oil seals per block shall be renewed, CCG Supply (GSM).
14. Contractor shall provide a separate quote for replacement of individual shaft oil seals, which shall be credited via PWGSC 1379 action in the event that TCMSB does not require the seals to be replaced.
15. Sump oil coolers shall be removed for inspection, cleaning, and testing. Coolers shall be cleaned internally and externally and then prepared for hydrostatic tests. Contractor shall apply a hydrostatic test pressure of 45 psi. Pressure test shall be witnessed by Chief Engineer and TCMSB surveyor. Contractor shall supply all hardware and materials for the hydrostatic test.
16. All sealing surfaces and mating surfaces shall be thoroughly cleaned. Thrust block sump shall be thoroughly cleaned out after oil coolers have been removed.
17. Upon completion of all work, thrust blocks shall be reassembled in good order and adjustment. All internal fasteners in thrust blocks shall be secured using Loctite on all threads. All piping shall be reconnected using new joints.
18. Thrust block sumps shall be refilled using Petro-Canada Hydrex MV-36; approximately 114 litres each.

2.2 Location

1. The thrust bearings are located in the propulsion motor room.

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.

CCGS Edward Cornwallis
August, 2015 Refit
E-02 – Thrust Blocks

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

Vickers Limited

MICHELL BEARINGS

SCOTSWOOD ROAD

NEWCASTLE UPON TYNE

Bearing No. 91257/2 (Port) 91257/1 (Stbd)

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 CCG Technical Authority.

Canadian Coast Fleet Safety Manual (DFO 5737)

Coast Guard ISM Lock Out/Tag Out Procedures

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. All work shall be carried out to the satisfaction of the Owner's Representative and attending TCMSB surveyor.

4.2 Testing

1. Successful sea trials consisting of no less than one hour operation operating within normal parameters (temperature, no vibration/noise, all sensors operational).

4.3 Certification

1. Contractor shall contact TCMSB and arrange for all required inspections in order to gain surveyor certification for Division 3 survey items 3F007 and 3F008.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. All readings shall be recorded in a computer generated report. A digital copy and three printed copies shall be provided to Chief Engineer upon completion of all work.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August 2015 Refit
E-03 – Sewage Vent Renewal

1: SCOPE:

1. The vent line for the sewage system vacuum pumps is becoming frequently choked with rust and quite manpower intensive to clear. The intent of this specification is to install a new vent line from the vacuum pumps and the forward sewage transfer tank in the engine room to a termination point on the side of the ship's funnel as shown in the reference photo Fig. 1.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The new vent piping shall run parallel in most part to the existing pipe. All piping shall be made from 2 inch x schedule 80 E.R.W., pre-galvanized ASTM A-53 Gr. B steel using flanged 150# 4 bolt flanges complete with neoprene gaskets.
2. Contractor shall supply and fit suitable brackets and fasteners for the new run of pipe. The total approximate run of pipe required for the new sewage vacuum pump / transfer tank vent line is 120 feet. It is anticipated that this pipe will also incorporate 4 x 90 degree elbows, 2 x 45 degree elbows, and 4 tees (cleanouts) in the new run of pipe.
3. Contractor shall note the existing pipe and the current configuration where the pipe has been bent to fit accordingly. Contractor shall bend the pipe as much as possible to eliminate the requirements for pipe fittings.
4. Contractor shall supply and fit a new vent head. The vent head shall be of similar construction as per the unit in Fig. 1 and shall be fitted with a removable flash proof screen, hinged cover complete with closure hardware, and cover gasket. There shall be a sleeved penetration as per the photo.
5. A brass nameplate shall be affixed to the funnel, below the new vent and labelled as: "Sewage Vacuum Pumps & Transfer Tank"
6. The new vent line shall be flanged approximately every 10 feet such that the new flange locations will facilitate ease of pipe installation, and removal at a later date. For bid purposes Contractor shall quote on supplying and installing 20 pairs of 150# steel 2 inch slip on weld x 4 bolt flanges including fasteners and gaskets. Contractor shall supply a unit cost per supply and fitting of a flange set.
7. Contractor shall supply and install 3 tees to the new vent line, to act as clean outs. CGTA shall advise the Contractor as to the best location for the tees.
8. The new vent line is to be adequately bracketed and supported using existing pipe runs and structural members. Removal of expanded metal and insulation shall be kept to a minimum. For bid purposes Contractor shall quote on supplying and installing 30 pipe brackets including fasteners, plus unit cost per bracket set. Also Contractor shall quote on the removal of 6 x 1 square foot sections of expanded metal and insulation for attaching brackets should it become necessary. This shall also include the subsequent replacement of insulation materials and new expanded metal.

E-03 – Sewage Vent Renewal

9. The new vent pipe shall be tied into the existing vacuum pump discharge tank, towards the end of all work so as to minimize the sewage system downtime. The existing arrangement is joined by pipe unions. Contractor shall modify the existing vacuum pumps vent common discharge pipe in the engine room. The grey water side of the vents from the vacuum pump tanks shall be fitted with new flanges and piping to change from the original 1.5 inch pipe to the new 2 inch pipe. This is on the outlet from the tank. Contractor shall join the new vent lines by fitting flanges into both the new discharge vent line from the vacuum pumps and the new vent line.
10. The new vent pipe shall be modified from the outlet of the sewage transfer tank. Existing as fitted pipe cent consists of a 2 inch pipe and union. This section of pipe shall be modified and configured to accept a flange pipe connection and to replace the current union.
11. All areas that have been affected by this work shall be mechanically cleaned to SSPC-SP-3 standards. Upon completion of cleaning to SSPC-SP-3 standards, the complete area shall receive 2 coats of contractor supply Devco Bar-Rust 235 and 2 topcoats of Coast Guard supplied marine enamel. This shall include all new pipe work and associated brackets as well as the new vent head and adjacent areas both inside and outside the funnel. Contractor shall allow suitable curing times between coats.
12. Upon completion of all work, Contractor shall remove all equipment, dirt, debris, materials, etc used to carry out this work. All hardware, plumbing, etc. that was disturbed in order to carry out this work shall be reinstalled and connected in good order. The spaces shall be left in a clean and tidy condition.
13. Unless otherwise specified, all materials shall be contractor supply.

2.2 Location

1. The vent pipe run starts in the engine room, at the vacuum pump common discharge pipe, and runs up the inside of the ship's funnel, ending at the termination point outside.

2.3 Interferences

1. In order to complete all requirements of this specification, Contractor will be required to work in tight areas in the funnel, and scaffolding may be required.

CCGS Edward Cornwallis
August 2015 Refit
E-03 – Sewage Vent Renewal

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data



Fig. 1: Vent located on Ship's Funnel

3.2 Standards and Regulations

1. Hot work shall not commence until all areas in the vicinity of the hot work have been certified gas free and safe for hot work. Contractor shall obtain and arrange for the services of a certified Marine Chemist prior to the commencement of any hot work to determine by testing/inspection and proof of certificate that the area is safe for hot work. A copy of the hot work certificate shall be given to the Chief Engineer and a copy posted in a conspicuous location adjacent to the hot work area. All precautions shall be taken to protect all areas and personnel from hot work damage. Contractor is responsible for maintaining an adequate fire watch during the course of all hot work. This shall include providing various applicable extinguishers and extinguishing mediums as necessary. This shall also include any necessary preparations and cleaning in the vicinity of the work area to obtain a gas-free permit.
2. Contractor shall provide suitable ventilation/extraction equipment complete with flexible ducting. This shall be used continuously and the ducting shall be led to the outside of the ship during hotwork operations and during the curing process for all coatings. Contractor shall take precautions to prevent dust, dirt, and vapours from entering the machinery spaces.

CCGS Edward Cornwallis
August 2015 Refit
E-03 – Sewage Vent Renewal

3.4 Owner Furnished Equipment

1. CCG shall be supplying Marine Enamel, as per 2.1.9.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Upon completion of all welding operations and prior to painting, Contractor shall hose test the funnel penetration to demonstrate the watertight integrity of the welds.

4.2 Testing

N/A

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

E-04 – Machinery/Accommodation Vent Door Repairs

1: SCOPE:

The intent of this specification shall be to overhaul and repair the machinery and accommodation vent doors as listed below.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove these doors to de-scale the corrosion on the doors and louvers, as well as to paint, fit new gaskets and re-use the existing galvanized screening. The hinges shall be replaced if required, to operate easily.

2. The following vent doors shall be overhauled:

Vent	Size	Gasket
a. Transformer room inlet	47" x 40"	1 ¼" x ½" thick
b. Propulsion Motor room outlet	39" x 24"	1 ¼" x ½" thick
c. Purifier Room outlet	24" x 36"	1 ¼" x ½" thick
d. Vent fan room	11.5" x 11.5"	1 " x ½" thick
e. Transformer Room Outlet	47" x 47"	1 ¼" x ½" thick
f. Toilet Air Outlet	40" x 20"	1 ¼" x ½ " thick
g. Converter Room Outlet	40" x 24"	1 ¼ " x ½ " thick
h. Galley Intake and new screen	24" x 16"	1 " x ½" thick

3. The following vents shall have louver slats removed and replaced with new louvers:

Vent	Louver Qty	Louver Size
a. Propulsion Motor Room Intake	4	22" x 3" x 3/16"
b. Ventilation Fan Room	4	11½" x 3" x 3/16"
c. Emergency Gen Room Intake	3	17" x 3" x 3/16"

4. The following vents shall have a doubler installed over the existing **hole**

a. Emergency Gen Air Cooling	1	6" x 3" x 3/16"
b. Port Accommodation Air Intake	1	6" x 3" x 3/16"

5. All doors shall be removed either by cropping the existing hinge tabs or removal of the hinge pins.
6. Hot work shall not commence until all areas in the vicinity of the hot work have been certified gas free and safe for hot work. Contractor shall determine by testing/inspection and proof of certificate that the area is safe for hot work. A copy of the hot work certificate shall be provided to the Chief Engineer and a copy posted in a conspicuous location adjacent to the hot work area. All precautions shall be taken to protect all areas and personnel from hot work damage. The contractor is responsible for maintaining an adequate fire watch during the course of all hot work. This shall include providing various applicable extinguishers and extinguishing mediums as necessary. This shall also include any necessary preparations and cleaning in the vicinity of the work area to obtain a gas-free permit.

E-04 – Machinery/Accommodation Vent Door Repairs

7. All louvers and frame, both internal and external, at each ventilation door location, as well as areas where paint has been damaged while completing related work shall be mechanically cleaned to SSPC-SP-3 standards and shall be given 2 coats of contractor supply Amerlock 83 HS Buff Resin Primer and 2 topcoats of Amerlock 2 Coast Guard white. Contractor shall allow suitable curing times between coats, as per paint manufacturer's recommendations.
8. Louver openings shall be sealed as best as possible to prevent debris accumulating in the ventilation trunk. Where accessible, contractor shall clean & coat the inlet trunk as specified above.
9. Gasket material shall be removed from each door and disposed of ashore by the contractor.
10. New hinge tabs, complete with stainless steel hinge pins, shall be fabricated and installed on all doors and door frames. Contractor shall bid on renewing all hinge assemblies. Cost to replace all hinges shall be included in the total bid. Contractor shall provide a unit price to replace one hinge assembly. Actual number of hinge replacements shall be determined at the beginning of the refit period by the contractor, and final cost for hinge replacements shall be adjusted up or down by PWGSC 1379 action.
11. Each hinge pin shall be fitted with grease passages as well as stainless steel grease fittings to permit lubrication of each hinge pin assembly. All new fasteners shall be of stainless steel.
12. All securing dogs shall be made free. The pins must be removed and excess paint cleared off. Threaded portion of the dogs shall be cleaned using a die nut or die.
13. All doors shall be dry abrasive blasted to a bare steel condition of (SSPC-SP10)/NACE No. 2(Sa 2-1/2) near white metal on all surfaces. The surface profile shall have a minimum roughness of 2 mils. All surfaces of each door shall receive 2 coats of contractor supply Amerlock 83 HS Buff Resin Primer and 2 topcoats of Amerlock 2 Coast Guard white. The contractor shall allow suitable curing times between coats and is apply the paint as per Amerlock recommendations.
14. Upon completion of all painting, Contractor shall supply and fit neoprene gasket material to all doors, glued in place. All doors shall be installed and checked for a good fit. All hinges shall be lubricated. Each door shall be hose tested to prove its integrity. Contractor shall measure and size with same size of gasket material used. Contractor shall verify the sizes of the material. As noted sizes are approximate.
15. Contractor shall supply and install a new stainless steel grid screening (½ " square) on the galley intake vent.
16. Contractor shall supply and fit brass nameplates accordingly to both sides of each door. The nameplates set shall read the same as the existing name plates. Credit shall be given if no name plates are used.

2.2 Location

1. All vents in this specification are accessible from the vessel's outer decks.

E-04 – Machinery/Accommodation Vent Door Repairs

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.
2. Contractor shall be responsible for the cleaning of dust of debris when working on the vents and areas affected as a result of the work.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Chief Officer shall inspect completed work to ensure all doors functioning correctly.

4.2 Testing

1. All gaskets shall be chalked, and each door shall be secured closed, then reopened. Acceptance shall be based on 100% chalk transfer around the perimeter of each door.
2. If any gaps are found, Contractor shall make repairs and retest until 100% seal is achieved.

4.3 Certification

N/A

E-04 – Machinery/Accommodation Vent Door Repairs

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-05 – Ventilation Duct Cleaning

1: SCOPE:

The intent of this specification shall be to access and clean all air ducting for accommodations, the exhaust air ducting for the washrooms, the supply air ducting to the wheelhouse windows, the supply and exhaust galley air ducting (including the galley range hood) as well as the return air ducting for the accommodations and wheelhouse systems. In addition Contractor shall clean dryer ducting from both laundry rooms.

2: TECHNICAL DESCRIPTION:

2.1 General

1. In order to prevent contamination from other tasks performed during the overall refit period, Contractor is requested to delay starting this specification until as late as possible, after most of the work is completed.
2. Contractor shall co-ordinate the cleaning of this trunking with the ship's staff in order to minimize interruption of normal work routines.
3. Contractor shall provide the services of a qualified HVAC representative to mechanically clean the vessel's ducting. All ducting shall be thoroughly cleaned of dust, dirt, debris, scale, rust, etc.
4. Since this task has been carried out in previous maintenance periods, many access points exist, which are simply plugged. Contractor shall be responsible for accessing and opening these access points as required. If any additional access points are required, Contractor shall be responsible for making penetrations for the cleaning equipment.
5. Contractor shall be responsible for the subsequent sealing of all access points upon completion of all work. Note: Plastic plugs shall not be used to seal access points. All access points shall be sealed with contractor supply metal plugs.
6. 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 shall be securely 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 shall be reinstalled in good order in its original location and condition. All removed insulation shall be reinstalled accordingly and all taped seams shall be re-taped with new approved tape for HVAC systems.
7. Prior to commencing any work, Contractor shall lock and tag out each system supply/exhaust fan set. Contractor shall supply and install their own locking devices and keep possession of all keys during the scope of this work. Ship's personnel shall assist in identification of air movement equipment throughout the vessel.
8. Contractor shall remove all materials used in the project from the vessel. Ship's waste receptacles and those on the dock shall not be used for disposal of any removed materials.
9. Contractor is responsible for the cleaning of all spaces, furniture, equipment, etc. that is contaminated or soiled during the project.
10. All systems shall be closed up as per original upon completion of the cleaning process.

E-05 – Ventilation Duct Cleaning

11. 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 shall remove all blanks or plugs as they are encountered, and provide documentation to Chief Engineer identifying all blockages encountered. These blanks shall not be replaced, such that all spaces will be served by ventilation and exhaust flow as applicable.

Galley

12. The range hood and exhaust trunking is 400mm x 160mm, and 200mm x 125mm, and 600mm x 150mm - approximately 10m in length overall.
13. 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.
14. 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 to be temporarily relocated and protected.
15. The range hood filter screens shall be removed and steam cleaned.
16. Trunking in way of the exhaust fan shall be opened to allow complete degreasing of fan, fan motor, and its support brackets. Approximately 9m of 700mm x 260mm trunking is involved. It will be necessary to remove sections of the stainless steel cladding for access.
17. 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 Chief Engineer.

Laundry Dryers

18. Locations:
 - M-58 Main Deck, port side (Crew's Laundry)
 - U-64 Upper Deck, aft (Officer's Laundry)
19. Contractor shall clean the dryer ducting in each of the above spaces. There is one combination washer/dryer unit in the Officer's Laundry and three combination washer/dryer units and a commercial dryer unit in the Crew's Laundry.
20. In order to access the combination washer/dryer ducting, it will be necessary for Contractor to unbolt each unit and pull it forward to access the ducting behind each unit. Units shall be fastened in place upon completion of all work.
21. In addition to cleaning the dryer ducting, Contractor shall unfasten the Crew's Laundry Room dryer exhaust fan located in the port breezeway, Upper Deck at frame 60. The unit shall be isolated and locked out electrically. Contractor shall remove the unit ashore for cleaning and to gain access to the dryer outlet ducting which shall also be cleaned.
22. Upon completion of all work, the dryer exhaust fan shall be installed with a new gasket and new sealant. The louver assembly shall be checked for correct operation and freedom of movement.

E-05 – Ventilation Duct Cleaning

Accommodation Ventilation Cleaning

23. The accommodation HVAC supply and return air system shall be mechanically cleaned of dust, dirt, oil, grease and other debris. Both air handling units are located on the Boat Deck in the Accommodation Fan Room, Frames 48- 60. The system consists of the components and interconnecting ductwork, which are located throughout the Accommodations on, and between the Boat, Upper, and Main Decks.
24. While this is an “unmanned” refit, most cabins will contain crewmembers personal effects. Contractor shall not enter personnel cabin's without permission of Chief Officer, or without Owner’s Representative in attendance.
25. During the cleaning of ductwork, care shall be taken not to allow the ingress of contaminants into the accommodations and work areas serviced by the air outlets. Particular attention shall be paid to the following locations:
- Boat Deck - Radio Room and Electronics Equipment Room
 - Upper Deck - Ship’s Office, Engineering Office
 - Main Deck - Galley, Crew’s Mess, Officer’s Mess
26. All equipment exposed to the possibility of contamination shall be protected with taped down polyethylene film.

Wheelhouse HVAC System

27. Location:
- Air Conditioning Compartment on top of the Wheelhouse
28. The Wheelhouse HVAC supply and return air system shall be mechanically cleaned of dust, dirt, oil, grease and other debris.
29. The system consists of the components and interconnecting ductwork which supplies the Bridge with heating, air conditioning, and defrosting air for the bridge windows.

Aft Cargo Hold

30. Location:
- M-55 Aft Cargo Hold.
31. Contractor shall access and clean the exhaust fan ducting that services the aft Cargo Hold on the Main Deck Aft. The ingress point is in the Aft Cargo Hold, runs through the storeroom M-61 (normally secured) and up through the deck head to a termination point on the Upper Deck aft at frame 20 in the port breezeway. The vent head is labeled "Cargo Hold Outlet".
32. Contractor shall cut access points in the ducting to carry out cleaning. The approximate run of ducting is 35 mm diameter x 8 m long. All access points shall be covered and sealed upon the completion of all work.

CCGS Edward Cornwallis
August, 2015 Refit
E-05 – Ventilation Duct Cleaning

2.2 Location

1. Various locations identified in the general technical description.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Chief Engineer shall provide Contractor access to 1:100 scale drawings: A/C System Diagrams which details the location of air handling units, outlets, return air dampers and ducting runs.
 - 229-01 (2 sheets) HVAC various decks
 - 229-02 (2 sheets) HVAC various decks
 - Aft Cargo Hold – Exhaust
 - Galley supply and exhaust from the Boat deck to the Well deck
 - (12 sheets) Laundry Rooms (Main and Aft) list of materials on sheet 12
 - (2 sheets) Wheelhouse A/C system and materials list

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 CCG Technical Authority.
 - Canadian Coast Fleet Safety Manual (DFO 5737)
 - Coast Guard ISM Lock Out/Tag Out Procedures

3.4 Owner Furnished Equipment

1. Unless otherwise stated, Contractor shall 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

CCGS Edward Cornwallis
August, 2015 Refit
E-05 – Ventilation Duct Cleaning

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall allow Owner's Representative to inspect each 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 Chief Officer shall inspect all spaces to ensure all removals are replaced.

4.2 Testing

N/A

4.3 Certification

1. Signoff shall occur when all work is completed to the satisfaction of the Chief Officer.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide a report of the Duct Cleaning when the job 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 shall be identified in this report.

5.2 Spares

N/A

5.3 Training

N/A

E-06 – Engine Room Exhaust Fan Repairs

1: SCOPE:

The contractor shall remove the existing axial fan impeller and motor in the fan casing for the engine room exhaust fan casing. The removed motor shall be set to a certified repair facility for overhaul. The contractor shall install a new fan impeller (GSM) on the re-built motor in the fan casing and re-install back in the fan casing.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The power for the exhaust fan shall be isolated and tagged by the Contractor. The contractor shall disconnect the power to the motor at the junction box and the wires to be labelled. The fan casing shall be disconnected from the upper and lower flanges of the fan casing and is located on the engine room stack. The fan and motor section of fan casing shall be removed from the existing fan trunking. Lower section of the exhaust casing shall be supported while the casing is removed as it will drop if not supported.
2. Contractor is responsible for removing and replacing the motor from the engine room and to a Certified Repair Facility. Chief Engineer shall be given copies of the work order regarding the overhaul of the motor.
3. The removed fan impeller can be used as a guide for the new fan impeller for bore size and fitting arrangement. The old fan impeller shall be returned to the CGTA upon completion.
4. Contractor shall remount and attach the overhauled motor in the fan casing with new bolts and lock washers. Contractor shall ensure the motor shaft is concentrically placed in the fan casing before tightening the bolts. The new impeller shall be mounted on the motor shaft by means of a tool fastened in the threaded hole of the motor shaft. The new fan impeller shall be bored if required with a key way to match the motor shaft keyway. The bore of the fan impeller shall match the diameter of the motor shaft with a tolerance fit. The fan impeller shall be tightened onto the motor shaft until the impeller hub rests against the motor shaft collar. A centre disc shall be fabricated and installed prior to the centre screw. Loctite "A" or equivalent shall be used on the threaded centre screw prior to installation.
5. Contractor shall check the blade clearance of the impeller and ensure it is the same throughout the circumference of the casing. Contractor shall adjust the motor location in the suspension arrangement if measurements are not acceptable. Measurements of the clearances shall be given to and verified by the Chief Engineer.
6. Contractor shall connect the motor cable to the junction box on the motor. Ship's Electrician shall be present to witness electrical connections.
7. Contractor shall place exhaust fan casing in correct orientation within the existing exhaust ducting. New flange gaskets, nuts, bolts, flat washers are to be Contractor supplied.
8. Contractor is responsible for balancing of the fan impeller. Contractor shall supply a cost per trial of balancing the fan impeller for PWGSC adjustment purposes.

E-06 – Engine Room Exhaust Fan Repairs

9. Contractor shall ensure the work area is thoroughly cleaned prior to the acceptance.

2.2 Location

1. The Exhaust Fan Casing is located at frame 75 on the bridge deck (inside the Engine room stack funnel- port side).
2. Most of this work will be completed inside the funnel area as the current Novenco fan casing cannot be removed to the Contractor's Facility.

2.3 Interferences

1. Contractor is responsible for identifying any interference items during the vessel's Bidder's Conference.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Motor Data: Mfg Brook- Crompton
Model LNV- 254T
HP 10 / 4.4 HP
Volts 600 VAC
Amps 10 / 5.5
Speed 1740/1160 RPM
Serial # X992172

3.2 Standards and Regulations

1. See General Notes.

3.4 Owner Furnished Equipment

1. Unless otherwise noted, all labour, materials, and equipment are contractor supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

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

4.2 Testing

1. Prior to start of operation of fan the contractor shall check that the fan and duct connections are clean and free from tools and foreign substances. Direction of rotation of the fan shall be verified and compiles with the arrow-plate (check by short time operation). Contractor shall be responsible for changing the direction of rotation if incorrect.
2. Contractor shall check that no abnormal noises occur and verify that the vibration levels are normal. The vibration level of the fan operating speed must not exceed 7 mm/s rms, this is to be measured radially at 2 points, 90 degrees offset and at the free end of the motor. If the fan operates at a higher vibration level (11 mm/s rms) the fan must be balanced.

E-06 – Engine Room Exhaust Fan Repairs

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A computer generated report containing all measurements and test data acquired in relation to this specification shall be provided to Chief Engineer in order for this specification to be considered complete.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

1: SCOPE:

The intent of this specification is to partially disassemble the barge davit system for survey and load testing.

2: TECHNICAL DESCRIPTION:

2.1 General

1. All manufacturer's procedures and recommendations shall be followed during the scope of all work with all technical specifications being adhered to as a minimum by the Contractor. Contractor shall arrange for scheduling the on-site presence of a Marine Safety Inspector as required for inspections/testing during the course of all work.
2. Contractor shall make include an allowance of \$10,000 for to cover the travel and living expenses of a Caley 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 shall form part of the overall bid and shall be adjusted by 1379 action upon proof of final invoice.
3. Contractor shall supply all the necessary staging and craneage as required to work on, remove, transport, and install the various components during this overhaul. All personnel working on the A-frame shall be suitably trained in fall restraint and all fall restraint equipment shall be certified and current.
4. Prior to the commencement of any and all work, Contractor shall lock out both power pack motors, associated 110 volt condensation heaters, and the oil reservoir immersion heater. Contractor shall install /remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in locating locations to perform the lock outs but will not perform the actual lock out. Contractor shall supply and install their own locking devices and retain all keys during the scope of this work.
5. Note: The nitrogen charged accumulator shall be isolated and locked out electrically as per above and the accumulator shall be relieved of all hydraulic pressure prior to working on the davit system.

DAVIT A FRAME

1. Contractor shall prepare and paint the davit A Frame.
2. All preparation work, cleaning, priming, and painting shall be as per the Manufacturers (Amercoat Canada) instructions and specifications for their products (see Amercoat Canada specifications and instructions included in this Specification package, Appendix D).
3. Two primer coats of Amerlock 2 epoxy (1st one grey and the 2nd one white) and a top coat of Amercoat 5450 Marine Enamel White (Contractor Supplied) shall be applied, as per Amercoat Canada specifications.

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

HYDRAULIC COMPONENTS

4. The maximum working pressure of the hydraulic system is 250 bar.
5. Contractor shall take all necessary precautions to protect the cylinders, piston rods and other hydraulic components from exposure to dirt, welding fumes, dust, and damage in general. During removal, exposed piston rods shall be coated with a protective oil film and wrapped with a suitable barrier material.
6. All Denso tape that is removed to carry out the following work shall be discarded and new Contractor supply tape shall be installed upon completion of all work.
7. An oil reservoir sample shall be taken and sent ashore for analysis by the Contractor. The analysis results shall be given to the Chief Engineer upon receipt. Contractor shall drain both partitions in the reservoir of all oil, approximately 800 liters. The oil shall be disposed of ashore by Contractor in an environmentally safe manner as per local, provincial, and federal requirements. Proof of this disposal shall be given to the Chief Engineer by way of invoice or other pertinent documentation.
8. Both hand-hole covers shall be removed. Reservoir immersion heater elements shall be cleaned. The internals of each tank shall be wiped cleaned and visually inspected by the Chief Engineer prior to final closing. New Contractor supply oil resistant gaskets shall be installed on each hand-hole cover.
9. Both pump suction strainers shall be opened out and cleaned/replaced as required. Common pressure filter and return filters shall be renewed.
 - a. Return filter Part # Parker 933816Q
 - b. Pressure filter Part # Parker 932679Q
 - c. Suction Filter – axial pump Part # Stauff TFS-200-0-P
 - d. Suction filter – gear pump Part # Stauff TFS-120-0-P
10. The oil reservoir level gauge shall be removed, dismantled, cleaned, and installed using new gaskets/seals.
11. The desiccant air breather cartridge (Stauff, SDB93) shall be renewed.
12. While the oil reservoir is open, the low oil level pump motor cut-out switch shall be tested for correct operation with the Electrical Officer in attendance. Motors shall be disconnected for this test.
13. The winch gearbox shall be drained (19 liters) with oil being disposed of ashore as per above and an oil sample shall be sent away as per the reservoir, complete with report. The gearbox shall be refilled with new oil, Esso Ultima EP 68, upon completion of all work.
14. All 12 hydraulic hoses shall be drained, removed, and replaced with new similar units, complete with new fittings as per existing. Copies of manufacturer's compliance certificates for each hose shall be given to the Chief Engineer. All hose openings shall be suitably plugged/capped to prevent the ingress of dirt and debris until the hoses are installed on the davit system. All new hoses shall have jackets fitted to prevent UV deterioration. An allowance of \$9,000 shall be made to cover the cost of hydraulic hoses fittings, and associated hardware. This allowance shall

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

form part of the overall contract bid. Allowance shall be adjusted up or down upon proof of invoice by PWGSC 1379 action.

15. Contractor shall supply all equipment, fittings, hardware, filters, manpower, etc. to carry out a full system filter/flush. This shall include the services or subcontracting of a certified hydraulics technician to carry out the work. Flushing oil shall be supplied by Contractor and disposed of in an environmentally safe manner upon completion of all work. The davit system shall be flushed and filtered down to 10 micron status. Contractor shall have periodic oil samples tested to determine the status of flushing/filtering. Copies of final oil cleanliness certificates shall be given to the Chief Engineer.
16. Upon completion of all work, the unit shall be filled with new oil, Petrocanada Hydrex MV36. Reservoir shall be filled via filter cart with a 3 micron absolute with 200 Beta rating.
17. Upon completion of all operational testing, Contractor shall take an additional oil sample and send away for analysis complete with report.

DAVIT COMPONENTS

18. Contractor shall disassemble the davit system A-frame and associated components for cleaning, inspection, repairs, and load/NDT testing as per Marine Safety requirements. Components shall include those fitted to the A-frame structure, wire ropes, deck mounting brackets and associated pins, luffing cylinders, flagging sheaves, and fixed sheaves. All A-frame components shall be assembled and installed in good order upon completion of all work.
19. Component weights:
 - a. A-frame structure 10.0 tonnes.
 - b. A-frame aft leg 1.8 tonnes
 - c. A-frame fwd leg 1.8 tonnes
 - d. A-frame cross beam 2.6 tonnes
 - e. Luffing cylinder 450 kg ea
20. Various fasteners require replacement and are generally 8.8 grade zinc plate steel. Torques shall be applied to all fasteners as per the manufacturer's table if not specified.

WIRES

21. The davit wires shall be removed by Contractor's personnel prior to locking out the davit system. Wires shall be run out and disconnected at the winch barrel ends. All wires shall be tagged and identified by the Contractor. All reaving shall be noted. Contractor shall supply personnel to aid the Marine Safety Inspector in the inspection of the wires. Upon completion of all work, the wires shall be mechanically fastened at the winch drum end and reaved onto the system. All reaving shall be done to the satisfaction of Chief Officer.
22. New owner supplied (GSM) wires, on order, shall be installed if received in time. Contractor shall check with the Chief Officer to determine the status of delivery prior to installing the

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

existing wires. Existing wires shall be disposed of ashore by Contractor pending the installation of new wires.

FIXED SHEAVES

23. The fixed sheave assembly shall be removed from the A-frame for disassembly, cleaning, inspection, and measurements as per the flagging sheave assemblies. All M24 fasteners shall be renewed and torqued to 636 Nm. Loctite 270 shall be applied to the side lock screws. The grub screws fitted to the dimple shaft shall be torqued to 124 Nm.

DECK BRACKETS

24. The A-frame shall have all deck bracket pins and both luffing cylinder rod end pins withdrawn, while fully supporting the A-frame assembly (10.0 tonnes) at all times. A-frame assembly shall be lifted ashore and blocked/supported as per the manufacturer's drawings during all work.
25. Each of the 4 deck brackets and components shall be disassembled, cleaned, and inspected for wear and defects. All grease passages shall be proven free and clear. New grease nipples shall be installed in place of existing units.
26. Each heel pin, luffing cylinder deck pin, and luffing cylinder rod end pin shall be cleaned, inspected for defects, and measured in 6 locations as per the sheaves. All reading shall be recorded. Each corresponding bushing/bearing surface shall be cleaned, inspected for wear and defects. Readings shall be recorded in the final report.
27. The deck bracket fasteners shall be renewed with Contractor supply fasteners, one at a time, so as not to disturb the alignment of the system.
- a. Heel pin bracket hold down bolts: 16 x M24 @ 650 Nm
 - b. Luffing cylinder bracket hold down bolts: 12 x M30 @ 1300 Nm

LUFFING CYLINDERS

28. Each luffing cylinder shall be removed ashore to Contractor's facilities. Each spherical self-aligning bearing at the cylinder rod end and cylinder clevis shall be cleaned, inspected, and measured for wear/defects. Each pin shall have its associated lock removed and each pin shall be withdrawn to permit removal of both cylinders. Pins shall be identified to prevent inadvertent swapping of pins. Both cylinders shall be supported at all times and the piston rods shall not be used for support or movement of the unit.
29. Contractor shall ensure that there is no system pressure remaining, prior to hydraulic cylinder removal. Each cylinder shall be removed and landed ashore. Both cylinders shall be transported to Contractor's facilities for disassembly, cleaning, inspection, and overhaul.
30. Contractor shall disassemble both hydraulic cylinders. All components shall be cleaned and laid out for inspection. Precautions shall be taken to prevent interchanging components. Cylinder bore, rod, piston, gland, etc. shall be inspected for wear and defects. All pin and cylinder connection bores shall be measured at 6 locations (2 at each end and 2 in the middle at 90

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

degrees apart). All readings shall be recorded and entered into the final report. All defective parts shall and new OEM piston and gland seal kits shall be supplied and installed by Contractor. Seal kit Part # IOA-SKGC4617 (1-9). Contractor shall remove and install two sets of the over-center valves on each hydraulic cylinder Part # SKGC 4617-22.

31. Grease passages in each hydraulic cylinder pin bores shall be proven clear and free. Any defective grease fittings shall be renewed with similar fittings.
32. Marine Safety Inspector and Chief Engineer shall be present for the inspection of components.
33. Both cylinders shall be assembled and returned to the vessel upon completion of all work. The cylinders shall be attached with their respective original pins. All applicable fasteners and pins shall be locked. All fasteners shall be torqued accordingly and all threaded fasteners shall be coated with anti-seize compound.
34. All fittings shall be wrapped in Denso tape upon completion of work. New Contractor supplied seals and o-rings shall be installed on all connections.
35. Contractor shall include an allowance of \$8,000 to cover the cost of labour, transportation and for services to rechrome each cylinder rod. This allowance shall form part of the bid. Final cost shall be adjusted by PWGSC 1379 action upon proof of final invoice.

CROSSBEAM

36. Contractor shall renew the 28 x M24 @ 721 Nm fasteners on both of the crossbeam flanges. Renewal shall be done one bolt at a time so as to not disturb the alignment of the structural members.

WINCH BARREL MOUNTING BRACKETS

37. Contractor shall renew 16 x M24 @ 721 Nm winch barrel mounting bracket fasteners used to secure the winch to the aft A-frame leg.

2.2 Location

1. The Caley Barge Davit is located on the Boat Deck, Starboard side.

2.3 Interferences

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

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Manufacturer:
 - a. Caley Ocean Systems Ltd.

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

- b. Ph: +44 (0) 1355 246626
- c. Fx: +44 (0) 1355 229359
- d. Email: caley_ocean_systems@compuserve.com
- 2. Job #:4373
- 3. Model:18 Ton Barge Launch and Recovery Davit

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

3.4 Owner Furnished Equipment

- 1. Unless otherwise stated, Contractor shall supply all materials, labour, and equipment required to complete all specified work.

4: PROOF OF PERFORMANCE:

4.1 Inspection

- 1. See below.

4.2 Testing

- 1. Upon completion of all work Contractor shall carry out operational testing and system load testing. Contractor shall supply certified weights as well as all appliances, hardware, and manpower necessary to load test the derrick system using certified weights. All test equipment used, as well as weights, shall have verification and applicable test certificates and Contractor shall show these to the inspector or Chief Engineer as requested. Equipment, materials, etc not having applicable certification shall not be used, and the testing shall not proceed until as such time as authentication can be provided.
- 2. Prior to load testing, the davit system shall be proven operational.
- 3. Safe working load of the system is 18.0 tonnes. System shall have a function load test carried out. Contractor shall supply and attach a 9.9 tonne weight to each fall wire for a total of 19.8 tonnes. The system shall then be operated to demonstrate a function load test. All testing shall be carried out to the satisfaction and specifications of the attending TCMS Surveyor. Prior to the actual test, Contractor shall confirm with the Surveyor that the weights and test method are satisfactory.
- 4. Upon completion of load testing, Contractor shall carry out non-destructive testing on various assembly welds and components as per the directions of the attending Marine Safety Surveyor. Contractor shall use a certified NDT technician or sub-contract to a certified NDT company.
- 5. Contractor shall include in the bid, 100 linear feet of NDT as well as a quote per additional foot. This price shall include preparations for the weld areas, actual dye-penetrant inspection using

CCGS Edward Cornwallis
August, 2015 Refit
E-07 – Barge Davit Survey

the technician's services, and subsequent priming and two top coats of coating. Top coatings shall be as per existing grade and colour.

6. Upon completion of all NDT, Contractor shall include in the overall work report, the results of the tests such as locations and results.
7. All locations chosen for NDT shall be at the direction of the attending Marine Safety Inspector.

4.3 Certification

1. TCMS Surveyor certification for division 3 credit under reference # 2J0180 shall be provided upon completion of this specification.
2. Manufacturers certification of safe operation shall be obtained from the FSR.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall supply 4 computer generated reports upon completion of all work. The report shall at a minimum list all work undertaken, repairs, parts used, measurements, readings, etc.
2. A load test certificate and report shall be provided to Chief engineer upon completion of testing.

5.2 Spares

1. Any remaining spare parts that were purchased but not used for this specification shall be supplied to the Chief Engineer for onboard spares.

5.3 Training

N/A

E-08 – Miranda Davit New Motor & Annual Survey

1: SCOPE:

The intent of this specification shall be to install a new GSM hydraulic motor and valve block to the Miranda Davit, as well as complete an annual survey, as per manufacturer recommendations.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall obtain the services of a qualified Schat-Harding Field Service Representative.
 - a. Contractor shall provide all equipment, hardware, personnel, etc to carry out the required work under the direction and guidance of the FSR.
 - b. Contractor shall obtain certification for the FSR from Schat-Harding.
2. Contractor shall allow \$15,000 for the services of the attending FSR and Contractor shall provide a fee schedule from Schat-Harding for the services of the FSR. This info shall be included in the PWGSC data pricing sheet. Final costs for the FSR, as well as parts and materials shall be adjusted up/down separately via PWGSC 1379 action, upon proof of invoices.
3. Contractor shall remove the hydraulic motor and valve block from the MRT 3900, and replace with new GSM materials. The old motor may be discarded, and the valve block returned to Chief Engineer.
 - a. The existing motor pinion gear, along with all existing hoses, pipe, and hose/pipe fittings shall be reused on assembly.
 - b. FSR shall set the new relief valves and load control valves to the settings currently used with the existing davit.
4. All manufacturer's procedures and recommendations shall be followed during the scope of all work with all technical specifications being adhered to as a minimum by Contractor.
5. Contractor shall arrange for scheduling the onsite presence of a Transport Canada Marine Surveyor as required for inspections and/or testing throughout the course of all work.
6. Upon successful completion of all tests, Contractor shall supply and wrap the entire new valve block and fitting with Denso Tape.
7. Contractor shall supply all the necessary staging and craneage as required to work on, remove, transport, and install the various components during this overhaul. All personnel working on the davit system shall be suitably trained in fall restraint and all fall restraint equipment shall be certified and current.

2.2 Location

1. The davit is located on the Flight and Boat Deck, Port side.

E-08 – Miranda Davit New Motor & Annual Survey

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Miranda type MRT 3900
2. Winch type BHY 5300
3. Manufacturer Contact Info:
Contact: Colin Edwards
Umoie Schat-Harding Inc.
16160 78B Avenue
Surrey, British Columbia
V3S 7H9
Tel: 1-604-543-0849
Fax: 1-604-543-0829
E-mail: schat-harding@telus.net

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Prior to the commencement of any and all work, Contractor shall lock out the power pack unit, associated 110 volt condensation heaters, and the oil reservoir immersion heater as per the Coast Guard ISM Safety Lockout Procedure 7.C.1.M S36-01 safety code. Contractor shall install & remove locks and tags accordingly during the scope of work. The Electrical Officer will assist Contractor in locating locations to perform the lock outs but will not perform the actual lock out.
3. Contractor shall supply and install their own locking devices and retain all keys during the scope of this work.

3.4 Owner Furnished Equipment

1. The hydraulic motor and valve block shall be GSM. Part # M7500 A767 AD NK25-6 complete with new load control valves and relief valves.
2. Unless otherwise stated, Contractor shall supply all materials, equipment and parts required to perform the specified work.

E-08 – Miranda Davit New Motor & Annual Survey

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. FSR shall be responsible for all components of inspection for certification.
2. TCMSB Surveyor shall update the vessel's Current Data Report under field # 2J0180 to reflect current condition of the davit.

4.2 Testing

1. Upon completion of installation, FSR shall conduct a load test, with assistance from Contractor. Contractor shall supply the test weights required for the FSR to conduct the load test, and make arrangements to have TCMSB present during the load testing of the davit.

4.3 Certification

1. After successful completion of all tests, FSR shall provide certification of safe operation for lifesaving equipment.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. All documentation shall be provided to demonstrate OEM compliance. No materials substations shall be undertaken without the expressed written consent of Schat-Harding.
2. Contractor shall supply Chief Engineer with a digital copy, as well as four printed copies of a computer generated report upon completion of all work from the FSR prior to leaving dry-dock. All documents, including drawings and measurements taken shall be provided to CGTA in computer generated form. The report shall at a minimum list all work undertaken, repairs, parts used, measurements, readings, etc.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

1: SCOPE:

The intent of this specification is to survey the Schat Harding Lifeboat Davit system, for a Marine Safety quadrennial inspection and testing. In addition, the lifeboat shall receive an annual inspection as per Schat's recommendations.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall obtain the services of a qualified Schat-Harding Field Service Representative. Contractor shall provide all equipment, hardware, personnel, etc to carry out the required work under the direction and guidance of the FSR. Contractor shall obtain certification for the FSR from Schat-Harding.
 - a. Contact: Colin Edwards
 - b. Umoe schat-harding Inc.
 - c. 16160 78B Avenue
 - d. Surrey B.C.
 - e. V3S 7H9
 - f. Tel: 1-604-543-0849
 - g. Fax: 1-604-543-0829
 - h. e-mail: schat-harding@telus.net
2. Contractor shall include an allowance of \$10,000 for to cover the travel and living expenses of a Schat-Harding FSR. The FSR shall 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 shall form part of the overall bid and shall be adjusted by 1379 action upon proof of final invoice.
3. All manufacturer's procedures and recommendations shall be followed during the scope of all work with all technical specifications being adhered to as a minimum by the Contractor. Contractor shall arrange for scheduling the on-site presence of a Marine Safety Inspector as required for inspections/testing during the course of all work.
4. Contractor shall supply all the necessary staging and cranage as required to work on, remove, transport, and install the various components during this overhaul. All personnel working on the davit system shall be suitably trained in fall restraint and all fall restraint equipment shall be certified and current.
5. Prior to the commencement of any and all work, Contractor shall lock out the power pack unit, associated 110 volt condensation heaters, and the oil reservoir immersion heater. Contractor shall install /remove locks and tags accordingly during the scope of work. Electrical Officer will assist Contractor in locating locations to perform the lock outs but will not perform the actual lock out. Contractor shall supply and install their own locking devices and retain all keys during the scope of this work. Contractor shall isolate and lockout the hydraulic system associated with

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

the lifeboat davits. Condition of the hydraulic hoses shall be noted. Any defective hoses shall be brought to the attention of the Owners Rep.

6. All open fittings shall be capped or plugged to prevent entry of foreign objects and dirt. Care shall be taken of through deck fittings and tubing to ensure they are not damaged while working on davit components.
7. The lifeboat shall be removed by Contractor for storage. Contractor shall provide all equipment, manpower, etc to remove and land the lifeboat ashore and place it contractor supplied boat chocks ashore. The lifeboat and davit arms cradle shall be transported to the Contractor's facilities. Contractor shall store the boat in a location in the contractor facility where it will not be damaged or painted by overspray from the vessel's painting and sandblasting. Contractor is responsible for any damage to the lifeboat.
8. The Lifeboat Davit system and components shall be disassembled, cleaned, inspected for wear and defects, and reassembled in good order upon completion of all work. Hydraulic luffing cylinders shall be disconnected from the davit arms. The davit arm hinge pins shall be removed. Davit arms shall be placed on deck and suitably supported to allow inspection of hinge pin bearings in the arms and the hinge bases.

DAVIT ARMS

9. Contractor shall prepare and paint the davit arms.
10. All preparation work, cleaning, priming, and painting shall be as per the Manufacturers (Amercoat Canada) instructions and specifications for their products (see Amercoat Canada specifications and instructions included in this Specification package, Appendix D).
11. Two primer coats of Amerlock 2 epoxy (1st one grey and the 2nd one white) and a top coat of Amercoat 5450 Marine Enamel White (Contractor Supplied) shall be applied, as per Amercoat Canada specifications.

DECK BRACKETS

12. Each davit arm deck bracket pins (4 pins total) locking devices shall be removed and each pin withdrawn, while fully supporting the each davit arm assembly at all times.
13. Each of the 2 deck brackets and components shall be disassembled, cleaned, and inspected for wear and defects. All grease passages shall be proven free and clear. New grease nipples shall be installed in place of existing units.
14. Each heel pin shall be cleaned, inspected for defects, and measured in 6 locations as per the sheaves. All reading shall be recorded. Each corresponding bushing/bearing surface shall be cleaned, inspected for wear and defects. Readings shall be recorded in the final report.
15. Each of the deck bracket fasteners shall be renewed with Contractor supply fasteners.
16. It may be necessary to remove each pin, one at a time for servicing. Work shall be carried out as per the recommendations of the FSR.

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

SHEAVES & PULLEYS

17. All sheaves, blocks, and shock absorbers shall be stripped out for cleaning, examinations, and survey by TSMB surveyor. Grease ways in all pins and pin hinges shall be proven clear. Particular attention is shall be paid to the block hinge pins in the davit arm heads to ensure that the grease ways are clear. The list of blocks, pins, and sheaves is as follows:
 - a. 2 each - blocks (on davit arms)
 - b. 2 each - axles for blocks
 - c. 2 each - limit switch operators
 - d. 2 each - shock absorber / becket end assemblies
 - e. 11 each - sheaves (on davit arms)
 - f. 2 each - sheaves (on deck)
 - g. each - davit arm heel pins (two per arm)
 - h. each - pins for luffing cylinders
 - i. 2 each - gripe levers
18. There are 14 pulleys and 2 blocks that will require inspection and servicing. Contractor shall remove all blocks and pulleys. Removed items shall be disassembled for cleaning and inspection.
19. All sheaves and pulleys with associated components shall be kept as units. Contractor shall mark and identify all components to prevent inadvertent swapping of components. All units shall be reassembled and installed in their respective subsequent locations upon completion of all work.
20. Measurements shall be taken of all pins and bushings. Defects/excessive wear shall be noted and brought to the attention of Chief Engineer. All defects shall be repaired and noted in the final service report. Contractor shall arrange for the viewing of applicable components by a Marine Safety Inspector when items are ready for viewing.
21. Each sheave assembly shall be totally disassembled, including associated subcomponents. Each component shall be cleaned and laid out for inspection by the attending Marine Safety Inspector. All grease passages shall be proven clear. All new grease nipples shall be installed in place of existing units. All defective components shall be repaired/renewed as determined by Chief Officer and Inspector.
22. All pin diameters shall be measured in way of each bearing surface. The measurements shall be taken at each pin end, in the middle, and at 90 degrees to each position, for a total of 6 measurements per bearing surface. Each pin bushing bore shall be measured in the same manner.
23. Upon completion of examination and survey, all items shall be assembled in good order. Grease ways in all pins proven clear
24. All the foregoing measurements shall be recorded in the final report.

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

GEARBOX AND WINCH

25. The winch gearbox shall be drained (19 liters) with oil being disposed of ashore as per reservoir and an oil sample shall be sent away as per the reservoir, complete with report.
26. Davit winch shall be opened up for cleaning and examination of brake linings. In addition, both centrifugal and disc brake assemblies shall be opened up for inspection.
27. All gears shall be visually inspected for wear and defects.
28. The gearbox shall be refilled with new Contractor supply oil, Esso Ultima EP 68, upon completion of all work. A new cover gasket shall be supplied and fitted by the Contractor.

HYDRAULIC POWER PACK RESERVOIR

29. All Denso tape that is removed to carry out the following work shall be discarded and new Contractor supply tape shall be installed upon completion of all work.
30. An oil reservoir sample shall be taken and sent ashore for analysis by the Contractor. The analysis results shall be given to Chief Engineer upon receipt. Contractor shall drain the reservoir of all oil, approximately 400 liters. Oil shall be disposed of ashore by Contractor in an environmentally safe manner as per local, provincial, and federal requirements. Proof of this disposal shall be given to the Chief Engineer by way of invoice or other pertinent documentation.
31. The hand hole cover shall be removed. Tank internals shall be wiped cleaned and visually inspected by Chief Engineer prior to final closing. New Contractor supply oil resistant hand hole gasket shall be installed.
32. Contractor shall supply all equipment, fittings, hardware, filters, manpower, etc. to carry out a full system filter/flush. This shall include the services or subcontracting of a certified hydraulics technician to carry out the work. Flushing oil shall be supplied by Contractor and disposed of in an environmentally safe manner upon completion of all work. The davit system shall be flushed and filtered down to 10 micron status. Contractor shall have periodic oil samples tested to determine the status of flushing/filtering. Copies of final oil cleanliness certificates shall be given to the Chief Engineer.
33. Upon completion of all work, the unit shall be filled with new oil, Petrocanada Hydrex MV36. Reservoir shall be filled via filter cart with a 3 micron rating.
34. Upon completion of all operational testing, Contractor shall take an additional oil sample and send away for analysis complete with report.

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

HOSE RENEWAL

35. All hydraulic hoses shall be drained, removed, and replaced with new similar units, complete with new fittings as per existing. This shall include hoses on the davit components as well as the hand pumping station. Copies of manufacturer's compliance certificates for each hose shall be given to Chief Engineer. All hose openings shall be suitably plugged/capped to prevent the ingress of dirt and debris until the hoses are installed on the davit system. All new hoses shall have jackets fitted to prevent UV deterioration. All materials are Contractor supply. An allowance of \$7,000 shall be made to cover the cost of hydraulic hoses fittings, and associated hardware. This allowance shall form part of the overall contract bid. The allowance shall be adjusted up or down upon proof of invoice by PWGSC 1379 action.

LUFFING CYLINDERS

36. Each luffing cylinder shall be removed ashore to the Contractor's facilities. Each spherical self-aligning bearing at the cylinder rod end and cylinder clevis shall be cleaned, inspected, and measured for wear/defects. Each pin shall have its associated lock removed and each pin shall be withdrawn to permit removal of both cylinders. Pins shall be identified to prevent inadvertent swapping of pins. Both cylinders shall be supported at all times and the piston rods shall not be used for support or movement of the unit.
37. Contractor shall ensure that there is no system pressure remaining, prior to hydraulic cylinder removal. Each cylinder shall be removed and landed ashore. Both cylinders shall be transported to the Contractor's facilities for disassembly, cleaning, inspection, and overhaul.
38. Contractor shall disassemble both hydraulic cylinders. All components shall be cleaned and laid out for inspection. Precautions shall be taken to prevent interchanging components. The cylinder bore, rod, piston, gland, etc. shall be inspected for wear and defects. All pin and cylinder connection bores shall be measured at 6 locations (2 at each end and 2 in the middle at 90 degrees apart). All readings shall record and entered into the final report. All defective parts shall be renewed, Contractor supply. New OEM piston and gland seal kits shall be supplied and installed by Contractor.
39. Grease passages in each hydraulic cylinder pin bores shall be proven clear and free. Any defective grease fittings shall be renewed with similar fittings.
40. Marine Safety Inspector and Chief Engineer shall be present for the inspection of components.
41. Both cylinders shall be assembled and returned to the vessel upon completion of all work. The cylinders shall be attached with their respective original pins. All applicable fasteners and pins shall be locked. All fasteners shall be torqued accordingly and all threaded fasteners shall be coated with anti-seize compound.
42. All fittings shall be wrapped in Denso tape upon completion of work. New Contractor supplied seals and o-rings shall be installed on all connections.

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

43. Contractor shall include an allowance of \$8,000 to cover the cost of labour, transportation and for services to rechrome each cylinder rod. This allowance shall form part of the bid. Final cost shall be adjusted by 1379 action upon proof of final invoice.
44. Contractor shall confer with the FSR as to the necessity for carrying out the work required on the luffing cylinders and shall only carry out as much work as deemed necessary by the FSR. The foregoing is a list of anticipatory work required. The FSR and attending Marine Safety Inspector shall be the final authority on work required.

LIFEBOAT HOOKS

45. While the Lifeboat is off the vessel, the two (2) existing release hooks shall be renewed with new GSM LHR-6 release hooks. Contractor, under FSR supervision, will remove the existing release hooks and install the new release hooks. As per section H-5.8 of this specification Contractor shall provide all equipment, hardware, personnel, etc. to carry out the required work and testing of the new release hooks under the direction and guidance of the FSR.

LUBRICATION POINTS

46. Prior to functional testing. All grease points shall be suitably greased with Unirex EP2 grease, Contractor supply.
47. All oils and lubricants shall be Contractor supply.
48. The cost of all craneage and transportation of components shall be provided and arranged by Contractor. All costs shall be included in the overall quote.
49. Contractor shall supply 4 typewritten reports upon completion of all work. The report shall at a minimum list all work undertaken, repairs, parts used, measurements, readings, etc.
50. All documentation shall be provided to demonstrate OEM compliance. No materials substations shall be undertaken without the expressed written consent of Schat-Harding.

2.2 Location

1. The Schat Lifeboat Davit is located on the Boat deck, Stbd side.

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.

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

Davit: Schat, LB Davit 13972
Schat Winch # 2303
Type: BE 4500
Lifeboat: Watercraft, 50 person, LB #9012975
Hooks: Mills Titan

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other relevant standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment, and transportation required to complete all requirements of this specification shall be Contractor supply.

4: PROOF OF PERFORMANCE:

4.1 Inspection

See testing section below.

4.2 Testing

1. Upon completion of all work Contractor shall carry out operational testing and system load testing. Contractor shall supply certified weights as well as all appliances, hardware, and manpower necessary to load test the system using certified weights. All test equipment used, as well as weights, shall have verification and applicable test certificates and Contractor shall show these to the inspector or Chief Engineer as requested. Equipment, materials, etc not having applicable certification shall not be used, and the testing shall not proceed until as such time as authentication can be provided.
2. Prior to load testing, the davit system shall be proven operational.
3. A functional test shall be performed with the Lifeboat. Boat shall be lowered with Contractor supplied certified weights. A weight of 4,526.5 kg shall be put in the boat to perform the test. Lowering speed shall be noted. Both manual & hydraulic systems shall be checked. Release hook and suspension chain shall be inspected and tested. Contractor shall arrange for the services of the Marine Safety Inspector.
4. Upon completion of load testing, Contractor shall carry out non-destructive testing.

CCGS Edward Cornwallis
August, 2015 Refit
E-09 – Lifeboat Davit

5. Testing on various assembly welds and components as per the directions of the attending Marine Safety Surveyor. Contractor shall use a certified NDT technician or sub-contract to a certified NDT company.
6. Contractor shall include in the bid, 100 linear feet of NDT as well as a quote per additional foot. This price shall include preparations for the weld areas, actual dye-penetrant inspection using the technician's services, and subsequent priming and 2 top coats of coating. Top coatings shall be as per existing grade and colour.
7. Upon completion of all NDT, Contractor shall include in the overall work report, the results of the tests such as locations and results.
8. All locations chosen for NDT shall be at the direction of the attending Marine Safety Inspector.

4.3 Certification

1. See above.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A detailed report including all work carried out, shall be provided to Chief Engineer.
2. A paint quality assurance report shall be provided for each layer of paint applied.
3. A test report shall be provided to Chief Engineer indicating all tests performed, time of test, the weights used, and the duration of test.

5.2 Spares

1. Any spare parts remaining after all work has been completed shall be provided to the Chief Engineer.

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-10 – Liferaft Annual Inspection

1: SCOPE:

The intent of this specification is to perform annual servicing and certification of the vessel's life rafts and hydrostatic releases.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the liferafts and their hydrostatic releases from their stowed positions on the vessel and transport them to and from the sub-contractor's premises for servicing.
2. Contractor shall subcontract the annual inspection and recertification of the liferafts by an approved Transport Canada service facility that meets OEM certification.
3. An allowance of \$15,000 shall be provided for the sub-contractors work. This allowance shall be adjusted up or down via PWGSC 1379 action upon proof of invoice.
4. Contractor shall be responsible for ensuring the liferafts are witnessed by TCMS Surveyor as required and for providing certificates for the life rafts as appropriate.
5. Contractor shall return the liferafts and their hydrostatic releases to the stowed position on the vessel.

2.2 Location

1. See references section.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

DESCRIPTION	LOCATION	SERIAL #
Viking 25 Persons	Boat Deck Port	11466421
Viking 25 Persons	Boat Deck Port	11466418
Viking 25 Persons	Boat Deck Port	11466420
Survitec SAS 6 Persons	Barge	XDC 4FS42A515
DSB 12 Persons	Bridge Deck Port	53102

CCGS Edward Cornwallis
August, 2015 Refit
E-10 – Liferaft Annual Inspection

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)

3.4 Owner Furnished Equipment

1. Unless otherwise specified, all materials, labour, and equipment required to complete all specified work shall be Contractor supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall subcontract the annual inspection and recertification of the liferafts by an approved Transport Canada service facility that meets OEM certification.

4.2 Testing

1. Inspection and testing required for certification is sub-contractor's responsibility.

4.3 Certification

1. Sub-Contractor shall provide all test certificates, and endorsement of safe operation required by TCMS for certification in vessel's Division 3.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide a listing of the work that was performed including 'as found and as left condition'.
2. Certificates and work description are provided to the Commanding Officer.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-11 – Starboard Mooring Winch

1: SCOPE:

The intent of this item shall be to have the Starboard Forward Mooring Winch removed and dismantled for inspection and repair.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The Mooring Winch unit shall be disconnected, both hydraulically and mechanically, and removed from vessel to be taken to an accredited Hydraulic service/repair facility for inspection and overhaul.
2. The contractor shall completely open the winch unit for inspection and cleaning.
 - a. The Hagglund motor shall be removed from winch assembly and disassembled for inspection.
 - b. Shaft bearings shall be opened up for inspection.
 - c. New seals kits, main shaft seals and new seal wear rings shall be supplied and installed by the contractor.
3. Contractor shall include in their quote the cost of machining and the supply of new seal rings, drum bearings and seals and the labour to install.
4. Mechanical cleaning of the brake surface shall be carried out by the contractor. This brake drum shall be cleaned as per SSPC-SP3 standards.
5. Contractor shall inspect the clutch assembly and brake lining for defects. Contractor shall include in their cost the supply and install of new brake pads on the winch.
6. Contractor shall fabricate and supply two (2) new pins and a mechanical adjuster for the winch brake assembly.
7. If other parts or labour is required beyond the scope of this specification the contractor shall notify the Chief Engineer for approval and supply a separate quote.
8. Contractor shall mechanically clean the winch base while the winch is removed to SSPC-SP3 standards. The dissembled winch and covers shall be grit blasted to SSPC-SP6. Both the winch and the winch base shall be painted with two coats of Amercoat 235 (Buff).
9. Contractor shall repair the cover in way of noted deterioration around the bottom cover bolts and along the edge of the cover.
10. The winch/motor shall be re-assembled in good order and a functional test shall be carried out on the complete winch assembly on a test stand. Functional test shall be witnessed by the Chief Engineer.
11. The winch unit shall be returned to the vessel and installed using new contractor supplied holding bolts (Grade 8) and fasteners. Contractor shall replace existing hydraulic hoses on unit with new, specs as per the existing hoses. All hydraulic connections shall be completely wrapped with Denso Tape.

E-11 – Starboard Mooring Winch

2.2 Location

1. The winch assembly is installed on the deck above the foc'sle area.
2. The hydraulic power pack and electrical switchgear is inside the foc'sle.

2.3 Interferences

1. None identified.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Mfg: Pacific Winch Ltd.
2. Serial No. Stbd Fwd – 56-3B-3-P

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall employ proper safety lockout procedures before work on any Hydraulic component takes place. Isolation of unit shall be accomplished both electrically, and mechanically and at the pump isolation valves.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, Contractor shall supply all materials, labour, equipment, and transportation required to complete all requirements of this specification.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. All required inspections are identified in section 2.1 of this specification.

4.2 Testing

1. Upon reassembly of the winch/motor assembly in Contractor's workshop, a functional test shall be carried out on the complete winch assembly on a test stand. Functional test shall be witnessed by the Chief Engineer.
2. Upon installation, winch/motor unit shall be test run and load tested to prove proper operation by Ship's Personnel.

4.3 Certification

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-11 – Starboard Mooring Winch

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Upon successful completion of all specified work, contractor shall provide the Chief Engineer with three (3) typewritten copies of a service report. This report shall detail all work carried out, any defects found and repaired, and all readings obtained and parts used during the course of the work detailed herein.

5.2 Spares

N/A

5.3 Training

N/A

E-12 – Aviation Gas System Valves

1: SCOPE:

The intent of this item shall be to have the following three valves removed from their locations on the Aviation Fuel Tank, and be dismantled for inspection:

- | | |
|---|--------|
| A. VACUUM RELIEF VALVE (1.5") | 1 each |
| B. SERVICE PRESSURE RELIEF VALVE (1.5") | 1 each |
| C. FULL FIRE ENGULFMENT VALVE (6") | 1 each |

2: TECHNICAL DESCRIPTION:

2.1 General

1. These valves shall be sent to the following certified testing facility. No substitutions by the contractor will be accepted. Contractor is responsible for all shipping and transportation costs associated with shipping and receiving the three valves along with the certificates.
Mobile valve (A source Atlantic Company)
140 Highway 1, PO Box 90
Mount Uniacke, Nova Scotia
B0N 1Z0
Ph. (902) 866-0719
Fax (902) 866-0236
2. While valves are removed from their locations, all openings to the fuel system shall be protected from dirt ingress.
3. All valves shall be cleaned, and all sealing surfaces shall be checked for wear. Contractor shall supply and install new flange gaskets on all valves. Gaskets shall be ANSI B16-21 C.A.F. with P.T.F.E. envelopes. Quantity required is two each per valve. No substitutions for material will be allowed without the express written permission from the Chief Engineer.
4. After valves have been overhauled and delivered to Contractor, they shall be reinstalled in their original locations. Valve relief pressure settings shall be set to:
 - a. VACUUM RELIEF VALVE 15 PSIG
 - b. SERVICE PRESSURE RELIEF VALVE 13 PSIG
 - c. FULL FIRE ENGULFMENT VALVE 0.5" HG
5. The helicopter refuelling hose shall be removed to Contractor's facility for testing purposes, and reinstalled aboard vessel upon testing completion. The hose shall be pressure tested with a liquid medium compatible with "JET A-1" aviation fuel, at 150 PSI (10.2 Bar) pressure which shall be maintained for no less than one hour. The hose shall be visually examined for defects while under test.
6. The flame arrestor screen on the vent pipe end shall be removed for cleaning and inspection. Care shall be taken to prevent damage or distortion to the screen mesh in any manner. The screen elements shall be washed in solvent solution, and blown through with compressed air

E-12 – Aviation Gas System Valves

upon completion until dry. No mechanical means shall be used to clean the screen elements. After drying has been completed, the screen shall be reinstalled in good order.

2.2 Location

1. The Aviation fuel system is located on the boat deck aft, port side.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. NOTE: Valves (A) and (B) are in-line types with 1.5" BSP male body. They are installed within a pair of flanges on the appropriate pipes adjacent to the top of the Aviation Fuel Tank.
2. NOTE: The flame arrestor overhangs the stern quarter of the ship. Access to service the flame arrestor screen may require a "Genie Boom" to be set up under the end of the Flight Deck.

3.2 Standards and Regulations

35T

3.4 Owner Furnished Equipment

35T

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall contact TCMSB Surveyor and arrange for inspections and testing required for Division 3 certification.

4.2 Testing

1. The testing outlined in this specification shall be a minimum, which may or may not be acceptable for TCMSB Surveyor certification. If different testing is required by TCMSB Surveyor, Contractor shall provide all materials, labour, and equipment required, which shall be tracked via PWGSC 1379 action.

4.3 Certification

1. Mobile Valve shall provide test certificates, which shall be provided to Chief Engineer.
2. TCMSB Surveyor shall provide survey credit in the vessel's division 3.

CCGS Edward Cornwallis
August, 2015 Refit
E-12 – Aviation Gas System Valves

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall provide test certificates for all valves and the fuel hose.
2. All certificates shall state final test pressures.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-13 – Fixed Fire Fighting Systems

1: SCOPE:

Contractor shall arrange for inspection, testing and recertification of vessel's fixed fire detection and extinguishing systems, as described and listed below, by an authorized service provider. Proof of credentials and certification of service provider shall be made available to Chief Engineer.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall tender for a service provider, with current certification to service a "Notifier" brand fire detection system, to complete all work as outlined in the specification including all Travel and Living expenses.
2. No components or parts shall be replaced without the written consent of the Chief Officer. Any removed parts shall be turned over to Chief Officer.
3. All systems shall be left in an operational condition overnight, unless written permission has been provided by the Chief Engineer.
4. Contractor shall inform Chief Engineer prior to making any system inoperable due to maintenance/inspection. All bottles shall be disconnected before tests are completed.
5. Final inspection of completed work shall be undertaken by Contractor's charge hand in the presence of the designated Ship's Officer. All work shall be to the satisfaction of the Chief Officer and TCMSB.

Notifier Fire Detection System

6. All components of the fire detection system shall be tested.
7. All rotating beacons and flashing lights shall be tested and proven in good working order.
8. All audible alarms shall be tested and proven in good working order.
9. Any defects found shall be repaired via PWGSC 1379 action.

Fixed CO2, Wet and Dry Chemical, and FM-200 Fire Suppression Systems

10. The vessel's fixed CO2, Wet and Dry, Chemical fire suppression systems shall be inspected and certified for TCMS. The system cylinders are listed in Appendix A.
11. The vessel's Kidde Marine FM-200 fire suppression system shall be disconnected at docking, inspected and certified for TCMS, and reconnected prior to undocking. The system cylinders are listed in Appendix B.
12. All weights, levels, and pressures of cylinders shall be measured and recorded.
13. All rotating beacons and flashing lights shall be tested and proven in good working order.
14. All audible alarms shall be tested and proven in good working order.
15. All wires and cables shall be proven in good working order.
16. All piping and nozzles shall be proven clear.
17. Any defects found shall be repaired via PWGSC 1379 action.

E-13 – Fixed Fire Fighting Systems

2.2 Location

1. The ship's fire detection system covers all areas of the ship.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Ship's Drawing # E07040 Fire Control Plan.
2. Fire Detection System consists of the following:
 - a. Notifier NFS-640 System Control Panel
 - b. 151 Smoke Detectors
 - c. 19 Heat Detectors; a combination of "rate of rise" and/or "fixed temperature"
 - d. 3 Flame Detectors
 - e. 33 Pull Station
 - f. Monitor
 - g. Bells & Visible Beacons
 - h. General Alarm Activation
 - i. Fire Door Activation

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied

CCGS Edward Cornwallis
August, 2015 Refit
E-13 – Fixed Fire Fighting Systems

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor is responsible for arranging Transport Canada Marine Safety for all firefighting and fire detection system inspections.

4.2 Testing

1. Refer to Technical Description.

4.3 Certification

1. Refer to Technical Description.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. All certificates and service reports issued by the Contractor for this work must refer to each serviced component's serial number and location on the vessel.
2. Two copies of all certification shall be passed to Chief Engineer upon completion of work.
3. Contractor shall provide annual inspection certificates for all firefighting systems.
4. Contractor shall provide service reports indicating all inspections/work carried out.

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-14 – Foam Firefighting System

1: SCOPE:

Contractor shall provide the services of a certified fire protection service company to perform annual inspection and servicing of the foam firefighting systems, as per the manufacturer's recommendations.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The system shall be inspected and certified by a Class approved, certified marine fire systems inspection agency. Certification issued shall be valid for a 12 month period. This work shall include but is not limited to:
 - a. Foam Concentrate samples and testing. (Contractor shall quote on testing 4 samples).
 - b. All monitors checked for vertical and horizontal movement
 - c. All branch piping inspected and proven clear
 - d. Lines , hoses and nozzles inspected, tested and proven clear
 - e. All valves checked for proper operation
 - f. Foam concentrate contents verified
 - g. Fire Main inspected and tested
 - h. System sealed and left in operational order, inspection date labels attached
 - i. All instruction plates inspected
2. The pressure balancing valve shall be carefully disassembled for inspection. Any deposits left by foam concentrate shall be cleaned from valve internals. After inspection, the valve shall be reassembled in correct operating condition.
3. Level and contents of foam tank shall be checked. A sample shall be taken from foam tank. Sample strength shall be tested and copies of results given to Technical Authority (or designate).
4. Integrity of diaphragm in each of the two helicopter hanger 560 gallon capacity tanks shall be proven. The Contractor shall allow \$500.00 to renew the tank manhole gaskets; this total will be adjusted by 1379 action.
5. Condition of hoses, nozzles, valves, gauges, piping, hoses and hose-reels, monitors and pumps shall be checked.
6. Correct operation of local and remote start/stop switches for foam pump and sea water pump shall be verified.
7. Upon completion of the above the system shall be secured in operational condition, with all valves in proper positions.
8. Any recharging/repairs shall be covered by 1379 action.

2.2 Location

1. Helicopter Hangar Deck Foam Systems: Nordic Steel Products (2 Tanks)
2. Wheel House Top Monitors and External Helicopter Deck Foam System (1 Tank)

CCGS Edward Cornwallis
August, 2015 Refit
E-14 – Foam Firefighting System

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Manuals are available from the Chief Engineer upon request.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor is responsible for arranging Transport Canada Marine Safety for all firefighting and fire detection system inspections.

4.2 Testing

1. Refer to Technical Description.

4.3 Certification

1. Refer to Technical Description.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Copies of the test certificates shall be forwarded to Technical Authority (or designate). Contractor shall provide certification providing characteristics of new foam concentrate, to determine acceptability. Report shall be provided to Chief Engineer for record keeping purposes. Certification shall be provided to Chief Engineer (two copies).

5.2 Spares

CCGS Edward Cornwallis
August, 2015 Refit
E-14 – Foam Firefighting System

N/A

5.3 Training

N/A

E-15 INCINERATOR RENEWAL AND SLUDGE TANK INSTALLATION

VESSEL LIFE EXTENSION WORK

General

E-15.1

Contractor shall employ the services of an authorized TeamTec Field Service Representative (FSR) to supervise the installation and commissioning of the new incinerator, associated equipment, and sludge tank.

The Teamtec Factory Service Representative shall be coordinated through Hermont Marine Inc. who are the Canadian Teamtec representatives. The contact information is:

Stephen Boyd
National Sales
Tel: (514) 856-1212 ext. 227

It is estimated that 1 TeamTec FSR shall be required for 12 days, working 10 hour days, for this project. The FSR shall 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. Contractor shall include a \$20,000 allowance for expenses incurred as described above; this allowance shall form part of the overall bid and shall be adjusted by PWGSC 1379 action upon proof of final invoice.

E-15.2

Contractor shall follow all manufacturers' installation instructions for the installation and mounting of all GFE for this specification item in order to maintain warranty of the components.

E-15.3

Contractor shall schedule the work accordingly so that no delays are incurred. If there are delays as a result of Contractor's scheduling of work, then Contractor shall be responsible for covering any additional costs associated with retaining the TeamTec FSR.

E-15.4

Contractor shall electrically and mechanically isolate the existing incinerator and remove it down to the bed frame. All electrical and mechanical lockouts and tag outs shall be carried out to the satisfaction of the CGTA as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor shall 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/FSR shall 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 shall be in attendance when all locks/tags are removed.

E-15.5

Existing wiring shall be marked as per OEM drawings prior to removal in case it can be reused. A drawing of the existing incinerator controls shall be provided to Contractor to copy. Contractor shall return the original drawing to the CGTA immediately after making a copy.

Incinerator Removals

E-15.6

Contractor shall remove the following components: incinerator casing, control panel, refractory, seal kits, pilot fuel heater, flue gas damper, flue gas fan, sludge dosage unit, burner kit, sensor and control kit, door kit, flue gas pipe expansion compensators, and counter flanges for the flue gas pipe.

E-15.7

Contractor shall disconnect all wiring (not cut), labelled and secured so as not to interfere with the removal and installation process. Any fitted cables that Contractor intends to re-use for the installation of the new incinerator shall be surveyed and megger tested by contractor prior to integration into the new circuits. Any defects shall be presented to CGTA for negotiation through PWGSC 1379 action.

For estimating purposes, Contractor shall supply 1 skilled Mechanical Technical-Welder –Fitter for 12 days, working 10 hours a day with the TeamTec FSR. In addition, it is estimated that approximately 100 hours of various skilled trades' persons shall be required at various times throughout the installation. This allowance shall form part of the overall bid and shall be adjusted through PWGSC 1379 action upon proof of final invoice and time sheets.

E-15.8

Contractor shall dismantle and return to CGTA for disposal by the Crown all components removed from the ship for this specification item. All parts shall be carefully handled to prevent damage, and placed in crates or on pallets for transport. These crates and pallets are to be moved to the helicopter hanger for storage.

E-15.9

Fuel lines (two) and sludge lines (two) to the incinerator shall be disconnected and the ends of the pipes shall be capped off so as not to interfere with the removal of the existing incinerator or the installation of the new incinerator components.

E-15.10

Contractor shall be responsible for determining if there are any interference items that need shall be removed from inside the incinerator room or at the entrance to the incinerator room that may be damaged during the removal or installation process. Items which are electrically energized shall be electrically isolated at their supply breakers with the concurrence of the CGTA. All interference items shall be stowed safely by Contractor. Pipes shall be blanked off with suitable flanges and gaskets, or pipe caps, of the correct size. Any items that are not removed and are subsequently damaged during the removal or installation process shall be repaired at Contractor expense.

E-15.11

The compartment shall be cleaned of all debris prior to the installation of the new incinerator components. All deck areas that have been affected by this work shall be mechanically cleaned to SSPC-SP-11 standards and shall be given 2 coats of primer paint, Interprime 198 Grey color No. CPA098 International Paint. Coatings shall be applied to yield 2-3 mils (ASTM D1640) DFT per coat.

Contractor may be required to modify the bolt hole arrangement on the bed plate to accommodate the new incinerator.

Incinerator Installation (Installation Information from TeamTec Provided Appendix E.1)**E-15.12**

The new incinerator shall be delivered flat packed and require assembly under the direction of the TeamTec FSR. The incinerator shall be secured to the bed plate as recommended in the manufacturer's instructions and under the guidance of the TeamTec FSR. All electrical connections, glands, pipe sealant, flange gaskets, pipe and pipe fittings, fasteners, isolation valves, and other consumable products required for this installation shall be new and CFM.

E-15.13

Contractor shall install the following components: incinerator casing, control panel, slave panel in Control Room, refractory, seal kits, pilot fuel heater, flue gas damper, sludge dosage unit, associated piping, burner kit, sensor and control kit, door kit, flue gas pipe expansion compensators, and counter flanges for the flue gas pipe under the direction and guidance of the TeamTec FSR.

E-15.14

The proper electrical wiring shall be run from the incinerator to the slave panel in the Control Room. The wiring shall be properly secured to existing cable runs. All new wiring shall meet or exceed Team Tec specifications.

Contractor shall be responsible for the proper securing of all electrical cabling. All work shall be to code, as per TP127 and Canada Shipping Act. Contractor shall be responsible to make arrangements to have TCMSS Surveyor to view the wiring installation as work progresses.

E-15.15

The incinerator slave panel shall be installed in the Main Control Room (MCR) below the "Notifier" Fire Detection Slave Panel (see picture below). Contractor shall fully wire in the slave panel and confirm proper operation upon completion of the Incinerator installation.



E-15.16

Contractor shall install a new CFM flue gas fan, flue damper, and sludge oil tank with heating coil.

E-15.17

Contractor shall remove the original incinerator 600V power supply cable, which feeds from Power Panel 619 in the AC Fan Room, located on the Flight & Boat Deck. This cable shall be replaced with a new 8AWG, 4 wire cable. Contractor shall ensure cable is properly secured and connected in compliance with TC TP127, and Canadian Electrical Code requirements.

E-15.18

The original 15A breaker intended for feeding the incinerator occupies slots 2-4-6 in Power Panel 619. It shall be removed and returned to CGTA. A new 40A, 600V, 3Φ breaker shall be installed in its place.

E-15.19

Contractor shall supply, install, and connect all required cabling from the control panel to the following equipment, in accordance with wiring diagrams provided in Appendix E:

- a. 600VAC 3Φ power wiring to the flue gas fan and sludge service tank pump;
- b. 600VAC 3Φ power wiring to the sludge service tank heater
- c. 220 VAC 1Φ power wiring for the emergency stop;
- d. 24VDC supply to the sludge oil tank level sensor, the flue gas temperature sensor, the flue gas damper, and the run indicator.

E-15.20

Contractor shall install all wiring under the direction of the FSR for the sensor and control wiring required for the upgraded components. All electrical connections, including to the VTS alarm and monitoring system shall be reconnected by Contractor and proven functional to the satisfaction of the CGTA and the TeamTec FSR.

E-15.21

Contractor shall re-install any interference items that had been removed at the completion of the incinerator installation using new electrical connections, pipe fasteners and insulation as required. For estimating purposes, Contractor shall allow \$5,000.00 for materials and supplies. Allowance shall form part of the overall bid and shall be adjusted by PWGSC 1379 action upon proof of final invoice.

Sludge Tank (see Sludge Tank Installation and Associated Piping Appendix E.2)

Sludge tank shall be mounted at the "Upper deck" level of the engine room casing, starboard side aft (same level as the flue gas fan unit). In addition, a suitable catch all shall be fitted beneath the new sludge tank with a drain line that is plumbed into the existing boiler fuel strainer catch all drains.

The existing support framing on aft bulkhead in this area will have to stiffened/enlarged in order to support a 786 Kg sludge tank at operating conditions & catch all.

The fitted fuel transfer pipe will have shall be rerouted around the sludge tank.

E-15.22

Contractor shall install new mounting seats for the sludge oil tank in accordance to the FSR supplied guidance drawings.

E-15.23

All welding, piping, gaskets and flanges associated with the incinerator sludge tank shall meet or exceed TCMSS requirements and TeamTec specifications for this installation. All piping and fittings shall be CFM.

E-15.24

Contractor shall install a vent line from the sludge tank. Contractor shall install a 2 inch schedule 80 vent line from the top of the sludge tank to the starboard side of the funnel on the bridge deck. Approximately 7 meters of seamless schedule 80, 2 inch pipe, 3x 90 degree elbows, 4 slip on 2 inch, 4 bolt flanges. Contractor shall fit GSM Winteb DIN 50 heated vent. The vent head flange shall be positioned approximately 60 cm above the bridge deck. Contractor shall use full penetration fillet welds on the pipe and shall ensure that the interior of the vent remains free of any weld obstructions at the seams. Internal portion of the vent pipe shall be insulated up to the funnel side plate, once proven leak free.

Contractor shall mount a GSM 115 VAC Pauluhn receptacle for the Winteb Vent. The exact location shall be determined by the CGTA.

E-15.25

Contractor shall install a 1- ¼ inch filling line for the new sludge tank from the existing sludge transfer pump. This line shall be tee' d into the existing discharge line from the pump and fitted with an isolation ball valve at the transfer pump. Approximately 6 meters of seamless schedule 80, 1- ¼ inch pipe, 4 x 90 degree elbows, 6 slip on 1- ¼ inch, 4 bolt flanges.

E-15.26

Contractor shall install supply and return pipes from the sludge tank to the incinerator in accordance with the FSR supplied documentation. Pipes shall be insulated as per manufacturer's recommendation. New pipe route shall travel aft from the incinerator then turn 90 degrees starboard towards the sludge tank. For estimating, approximately 8 meters of seamless schedule 80, 1 inch pipe, 8 x 90 degree elbows, 10 slip on 1 inch 4 bolt flanges shall be required. Pipes shall be secured with welded brackets at appropriate intervals to prevent vibration and shall be located with consultation with the CGTA.

Exhaust Piping**E-15.27**

Contractor shall remove and properly dispose of the exhaust lagging wrapping of the incinerator exhaust piping in way of the new flue gas fan, and expansion compensators. Exhaust piping shall be removed as well. Note the potential for asbestos, and the gaskets between the flanges and counter flanges, textile wrapping on the exhaust may contain asbestos. Therefore all work associated with the exhaust shall be treated as if containing type 1 Asbestos for removal and remediation.

E-15.28

The exact location of piping shall be removed shall be determined by Contractor in consultation with the FSR and the CGTA and take into account the installation of the flue gas fan mounting arrangement and access to the flue gas damper.

E-15.29

Contractor shall quote on constructing two (2) new sections of 12 inch OD spiral weld 0.25 inch wall ASTM A-242 Corten Steel exhaust piping, two (2) feet long, including 4 flanges. Contractor shall also fit a new flange to the existing pipe. Contractor to use full penetration fillet welds on the pipe and shall ensure that the interior of the exhaust pipe remains free of any weld obstructions at the seams. These exhaust pipes shall be needed to tie the new flue gas fan unit to the incinerator outlet and exhaust uptakes.

The exact size and length shall be determined by the FSR.

This quote shall form part of the overall bid and shall be adjusted through PWGSC 1379 action. Also, any additional changes required to the exhaust system shall be presented to the CGTA & FSR for review & approval. If changes are accepted, work shall be negotiated through PWGSC 1379 shall be actioned.

Note, if any work is required to the 16 inch OD exhaust outlet pipe. The pipe is made of stainless steel – ¼ inch wall thickness.

E-15.30

Any welding and any new piping, flanges, and fasteners for the exhaust gas system shall meet or exceed TCMSS requirements and TeamTec specifications for this installation. All piping and fittings shall be CFM.

E-15.31

Contractor shall construct and install a foundation mount for the flue gas fan assembly in accordance with the TeamTec diagrams supplied. The flue gas fan shall be mounted using new stainless steel fasteners.

E-15.32

Contractor shall supply and install new pipe hangers as needed to support the length and weight of exhaust piping, flue gas fan, damper, and expansion compensators installed. The hangers shall prevent any undue stress from being exerted on the incinerator exhaust outlet flange or the flue gas fan exhaust outlet.

E-15.33

Contractor shall ensure the exhaust piping is routed a suitable TCMSS approved distance from combustibles and allow for the installation of approved new lagging.

E-15.34

Contractor shall provide and install Marine approved exhaust lagging & calcium silicate with fiberglass sheathing (where applicable) for disturbed and new lengths of the exhaust piping installation, including all custom transition laggings for the flue gas fan, flue gas damper, expansion compensators and incinerator's exhaust uptake. All blankets & calcium silicate insulations forms shall have sufficient insulating capacity to reduce the surface temperature at the surface to maximum of 60 degrees Celsius. The exhaust blankets shall have hook and loop closure devices such that they can be secured in place with stainless steel lock wire and be removable for the servicing and inspection of the flue gas components.

E-15.35

Contractor supply and fit new gaskets to all new and disturbed exhaust pipe joints. The material to use is "Slade Pyro-Tex Woven Gasket" material. Contractor shall prove all welds and exhaust piping connections shall be free from leakage.

E-15.36

Contractor shall provide the CGTA the opportunity to witness the final exhaust piping uptake installation prior to the application of the exhaust lagging blankets.

Commissioning

E-15.37

Contractor shall have on hand the FSR for the commissioning and set to work of the incinerator and sludge tank and prove the correct operation of the entire system. The FSR shall be on hand to make final adjustments to optimize the incinerator firing settings, the forced draft air setting and any other adjustments necessary to fully commission the system.

E-15.38

The incinerator shall be test fired prior to the installation of the exhaust blankets. The attending TCMSS Surveyor shall witness the test firing of the incinerator once the FSR is satisfied the unit will operate correctly. All bolts on newly fitted and disturbed flange joints shall be re-secured after the test firing & the pipe has cooled down.

E-15.39

Once the incinerator operation has been established, the incinerator uptake shall be insulated and the incinerator shall be run for a period of six hours to ascertain that all sections are tight and that there are no leaks in the system.

E-15.40

Contractor shall provide documentation on any new exhaust piping and fittings used for the construction of any new exhaust piping.

E-15.41

Contractor shall provide documentation and certification that the new exhaust pipe hangers installed are of sufficient capacity to support the exhaust uptake piping.

E-15.42

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

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16 PORT AND STARBOARD BOILER CONTROLS RENEWAL

VESSEL LIFE EXTENSION WORK

General

E-16.1

Contractor shall employ the services of two (2) authorized Alfa Laval Aalborg Field Service Representatives (FSR) for the installation of the new port and starboard boiler controls and associated components, and commissioning of the units. The Alfa Laval Aalborg Field Service Representatives shall be coordinated through Alfa Laval Inc.

The contact information is: Bob Keating
Email: bob.keating@alfalaval.com
Tel: (416) 297 6308

It is estimated that 2 Alfa Laval Aalborg FSRs shall be required for 12 days, working 12 hour days, for this project. The FSRs shall be reimbursed for their services, 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. Contractor shall include in the bid, a \$25,000 allowance for expenses incurred as above. The Allowance shall form part of the overall bid and shall be adjusted by PWGSC 1379 action upon proof of final invoice.

E-16.2

Contractor shall ensure that the work on the following specifications shall be completed prior to any testing of the new boiler burners and control systems:

E-16.2.1. > HD-07 FUEL TANK (SURVEY) for the day & settling tanks

Contractor shall schedule the work accordingly so that no delays are incurred. If there are delays as a result of Contractor's scheduling of work, then Contractor shall be responsible for covering any additional costs associated with retaining the two Alfa Laval Aalborg FSRs.

E-16.3

Contractor shall follow all manufacturers' installation instructions, FSR instructions for the installation and mounting of all GSM for this specification in order to maintain warranty of all components.

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16.4

Contractor shall electrically and mechanically isolate the existing boilers to allow the removal of the components. All electrical and mechanical lockouts and tag outs shall be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5 - LOCKOUT AND TAGOUT. Contractor shall 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/FSR shall 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 shall be in attendance when all locks/tags are removed.

Existing wiring shall be marked as per OEM drawings prior to removal, in case it can be reused. A drawing of the existing boiler controls will be provided to the Contractor to copy.

E-16.5

Work shall not commence until the all associated work areas have been certified gas free and safe for hot work. Contractor is responsible for any cleaning in this area to prepare for hot work. 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 shall be given to the CGTA prior to personnel entering the space and a copy of each certificate shall be posted in a conspicuous location in close proximity to the manhole cover for each space. Spaces shall be tested each day that personnel are required entry in the space. All precautions shall be taken to protect all areas from hot work damage. Contractor is responsible for maintaining an adequate fire watch during the course of all hot work. This shall include providing various applicable extinguishers and extinguishing mediums as necessary. This shall also include any necessary preparations and cleaning in the vicinity of the work area to obtain a gas-free permit. Contractor shall take note of the requirements under the DFO/5737 Fleet Safety Manual, 7.B.3 - ENTRY INTO CONFINED SPACES and DFO/5737 Fleet Safety Manual, 7.B.4 – HOTWORK for these spaces.

E-16.6

Contractor shall supply any gases, oxygen, acetylene, and argon necessary for the repair.

E-16.7

Contractor shall supply all equipment enclosures, ventilation, staging, chain falls, crane, slings, and shackles necessary to perform the work. All lifting equipment shall be appropriate for the expected duties, and be accompanied by current certification indicating, or be permanently marked as shall being, of an adequate safe working load for the expected duties. Any brackets or other welded attachments required in the performance of this specification shall be welded into place as per section 7 of the general notes.

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

Scope of Work

E-16.8

Contractor shall assist the Alfa Laval Aalborg FSR's with the following work on the port and starboard boilers:

- E-16.8.1. > Mobilise, including all transportation, and cranaage required carrying out the work.
- E-16.8.2. > Open up for access.
- E-16.8.3. > Disconnect existing oil burner and forced draft fan.
- E-16.8.4. > Remove existing feed water pumps, motors and base.
- E-16.8.5. > Disconnect and remove existing control panels.
- E-16.8.6. > Prepare and install new burner.
- E-16.8.7. > Install new control panel.
- E-16.8.8. > Install new feed water pumps and motors.
- E-16.8.9. > Modify feed water piping to and from new feed water pumps
- E-16.8.10. > Open up Hotwell tank for access
- E-16.8.11. > Install a new feed water discharge line from the crossover line to and inside the Hotwell.
- E-16.8.12. > Install new feed water proportioning valves for each boiler.
- E-16.8.13. > Install/replace new cables if necessary for connections to the new control panel.
- E-16.8.14. > Installation of new water level control.
- E-16.8.15. > Box up everything.
- E-16.8.16. > Pressure test piping and Hotwell to CGTA satisfaction
- E-16.8.17. > Make pre-inspection, commissioning and start up.
- E-16.8.18. > Demobilise.

For estimating purposes, Contractor shall supply 1 skilled Mechanical Technician - Welder-Fitter for 12 days, working 12 hours days with Alfa Laval Aalborg FSR. In addition, it is estimated that approximately 100 hours of various skilled trades' persons shall be required at various times throughout the installation. This allowance shall form part of the overall bid and shall be adjusted through PWGSC 1379 action upon proof of final invoice & time sheets.

E-16.9

Contractor shall dismantle and return to CGTA for disposal by the Crown all components removed from the ship for this specification item. All parts must be specially handled to prevent damage, and placed in crates or on pallets for transport.

E-16.10

Contractor shall determine if there are any interference items that need to be removed from around the boilers and include the cost of removal and reinstallation in their bid. Items which are electrically energized shall be electrically isolated at their supply breaker with the concurrence of the CGTA. All interference items shall be safely stowed by Contractor. Pipes shall be blanked off with suitable flanges and gaskets, or pipe caps, of the correct size. Any items that are not removed and are subsequently damaged during the removal or installation process shall be repaired at contractor expense.

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16.11

The new boiler up-grade kits shall be delivered flat packed and will require assembly by the Aalborg FSR's. All electrical connections, glands, pipe sealant, flange gaskets, pipe and pipe fittings, fasteners, isolation valves, and other consumable products required for the installation shall be new and CFM. For estimating purposes, Contractor shall allow for \$5,000.00 for materials & supplies. Allowance shall form part of the overall bid and shall be adjusted through PWGSC 1379 action upon proof of final invoice.

E-16.12

The new boiler control panels shall be installed in the same location as the existing ones. The new panels are larger than the existing panels. New brackets shall be made to extend the new panels out further from the bulkhead, as directed by the CGTA.

E-16.13

Contractor shall properly secure all electrical cabling. All work shall be to code, as per TP127E & Canada Shipping Act. Contractor shall make arrangements to have TCMSS Surveyor to view the wiring installation as work progresses.

E-16.14

Contractor shall remove the two (2) existing feed water pumps along with the motors. These pumps are located in the main generator room at the tank top level, starboard side just aft of the distiller. Contractor shall take note of the existing arrangement of the piping and valve arrangement. There is a crossover pipe that allows operators to use either pump, to operate with either boiler. The new piping arrangement shall allow the new pumps to have the same capabilities. The new feed water pumps, GSM supplied, shall be installed in approximately the same location, as directed by CGTA.

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16.15

The existing feed water supply, discharge and crossover valves plus associated piping shall be removed in the general area of the existing pumps in order to fit the new pumps, regulator valves and isolation valves. The original pump seat/base shall be removed and a new mounting seat fabricated and installed to accommodate the new pump units.

Contractor shall supply, fabricate and install new suction and discharge piping in order to connect the following items:

- New pumps
- Recirculation line to hot well with isolation valves and orifice plate
- Feed water PDI regulator valves with bypass lines and isolation valves

The existing suction piping is 1 ½ inch schedule 40 seamless ASTM A-53 Grade B black steel. The existing discharge piping is 1 inch schedule 80 seamless ASTM A-53 Grade B black steel. Contractor shall fit flange adapters to the 1 ¼ inch inlet and outlet ports of the new pumps to match the existing piping.

The configuration of the 2 pumping system isolation valves, regulators, recirculation valves, by-passes and piping shall be fitted in a neat orderly arrangement. The arrangement shall be logical to prevent any confusion to the operators. The regulators shall be fitted in such a manner that allows easy access/removal for servicing.

The final layout design shall be approved by CGTA and Aalborg FSR.

All valves shall have identification brass tags fitted. Each brass tag shall be engraved in black letters identifying the purpose of the valve. The brass tags shall be fitted to the valve wheel stems. CGTA will provide a list of identification tag names. A total of 12 brass identification tags are required

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16.16

All valves and regulators shall have 4 bolt hole flanged connection to allow easy removal. All Contractor supplied valves and flanges shall be rated for PN 40 or ANSI 300 steam service. Ball valves that are fitted must be fabricated with ball seat material that is rated for steam service at a minimum temperature of 180 degrees Celsius (ANSI 300 rating). All gasket material supplied and fitted shall be rated for steam, suggest "Durlon 9000 Blue" gasket material.

E-16.17

Contractor shall fit and install a new 1 inch seamless schedule 80 pipe from the new pump crossover pipe to the Hotwell. Contractor shall empty the Hotwell of the boiler feed water and remove the aft access cover. Contractor shall fit a recirculation stub pipe with compensation flange to the aft wall of the Hotwell tank. The stub pipe fitted inside the Hotwell shall be at least 12 inches long with an angled end to ensure the discharge is below the minimum operating level of the Hotwell tank.



Hot Well recirculation line
penetration location

Location of pipe penetration to Hotwell tank

An isolation flange connection 1 inch globe valve with a 1 inch flange orifice plate shall be fitted at the recirculation line inlet flange to the Hotwell. The size of the orifice shall be engraved on a brass tag, which shall be mounted to the Hotwell tank.

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16.18

For estimating purposes Contractor shall quote on supplying and fitting the following items:

- E-16.19.1. > 8 meters seamless schedule 80, 1 inch seamless ASTM A-53 Grade B black steel pipe
- E-16.19.2. > 2 meters seamless schedule 40, 1.5 inch seamless ASTM A-53 Grade B black steel pipe
- E-16.19.3. > 6 x 90 degree 1 inch socket weld elbows, ANSI 300
- E-16.19.4. > 1 x 1 inch socket weld Tee, ANSI 300
- E-16.19.5. > 23 slip on 4 bolt, 1 inch flanges ANSI 300
- E-16.19.6. > 4 x 1 inch SDNR flanged globe valve DN25 PN40
- E-16.19.7. > 1 x 1 inch SD flanged globe valve DN25 PN40
- E-16.19.8. > 2 x 1.5 inch SD flanged globe valve DN40 PN40
- E-16.19.9. > 2 x 1 inch flanged ball valve DN25 PN40
- E-16.19.10. > 2 x 1.5 inch to 1.25 inch adapters
- E-16.19.11. > 2 x 1.25 inch to 1 inch adapters

E-16.19

Contractor shall arrange to have TCMSS Surveyor view the proposed changes to the feed water piping prior to commencing this work.

E-16.20

Contractor shall ensure that sufficient hangers, pipe clamps, brackets are supplied and fitted to properly secure the piping in place and prevent vibration.

E-16.21

Contractor shall acid wash (pickle) all new steel pipe sections prior to final fitting where possible. Once cleaned, all pipe sections shall be fitted, flushed and pressure tested to CGTA's satisfaction. The Hotwell shall be isolated and air tested to a pressure of 2 psi. All vents and drain lines require "ballons" fitted to isolate the tank. All leaks found shall be repaired at the Contractors expense.

E-16.22

Contractor shall install any interference items that had been removed at the completion of the boiler work.

CCGS EDWARD CORNWALLIS DRY DOCKING & REFIT 2015

E-16.23

All areas that have been affected by this work shall be mechanically cleaned to SSPC-SP-11 standards. Upon completion of cleaning to SSPC-SP-11 standards, all affected areas shall receive 2 coats of primer and fire retardant white paint. This shall include all new pipework and associated brackets. Contractor shall allow sufficient curing time between the coats. Hotwell internal disturbed areas shall be coated with Dulux APEXIOR® No 1.

The disturbed insulation on the Hotwell tank shall be repair/replaced. The 1 inch recirculation line to the Hotwell shall be insulated from the upper-landing deck to the Hotwell isolation valve. The pipe insulation must be adequate in thickness to reduce the 90 degrees Celsius uninsulated temperature of the recirculation pipe to a safe to touch and hold temperature of 25 degrees Celsius maximum.

Commissioning

E-16.24

Contractor shall ensure there is at least one Aalborg FSR on hand during the commissioning and setup work for both boilers. This includes the setup of the boiler controls, feed water systems and alarm systems and proves the correct operation of the entire system for both boilers.

Once the Boiler control systems are fully functional, Contractor shall make arrangements for TCMSS to witness the testing of various safety features of the Boiler controls. The testing shall be performed to the satisfaction of both the TCMSS Surveyor and the CGTA.

E-16.25

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

E-17 – Sewage Media Tank & Wet Well

1: SCOPE:

The intent of this specification is to open up the ship's sewage media tank and wet well tank for cleaning, inspection, tank interior coating repairs, and to clean/renew the media sections in media tank.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The sewage system media and wet well tank shall be shut down and isolated by Contractor. Owner's representative shall provide direction for these tasks. The Owner's manual will be made available for Contractor to copy.
2. Temporary by-pass lines shall be operated prior to commencement of work.
3. All effluent in both tanks and residues from water washing shall be disposed of ashore by Contractor in an environmentally safe manner. Disposal certificates shall be provided to the Chief Engineer.
4. Piping connections to the media tank cover shall be let go and removed to permit to the removal of the tank cover. The cover is made of 2 sections.
5. Both media tank covers (halves) shall be unbolted and removed. Due to the cover sizes and the relative size of the compartment it may be necessary for Contractor to periodically shift the covers during the course of work in order to gain good access to all areas of the tank. The tank covers shall be supported, in order to prevent deformation during removal and periodic relocation.
6. The existing media sections shall be carefully removed, cleaned, and examined for defects. Note: These sections are fragile and good care shall be taken to prevent inadvertent damage to the various sections during removal, handling, and subsequent installation. Media that is attached to the air lift system will require disconnection from same. Caution shall be taken during this procedure to prevent damage to the air lifts and scouring systems. Contractor shall take all precautions to limit the spread of effluent into the compartment.
7. New GSM media shall fitted by Contractor if deemed necessary. The new media bundles will need 2 x 10.75 inch diameter holes cut for the air lifts. The media is supplied oversized all around to ensure a tight fit. Drawings of the media bundles can be found in the Owner's manual. For bidding purposes, contractor shall assume all new media bundles will be fitted.
8. On the wet well tank, the electrical connection to the level probe shall be carefully labelled and disconnected, and the probe shall be removed and wrapped/sealed to prevent any damage from the water blasting. The chlorinator shall be carefully removed. Contractor shall be aware that the housing contains chlorine pucks which are very corrosive.
9. The internal baffle plate fitted inside the wet well tank shall be removed and all surfaces hydroblasted and checked for defects. The baffle plate shall be reinstalled upon completion of all work.

E-17 – Sewage Media Tank & Wet Well

10. Contractor shall use high pressure hydroblasting on the interior of both tanks to remove the existing coating. All surfaces shall be prepared in accordance with paint manufacturer application specifications. Areas in way of pipe inlet and outlet welds shall be particle blasted. Contractor shall temporarily seal any openings to prevent water spray from impinging on machinery and equipment outside the transfer tank. High pressure water blasting shall be at a minimum of 40,000 psi and all surfaces shall be made bare to SSPC-SP-3 standards. In order to permit drainage, Contractor shall use a vacuum collector truck to extract the residues.
11. Prior to coating the tanks internals, the Chief Engineer shall inspect the internals of each tank. Internal welds shall be examined for wastage. Any unforeseen repairs resulting from this inspection shall be carried out via 1379 action.
12. The media and wet well tanks shall be thoroughly dried prior to the application of all coatings.
13. Contractor shall supply and apply two separate coats of International Interline 624 epoxy coating to achieve a final minimum total of 16 mils DFT. Approximate coverage area is 30 square meters for the media tank and 6 square meters for the wet well. Coatings shall be applied as per the paint manufacturer's application specifications. Thickness readings shall be taken and recorded to verify that this result has been achieved.
14. Contractor shall supply and install a portable dehumidifier/ heater to aid in the curing process. Sufficient curing time shall be allowed between coats. In addition, Contractor shall provide extraction fans to remove vapours during curing of the various coats. Ducting shall be led away out of the machinery spaces. Contractor shall ensure that vapours shall not be allowed to enter the machinery spaces.
15. Upon completion of all internal tank work, all media sections shall be installed in proper order. Contractor shall include in their cost any modifications and cutting of the media blocks for installation.
16. The media tank and wet well covers shall be installed, using new gasket material. Contractor shall remove all temporary closings, plugs, etc. All removed piping shall be reconnected using new gasket material.
17. The inspection cover shall be left unsecure to allow proper start-up of the sewage tank. Tanks shall be filled with fresh water near the end of the refit period.
18. Contractor shall supply a suitable quantity of "VETA BIO-PP" to mix with 7250 litres of fresh water, (or similar product) and mix with fresh water to aid with the initial start-up of the sewage media tank. Mixing instructions must be strictly followed. This task shall be performed 2-3 days prior to arrival of the ship's crew.
19. Upon completion of all work, the Sewage Compartment shall be returned to a clean condition. Bulkheads, deckhead, and equipment soiled during the work period shall be cleaned with a pressure washer system using hot water and disinfectant. Compartment bilges, deck plates and gratings shall be pressure washed and vacuumed cleaned. All liquid in the bilges shall be pumped ashore and disposed of by Contractor.
20. All painted areas outside of the tanks that have been damaged by this work shall be mechanically cleaned to SSPC-SP-3 standards. Upon completion of cleaning to SSPC-SP-3

E-17 – Sewage Media Tank & Wet Well

standards, all affected areas shall receive 2 coats primer and fire retardant white paint. This shall include all new pipe work and associated brackets. Contractor shall allow suitable curing times between coats.

2.2 Location

1. The sewage media tank and wet well are located in the sewage compartment: frames 23 to 28, center line, tank top level.

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.
3. Contractor shall be responsible for the removal of the contents of the media tank during the scope of this work.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

System: Fast

Model: D4SP1/UV

Maker: Scienco/Fast
St. Louis, Mi
(314) 621-2536

Capacity: The internal tank area is approximately 30 square meters.

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

E-17 – Sewage Media Tank & Wet Well

1. Contractor shall inform the owner's representative for inspection of the existing media blocks, the internal tank prior to and after painting. Contractor shall also notify the owner's representative for the inspection of the newly installed media blocks

4.2 Testing

1. The sewage system shall be tested and witnessed by owner's representative upon completion of work. This shall include the operation, air scouring, and pumping of the compartments inside the tank inside with the currently installed valves. The sewage system shall be filled with water and the system proven operation by the final discharge from the media tank into the batch discharge tank.

4.3 Certification

1. Proof of Performance is identified as the parts (media blocks) were purchased from an accredited distributor for the FAST system. (Jet Vac)

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

1. All unused spares shall be returned to Chief Engineer.

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-18 – Fire Main Valve

1: SCOPE:

The intent of this item shall be to have the Contractor remove, and overhaul the existing Fire Main Isolation Valve and modify the existing door panel to allow easier access to the valve.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall remove the existing access door for the isolation valve.
2. Contractor shall modify the bulkhead to accept a new door, complete with hinges and latching device, which shall be fabricated by Contractor. The new door shall have an opening of 23" X 30", using the same panelling material as the surrounding bulkhead. Contractor shall fabricate new coaming and edging materials to match the current configuration using contractor supplied materials. Contractor shall remove the existing wooded trim and cut back approximately 6" for the new opening. If necessary, Contractor may remove the hand rail to complete the scope of this work.
3. Contractor shall isolate and drain the fire main temporarily to allow removal of the valve.
4. In order to minimise the time the fire main is disabled, Contractor shall supply and fit pipe blanks of correct dimension on the existing pipe flanges as soon as the valve is removed. These pipe flanges shall be cleaned prior to installation of the blanks and fitted with new fasteners.
5. Contractor shall overhaul the existing valve and the valve shall be inspected by CGTA prior to reassembly and installation.
6. Contractor shall isolate and drain the fire system prior to installation of the valve. The valve shall be installed with new gaskets and stainless steel fasteners.
7. Contractor shall fit and install the new door to the opening on the bulkhead.

2.2 Location

1. The fire main isolation valve is located on the main deck starboard side, frame 42 in the alley way.

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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-18 – Fire Main Valve

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Work shall be carried out to the satisfaction of the Owners Representative.
2. The fire main valve shall be inspected by CGTA and the operation proven to the CGTA once installed.

4.2 Testing

1. The Fire Main shall be pressurized and no leaks may be found using a soapy water solution around all disturbed fittings.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
E-19 – Portable Fire Extinguishers

1: SCOPE:

Contractor shall have the ship's fire extinguishers (94 in total) weighed, inspected, and tagged for re-certification by an authorized service agency.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall tender for “an authorized service provider” to complete all work as outlined in the specification including all Travel and Living expenses.
2. No components or parts shall be replaced without the prior consent of the Chief Officer. Any parts replaced shall be turned over to Chief Officer.
3. All certificates and service reports issued by the Contractor for this work must refer to each serviced component’s serial number and location on the vessel.
4. The system in both FRCs shall be inspected and certified at this time.
5. Portable extinguishers shall remain operational and onboard the vessel at all times, except when being serviced. Any extinguishers that are required shall be sent out for the purpose of recharging, repairs or testing, shall be replaced with temporary extinguishers of the same type and size provided by the Contractor. Time required to carry out this work shall be kept to a minimum.
6. Any additional service work shall be PWGSC1379 action.
7. All work shall be completed to the satisfaction of the Owner's Representative and TCMS.

2.2 Location

1. Chief Officer shall provide a detailed inventory of all fire extinguishers and their locations shall be available 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.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. The type and quantity of extinguishers are listed in the Appendix C.

3.2 Standards and Regulations

E-19 – Portable Fire Extinguishers

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

- a. Canadian Coast Fleet Safety Manual (DFO 5737)

2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

See Certification below.

4.2 Testing

See Certification below.

4.3 Certification

1. Contractor shall obtain all test certificates and forward them to the Chief Officer with a detailed description of any repairs carried out. Each extinguisher is shall be “tagged” to show the inspection date.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

2. Contractor shall provide annual inspection certificates for all fire fighting systems.
3. Contractor shall provide service reports indicating all inspections/work carried out.
4. Two (2) copies of certificates of inspection and tests shall be turned over to the owner's representative.

5.2 Spares

N/A

5.3 Training

N/A

L-01 – Propulsion Multifunction Relay (MFR) Upgrade

1: SCOPE:

The intent of this specification is to install two new Government Supplied Siemens Siprotec Multi-Function Relays, Model 7UM62, in the Port and Stbd Propulsion Motors sections of the Main Switchboard. This same work was recently completed for the three Diesel Generators.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The contractor shall install new owner supplied, Siemens Siprotec Multi-Function Relays in place of existing equipment on the port and stbd propulsion motor section of the Main Switchboard.
2. The contractor shall remove the existing Differential Protection relay located in the upper sections of the Motor Control cabinet doors. Protection relays located in the inner cabinet panels, that will become redundant, will be removed and the wiring routed to the Siprotec Relay.
3. The program used aboard CCGS Sir William Alexander will be used on these new Siprotec Relays and loaded onto the new relays. Verifications will be made to ensure that there are no differences between the machines or system that would result in any issues.
4. The Chief Engineer shall supply drawings for the current installation to aid in the upgrade to assist in the Propulsion Motor Siprotec MFR (multi-function relay) installation. The contractor shall make working copies of the original and return the original to the Chief Engineer. The contractor shall mark up any differences on the drawing for port and stbd Propulsion Motors and these marked up drawings shall be given to the Chief Engineer upon completion of all work.
5. Contractor shall modify switchboard doors as required to suit the new MFRs. The wiring is based on the documentation provided by Siemens and the installation previously carried out on the CCGS Sir William Alexander.
6. Contractor shall include an allowance of \$50,000 to cover expenses for the services of a Siemens FSR to carry out the upgrades. Final cost shall be adjusted up/down on 1379 action upon invoices received from Siemens.

Suggested FSR Contact:

Barry Renouf , Siemens, 506-381-2289

Dartmouth, Nova Scotia.

Email: berenouf@gmail.com

7. The scope of work shall also include a commissioning test and report, per unit, to be supplied upon completion of all work. The testing & commissioning of the relay shall ensure the program and the protection functions are fully operational.
8. All materials (other than the multi function relays), equipment, personnel, etc. shall be contractor supply.

L-01 – Propulsion Multifunction Relay (MFR) Upgrade

2.2 Location

1. All work in the scope of this specification is located within the vessel's propulsion transformer room.

2.3 Interferences

1. None identified. It is the contractor's responsibility to identify interference items during the vessel's bidder's conference.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Reference drawings shall be provided by the vessel's chief engineer.

3.2 Standards and Regulations

1. Refer to general notes. All applicable regulations apply.

3.4 Owner Furnished Equipment

1. Unless otherwise notes, all materials and labour shall be contractor supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall allow for TCMSB inspection as surveyor sees fit.

4.2 Testing

1. In order to properly test this new installation, testing must be performed while vessel is afloat.
2. A full test shall be performed, to ensure proper operation of all MFR functions, including safety shutdowns.

4.3 Certification

1. Contractor shall contact TCMSB for surveyor certification.

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Contractor shall supply computer generated maintenance reports of all work carried out.
2. Updated drawings shall be provided in .DWG and .PDF formats

5.2 Spares

1. Any spares shall be returned to CGTA.

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
L-03 – Fire alarm pull stations

1: SCOPE:

The intent of this item shall be to remove the existing Fire pull stations located outside the forward CO₂ Room and on the aft bulkhead of the Foc'sle Area, to be replaced with new pull stations mounted inside new watertight enclosures.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Contractor shall coordinate with the ship's electrical officer to correctly isolate the two pull-stations, in order to prevent a ship-wide false general alarm while completing the required work.
2. Contractor shall remove the two fire pull stations and two back boxes and replace with new materials, mounted in new water tight enclosures.
 - a. New pull station assemblies shall be of the Notifier brand of the same type and design - Part # NBG-12LX. The new pull stations shall be mounted on new surface back-boxes- Part # SB-I/O.
 - b. The new enclosures shall be red, constructed of polycarbonate, to NEMA 4X standard, equipped with metal snap latch, and a hinged clear cover. Enclosures shall be of suitable size to house the new fire pull station assembly.
3. Contractor shall remove the metal grating and insulation from the bulkhead in the Foc'sle and from inside the port CO₂ room to allow installation of the enclosures. When the work is completed the insulation shall be replaced and the grating reinstalled with new contractor supplied materials.
4. Contractor shall fabricate and install new mounting brackets for the watertight box for the pull station located on the Foc'sle aft bulkhead. These brackets are required to be welded to the interior bulkhead on the main deck in order to mount the enclosure. Bracket shall be fitted to allow the enclosure to be mounted on the bulkhead.
5. After the brackets are installed, the bulkheads shall be cleaned to SSPC-SP-3 standard, and two coats of a Marine Primer Amercoat 235 (white) shall be applied.
6. After the coating has properly cured, the original insulation and sheathing shall be replaced.
7. Contractor shall fit the enclosures with stainless fasteners and new cable glands shall be installed for the wiring. Any defects to the wiring shall be brought to the attention of the CGTA.
8. Contractor shall include in their quote the cost for new parts (material quote) of \$2000. This amount shall be adjusted up or down upon receiving the final invoice from the contractor via PWGSC 1379 action.

2.2 Location

1. Forward CO₂ Room, Main Deck
2. Foc'sle, Main deck

CCGS Edward Cornwallis
August, 2015 Refit
L-03 – Fire alarm pull stations

2.3 Interferences

1. No interferences have been identified. It is contractor's responsibility to identify any interference items during the vessel's bidder's meeting.

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

N/A

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 CCG Technical Authority.
Canadian Coast Fleet Safety Manual (DFO 5737)
Coast Guard ISM Lock Out/Tag Out Procedures
2. All welding shall be performed by certified welder in accordance with all applicable codes and standards. Hot work permits where required are the responsibility of the welding contractor.
3. All insulation work shall be performed by certified technicians.
4. The Vessel's Asbestos Survey will be available to the contractor for viewing. Any asbestos abatement will be the contractor's responsibility.

3.4 Owner Furnished Equipment

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

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Final installation shall be inspected by Certified Notifier Factory Service Technician and ship's electrical officer.

4.2 Testing

1. After installation, the two new pull stations, and at least one pull station located further down each chain shall be tested to prove operation.

4.3 Certification

1. All Fire Detection modification work shall be performed by Notifier factory trained technician(s) and to the satisfaction of the Chief Engineer.
2. Technician certificates shall be presented to CGTA prior to commencing of work.

CCGS Edward Cornwallis
August, 2015 Refit
L-03 – Fire alarm pull stations

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. A computer generated report detailing all tests performed and results shall be provided to Chief Engineer.
2. Notifier Factory Trained Technician shall provide certification of service upon completion of work.

5.2 Spares

N/A

5.3 Training

N/A

L-04 – A-Frame Searchlight Repairs

1: SCOPE:

The intent of this specification is to remove and repair the Forward A-frame searchlight. In addition the contractor shall remove and fabricate a new vibration damper.

2: TECHNICAL DESCRIPTION:

2.1 General

1. The contractor shall mark and identify each circuit fitted to the searchlight. The wire circuits shall be carefully removed. The wire circuits will be re-connected to the searchlight when it is re-installed. All wire glands shall be suitably sealed to prevent water ingress during the repair. Wire harness shall be suitably secured using neoprene coated stainless steel wire straps.
2. The searchlight and associated vibration dampener base shall be removed and the searchlight given to CGTA and placed in the Helicopter hanger. Ship's crew shall repair the searchlight and will inform the contractor when it is ready to be re-installed.
3. The vibration damper base/ pedestal shall be cleaned to a bare steel condition of SSPC-SP-3 standard. Approximately one square meter of surface area shall be prepared and painted. The pedestal shall be coated with 2 coats of Interprime 234 – Alkyd Primer (Red Oxide). Apply the coating to yield 2 mils DFT, per coat. Followed with 2 complete coats of Interlak 665 Alkyd Marine Enamel (CG Red 509102). Apply the coating to yield 1.3 mils DFT, per coat.
4. Contractor shall fabricate a new vibration dampener base from the template of the old damper. In addition, contractor will be given a drawing with dimension and sizes. Contractor shall include new stainless steel fasteners and new springs of suitable size. Drawing # 7225 will also be supplied to the contractor. The new vibration damper base shall be painted the same as the base/ pedestal for the damper.
5. The searchlight shall be installed, mechanically & electrically to the new vibration damper and the pedestal/base. Stainless steel securing bolts, nuts and washers shall be used.
6. The contractor shall supply all craneage, lifting hardware, staging, personnel, fall restraint equipment, etc to carry out this work in a safe manner.
7. The contractor shall supply all materials, equipment and parts required to perform the specified work unless otherwise stated.

2.2 Location

1. The searchlight is mounted to the Forward A-Frame. Fall Restraint certified personnel, and contractor supplied equipment will be required to safely perform work required by this specification.

2.3 Interferences

1. None identified. It is the contractor's responsibility to identify any interference items during the bidder's meeting.

L-04 – A-Frame Searchlight Repairs

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Drawings are available from the Chief Engineer upon request.

3.2 Standards and Regulations

1. Prior to the commencement of any and all work, the contractor shall lock out the searchlight circuit as per the Coast Guard ISM Safety Lockout Procedure safety code. The contractor shall install /remove locks and tags accordingly during the scope of work. The Electrical Officer will assist the contractor in locating locations to perform the lock out but will not perform the actual lock out. The contractor shall supply and install their own locking devices and retain all keys during the scope of this work.

3.4 Owner Furnished Equipment

N/A

4: PROOF OF PERFORMANCE:

4.1 Inspection

N/A

4.2 Testing

1. Upon completion of all work the new searchlight shall be proven operational and tested to the satisfaction of the Owners Representative.

4.3 Certification

N/A

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

N/A

5.2 Spares

N/A

5.3 Training

N/A

CCGS Edward Cornwallis
August, 2015 Refit
L-05 – Sea Water Pump Motors

1: SCOPE:

Contractor shall remove, overhaul, and reinstall #1 and #2 Sea Water Pump Motors for TCMSB credit. This specification shall be carried out in conjunction with ED-09 – Sea Water Pumps and ED-10 – Sea Water Pump Valves.

2: TECHNICAL DESCRIPTION:

2.1 General

1. Unit shall be both electrically and mechanically disconnected, and removed from pump base.
2. Each motor shall be removed from vessel and taken to an accredited electric motor service/repair facility. Unless work is being performed as per ED-09, pump shafts shall be vertically supported for the entire period the motor is removed to limit any ingress of water and/or consequential damage to the mechanical seal.
3. The motors shall be completely opened for inspection and cleaning. All internals shall be wiped clean using an approved cleaning solvent. The motors shall be steam cleaned, baked and new insulating material applied to the windings as required. If at any point it is determined that there is winding work required, the Chief Engineer shall be notified prior to commencement of repairs, and winding repairs shall be completed via PWGSC 1379 action.
4. Contractor shall remove all installed bearings, then supply and install a set of new bearings. Bearings shall be OEM equipment or equal. Bearings shall be carefully installed on the rotor shaft using proper techniques to preclude the possibility of damage to bearings and/or shaft.
5. The motor shall be re-assembled in good order with megger testing of insulation performed and recorded.
6. Motor shall be returned to the vessel and installed in good order to associated pump unit.

2.2 Location

1. The Sea Water Pumps Motors are located in the Engine Room.

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.

CCGS Edward Cornwallis
August, 2015 Refit
L-05 – Sea Water Pump Motors

3: REFERENCES:

3.1 Guidance Drawings/Nameplate Data

1. Motor Nameplate Data:
 - a. Mfg: Etatech
 - b. Frame: 365TDZ
 - c. Type: NVB2- BPN1
 - d. KW: 34
 - e. Volt: 600/3/60
 - f. RPM: 1770
 - g. Serial No. MD2645-1 / MD2644-2

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 CCG Technical Authority.
 - a. Canadian Coast Fleet Safety Manual (DFO 5737)
 - b. Coast Guard ISM Lock Out/Tag Out Procedures
2. Contractor shall refer to General Notes for any other applicable standards and regulations.

3.4 Owner Furnished Equipment

1. Unless otherwise stated, all materials, labour, and equipment required to complete all requirements of this specification shall be Contractor Supplied.

4: PROOF OF PERFORMANCE:

4.1 Inspection

1. Contractor shall notify Chief Engineer when equipment is ready for inspections.

4.2 Testing

1. Prior to removal of motor, all phases shall be megger tested at a test potential of 500V.
2. After motor has been reassembled at the service facility, it shall be meggered again using the same criteria as above. Motor shall be bench tested under no load to ensure smooth and quiet operation.
3. The completed pump unit shall be test run for a period of one half hour under load to prove proper operation. During the load test, current and temperature of the motor shall be recorded at 5 minute intervals.
4. On successful completion of the test run, an additional set of motor megger readings shall be taken and recorded.

4.3 Certification

N/A

CCGS Edward Cornwallis
August, 2015 Refit
L-05 – Sea Water Pump Motors

5: DELIVERABLES:

5.1 Reports, Drawings, and Manuals

1. Upon successful completion of all specified work, contractor shall provide the Chief Engineer with three (3) typewritten copies of a service report. This report shall detail all work carried out, any defects found and repaired, and all readings obtained during the course of the work detailed herein.

5.2 Spares

N/A

5.3 Training

N/A

T1 Fleet Broadband 500 (FBB500) Installation

T1-1 Scope

The SAILOR 500 Fleet Broadband system is a replacement for the existing NERA Saturn B currently installed on CCGS Edward Cornwallis. Inmarsat B terminals are reaching the end of their operational life; no longer manufactured; spares and service support increasingly scarce.

T1-2 Equipment Removal

Remove existing NERA B Dome. The existing Coax Cable (LMR600) is to be re-used.

The AC cable for Dome heater is to be terminated in a JB to be installed on the existing pedestal and terminated inside a Junction Box. This will be used for a dome heater in the future.

Remove existing BDE, Power Supply (located in cabinet under ICEVUE computer), NERA B Handset, Data Com Switch Unit, Printer (if not already removed), Cisco router, Fiber/UTP converter and associated cables except the SATCOM Feed from the SX200 phone switch, this will be re-use for Phone/FAX ports. Remove cable from BDE Gyro Input (P12) back to JB under NERA B Console. Disconnect cable from NMEA – 0183 input (P11) and tie under IceVue Desk, disconnect other end from DD20-A O/P “D” and secure near DD20. Label cable as spare “DGPS” data cable.

Remove Existing Alarm generator and Message indicator from aft bulkhead of the bridge above NERA B BDE. Remove associated cables.

T1-3 Equipment Installation

Install and bolt new Fleet Broadband antenna mount adapter and rubber gasket on the existing NERA B dome pedestal on the Bridge Top.

Install Fleet Broadband antenna on adapter and use existing LMR600 cable. Cable will have to be cut to proper length and re-terminated.

Install Fleet Broadband terminal in location where NERA B BDE was removed, above ICEVUE desk aft Bridge. Terminate Satcom SX200 Feed cable in a dual outlet phone drop box if not already existing, pair 3 is for voice and pair 2 is for FAX, Pair 1 will be a spare. Use telephone patch cord (if required) to connect voice Port to Phone/FAX 1 and FAX Port to PHONE/FAX 2 (located closest to antenna connector).

Install Fleet Broadband Power supply under desk where CISCO Router was removed. Connect new Power Supply into existing Power Bar in closet below Satcom Desk and label SAC-4. Use supplied cable to connect Fleet Broadband terminal to Power Supply and label SAC-3, if cable is not long enough a Junction Box may have to be used to extend cable. Connect existing 24VDC to the Battery input of the Power Supply; the cable is not long enough and it will have to be extended using a JB c/w Weidmuller Terminal strip.

CCGS Edward Cornwallis Refit 2015

Install Thrane IP Handset on Bridge where the old NEAR B handset was removed. The Handset is to be connected to the BDE using factory supplied patch cable.

Install, label and terminate the following cables:

CABLE LABEL	CABLE TYPE	FROM	TO
SAC-6	CAT5e	Fleet Broadband terminal in Radio/COMSAT room Aft Bridge	LAN rack #2 in Radio Room aft of EER on Boat deck. (Leave 15 to 20' inside rack)
SAC-5	Belden 9312	24VDC Junction Box in Cabinet under ICEVUE desk Aft Bridge	Fleet Broadband Power Supply Battery input located under ICEVUE desk.

T1-4 Grounding

Install a #12 green ground wire from the Earthing Point of the BDE to a suitable grounding point on the Ship. The Dome shall be grounded to the existing pedestal (not the adaptor) using a #6 green wire.

T1-5 Reference Drawings and Documents

Appendix F1 - 683097WD.dwg

Appendix F2 - 683058WD .dwg

T1-6 Manuals

The installation guide and the user manual were supplied with system

T1-7 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)

T1-8 Regulations

Canada Shipping Act, 2001

T1-9 Disposal and Care / Custody of removed equipment

CCGS Edward Cornwallis Refit 2015

All removed equipment (Satellite Dome, BDE, Power Supply, Printer, Handset, Datacom Switch Unit, Cisco Router, A/B Switch, Alarm Generator and Message Indicator) are to be stored and returned to CCG upon completion of Refit. All other cables are to be disposed of after removal.

T1-10 Set to Work / Commissioning

The Contractor shall arrange for CCG authorized field service representative (FSR) to conduct the set to work and commissioning of the Fleet Broadband System.

The system installed on the vessel has to be registered with the BGAN Network through Shared Services Canada and they will require both the Financial Codes (**IS Org and IS Ref**) from the vessel.

Joy Sheng

Telecom Specialist
Service Management & Delivery
Information Technology Services Branch
Shared Services Canada
11 Laurier Street, Portage III, 5A2, Gatineau QC K1G 4A8
Tel: 819-956-4995
Fax: 819-956-8351
Joy.Sheng@spc-ssc.gc.ca

T1-11 Government Furnished Equipment

Fleet Broadband 500 c/w Dome, BDE, Power Supply and IP Thrane Handset.
N Type Male connector for LMR600FR
Antenna Adaptor Mounting Stand and Rubber Gasket
2 Junction Boxes
Cat5e Cable Belden 1300SB

T1-12 Material to be supplied by Contractor

#6 Green Ground Wire
#12 Green Ground Wire
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.

T1-13 Documentation

The Contractor shall ensure that the Fleet Broadband 500 manuals supplied with the new equipment unit is returned to CCG prior to the acceptance of this item.

Appendix A

Fixed Firefighting Suppression Systems

FIXED CO2 FIREFIGHTING SYSTEMS - 2015

FORWARD CARGO HOLD	LOCATION
CO2 Bottles (15)	CO2/FM200 Room
Solenoid Actuator	
Supply Lines	
Time Delay Bottle	
Pressure Gauge	
Latch Pull Stn. - TD & Instantaneous	Outside CO2/FM200 Room
Electric Pull Stn. - TD & Instant.	Outside Officers Lounge
Compressor Room – Aft Cargo	Location
CO2 Bottled (4)	Compressor Room
Solenoid Actuator	
Supply Lines	
Time Delay Bottle	
Pressure Gauge	
Electric Pull Stn. - Time Delay	Outside Officers Lounge
Propulsion Motor Room	
2x50lb. CO2	up high on platform STBD
Main Engineroom	
3 X 50 lb. CO2	Aft of #1 Main engine
Under Wheelhouse	Crawl Space
2 X 100lb CO2	
Galley	Galley
1 X 50 Lb. Kidde Wet Chemical System	
Dry Chemical	ER/ Hanger
3 X 50lb. chemical Wheeled System	
FRC – Suppression System	FRC compartment
1 X 1lb. Fireboy – CG2-076	

Appendix B

FM200 Fire Suppression System

FIXED FM200 SYSTEM 2015

Inspect bottles, gauges, latch pull seals, pressure switches, distribution heads, piping, etc...

BOTTLE LOCATION	SPACE PROTECTED	PULL LOCATION	PRESSURE SWITCH
Compressor Room w/ N2 Delay (2 pilot)	Transformer Room (1 x 350 lb)	Outside Officers Lounge	Yes
Compressor Room w/ N2 Delay (6 pilot)	Motor Propulsion Room (2 X 1010lb.)	Outside Officers Lounge	Yes
Compressor Room w/ N2 Delay (2 pilot)	Cyclo Converter Room (1 x 600 lb)	Outside Crews Lounge	Yes
Compressor Room w/ N2 Delay (2 pilot)	Purifier Room (1 x 175 lb)	Outside Crews Lounge	Yes
E/R Flat by Central Stores (2 pilot)	Sewage Compartment (1 x 900 lb)	Outside Crews Lounge	Yes
E/R Flat by Central Stores (2 pilot)	Central Stores (1 x 350 lb)	Outside Crews Lounge	Yes
E/R Flat by Central Stores (2 pilot)	Steering Gear Compartment (1 x 600 lb)	Outside Crews Lounge	Yes
E/R Flat by Central Stores (1 pilot)	Aviation Fuel Cofferdam (1 x 125 lb)	Outside Crews Lounge	N/A
Main Deck, Fwd. Port Side FM 200 (2 pilot)	Bowthruster & Winch Room (1 x 600 lb)	Fo'cle Bulkhead Port Side	Yes
Main Deck, Fwd. Port Side FM 200 (2 pilot)	Paint Locker (1 x 40lb)	Fo'cle Bulkhead Port Side	Yes
Main Deck, Fwd. Port Side FM 200 (2 pilot)	Bosun & Rope Locker (1 x 200 lb)	Fo'cle Bulkhead Port Side	Yes
Tank Top Deck, Port Side (CO2)	Generator Stator (3 x 50 lb)	At Bottles	N/A
Tank Top Deck, by Stbd. Shaft (CO2)	Propulsion Motor Casing (2 x 50 lb)	At Bottles	N/A
A/C Room, Boat Deck FM 200 (2 pilot)	Emergency Generator (1 X 125 lb)	Outside Space, Aft. Of Door	Yes
Equipment Locker, Boat Deck CO2	Crawl Space, Under Bridge (2 x 100 lb)	Centre of Bridge	N/A
Compressor Room FM200 For (12 pilots) For Main Engineroom, Stack, Control Room	Main Engine Room Upper (2 X 675 lb)	Outside Officers Lounge	Yes

BOTTLE LOCATION	SPACE PROTECTED	PULL LOCATION	PRESSURE SWITCH
Compressor Room FM200	Main Engine Room Lower (2 x 675 lb)	Outside Officers Lounge	Yes
SAR Locker FM200	Main Engineroom ER Stack (1 x 395 lb)	Outside Officers Lounge	Yes
Main Engine (FWD of Refrig. Compressors	MCR (1 X 200 lb)	Outside Officers Lounge	Yes
Motor Room Port,Fwd Up high on Catwalk	Cyclo-converter Room	Outside Officers Lounge	Yes
Motor Room Stbd.,Fwd. Up high on Catwalk	Purifier Room	Outside Officers Lounge	Yes

INSPECT:
Fixed systems –annually

Appendix C

Portable Fire Extinguishers

<u>No.</u>	<u>Extinguisher</u>	<u>Location</u>	<u>Serial #</u>
1	10 lbs. Dry Chemical	Bridge - Port Side	165035
1A	5 lbs. CO ₂	Bridge - Port Side	254029
2	10 lbs. Dry Chemical	Bridge - Stbd. Side	165100
3	10 lbs. Dry Chemical	Bridge - Stbd. Side	165032
3A	10 lbs. Dry Chemical	In spare locker	971331
4	20 lbs. ABC	Heli. Fuel Station	938295
5	20 lbs. Dry Chemical	Port Fueling Station	938026
6	5 lbs. Dry Chemical	Heli. Workshop	693288
6A	23 kg. Purple K	Hanger	284060
6B	23 kg. Purple K	Hanger	284164
7	10 lbs. Dry Chemical	Fan Room	675372
7A	10 lbs. CO ₂	Hanger	676572
8	20 lbs. Dry Chemical	Stbd. A/C Room	938035
9	10 lbs. Dry Chemical	Emergency Gen. Rm.	165125
10	10 lbs. Dry Chemical	Boat Deck Port Alley	165046
10A	5 lbs. CO ₂	Radio Room	508609
11	5 lbs. Dry Chemical	Electronics Room	523387
12	10 lbs. Dry Chemical	Fire Station 6	165013
13	10 lbs. Dry Chemical	Fire Station 8	165026
14	10 lbs. Dry Chemical	Fire Station 9	165113
14A	5 lbs. CO ₂	Engineer's Office	029788
15	10 lbs. Dry Chemical	Fire Station 10	165027
15A	5 lbs. CO ₂	Ship's Office	572304
16	10 lbs. Dry Chemical	Fire Station 11	165029
17	10 lbs. Dry Chemical	Steering Compartment	165092
18	10 lbs. Dry Chemical	Aft. Cargo Hold	165040
19	10 lbs. Dry Chemical	Fire Station 14	165106
19A	10 lbs CO ₂	Central Stores Stairs	163601
20	10 lbs. Dry Chemical	Fire Station 15	165124
21	20 lbs. Dry Chemical	Incinerator Flat	938298
22	10 lbs. Dry Chemical	Incinerator Flat	165111
23	10 lbs. Dry Chemical	Fire Station 16	165098
23A	10 lbs. Dry Chemical	Laundry	165034
24	10 lbs. Dry Chemical	Galley	165104
24A	6 Ltr. Wet Chemical	Galley	917244
25	10 lbs. Dry Chemical	Fire Station 17	165037
25A	5 lbs. CO ₂	Stbd. Winch Hse.	820167
25B	5 lbs. CO ₂	Port Winch Hse.	409522
26	10 lbs. Dry Chemical	Fo'csle	005551
26A	10 lbs. CO ₂	Fo'csle Work Bench	967506
26B	5 lbs. CO ₂	Fo'csle Stbd. Fwd.	59174
27	10 lbs Dry Chemical	Central Stores	165033
27A	5 lbs. ABC	Central Stores	235001
28	10 lbs. Dry Chemical	Upper Engine Rm.	275508
29	20 lbs. Dry Chemical	Upper Engine Rm. - Gen.	10376
30	10 lbs. Dry Chemical	Upper Engine Rm. - Gen.	165102

<u>No.</u>	<u>Extinguisher</u>	<u>Location</u>	<u>Serial #</u>
31	20 lbs. Dry Chemical	Upper Engine Rm. Boiler	938299
32	10 lbs. Dry Chemical	Upper Engine Rm. Boiler	105116
32A	23 kg. Purple K	Stbd. Fwd. E.R. Corner	636007
33	20 lbs. Dry Chemical	Outside E.R. Workshop	938300
33A	15 lbs. CO ₂	Outside E.R. Workshop	421632
34	10 lbs. Dry Chemical	E.R. Fwd. Entrance	165119
34A	15 lbs. CO ₂	Outside MCR Fwd.	240663
35	5 lbs. CO ₂	MCR	026886
35A	5 lbs. CO ₂	MCR Aft.	254028
36	10 lbs. Dry Chemical	Galley Stores	165093
37	10 lbs. Dry Chemical	Sewage Compt.	165012
38	10 lbs. Dry Chemical	MTR Room	165039
38A	10 lbs. Dry Chemical	MTR Room Upper	165042
38B	15 lbs. CO ₂	MTR Room	16480
39	10 lbs. Dry Chemical	Converter Room	165038
39A	15 lbs. CO ₂	Converter Room	16731
40	10 lbs. Dry Chemical	Aft. E.R. Stbd.	165090
41	10 lbs. Dry Chemical	Aft. E.R. Port	165109
42	20 lbs. Dry Chemical	Fwd. E.R. Stbd.	937972
43	20 lbs. Dry Chemical	Fwd. E.R. Port	938297
44	10 lbs. Dry Chemical	Fwd. E.R. Stbd.	165107
45	10 lbs. Dry Chemical	Fwd. E.R. Port	165021
46	10 lbs. Dry Chemical	Bow Thruster	165017
47	10 lbs. Dry Chemical	Fwd. Hold	165025
48	10 lbs. Dry Chemical	Fwd. Hold	165094
49	5 lbs. CO ₂	Spare	663625
51	10 lbs. Dry Chemical	Bow Thruster Hatch	165122
52	10 lbs. Dry Chemical	Spare	971750
56A	10 lbs Dry Chemical	FRC Aft	764000
56B	2.5 lbs. Dry Chemical	FRC Fwd	81692
55	10 lbs. Dry Chemical	Wheelhouse A/C Compt.	165101
56	5 lbs. Dry Chemical	Spare	411809
57	20 lbs. Dry Chemical	Spare	938294
58	20 lbs. Dry Chemical	Spare	938027
59	5 lbs Dry Chemical	Barge	893032
63	20 lbs. Dry Chemical	Outside Transformer Room	938031
64	5 lbs. CO ₂	Spare	460790
B1	10 lbs. Dry Chemical	Spare Locker	675281
B2	10 lbs Dry Chemical	Hanger	653790
B5	5 lbs. Dry Chemical	Lifeboat	495598
B6	5 lbs. Dry Chemical	Lifeboat	495629
B9	10 lbs. Dry Chemical	Spare	972696
B11	20 lbs CO ₂	Spare	32468
U1	10 lbs. CO ₂	Spare – Workshop	967507
U2	15 lbs. CO ₂	Spare – Workshop	1052
U3	20 lbs. CO ₂	Outside E.R. Workshop	32461

HW 15 lbs CO2
 2 Gal. Water

ER workshop
Spare (Locker)

1146
861013

Appendix D

Amerlock Paint Specification & Product Datasheets

WATER BLAST CLEANING AND PAINTING OF CCGS CORNWALLIS BULKHEAD

1.0 SCOPE OF WORK

This specification details the supply of all labor, material, equipment, plans and procedures required for Water blast cleaning and painting steel bulkheads aboard CCGS CORWALLIS.

2.0 GENERAL

2.01 DEFINITIONS

a) SSPC Specifications: Such references are as detailed in the Steel Structures Painting Manual, Volume 2, Systems and Specifications, published by the Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA, 15213.

These specifications are a part of this specification and in case of conflict the decision of the Engineer shall prevail.

b) Dry film thick nesses are stated in microns rather than mils, 1 mil = 25 microns

2.02 WORKMANSHIP

All work performed by the Contractor shall be of quality throughout and in accordance with all subsections of SSPC, unless otherwise specified. Any dispute or difference of opinion as to the interpretation of these specifications or regarding the quality of material or workmanship shall be left to the decision of the Engineer, whose decision shall be final and binding on both parties.

2.03 DETAILS OF WORK

Any particulars of work extent provided herewith are given only for the guidance of the Contractor, who will be held responsible for securing all necessary details, the intent of these specifications being to assist in a quality coating system on the steel.

2.04 MANUFACTURER'S INSTRUCTIONS

The coating manufacturer's published instructions are a part of this specification and shall be acquired by the contractor. In case of conflict, the decision of the Engineer shall prevail.

3.0 INSPECTION

3.01 CONTRACTOR'S RESPONSIBILITY

All material and equipment furnished and work done, shall be subject to inspection by the Engineer. Such inspection shall not relieve the Contractor of the responsibility for furnishing the qualified labor, etc. necessary to meet the requirements of the specifications. The Contractor shall ask for the Engineer's approval only after his own thorough inspection and after he is satisfied he has met all the requirements of the specification. The Owner may hire an inspector to perform the inspection of the work.

3.02 WORK STAGES

Inspection may be required for each work stage. Inspection may be waived only by written notice to the Contractor. The Contractor shall provide the Engineer with a schedule detailing each stage and at least 24 hours notice during the course of the project when delays are expected.

3.03 DEFECTIVE WORK

Any defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause resulting from the Contractor's actions or omissions, found to exist prior to final acceptance of the work, shall be repaired or removed immediately when ordered by the Engineer.

In the case of the repair, the procedure shall be in an acceptable manner as authorized by the Engineer. In the case of removal, the work shall be replaced by work and materials, which shall conform to the specification. This clause shall have full effect regardless of the fact that the Engineer may have previously overlooked the defective work.

3.04 DRY FILM THICKNESS

Dry Film Thickness measurements shall be made using a Positest or magnetic gauge, or equal approved by the Engineer and shall conform to SSPC-PA2.

6.0 SURFACE PREPARATION FOR PAINTING

6.01 OIL AND GREASE

All oil and grease contamination shall be removed according to the requirements of SSPC-SP1-82 Solvent Cleaning with Amercoat #65 or Detergent Power Wash Amercoat Prep 88.

6.02 ALL STEEL SURFACES

- 7 Power tool clean in accordance with SSPC-SP 3 Power Tool Cleaning standards.
- 8 A minimum profile of 25 microns (1 mils) is specified.

6.03 CONTAMINATION OR DETERIORATION

- 7 All coated surfaces shall be clean and dry before over-coating.
- 8 The degree of surface preparation specified shall exist as the appropriate coat of paint is being applied.

7.0 PAINTING

7.01 ALL STEEL

- 9 Primer shall be Amerlock 2 epoxy Grey or Ivory, applied by brush ,roller or spray application in one coat to a dry film thickness of 100-150 microns (4-6 mils)to all bare areas.
- 10 Mid Coat shall be Amerlock 2 epoxy White, applied by spray application to a dry film thickness of 100– 150 microns (4-6 mils) to entire bulkhead. (A stripe coat on all sharp edges and welds ,and bolts is recommended)
- 11 Top Coat shall be Amercoat 5450 Marine Enamel White, applied by spray application in one-two coats to a dry film thickness of 75 – 125 microns (3-5 mils) .This Coat is to be applied to the Mid-Coat epoxy while Thumb print soft to ensure good bond.
- 12 Total dry film thickness shall be 275 microns (11 mils) minimum to 425microns (17 mils) maximum.

7.02 COLOUR

Colour schedule shall be Ameron Protective Coating's colours as chosen by Engineer.

- 7.03 All coatings shall be uniformly applied without sags, foreign materials, contamination, or other blemishes. Such defects shall be removed and repaired before proceeding with another coat, at the discretion of the Engineer.
- 7.4.1 No coating material shall be applied when the steel temperature is less than 5 degrees C, or less than 3 degrees above the dew point. A surface temperature thermometer in intimate contact with the steel shall be used for monitoring purposes. The Contractor shall submit the temperature log of each day of painting.
- 7.4.2 The same manufacturer shall supply all coating materials for the selected system. Different lots of material shall be kept to minimum consistent with the manufacturer's production facilities for the product.
- 7.05 Paint shall be supplied at the site in new, unopened containers. Materials older than the manufacturer's published shelf life shall not be accepted. Damaged containers will not be accepted.

Prep 88

Water based cleaner

Product Data/ Application Instructions (For Marine & Offshore use)

- Excellent cleaning of soiled and chalked surfaces
- Cleans super clean
- Dramatically improves aged recoatability
- Reduces repainting costs
- No abrasive sweep blasting necessary
- No roughening aged painted surfaces
- Biodegradable
- Contains no solvents
- Contains no phosphates, halogens, chlorinated solvents or petroleum distillates

Typical Uses

Cleans intact, painted surfaces in preparation for repainting.

If you get the aged painted surface "super clean" with Prep 88 cleaner, no other surface preparation may be needed before recoating. Sanding, solvent wiping, abrasive sweep blasting and roughening aged coatings may be eliminated for non-immersion areas.

Prep 88 cleaner is ideal for:

- Drydock painting
- Maintenance painting
- New construction

Application Equipment

Low pressure sprayer, brush, roller, or mop.

Application Procedure

For most applications, Amercoat 88 cleaner can be diluted 1 part Prep 88 to 2 parts fresh clean water.

1. Apply generously by spray, brush, roller, or mop.
2. Wait 5 to 10 minutes (but do not allow to dry out), then pressure wash with fresh water.
3. Insure all of the Prep 88 cleaner is removed from the surface. Note: Scrubbing will aid in removing heavier stains.
4. Concentrated Prep 88 cleaner may be required for heavy oil residues.
5. If surfaces are hot, pre-wet before application of Prep 88 cleaner.
6. Do no apply under freezing conditions.

Physical Data

Type	Alkaline solution	
Color	Clear to slight haze	
Components	1	
VOC (EPA)	0	
	°F	°C
Flash point (SETA)	None	None
freezing point	25	-4
boiling point	212	100

Application Data

Applied over	Intact coatings	
Method	Spray, brush, roller, or mop	
pH	11 - 12	
Density	8.6 lbs/gal	1.03 kg/L
Solubility in water	Infinite	
Environmental conditions		
Temperature	°F	°C
air	40 to 100	4 to 38
surface	40 to 122	4 to 50

Formerly Devprep® 88

Safety Precautions

Read material safety data sheet before use. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which Ameron is unaware and over which it has no control.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.

Shipping Data

Packaging unit	5 gal	
Shipping weight (approx)	lb	kg
5-gal	45.7	20.7

Shelf life when stored indoors at 40 to 100°F (4 to 38°C)
cure and resin 1 year from shipment date

Numerical values are subject to normal manufacturing tolerances, colors and testing variances. Allow for application losses and surface irregularities.

This product is photochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. **In no event shall Ameron be liable for consequential or incidental damages.**



Ameron U.S.A. • 13010 Morris Rd, Suite 400, Alpharetta, GA 30004 • (678) 393-0653
Ameron B.V. • J.F. Kennedylaan 7, 4190 CA Geldermalsen, The Netherlands • (31) 345-587-587



AMERON
INTERNATIONAL

Performance Coatings & Finishes

Amercoat® 5450

Alkyd gloss topcoat

Product Data/ Application Instructions

- High gloss high performance alkyd topcoat
- Good weathering properties
- Good application characteristics
- Good drying properties
- VOC compliant at 3.5 lb/gal

Typical Uses

Amercoat 5450 alkyd topcoats are designed to protect and enhance the appearance of:

- Marine exterior areas such as freeboards, decks, houses and superstructures; interior areas such as engine rooms, passageways and equipment.
- Power plants
- Industrial structures, tanks, piping and equipment
- Railcars
- Wastewater Treatment plants and equipment
- Bridges

Amercoat 5450 is a gloss alkyd topcoat used for weathering, mild industrial and marine services. Color and gloss retention during continuous weathering exposure is typical of high quality gloss alkyds. Amercoat 5450 will not resist severe chemical, splash or immersion conditions.

Surface Preparation

Coating performance is, in general, proportional to the degree of surface preparation. Refer to specifications for the specific primer being used. Prior to coating, all surfaces must be clean, dry, undamaged and free of all contaminants, including salt deposits. Refer to specific primer application instructions for more information. For conditions outside the requirements or limitations described, contact your Ameron representative.

Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

Airless spray - Standard equipment such as Graco Bulldog Hydra-Spray 30:1 or larger with a 0.013- to 0.021-inch fluid tip.

Conventional spray - Industrial equipment such as DeVilbiss MBC or JGA spray gun with a 78 or 765 air cap and "E" fluid tip or Binks No. 18 or 62 spray gun with a 66 x 63 PB nozzle setup. Separate air and fluid pressure regulators, mechanical pot agitator and a moisture and oil trap in the main air supply line are recommended.

Brush - Natural bristle. Maintain a wet edge.

Roller - Industrial solvent resistant roller. Level any air bubbles with bristle brush.

Power mixer - Jiffy Mixer powered by an air or an explosion-proof electric motor.

Physical Data

Finish	High gloss	
Color	See color card	
Components	1	
Curing mechanism	Solvent release and air oxidation	
Volume solids (ASTM D2697 modified)	45% ± 3%	
Dry film thickness per coat	1.5-2.5 mils (38-63 microns)	
Coats	1	
<i>When white or light colors specified, 2 coats may be required, depending on primer color.</i>		
Theoretical coverage	ft ² /gal	m ² /L
1 mil (25 microns)	722	17.8
2 mils (50 microns)	361	8.9
VOC (EPA 24)	lb/gal	g/L
Amercoat 5450	3.34	401
Flash point (SETA)	°F	°C
Amercoat 5450	98	37
Amercoat 15	106	41
Amercoat 12	2	-17

Application Data

Applied over	Prepared and primed steel	
Primer	Amercoat 1000, 5105	
Ameron Epoxy Coating*	Amercoat 230, 235, 370, 385, Amerlock 400	
Surface preparation	See specific primer	
Method	Airless or conventional spray, brush, roller	
Environmental conditions		
Temperature air and surface	°F	°C
	45 to 100	7 to 38
Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.		
Drying time @ 2 mils (ASTM D1640)	°F/°C	
(hours)	70/21	
touch	2	
hard	12	
through	24	
recoat		
minimum	12	
maximum	Unlimited	
Thinner	Amercoat 15	
Equipment cleaner	Amercoat 12 or 15	

* When applied over epoxy coatings, the minimum topcoat time for the epoxy coating with Amercoat 5450 is dry hard time. The maximum topcoat time for the epoxy coating with Amercoat 5450 is 3 times dry hard time.

Formerly Bar-Ox® 450

Application Procedures

1. Clean all equipment with thinner or Amercoat® 12.
2. Stir material thoroughly with mixer until uniformly blended. Strain through cheesecloth or equivalent to remove skin particles or other contamination.
3. If needed for workability, use up to 1/2 pint Amercoat 15 per gallon of Amercoat 5450.
4. Apply a wet coat in even, parallel passes; overlap each pass 50 percent to achieve a dry film thickness of 1.5 to 2.0 mils. If required, cross spray pass at right angles.

Note: Do not apply when the relative humidity is high and condensation is possible. Substrate temperature must be 5°F (3°C) above dew point to prevent condensation. Drying will be retarded below 39°F (4°F).

5. Repair or touch up, respray large areas with original thickness, brush or roll smaller areas.
6. Store unused materials in tightly closed containers. Partially filled containers may show surface skinning after storage. Remove skin by straining before use.
7. Clean all equipment with Amercoat 15 or 12 immediately after use.

Repair

Prepare damaged areas to original surface preparation specifications, feathering edges of intact coating. Thoroughly remove dust or abrasive residue before touch-up.

Safety Precautions

Read material safety data sheet before use. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mists and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which Ameron is unaware and over which it has no control.

If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.

Shipping Data

Packaging	1- and 5-gal cans	
Shipping weight (approx)	lb	kg
1-gal can	10.5	4.7
5-gal can	52	23.6
Shelf life when stored indoors at 40 to 100°F (4 to 38°C)	1 year from shipment date	

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities.

This product is nonphotochemically reactive as defined by South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. **In no event shall Ameron be liable for consequential or incidental damages.**



Ameron U.S.A. • 13010 Morris Rd, Suite 400, Alpharetta, GA 30004 • (678) 393-0653
Ameron B.V. • J. F. Kennedylaan 7, 4191 MZ Geldermalsen, The Netherlands • (31) 345-587-587



AMERON
INTERNATIONAL

Performance Coatings & Finishes



The Next Generation of Amerlock 400



Fast drying surface tolerant VOC compliant epoxy

Amerlock Series

Product Data/ Application Instructions

- Fast dry, dry to touch in 2 hours at 70°F (21°C)
- Recoat in 3 hours at 70°F (21°C)
- Low temperature cure down to 0°F (-18°C)
- Exceptional corrosion protection in industrial and marine corrosive environments
- Surface tolerant, excellent adhesion to tight rust and prepared damp surfaces
- Self priming topcoat over most existing coatings
- Can be overcoated with a wide range of topcoats
- Meets all existing VOC regulations including SCAQMD Rule 1113 requirements for 2002

Amerlock 2's low solvent level meets VOC requirements, reduces the chances for film pinholing and solvent entrapment at the substrate-coating interface, often a major cause of coating failure with conventional epoxies and lower solids systems.

Amerlock 2 is available in a variety of colors, and therefore does not require a topcoat. For extended weatherability or special uses, a topcoat may be desired.

Typical Uses

Amerlock 2 is designed for use in a variety of areas, even those where surface preparation is impossible. As a maintenance coating, Amerlock 2 protects steel structures in industrial facilities, bridges, tank exteriors, marine weathering, offshore, oil tanks, piping, roofs, water towers and other exposures. Amerlock 2 has good chemical resistance to splash/spillage, fumes and immersion in neutral, fresh and salt water (see resistance table). Contact your Ameron representative for specific information.

Qualifications (Amerlock 2)

1. USDA – Incidental food contact
2. NSF Standard 61 - For use in drinking water.
See current NSF listing at www.nsf.org for restrictions and approved colors.
3. FDA 21 CFR 175.300 extraction test for direct food contact



Physical Data

Finish	Semigloss			
Color	Standard, Rapid Response, custom colors and aluminum			
Components	2			
Curing mechanism	Solvent release and chemical reaction between components			
Volume solids (ASTM D2697 modified)				
Amerlock 2	83% ± 3%			
Amerlock 2AL	85% ± 3%			
Dry film thickness (per coat)	4-8 mils (100-200 microns)			
Coats	1 or 2			
Theoretical coverage	ft²/gal	m²/L		
1mil (25 microns)				
Amerlock 2	1331	32.6		
Amerlock 2AL	1363	33.1		
5 mils (125 microns)				
Amerlock 2	266	6.5		
Amerlock 2AL	273	6.7		
VOC	lb/gal	g/L		
Amerlock 2 mixed*	1.5	180		
mixed/thinned (½ pt/gal)*	1.8	216		
Amerlock 2AL mixed**	1.0	123		
mixed/thinned (½ pt/gal)**	2.0	234		
* EPA method 24				
** Calculated				
Temperature resistance,	wet		dry	
	°F	°C	°F	°C
continuous	100	38	200	93
intermittent	100	38	350	177
Flash point (SETA)	°F		°C	
Amerlock 2/400 resin*	131		55	
Amerlock 2 cure	114		29	
Amerlock 2AL resin	110		43	
Amerlock 2AL cure	122		50	
Amercoat® 8	20		-7	
Amercoat 65	78		25	
Amercoat 12	2		-17	

* Amerlock 2 resin and Amerlock 400 resin are identical, and are packaged under a common label as Amerlock 2/400 resin. Amerlock 2 cure and Amerlock 400 cure are different, and are labeled individually.

Typical Properties (Amerlock 2)

Physical

Abrasion resistance (ASTM D4060)	
1 kg load/1000 cycles	weight loss
CS-17 wheel	102 mg
Impact resistance (ASTM D2794)	
Direct	24 in · lb
Reverse	6 in · lb
Moisture vapor transmission (ASTM F1249)	
	4.0 gm/m ² /day
Adhesion (ASTM D4541)	
	1200 psi

Performance

Salt spray (ASTM B117) 3500 hours	
Face corrosion/blistering	None
Humidity (ASTM D2247) 1500 hours	
Face corrosion/blistering	None
Prohesion (ASTM G85-A5) 3000 hours	
Face corrosion/blistering	None

Chemical Resistance Guide

Environment	Immersion	Splash and Spillage	Fumes and Weather
	2 2AL	2 2AL	2 2AL
Acidic	* *	F F	G G
Alkaline	* *	E G	E E
Solvents	* *	G G	E E
Salt water	E *	E E	E E
Water	E *	E E	E E
F-Fair	G-Good	E-Excellent	

*Contact your Ameron representative.

This table is only a guide to show typical resistances of Amerlock 2 and Amerlock 2AL. For specific recommendations, contact your Ameron representative for your particular corrosion protection needs.

Systems using Amerlock 2 or Amerlock 2AL

1 st coat	2 nd Coat	3 rd coat
Amerlock 2	None	None
Amerlock 2	Amerlock 2	None
Amerlock 2	450H	None
Amerlock 2	Amershield	None
Amerlock 2	PSX 1001	None
Dimetecote® 9, 9FT		
or 9HS	Amerlock 2	None
Dimetecote 9, 9FT		
or 9HS	Amerlock 2	450H

Note: For color contrast when two coats of Amerlock 2 Aluminum are used, Amerlock 2 Aluminum Red can be used as the first coat.

Surface Preparation

Coating performance is, in general, proportional to the degree of surface preparation. Abrasive blasting is usually the most effective and economical method. When this is impossible or impractical, Amerlock 2 can be applied over mechanically cleaned surfaces. All surfaces must be clean, dry and free of all contaminants, including salt deposits.

Amerlock 2 may be used over most types of properly prepared and tightly adhering coatings. A test patch is recommended for use over existing coatings.

Steel – Remove all loose rust, dirt, moisture, grease or other contaminants from surface. Power-tool clean SSPC-SP3 or hand-tool clean SSPC-SP2. For more severe environments, dry abrasive blast SSPC-SP7. Water jetting is also acceptable. For immersion service – dry abrasive blast SSPC-SP10.

Aluminum – Remove oil, grease or soap film with neutral detergent or emulsion cleaner, treat with Alodine® 1200, Alumiprep® or equivalent or blast lightly with fine abrasive.

Galvanizing – Remove oil or soap film with detergent or emulsion cleaner, then use zinc treatment such as Galvaprep® or equivalent or blast lightly with fine abrasive.

Concrete – Acid etching (ASTM D4260) or abrasive blast (ASTM D4259) new concrete cured a minimum of 14 days.

Application Data

Applied over	Steel, concrete, aluminum, galvanizing
Surface preparation	
Steel	SSPC-SP2, 3, 6, 7, 10 or 11
Concrete	ASTM D4259 or 4260
Aluminum	Alodine®, Alumiprep® or light abrasive blast
Galvanizing	Galvaprep® or light abrasive blast
Method	Airless or conventional spray. Brush or roller may require additional coats.
Mixing ratio (by volume)	1 part resin to 1 part cure
Environmental conditions	Air and surface temperature 20° to 120°F (-6° to 49°C)

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation. At freezing temperatures, surface must be free of ice.

Drying time (ASTM D1640) (hours)

	120/49	90/32	70/21	50/10	32/0	20/-6
			touch °F/°C			
Amerlock 2	0.5	1	2	8	24	48
Amerlock 2AL	0.5	2	3.5	11	30	—
			through			
Amerlock 2	1	2	4.5	13	38	96
Amerlock 2AL	1.5	3.5	7	17	48	—

Amerlock 2

(cure to immersion* (days)

	1	2	3	7	21	—
--	---	---	---	---	----	---

*non-potable water

Thinner	Amercoat 8 or 65
Equipment cleaner	Thinner or Amercoat 12

	90/32	70/21	50/10
	°F/°C		
Recoat/Topcoat time	90/32	70/21	50/10
minimum (hours)	1	3	6

Recoat/Topcoat time @ 70°F (21°C)

System	Maximum time
Amerlock 2/Amerlock 2	1 month
Amerlock 2/Amershield or 450H	1 week
Amerlock 2/Amercoat 5405	1 day
Amerlock 2AL/Amerlock 2AL	2 weeks

Note: If maximum time is exceeded, roughen surface. For topcoats (finish coats) not listed, see Product Data sheet for specific topcoat time limitations.

Pot life (hours)	90/32	70/21	50/10	32/0
	°F/°C			
Amerlock 2				
unthinned	0.75	1	2	4
½ pint thinner	1	1.5	2.5	5
Amerlock 2AL				
unthinned	0.5	0.75	1.5	—
½ pint thinner	1	1.25	2	—

Pot life is the period of time after mixing that a five-gallon unit of material is sprayable when thinned as recommended. Mixture may appear fluid beyond this time, but spraying and film build characteristics may be impaired.

Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

Airless spray – Standard equipment having a 45:1 or higher pump ratio, with a 0.017- to 0.021-inch fluid tip.

Conventional spray – Industrial equipment, such as DeVilbiss MBC or JGA or Binks 18 or 62 spray gun. A moisture and oil trap in the main air supply line, a pressure material pot with mechanical agitator and separate regulators of air and fluid pressure are recommended.

Power mixer – Jiffy Mixer powered by an air or explosion-proof electric motor.

Brush or roller – Additional coats may be required to attain proper thickness.

Application Procedure

1. Flush all equipment with thinner or Amercoat® 12 before use.
2. Stir resin and cure using an explosion-proof power mixer to disperse pigments.
3. Add cure to resin. Mix thoroughly until uniformly blended to a workable consistency.
4. Do not mix more material than can be used within the expected pot life.
5. For optimum application, material should be from 50° to 90°F (10° to 32°C). Above 122°F (50°C), sagging may occur.
6. Use only Ameron recommended thinners. Above 70°F (29°C) use Amercoat 8, at lower temperatures use Amercoat 65. A small amount of thinner greatly reduces viscosity; excessive thinning will cause running or sagging. Thin cautiously as follows:

	Amerlock 2	Amerlock 2AL
Airless – up to	½ pt/gal	1pt/gal
Conventional – up to	½ pt/gal	1pt/gal

Below 50°F additional thinning may be needed and multiple coats required to achieve specified thickness.

7. To minimize orange peel appearance, adjust conventional spray equipment to obtain adequate atomization at lowest air pressure.
8. Apply a wet coat in even, parallel passes with 50 percent overlap to avoid holidays, bare areas and pinholes. If required, cross spray at right angles.
9. When applying Amerlock 2 directly over inorganic zincs or zinc rich primers, a mist coat/full coat technique may be required to minimize bubbling. This will depend on the age of the Dimetecote®, surface roughness and conditions during curing.
10. Ventilate confined areas with clean air during application and while curing the final coat. Prevent moisture condensation on the surface between coats.
11. Repair damaged areas by brush or spray.
12. Clean equipment with thinner or Amercoat 12 immediately after use.

Note: Do not apply Amerlock 2AL on water-damp surfaces.

Shipping Data

Packaging unit	2 gal	5 gal
cure	1-gal can	2.5-gal can
resin	1-gal can	2.5-gal can
Shipping weight (approx)	lbs	kg
2-gal unit		
Amerlock 2 cure	12.8	5.8
Amerlock 2/400 resin	13.7	6.2
Amerlock 2AL resin	11.0	5.0
Amerlock 2AL cure	13.3	15.9
5-gal unit		
Amerlock 2 cure	33.0	15.0
Amerlock 2/400 resin	35.0	15.9
Amerlock 2AL resin	28.3	12.8
Amerlock 2AL cure	34.5	15.6

Shelf life when stored indoors at 40° to 100°F (4° to 38°C)
resin and cure 1 year from shipment date.

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities.

This mixed product is photochemically reactive as defined by the South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Safety Precautions

Read each component's material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.

Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep solvent vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interiors and buildings.

This product is to be used by those knowledgeable about proper application methods. Ameron makes no recommendation about the types of safety measures that may need to be adopted because these depend on application and space, of which Ameron is unaware and over which it has no control.

If you do not fully understand the warnings and instructions or if you cannot strictly comply with them, do not use the product.

Note: Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

This product is for industrial use only. Not for residential use.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. **In no event shall Ameron be liable for consequential or incidental damages.**

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether expressed, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.



Ameron U.S.A. • 13010 Morris Rd, Suite 400, Alpharetta, GA 30004 • (678) 393-0653
Ameron B.V. • J. F. Kennedylaan 7, 4191 MZ Geldermalsen, The Netherlands • (31) 345-587-587

Appendix E

Incinerator Installation

APPENDIX E.1

TeamTec Incinerator

OG200CS

**CCGS Edward
Cornwallis**

Purchase Order no: 1612

Installation Drawings

21.01.2015 VMS

Revision: 0

TeamTec PO No: 16761

Scope of Supply

	Item No.	Page No.	Description	Drawing No.
	1.	2	Scope of supply	
	2.	3-4	Technical Specification Incinerator	
	3.	5	IMO Resolution A962(23)	
	4.	6-8	Supplied Spare Parts	
	5.	9	Piping & Instrument diagram Incinerator	2009390
	6.	10	Main Dimensions Combustion Chamber Incinerator	1009049 C
	7.	11	Comb.Chamber Incinerator Assembly	1009051 G
	8.	12	Cable Arrangement for Incinerator	4009157
	9.	13	Control Panel Incinerator	1010690
	10.	14	Mounting Plate, Control Panel Incinerator	1010691
	11.	15-27	Electrical Diagram Incinerator	3010821
	12.	28	Terminal Diagram Diesel Oil Burner	4007918 A
	13.	29	Main Dimensions Flue Gas Fan	4006930 B
	14.	30	Flue Gas Fan Assembly	1006992 B
	15.	31	Flue Gas Damper	3007249 C
	16.	32	Flue Gas Damper Assembly	1006999 A
	17.	33	Expansion compensator	3009565
	18.	34	Main Dimensions Sludge Tank	2008577
	19.	35	Sludge Tank Assembly	2007300 C
	20.	36	Control Panel Sludge Tank	2009426
	21.	37	Mounting Plate Sludge Tank	2009427
	22.	38-39	El. Diagram Sludge Tank	3010068
	23.	40-47	Installation and commissioning guide	

Technical Specification

TEAMTEC INCINERATOR OG200C

Edition: TG5 (TeamTec Generation 5)

Market leaders since 1972 - More than 10 000 units sold world wide



The incinerator consist of a combustion chamber with burner unit, sludge burning equipment, and electric control panel, all assembled in one complete unit resting on four (4) feet or pads to be welded or bolted to the deck or platform. Flue gas damper and cooling fan are delivered as separate units to be installed in the flue gas duct or funnel.

TECHNICAL DATA – INCINERATOR:

version :	C	CS	CW	CSW	CI*	CIS*
Main Dimension Drawing	1009047	1009049	1009202	1009205	1009018	1009048
Dimensions (L x W x H mm)	1350x1900x1960	1697x1900x1960	1350x1900x1960	1697x1900x1960	1350x1900x2050	1697x1900x2050
Total weight, kg	3 055	3 305	3 000	3 200	3 065	3 315
Feeding door clear opening (W x H mm)	400 x 1188	400 x 1188	400 x 1188	400 x 1188	400 x 1188	400 x 1188
Sluice feeder opening	N/A	320 x 320	N/A	320 x 320	N/A	320 x 320
Sluice capacity, l/charge	N/A	55	N/A	55	N/A	55
Incineration thermal capacity:	400 000 kcal/h 465 kW	400 000 kcal/h 465 kW	400 000 kcal/h 465 kW	400 000 kcal/h 465 kW	542 000 kcal/h 630 kW	542 000 kcal/h 630 kW
Sludge oil burning capacity nominal **	53 l/h	53 l/h	N/A	N/A	70 l/h	70 l/h
Solid Waste capacity, batch load	400 l/charge	400 l/charge	400 l/charge	400 l/charge	400 l/charge	400 l/charge
Solid Waste continuous charging, kg/h	N/A	55	N/A	55	N/A	55
Water Injection capacity	N/A	N/A	N/A	N/A	127 l/h	127 l/h
Negative pressure	10 – 28 mm WC	10 – 28 mm WC	10 – 28 mm WC	10 – 28 mm WC	10 – 28 mm WC	10 – 28 mm WC
Outer skin temperature above ambient	15°C	15°C	15°C	15°C	15°C	15°C
Working temperature combustion chamber	850 – 1150°C	850 – 1150°C	850 – 1150°C	850 – 1150°C	850 – 1150°C	850 – 1150°C
Max temperature combustion chamber	1200°C	1200°C	1200°C	1200°C	1200°C	1200°C
Working temperature flue gas	250 – 350°C	250 – 350°C	250 – 350°C	250 – 350°C	250 – 350°C	250 – 350°C
Diesel oil viscosity (max)	13 cSt at 40°C	13 cSt at 40°C	13 cSt at 40°C	13 cSt at 40°C	13 cSt at 40°C	13 cSt at 40°C
Diesel oil consumption when support burner is in operation 1 / 2 nozzles, l/h	10 / 28	10 / 28	10 / 28	10 / 28	10 / 28	10 / 28
El. Power consumption diesel oil heater	2.0 kW	2.0 kW	2.0 kW	2.0 kW	2.0 kW	2.0 kW
Nominal total electrical power consumption	10 kW	10 kW	10 kW	10 kW	10 kW	10 kW
Total rated electrical power consumption	15 kW	15 kW	12 kW	12 kW	15 kW	15 kW
Recommended supply fuse	32 A	32 A	32 A	32 A	32 A	32 A
Steam or compressed air requirement (for sludge atomizing)	20 norm m³/h 7 bar	20 norm m³/h 7 bar	N/A	N/A	20 norm.m³/h 7 bar	20 norm m³/h 7 bar

* With TEAMTEC water injection system. ** IMO-defined sludge oil, 20% water content.

version :	C	CS	CW	CSW	CI*	CIS*
Pipe connection steam or air (DN)	15	15	N/A	N/A	15	15
Pipe connection for diesel line (supply/return) (DN)	15	15	15	15	15	15
Pipe connection for sludge oil line (supply/return) (DN)	25	25	N/A	N/A	25	25
Pipe connection bilge water (DN)	N/A	N/A	N/A	N/A	15	15
Pipe connection for drain of spill collector (DN/BSP)	25 / -	25 / -	25 / -	25 / -	25 / -	25 / -
Flue gas outlet dimension (DN)	400	400	400	400	400	400
Minimum distance between flue gas fan outlet and first component on the flue gas line	2500 mm	2500 mm	2500 mm	2500 mm	2500 mm	2500 mm
Incinerator body color	RAL 6019	RAL 6019	RAL 6019	RAL 6019	RAL 6019	RAL 6019
Control panel color	RAL 7035	RAL 7035	RAL 7035	RAL 7035	RAL 7035	RAL 7035

TECHNICAL DATA – FLUE GAS DAMPER:

version :	C, CS, CW, CSW, CI and CIS
Main Dimension Drawing	3007249
Flange connection inlet (from incinerator) (DN)	400
Flange connection outlet (fan side) (DN)	300
Weight, kg	68
Color (heat resistant)	Aluminum

TECHNICAL DATA – FLUE GAS FAN:

version :	C, CS, CW, CSW, CI and CIS
Main Dimension Drawing	4006930
Flue gas fan outer dimension (L x W x H)	1020 x 1040 x 1030
Flue gas duct dimension (inlet/outlet) (DN)	300 / 300
Weight, kg	326
Flue gas fan capacity, maximum	8 000 m ³ /h
Flue gas fan capacity, maximum	4 000 m ³ /h
Back pressure, maximum	150 mm WC
Separate starter recommended fuse	N/A
Rated power consumption from separate supply	N/A
Color (heat resistant)	Aluminum

TECHNICAL DATA – EXPANSION COMPENSATOR:

version :	C, CS, CW, CSW, CI and CIS
Flange connection (DN)	300

POTENTIAL DANGEROUS MATERIALS IN THE SHIP'S STRUCTURE AND EQUIPMENT

(in pursuance of IMO Resolution A.962(23), adopted 5 December 2003)

Manufacturer

TeamTec AS - Incinerators

Date: 09.10.12

Notes:

A. Please leave blank the row when the identified potential dangerous material is not present.

B. Entries in *Italic* are offered for guidance only

POTENTIALLY DANGEROUS MATERIALS	TYPE	APPROXIMATE QUANTITY	LOCATION - REMARKS
1. ASBESTOS			
2. PVC		100 Gram	<i>Tubes and fittings for under pressure</i>
3. GRP/FRP			
4. THERMOPLASTIC ELASTOMERE			
5. POLYURETHANE FOAM			
6. OTHER PLASTICS	XLPE + Fluor carbon Rubber	10 kg	<i>Electric cables</i>
7. ETHYLENE PROPYLENE RUBBER			
8. BUTYL RUBBER			
9. VISCO ELASTIC			
10. NITRIL BUTADIENE RUBBER	Nitril	150 gram	<i>Stator dosage pump</i>
11. PTFE			
12. VINYL			
13. MISCELLANEOUS PLASTIC		5 kg	<i>All types</i>
14. PCBs, PCTs, PBBs			
15. R134a			
16. R404a			
17. R134a			
18. R22			
19. HALON			
20. HCFC			
21. EPOXY RESINS		3 kg	<i>Coating</i>
22. MERCURY			
23. RADIOACTIVE MATERIALS			
24. PERLITE			
25. WOOD/PLYWOOD			

39- Spare part list

Article / Name	17910 / Minimum Spare Parts, OG200/400C, TG5
Name / Article	(Alle)
Salesitem	(Alle)
Yearmodel	(Alle)

Art. no.	Art. name	Quantity	Unit
15748	Bonded Stator, black mark	1,00	stk
7587	Photo resistor, QRB 1 A	1,00	stk

39- Spare part list

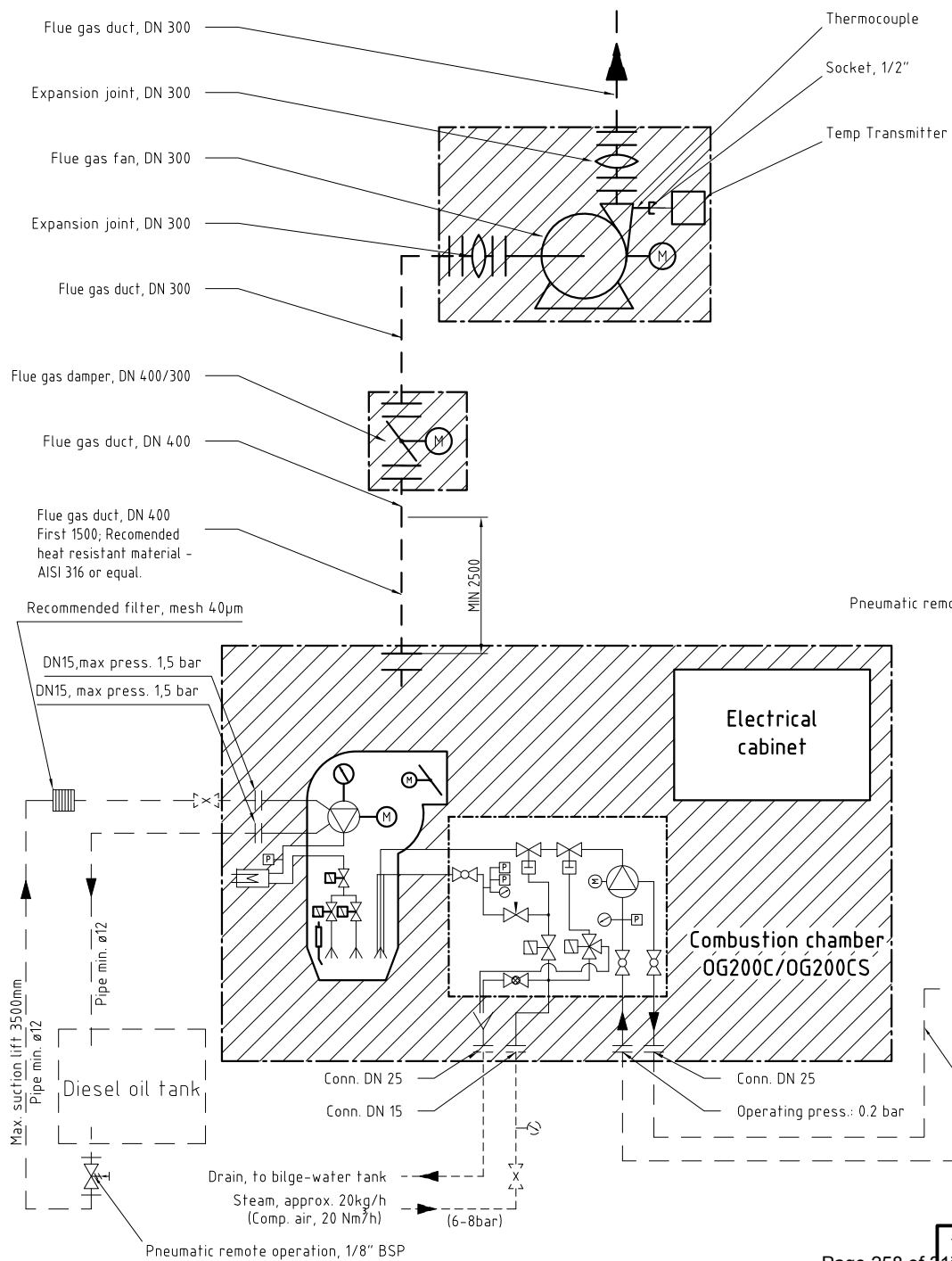
Article / Name	18232 / One year wear and tear parts, OG200/400C, TG5
Name / Article	(Alle)
Salesitem	(Alle)
Yearmodel	(Alle)

Art. no.	Art. name	Quantity	Unit
12329	Nozzle, 2,5 gph 60° S	2,00	stk
13530	Glassfibre Rope 15x20	3,75	M
15684	Rotor	1,00	stk
15688	Universal Joint	1,00	stk
15748	Bonded Stator, black mark	2,00	stk
16066	Glassfibre Rope 16x16	2,30	M
17168	Stuffing Box Gasket	1,00	stk
17691	Sealing Compound, NON DANGEROUS GOODS	1,00	stk
4979	V-belt, XPA 1357	2,00	stk
6996	Cover gasket	2,00	stk
7842	Nozzle, 4.5 gph 45° SS	2,00	stk

39- Spare part list

Article / Name	18221 / Recommended on board repair parts, OG200/400C, TG4/5
Name / Article	(Alle)
Salesitem	(Alle)
YearModel	(Alle)

Art. no.	Art. name	Quantity	Unit
11632	Flame Scrod	1,00	ea.
11878	CALDE PATCH PT 88 U	25,00	KG
12500	Thermocouple Type "N-300" Assembly	1,00	ea.
12501	Thermocouple Type "K" Assembly	1,00	ea.
12806	Repair kit for sludge valve A6324	1,00	ea.
15556	Solenoid Valve, G1/4",220V, 3-way	1,00	ea.
15687	Seal Plate Gasket	1,00	ea.
15741	Mechanical Seal	1,00	ea.
17168	Stuffing Box Gasket	1,00	ea.
5128	Bearing, 2211 EK	2,00	ea.
6154	Sludge Burner Assembly	1,00	ea.
6438	Thermocouple with Pocket	1,00	ea.
6565	Flue Gas Restriction Ring Brick, ø220	4,00	ea.
6567	Blast Tube. F-50-45-T	1,00	ea.
6568	Ignition Cable Compl. L=380	2,00	ea.
6981	Nozzle Line	1,00	ea.
6987	Press. regulator kit, 10-21 bars	1,00	ea.
7587	Photo resistor. QRB 1 A	1,00	ea.
8126	Solenoid Valve, G1/4",220V	1,00	ea.
8153	Ignition Electrode	2,00	ea.
8454	Solenoid Valve, 1/8", 220V	1,00	ea.
8563	Spline Coupling Compl.	1,00	ea.
9272	Shaft seal kit	1,00	ea.



Teamtec supply

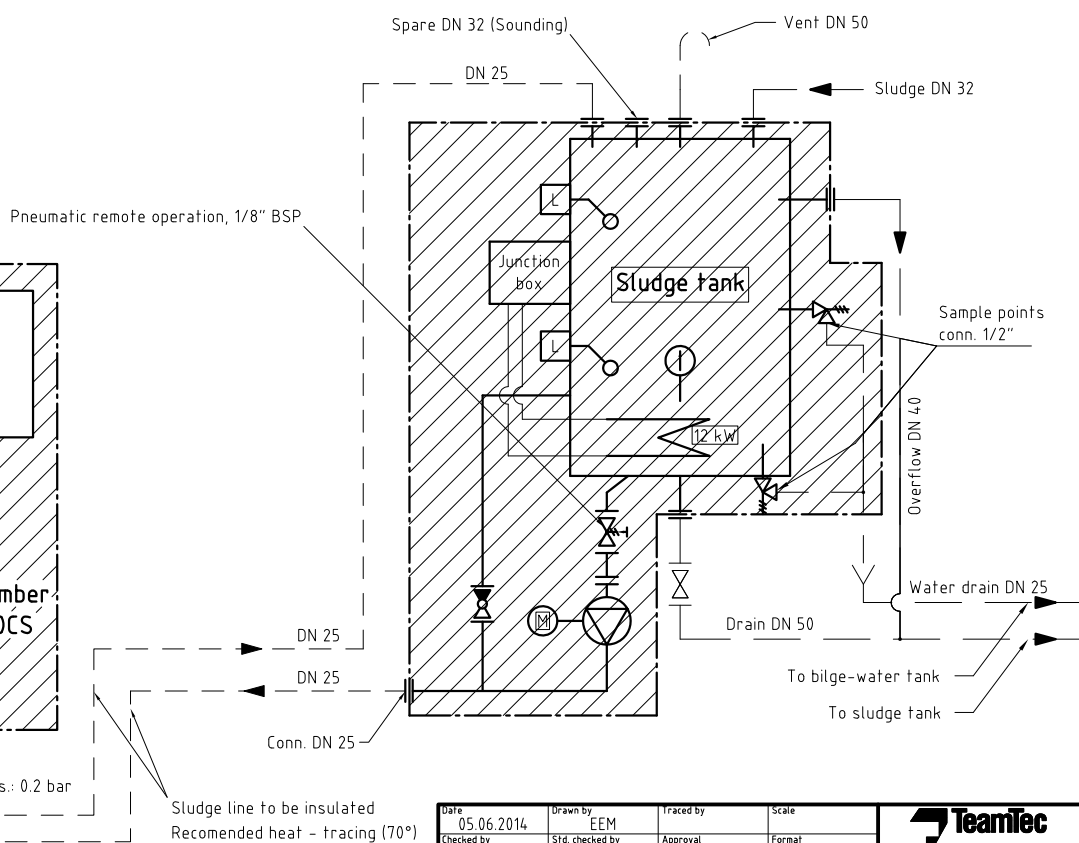
----- Yard supply / installation

All threaded connections: BSP

All oil flanges: DIN 2633/2501, pressure class PN 10/16

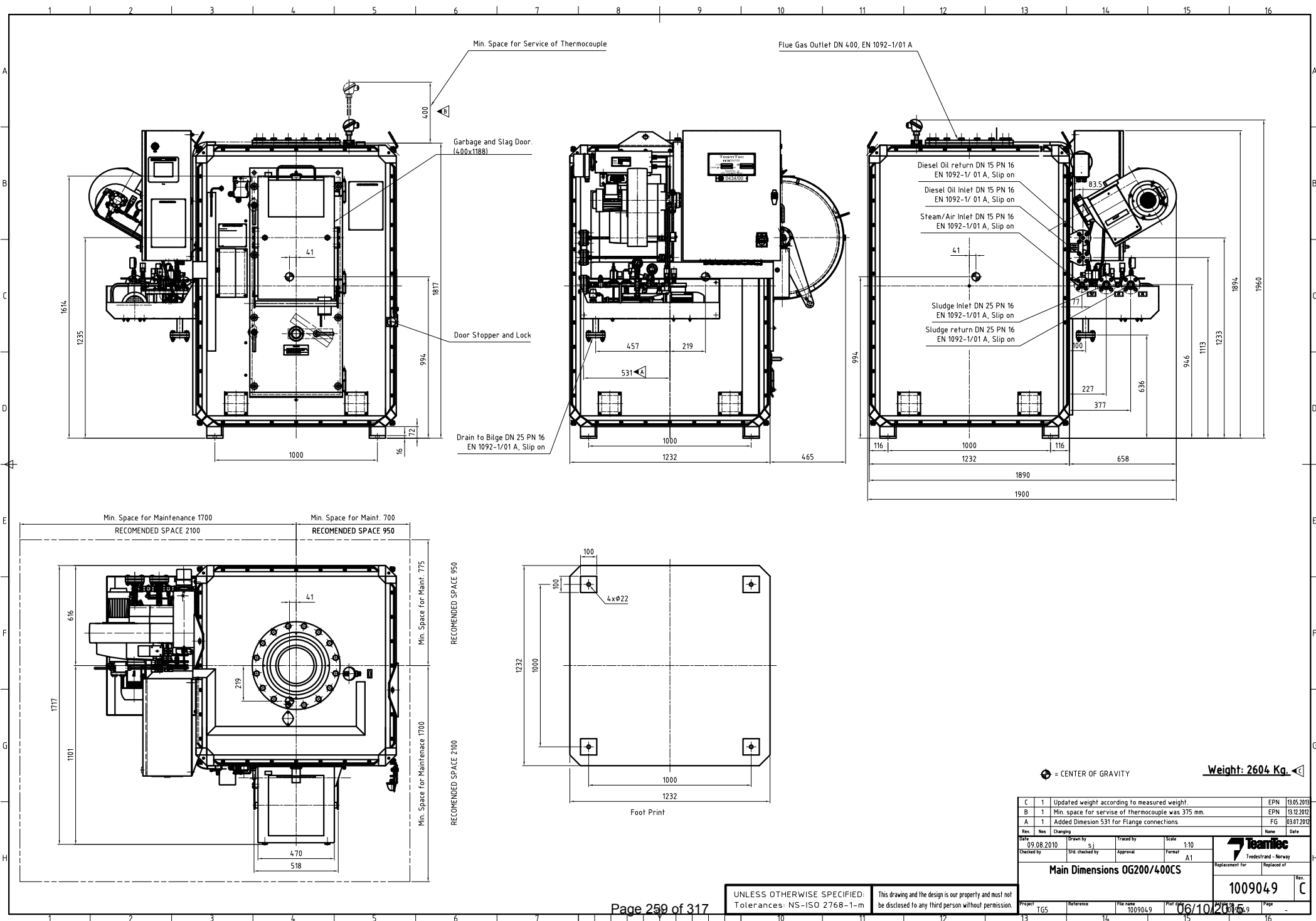
All flanges in flue gas duct drilled according to DIN 2573A

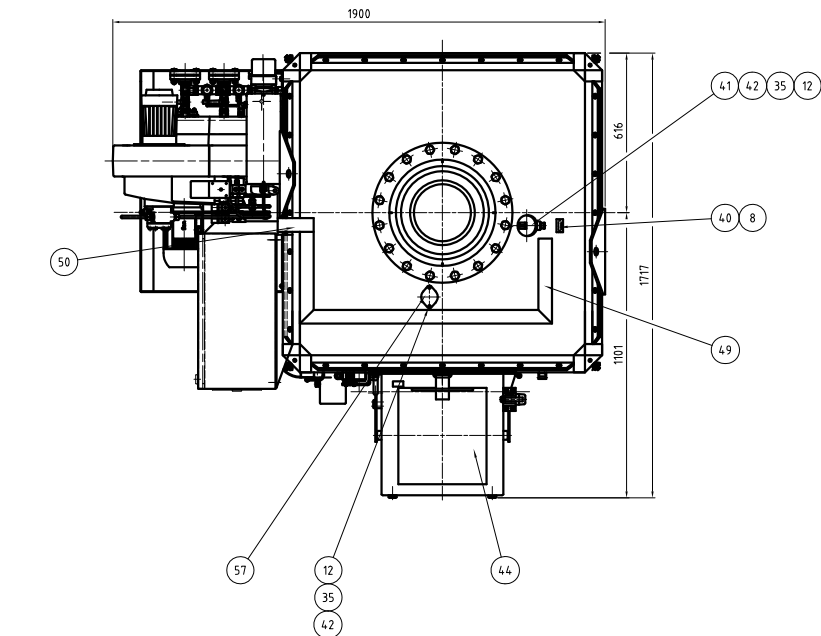
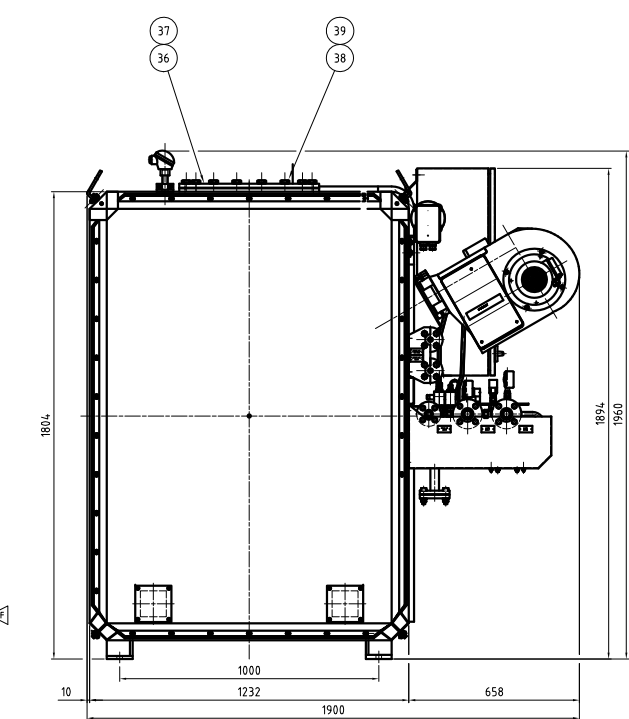
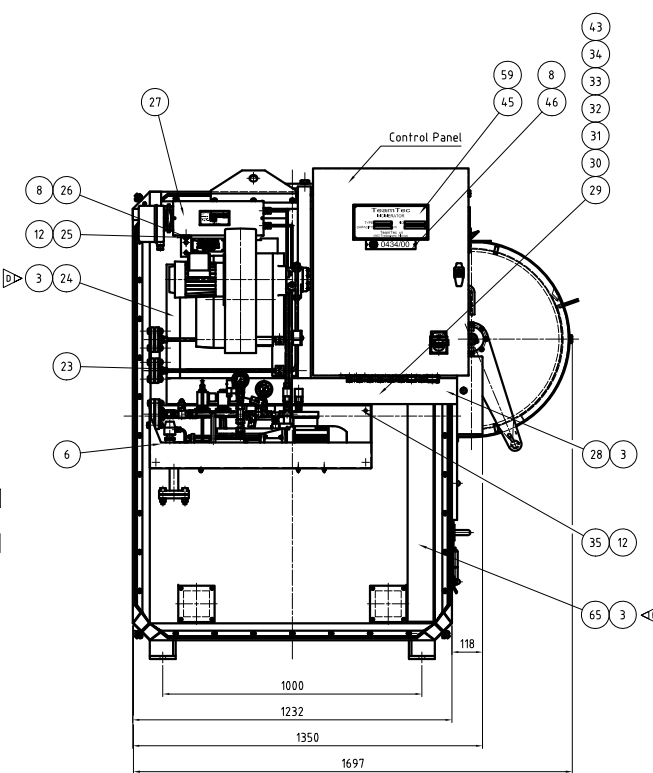
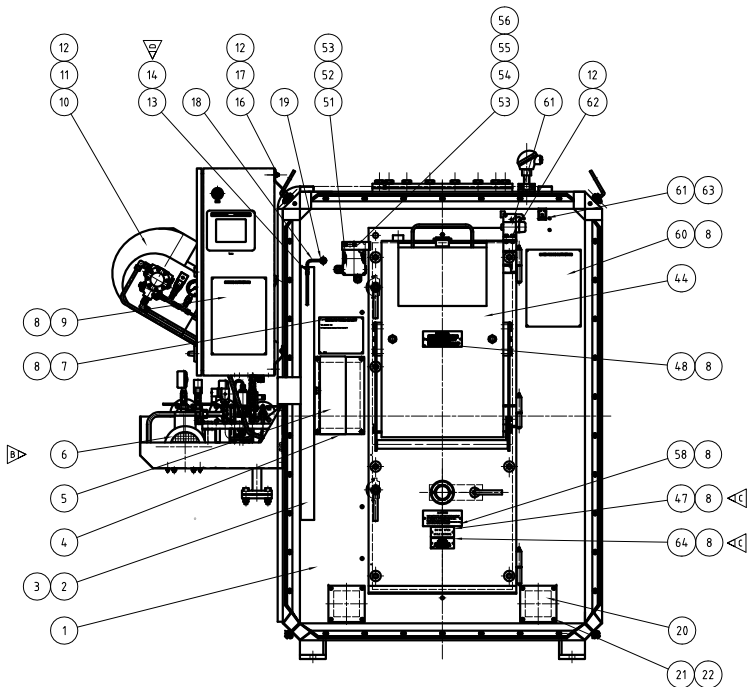
Sludge tank must be insulated! (Operating temp, 80 - 90°C)



This drawing and the design is our property and must not be disclosed to any third person without permission.

Date 05.06.2014	Drawn by EEM	Traced by	Scale	 Tvedestrand - Norway
Checked by	Std. checked by	Approval	Format A2	
Piping & Instrument Diagram Incinerator OG200C/OG200CS Sludge Tank 435L with El. Heating				Replacement for 2009390
Project	Reference	File name 2009390	Plot date 06.10.2015	Rev. -

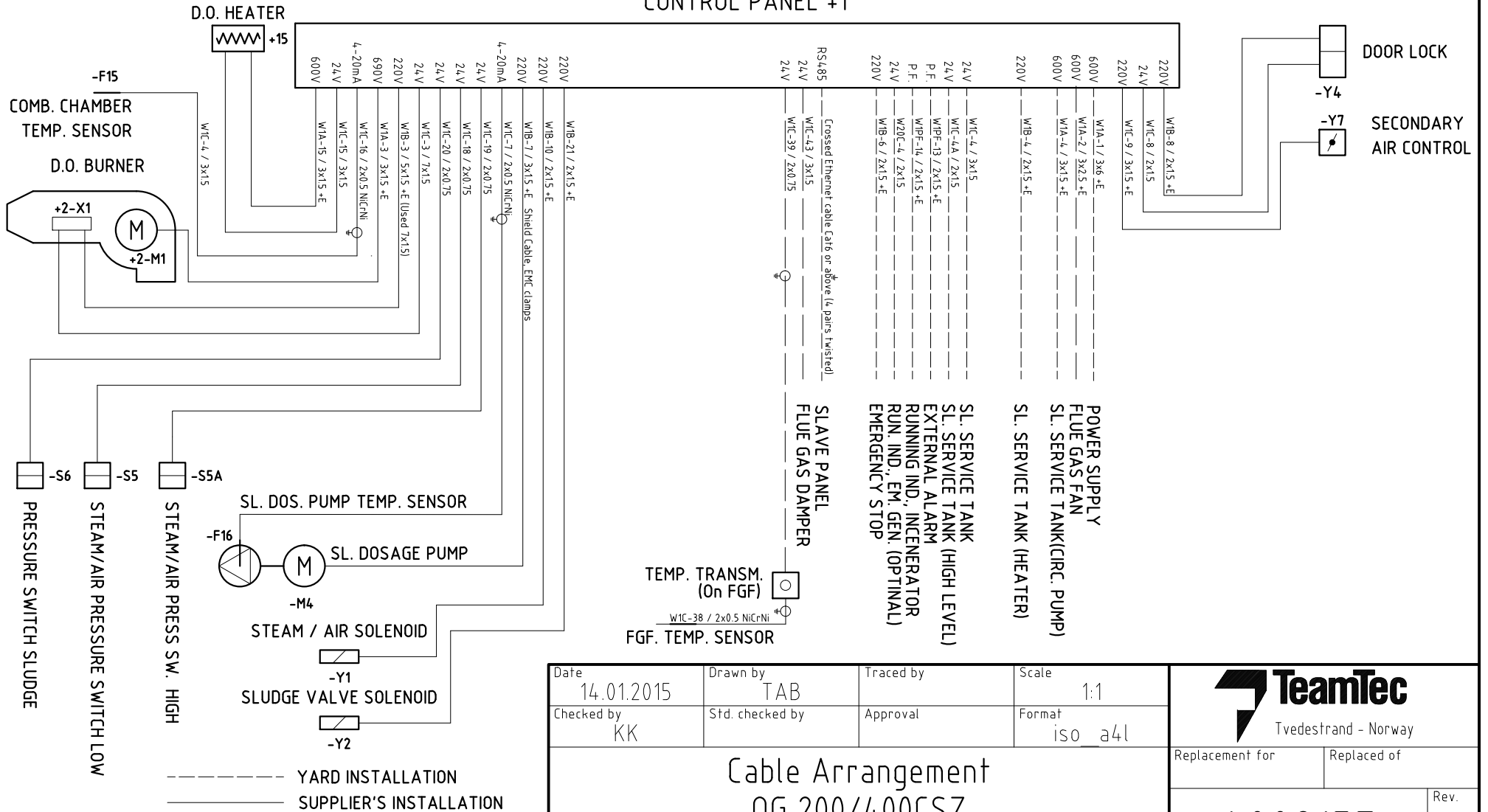





Weight: 2604 Kg.

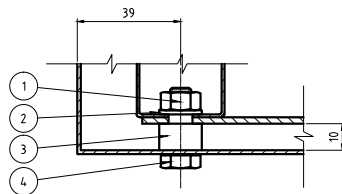
31	2	Cable Clamp RSGU 12/15					0.10	11622
30	9	Cable Clamp RSGU 10/15					0.10	11621
29	6	Cable Clamp RSGU 8/15					0.10	11620
28	1	Cable Bridge, B=100		4007237			3.07	4007237
27	1	Diesel Oil Preheater Assy. 2kW 3x440V		2007073			8.50	11932
26	1	Instruction Plate O O Heater		4007144			0.03	4007144
25	2	Bolt, hex. M8x16 EL Zn		ISO 4017		8.8	0.01	17144
24	1	Cable Bridge, SPB20/10-50, 430 mm					1.30	13523
23	1	Arrangement Piping, Fuel, Sludge, Steam		1009035			4.50	1009035
22	32	Washer, 6 EL Zn		ISO 7089		St.	0.00	3206
21	32	Bolt, hex. M6x10 EL Zn		ISO 4017		8.8	0.00	6294
20	8	Cover for Inspection Holes		4006342			0.50	6444
19	1	Protector, EA 3/4				Plastic	0.01	7962
18	1	Pipe to Vacuum Gauge		3007016		SIS 2343	0.04	6520
17	4	Nut, hex. M8 EL Zn		ISO 4032		8	0.00	2598
16	4	Socket Head Screw M8x20		DIN 912		8.8	0.01	13482
15	1	Fixing Sleeve, Ø6					0.03	11723
14	1	Pipe, Polyuretan Ø6, 900 mm					0.02	11722
13	24	Washer, 8 EL Zn		ISO 7089		St.	0.00	2621
12	11	Bolt, hex. M8x35, EL Zn		ISO 4017		8.8	0.02	1574
11	10	Oil Burner F-50-45-T, OG200/400C		1009194			35.00	1009194
10	9	Running Instructions OG200/400C		3010073			0.20	3010073
9	28	Blind rivet, 3.2x10				A2	0.01	9328
8	7	Sludge Capacity Plate		3008818			0.18	3008818
7	6	Sludge Oil Dosage Valve Assy		1009274			64.00	1009274
6	5	Combustion Air Damper, Assembly		3006956			5.94	6265
5	4	Screw, Cheese Head, M5x10 EL Zn		ISO 1207		4.8	0.01	4497
4	24	Screw, M5x30, LHJ Pozidriv		DIN 966		FZB	0.01	12053
3	2	Cable Bridge, SPB20/10-50, 1000 mm					1.30	13523
2	1	Combustion Chamber Mounting Drawing OG200/400C		1008973			24.10	1008973
1	G	Updated weight according to measured weight.					epn	14.04.2013
	F	Added cable bridge pos 65					epn	01.02.2013
	E	Cable gland pos. 52 was M16					epn	14.10.2013
	D	Removed Item 15 (Bulk Head Piece ø6 / Art No 10801)/Moved Item 24					FG	06.02.2013
	C	Pos. 47 moved / Pos. 64 added					FG	20.10.2011
	E	Pos 52 cable gland was M16					epn	14.11.2012
	A	Revised according project comments					sj	22.10.2010
Rev.	09.08.2010	Drawn by	SJ	Traced by		Scale	1:10	
Checked by		Std checked by		Approval		Format	A1	
Combustion Chamber Assy. OG200/400CS								
Replacement for								
Replaced of								
Article No. 1009051								
Date 06/10/2015								
Page 1009051								
Rev. G								
Project TGS								
Reference								
File name 1009051								
Plot date								
Article no. 1009051								
Page								

CONTROL PANEL +1



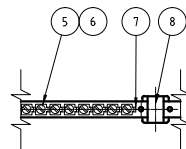
Date	14.01.2015	Drawn by	TAB	Traced by	Scale	 Tvedestrand - Norway	
Checked by	KK	Std. checked by		Approval	Format	Replacement for	Replaced of
Cable Arrangement						4009157	
OG 200/400CSZ						Rev.	
600V - 220V							
Project	Reference	File name	Plot date	Article no.	Page		
		4009157		4009157	06/10/2015		

This drawing and the design is our property and must not be disclosed to any third person without permission.

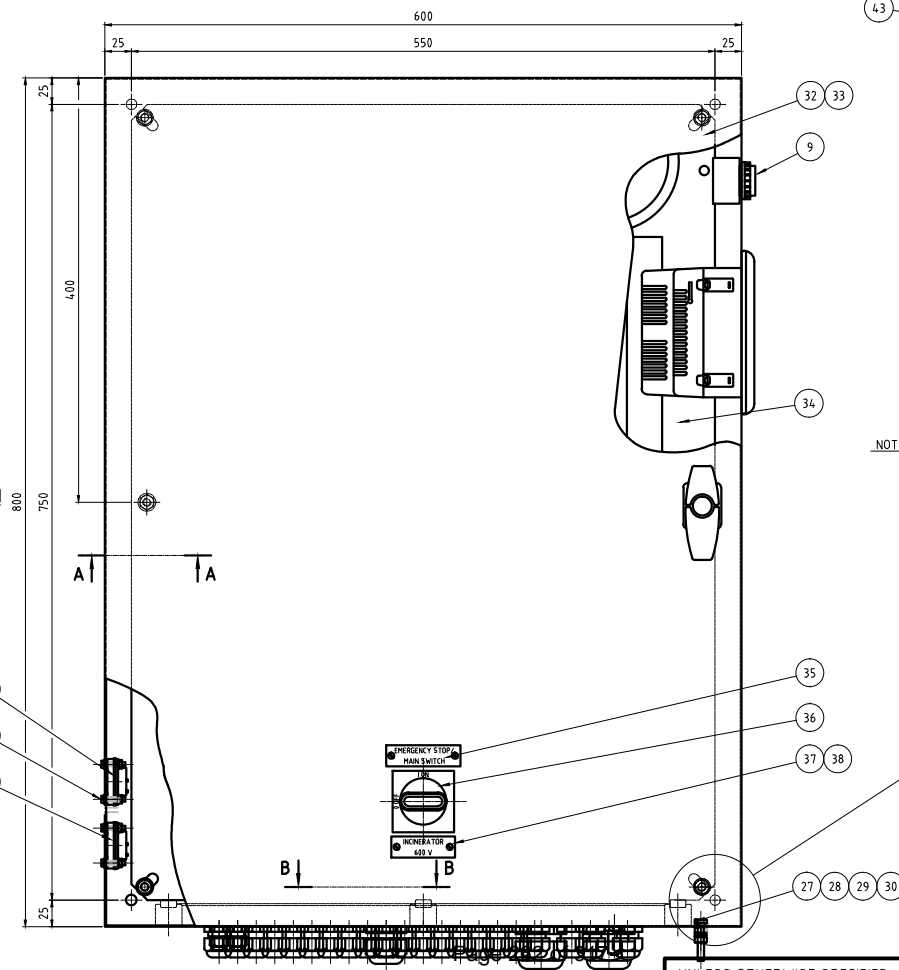
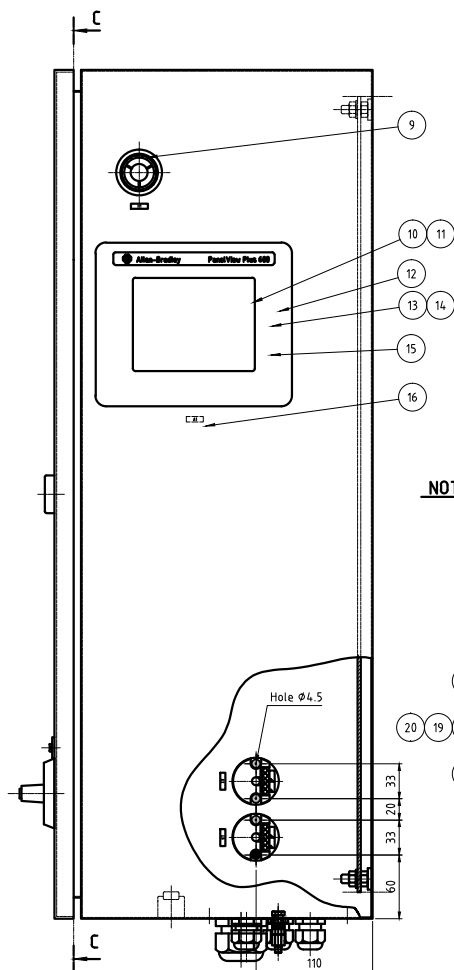
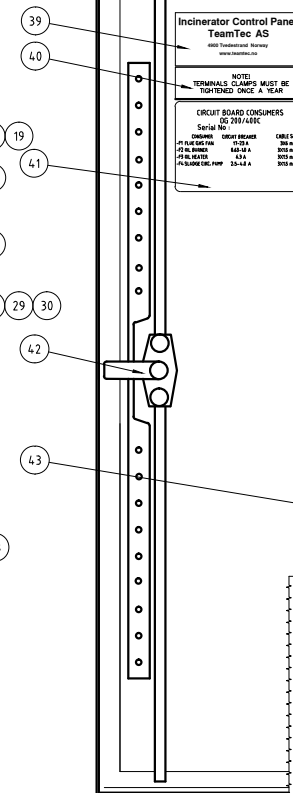
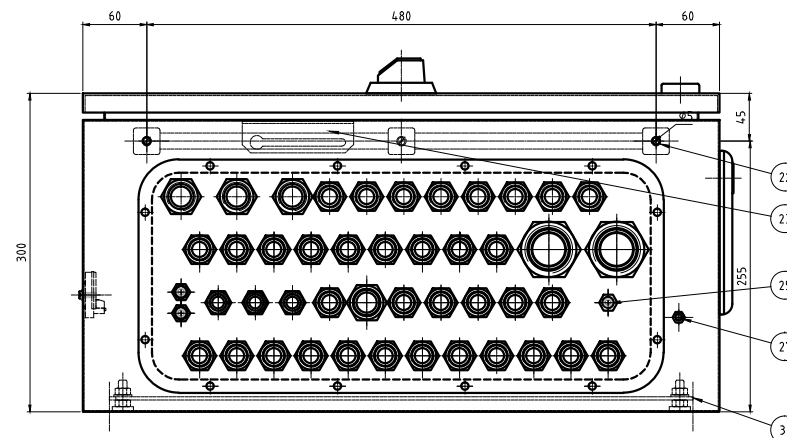


Section A-A

Scale 1:1

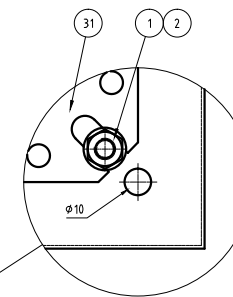


Section B-B



NOTE 1:

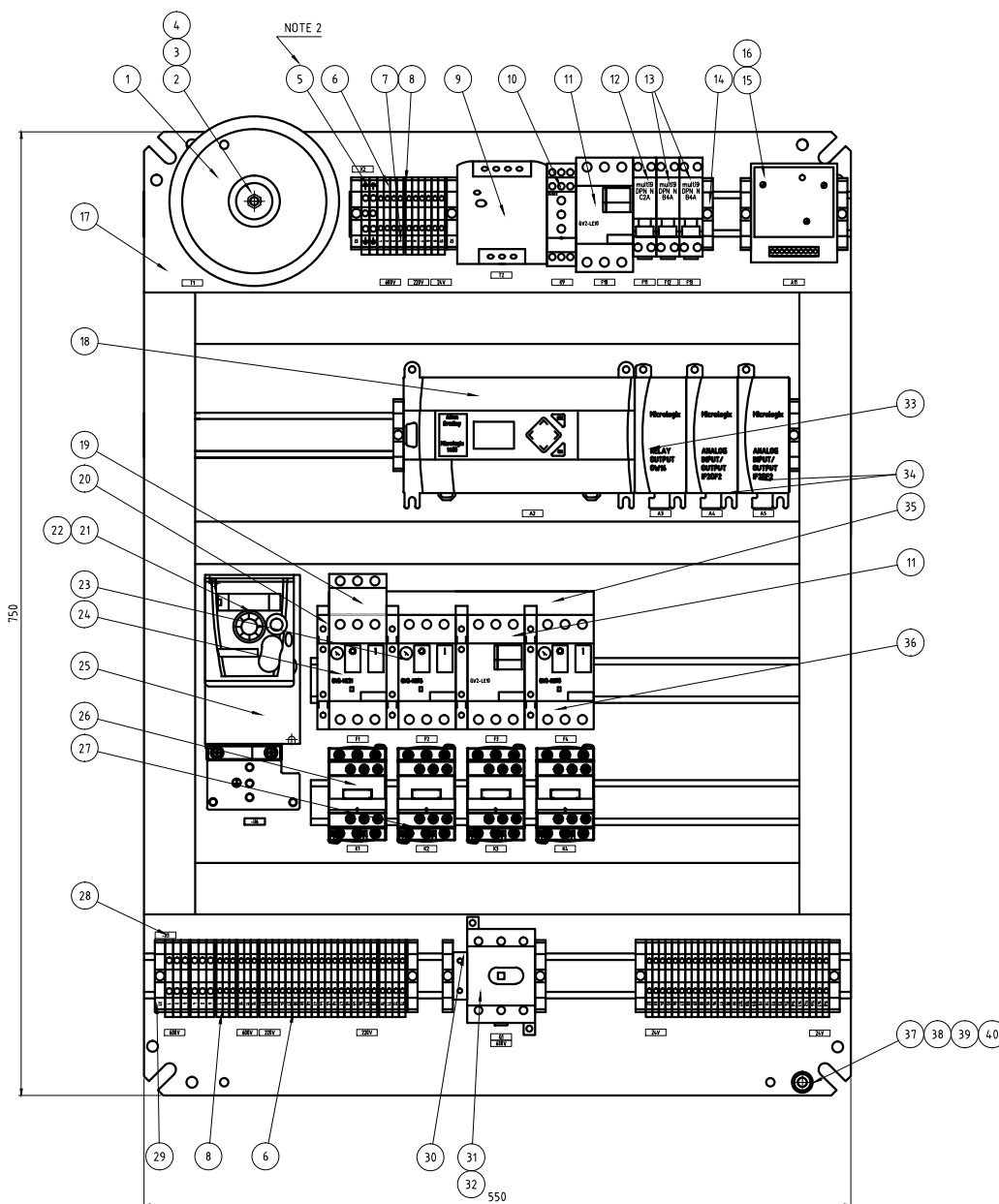
Labels to be placed on inside
of door and components



Scale 1:1

Weight: 56 Kg.

4.3	1	Drawing copy, A4	Sarel		0.00	16166	
4.2	1	Door-Lock w/Linkage Sarel 800x600x300	0008343 w/EN17384		0.00	16183	
4.1	1	Name Plate "Incinerator Control Panel" Error Beatz	0008000		0.05	4008000	
39	1	Name Plate "Incinerator Control Panel" Teanite	4007995		0.05	4007995	
39	1	Name Plate "Incinerator Control Panel" Note	4007999		0.05	4007999	
38	1	Instruction Plate, Incinerator 600V	4007256	St. steel	0.01	4007256	
37	4	Screw self tapping, 2.94x6.5	NS 1833	St.	0.00	4931	
36	1	Main switch, door connector	ABB	DHY33AH	0.00	18968	
35	1	Instruction Plate, Emergency Stop/Main Switch	0008730	Red Plastic	0.00	4008730	
34	1	Cutout Door & Enclosure, OG200/440C/200/440C	2009275		0.00	2009275	
33	1	Electrical Diagram OG200/440CS, 600V - 220V	3101821		0.00	3101821	
32	1	Cable Arrangement OG200/440CS, 600V - 220V	4009157		0.00	4009157	
31	1	Mounting Plate OG200/440CS, 600V - 220V	1010691		0.00	1010691	
30	1	Washer, Lock teeth, 6.4 ELzn		DIN 6798A	0.00	12617	
29	3	Washer, 6		Brass	0.00	12616	
28	2	Nut, hex M6		Brass	0.00	12615	
27	1	Bolt, hex M6x35		Brass	0.01	12614	
26	1	Cable set OG200/440C	2008597		0.00	2008597	
25	1	Flange with Cable Gland G5500, OG200/440C	3008809		1.40	3008809	
24	1	Door Latch, Sarel	Sarel	1512004.797	0.00	15099	
23	1	Enclosure, 800x600x300			30.50	15525	
22	3	Screw, Cheese Head, M4x10 ELZn	ISO 1207	4.8	0.00	4277	
21	1	Temp. transmitter, 0 - 800°C (K)	INOR	70APAHCF00M1K	0.25	10170	
20	1	Washer, 4 ELZ n	ISO 7089	St	0.00	5568	
19	1	Nut, hex, M4 ELZn	ISO 4032	8	0.00	1441	
18	4	Screw, Cheese Head, M4x20 ELZn	10119		0.00	10119	
17	1	Temp. transmitter, 0 - 1200°C (N)	INOR		0.03	6953	
16	1	Labels 5x16, Brady	Brady	1674.760000	0.00	14838	
15	1	SD Memory Card, 4GB			0.00	18971	
14	1	PLC Program OG200/440C Without water injection	PL50231		0.00	PL50231	
13	1	Display Program OG200/440C Without water injection	DI05231		0.00	DI05231	
12	1	KS232 Operating Cable Cable between PLC & Operator Panel	Allen Bradley	2711-NC21	0.00	16358	
11	1	Operator Terminal PV600	Allen-Bradley	2711P-TC6508	0.00	18969	
10	1	Film for Screen Protection		2711P-RG76	0.00	15896	
9	1	Buzzer, 30 - 250V, ESP		8111 100 313	0.04	12387	
8	3	Railholder, SHIPA	Weidmüller	SHIPA	0.01	4275	
7	1	Earth rail, NSch 15x2, 500 mm	Weidmüller		0.13	10626	
6	30	Screw (M5x8)	Weidmüller	85	0.00	4580	
5	30	Washer	Weidmüller	St.	0.00	4579	
4	2	Bolt, hex, M8x25 ELZn	ISO 4017	8.8	0.00	14404	
3	2	Distance Plastic-Bar, M8x10			0.00	16185	
2	8	Washer, 8 ELZn	ISO 7089	St.	0.00	2621	
1	8	Nut, hex, M8 ELZn	ISO 4032	8	0.00	2598	
Item		Qty.	Description	Standard	Material	Weight	Article No
Date		14.01.2015	Drawn by	AB	Scale	1:2.5	
Checked by		KK	Std. checked by	Approval	Formal	A1	
<div> <div> <div>Control Panel OG200/440CS2</div> <div>600V - 220V 06/10/2015</div> </div> <div> <div>1010690</div> <div>Rev.</div> </div> </div>							
Project		Reference	File name	Print date	Article no	Page	-
			1010690		1010690		



Weight: 30 Kg.

NOTE 1: Labels to be placed on mounting plate and components.

NOTE 2: To be connected to main earth rail.

Page 263 of 317

UNLESS OTHERWISE SPECIFIED:
Tolerances: NS-ISO 2768-1-m

This drawing and the design is our property and must not be disclosed to any third person without permission.

40	1	Washer, lock teeth, 8.4 ELZn	DIN 6798 A	St.	0.00	6413
39	2	Washer, 8 ELZn	ISO 7089	St.	0.00	2621
38	2	Nut, hex. M8 ELZn	ISO 4032	8	0.00	2598
37	1	Bolt, hex. M8x25 ELZn	ISO 4017	8.8	0.00	4404
36	1	Circuit breaker, 2.5-4A	Telemec.	GV2-ME08	0.26	12351
35	1	Terminal block for 4 x GV2	Telemec.	GV1-G07	0.09	5690
34	2	PLC, Expansion Module, Anal.2 In+ 2 Out	Allen Bradley	1762-IF20F2	0.00	15803
33	1	PLC, Expansion Module, 16 Dig. Outputs	Allen Bradley	1762-OW16	0.00	15800
32	1	Shaft for main switch, L=260	ABB	OXS 6x330	0.00	17369
31	1	Main switch	ABB	OT 80F3	0.00	17370
30	1	Contact block auxiliary, NC	ABB	OA 1G01	0.01	10906
29	6	Terminal clamp	Weidmüller	WDU 6	0.01	9406
28	32	Labels 5x16, Brady	Brady	1674.760000	0.00	4838
27	3	Starter contactor 9A	Telemec.	LC1-D09P7	0.32	12364
26	1	Starter contactor, 25A	Telemec.	LC1-D25P7	0.37	12367
25	1	Frequency inverter, 0.55 kW	Schneider	ATV-12H05M2	0.00	17573
24	1	Circuit breaker, 17-23A	Telemec.	GV2-ME21	0.26	12356
23	1	Circuit breaker, 0.63-1A	Telemec.	GV2-ME05	0.26	12348
22	2	Washer, lock teeth, 4.3 ELZn, 2 stk	DIN 6798 A	st.	0.00	4276
21	2	Screw, Cheese Head, M4x16 ELZn, 2 stk	ISO 1207	4.8	0.01	4559
20	4	Contact block, auxiliary	GV-AD0110	0.06	12358	
19	1	Terminal block for supply	Telemec.	GV1-G09	0.04	6409
18	1	PLC Main Unit 24 VDC	AB	1766-L32XB	0.00	18544
17	Mounting Plate for El. Components, 06120/200/400C		2009276		0.00	2009276
16	1	Hose, PVC, Ø4, 1200 mm	PVC		0.01	13993
15	1	Flame and press. control	Teamtec	201096	0.35	6407
14	13	End Bracket	WEW 35/2		0.01	5040
13	2	Circuit breaker, 4A double	Merlin Gerin	DPN N, B4	0.00	17547
12	1	Circuit breaker, 2A double	Merlin Gerin	DPN N, C2	0.10	11083
11	2	Circuit breaker, 6.3A	Telemec.	GV2-LE10	0.33	12531
10	1	Over- / under-voltage relay	Telemec.	RM4UB	0.10	15635
9	1	Power source 85-264VAC/24VDC(4.2A, 100W	Allen-Bradley	1606-XLP100E	0.00	15814
8	8	End Plate	WAP 2.5-10		0.00	5043
7	1	Marking set Terminal clamps Weidmüller WDU 2.5	Weidmüller	1609860000	0.00	5042
6	69	Terminal Clamp 2.5mm2	WDU 2.5		0.01	5041
5	2	Terminal Clamp	WPE 2.5		0.01	12197
4	2	Nut, hex. M8 ELZn	ISO 4032	8	0.00	2598
3	2	Washer, lock teeth, 8.4 ELZn	DIN 6798 A	St.	0.00	6413
2	1	Thread Bar, M8	DIN 975	8.8	0.32	13588
1	1	Transformer, 400VA, 600/220V - 24V	Ulveco	N15897	3.40	12900
Item Qty.	Description		Standard	Material	Weight	Article No

16.01.2015	Drawn by	TAB	Traced by	Scale	1:2
Checked by	Std. checked by	Approval	Format	A1	
Project Reference					File name
					1010691
Project Reference					File name
					1010691
Project Reference					File name
					1010691

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

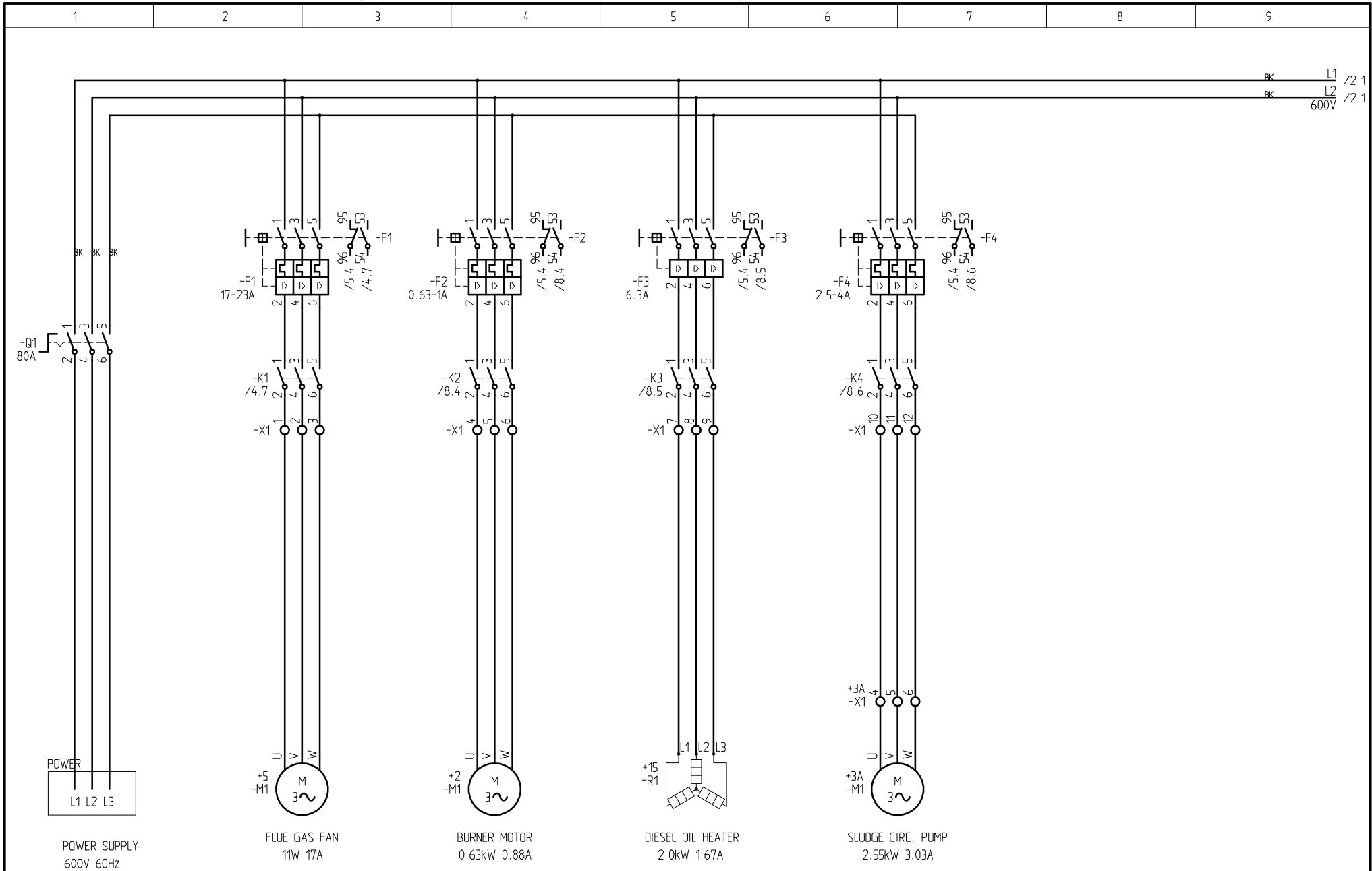
16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

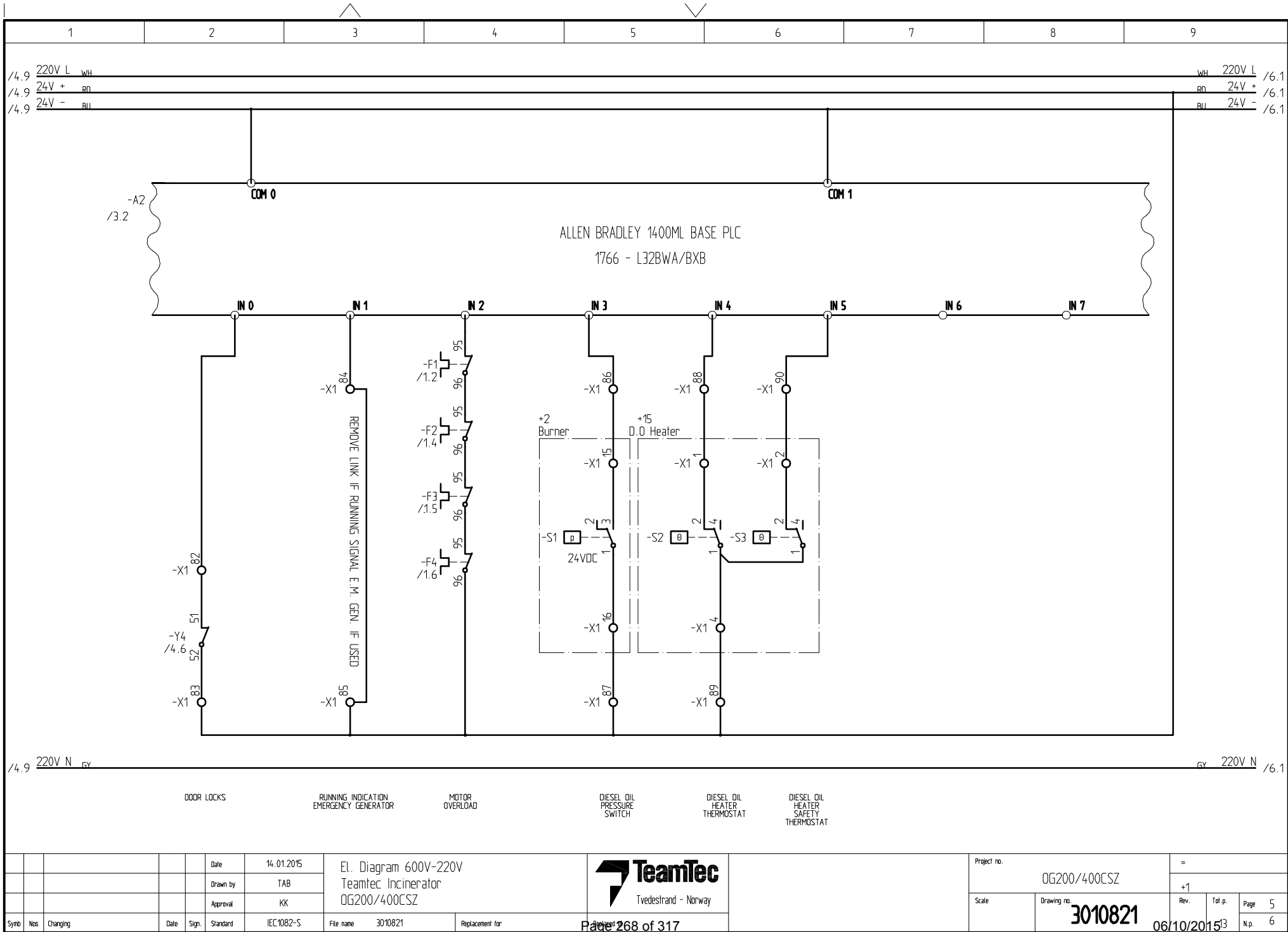
16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

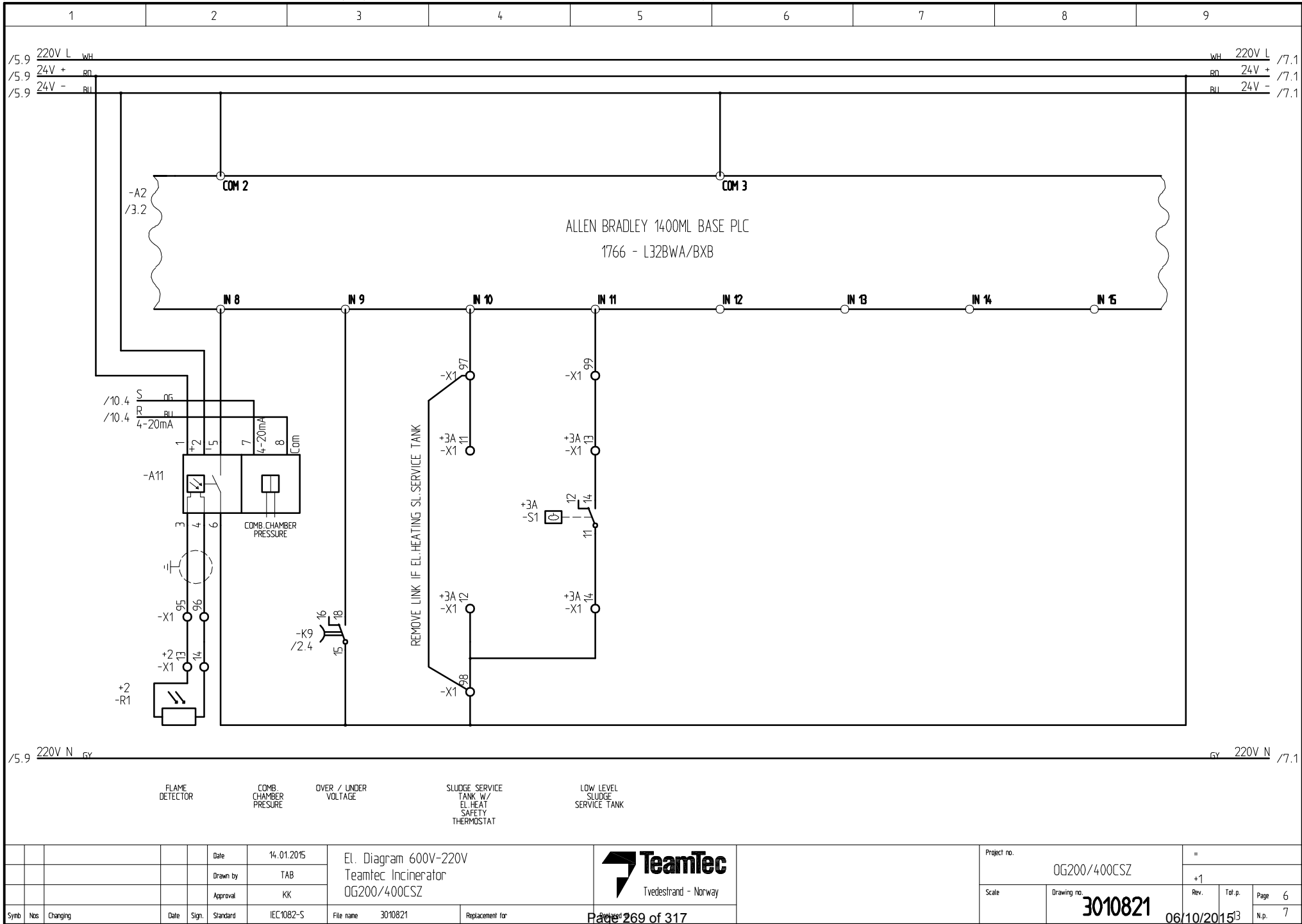
16.01.2015		Drawn by	TAB	Traced by	Scale	1:2
Checked by		Std. checked by	Approval	Format	A1	
Project Reference		File name	1010691	File date	Article no.	Page
					1010691	

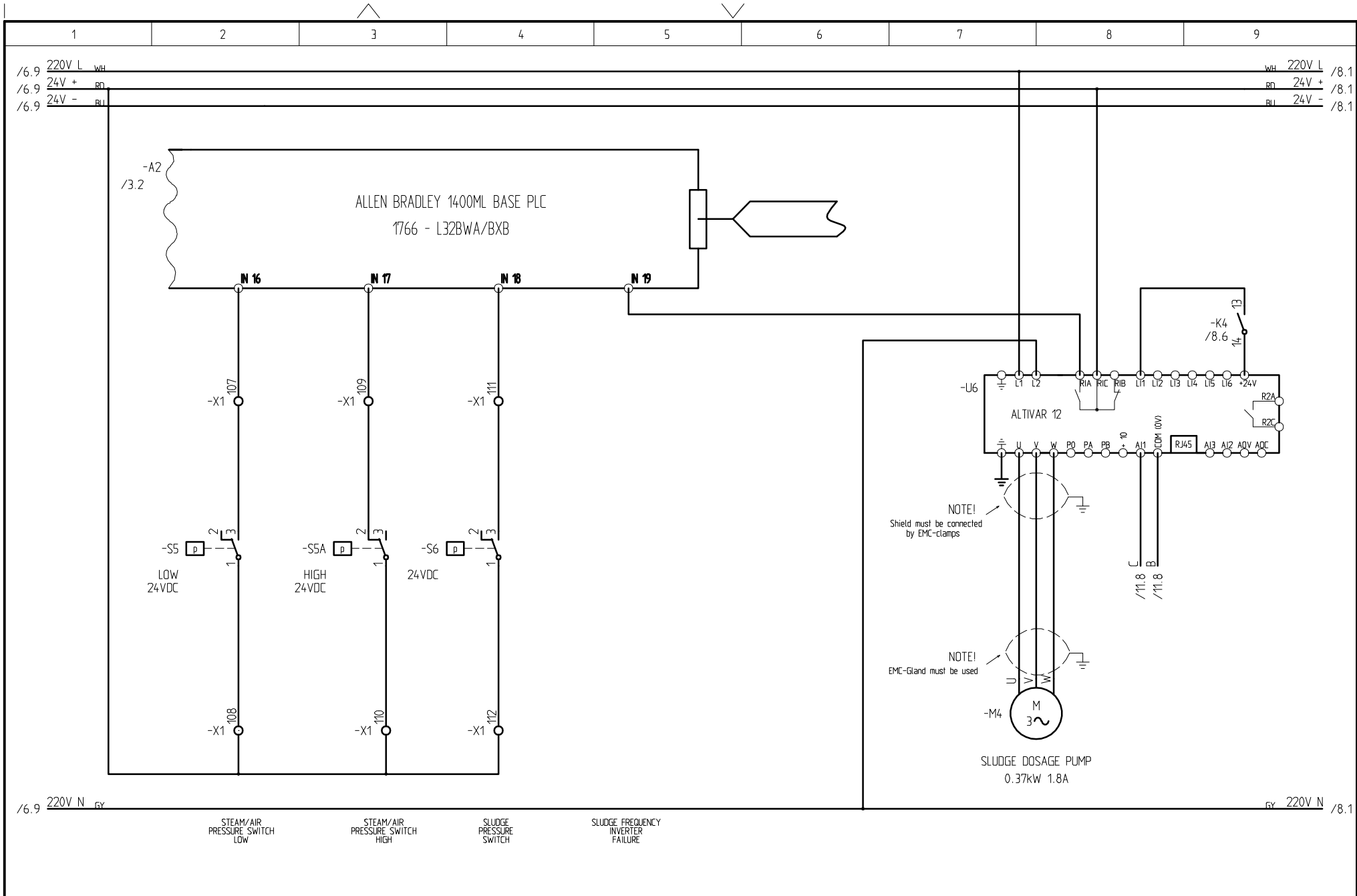
||
||
||



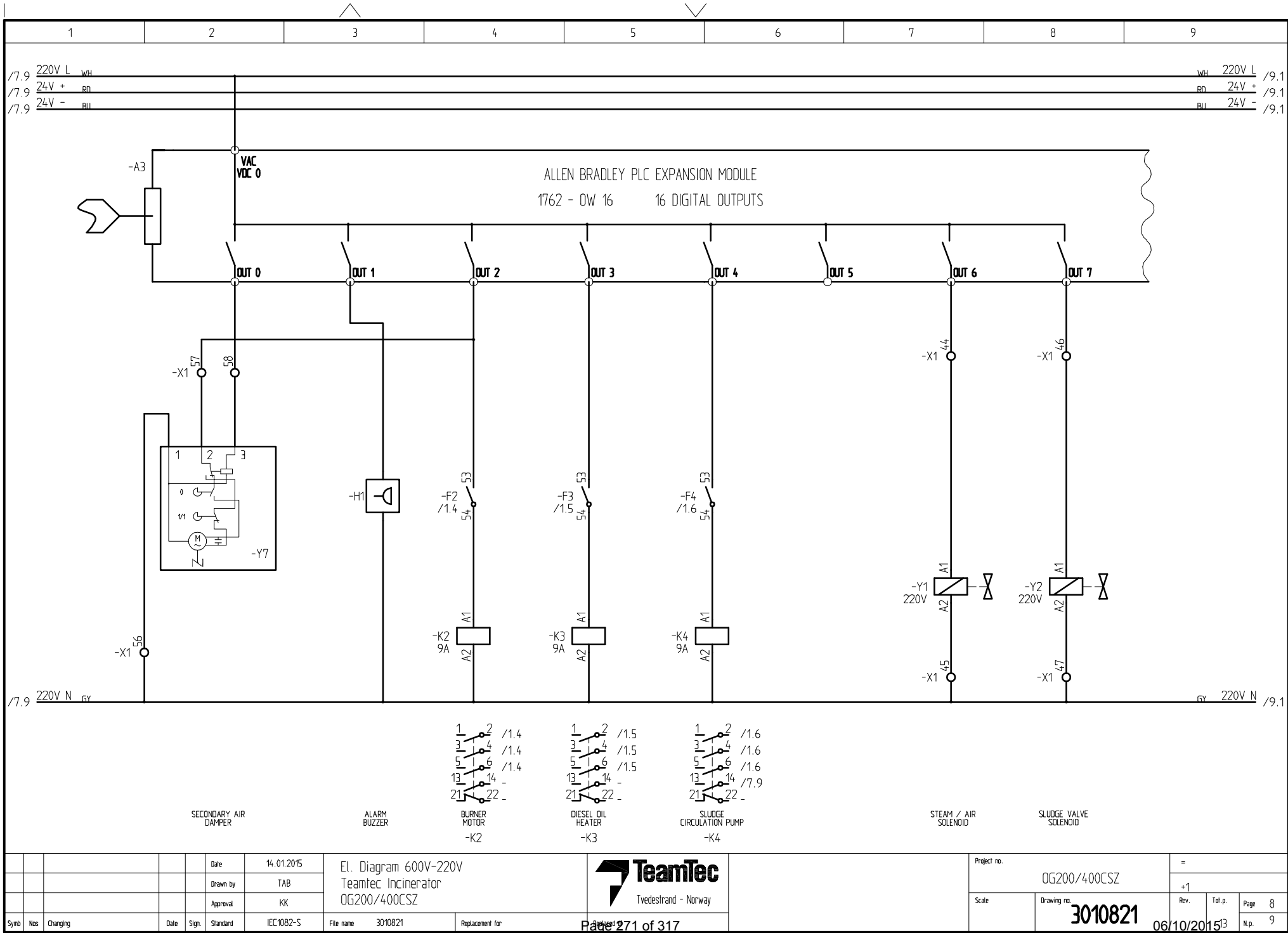
				Date	14.012015	El. Diagram 600V-220V Teamtec Incinerator OG200/400CSZ		 Tvedestrand - Norway		Project no.		=		
				Drawn by	TAB					OG200/400CSZ		+1		
				Approval	KK							Rev.	Tot.p.	Page 1
Symb	Nos	Changing	Date	Sign.	Standard	IEC1082-S	File name	3010821	Replacement for	Drawing no.		3010821		
												06/10/2015		
												Np. 2		

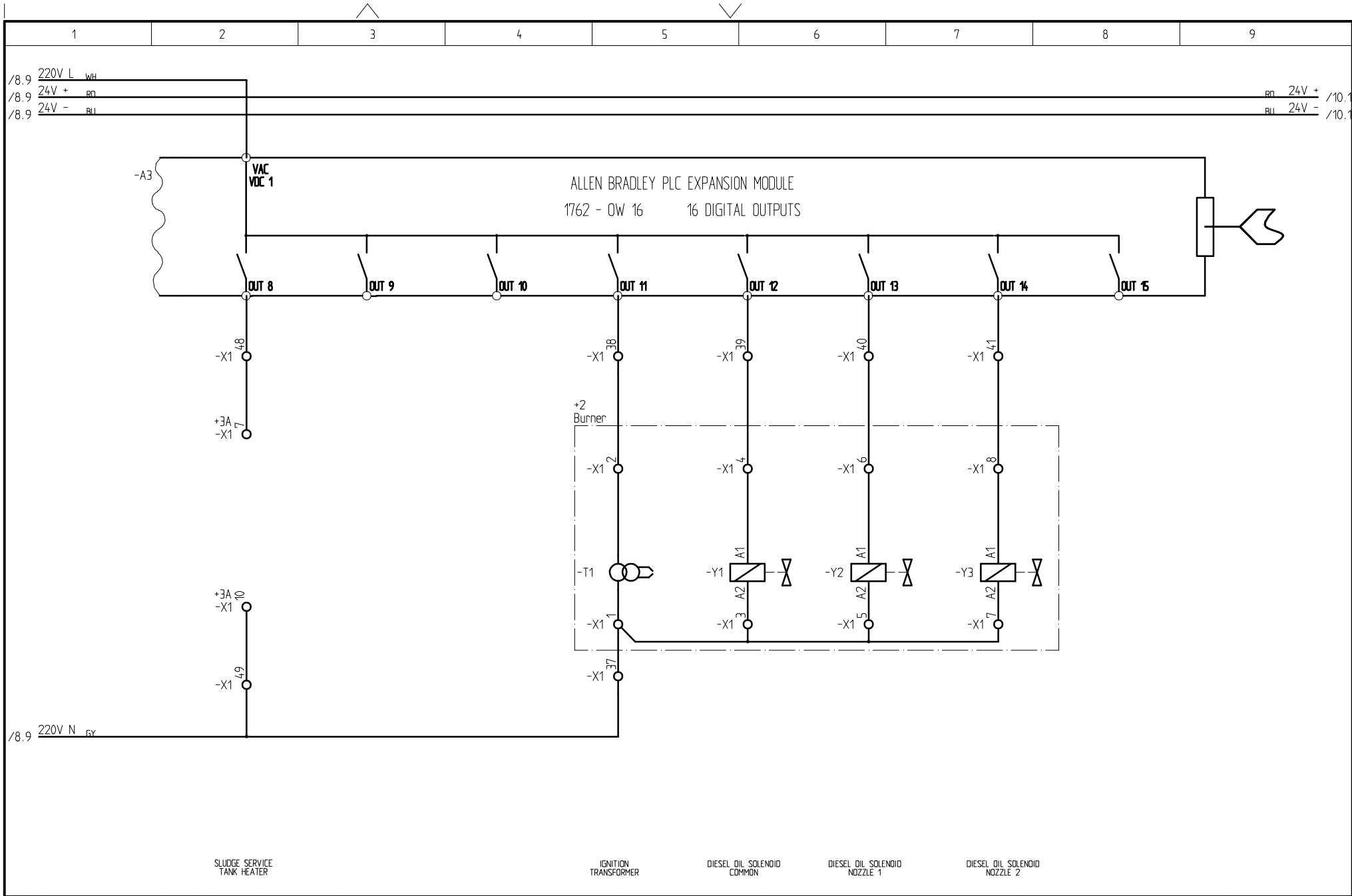




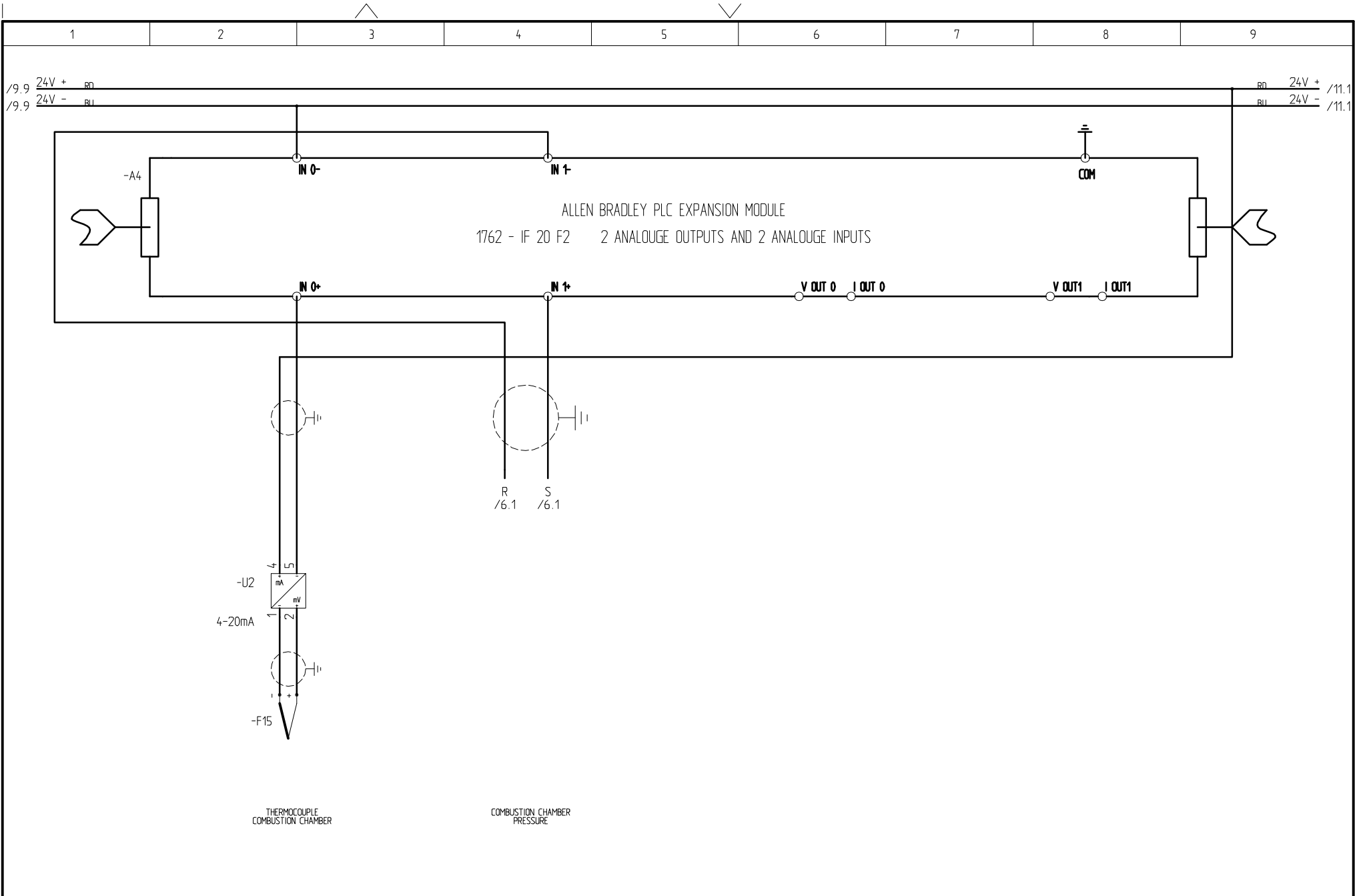


					Date	14.01.2015	El. Diagram 600V-220V Teamtec Incinerator OG200/400CSZ		 Tvedestrand - Norway		Project no.		OG200/400CSZ		=			
					Drawn by	TAB									+1			
					Approval	KK												
Symbol	Nos	Changing		Date	Sign.	Standard	IEC1082-S	File name	3010821	Replacement for	Scale		Drawing no.	3010821	Rev.	Tot.p.	Page	7
														06/10/2015		Np.	8	

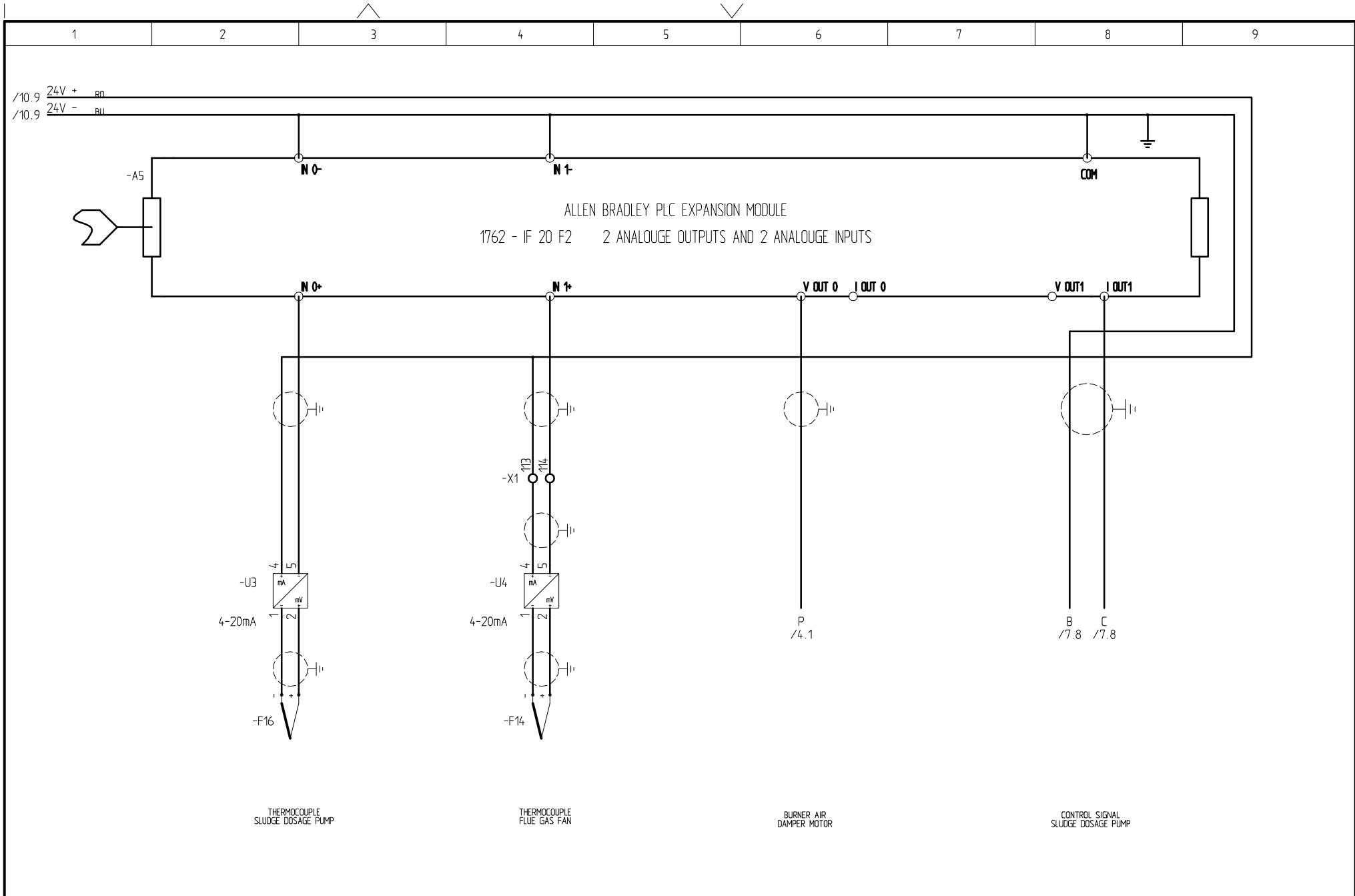




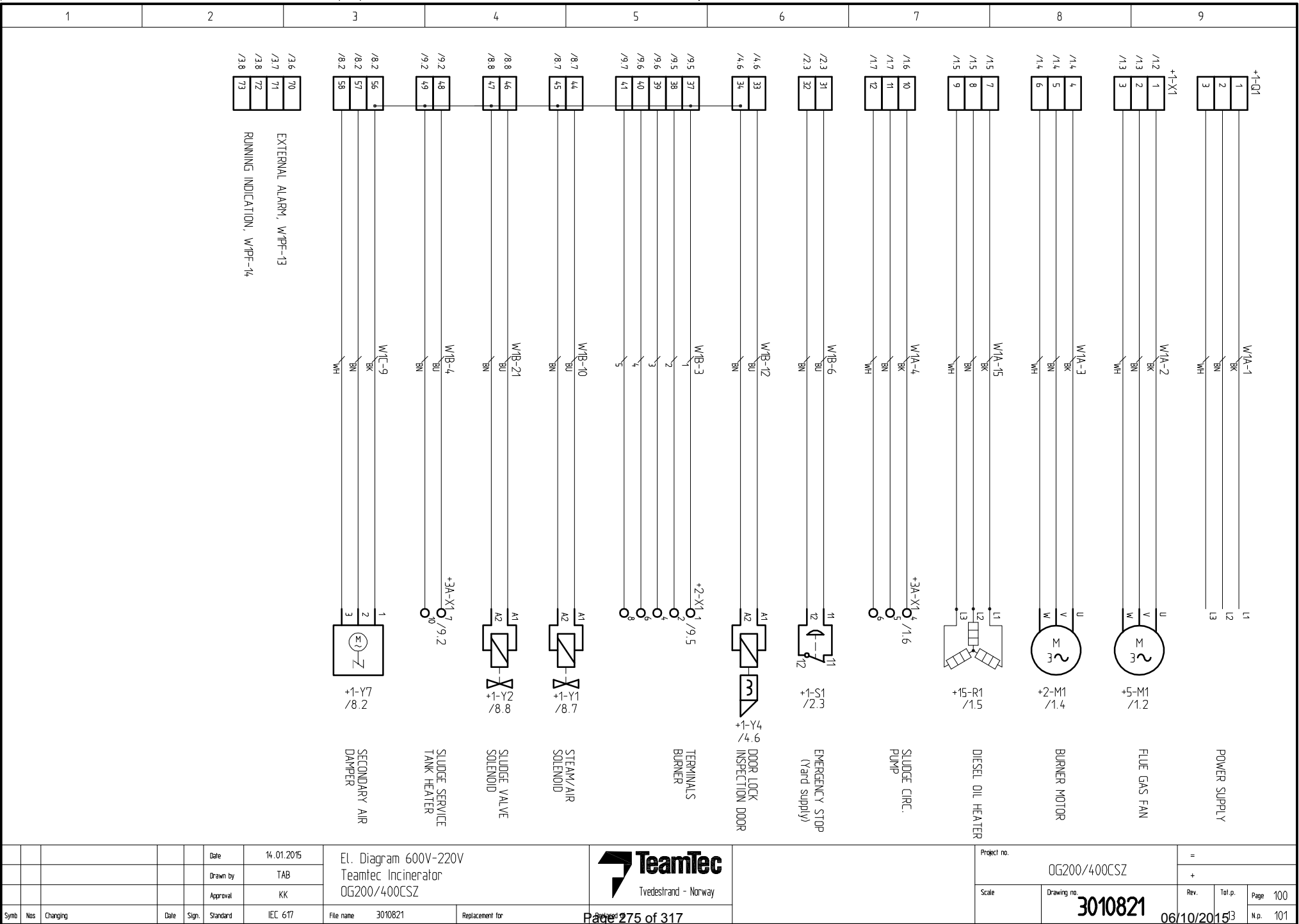
				Date	14.01.2015	El. Diagram 600V-220V Teamtec Incinerator OG200/400CSZ			 Tvedestrand - Norway	Project no. OG200/400CSZ		=					
				Drawn by	TAB												
				Approval	KK												
Symb	Nos	Changing		Date	Sign.	Standard	IEC1082-S	File name	3010821	Replacement for		Scale	Drawing no. 3010821	Rev.	Tot.p.	Page	9
														06/10/2015	13	N.p.	10

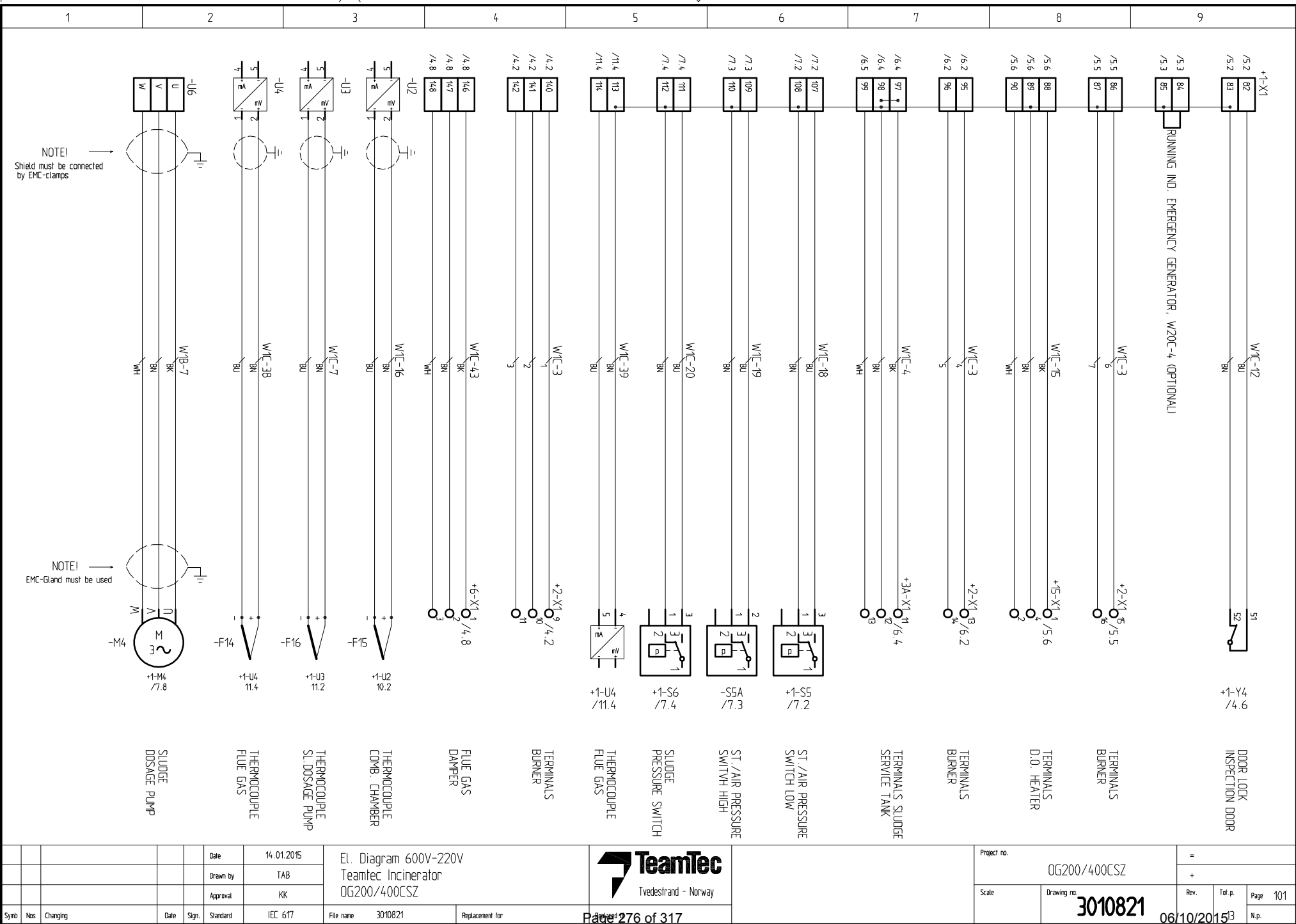


			Date	14.01.2015	El. Diagram 600V-220V Teamtec Incinerator OG200/400CSZ			 Tvedestrand - Norway			Project no.			=			
			Drawn by	TAB							OG200/400CSZ			+1			
			Approval	KK													
Symb	Nos	Changing	Date	Sign.	Standard	IEC1082-S	File name	3010821	Replacement for		Scale	Drawing no.	3010821	Rev.	Tot.p.	Page	10
													06/10/2015	13		N.p.	11

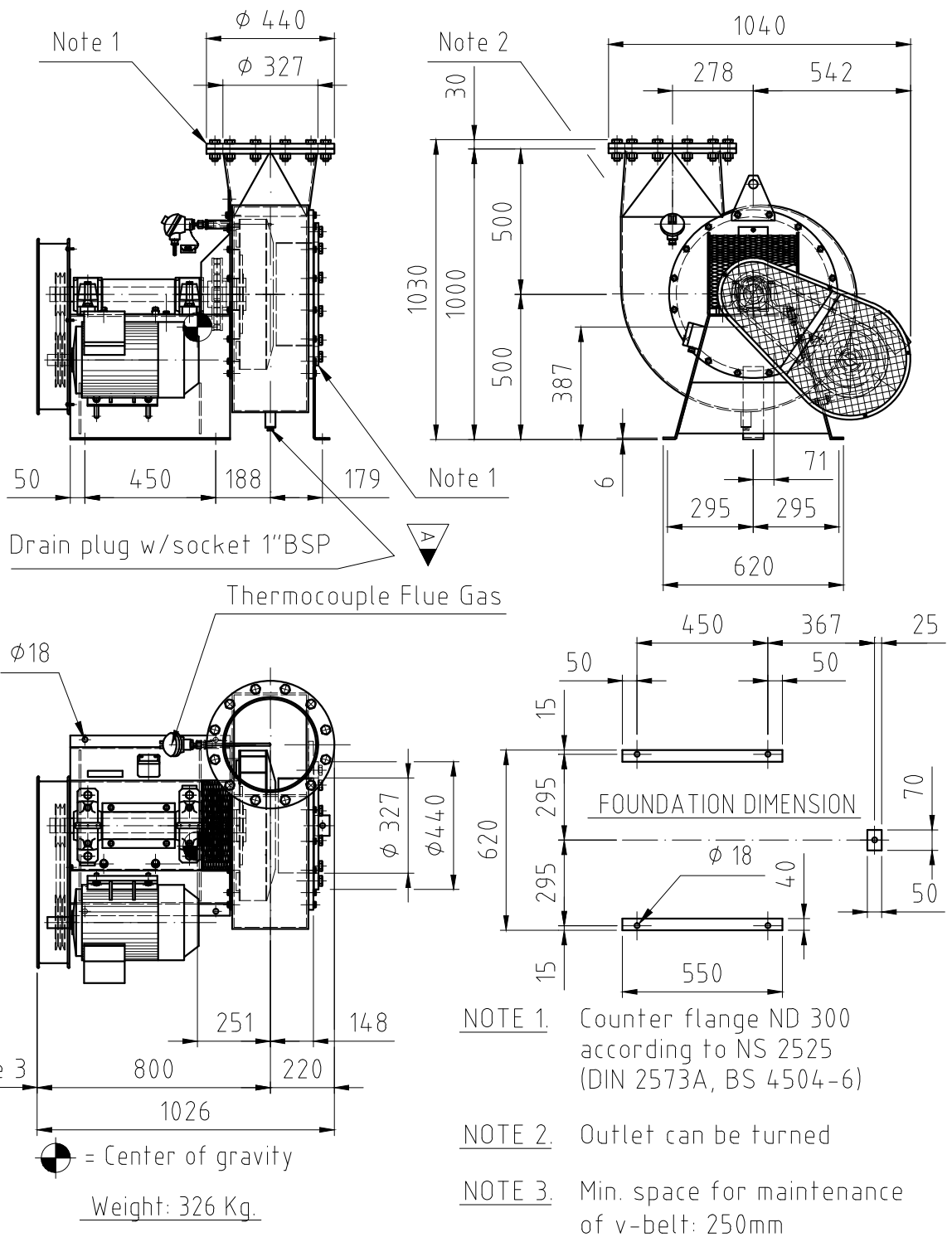


			Date	14.012015	El. Diagram 600V-220V Teamtec Incinerator OG200/400CSZ		 Tvedestrand - Norway		Project no.		=		
			Drawn by	TAB					OG200/400CSZ		+1		
			Approval	KK					Scale	Drawing no.	Rev.	Tot.p.	Page 11
Symb	Nos	Changing	Date	Sign.	Standard	IEC1082-S	File name	3010821	Replacement for	3010821		06/10/2015	Np. 100



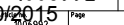


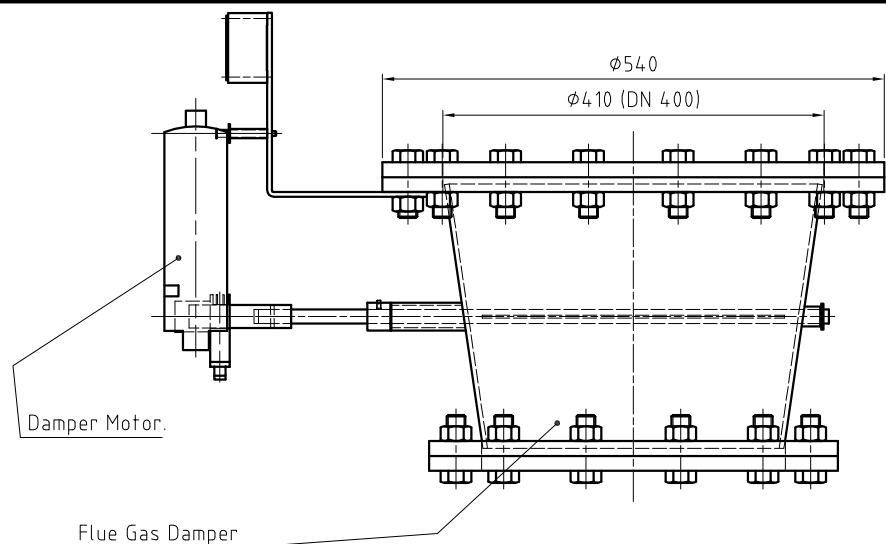
UNLESS OTHERWISE SPECIFIED:
Tolerances: NS-ISO 2768-1-m



A	1	Added drain plug				EMO	23.04.03
Rev.	Nos	Changing				Name	Date
Date	29.01.03	Drawn by	EM	Traced by	EM	Scale	1:20
Checked by	JFS	Std. checked by		Approval		Format	A4
Main Dimensions Flue Gas Fan DN 300 H2						Replacement for	Replaced of
						4006930	Rev. A
Project	Reference	File name	Plot date	Article no.	Page		
		4006930		-	-		

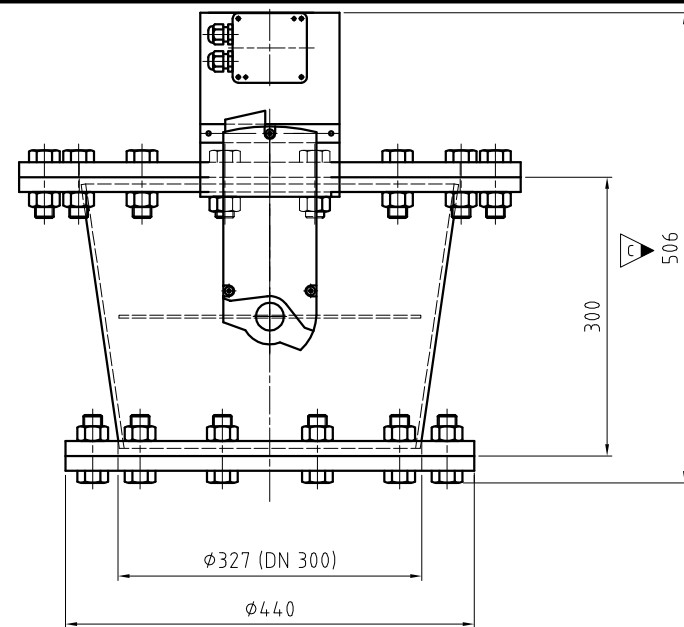
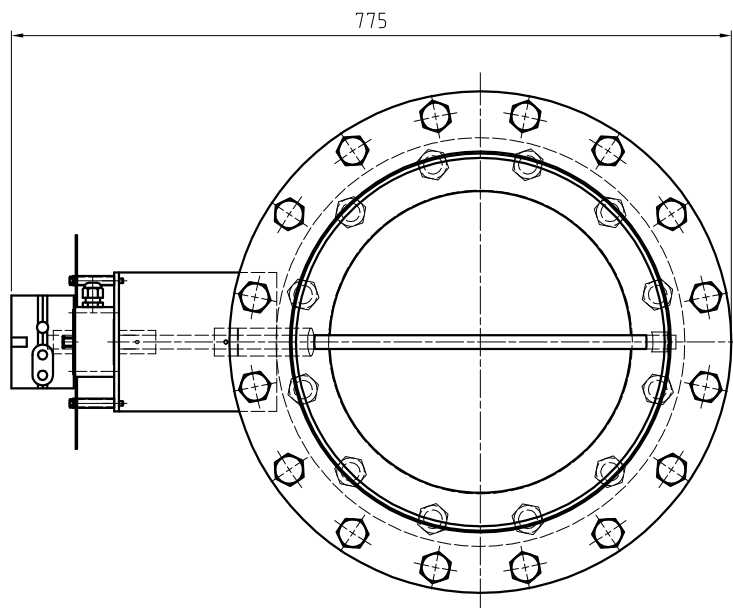






Damper Motor.

Flue Gas Damper



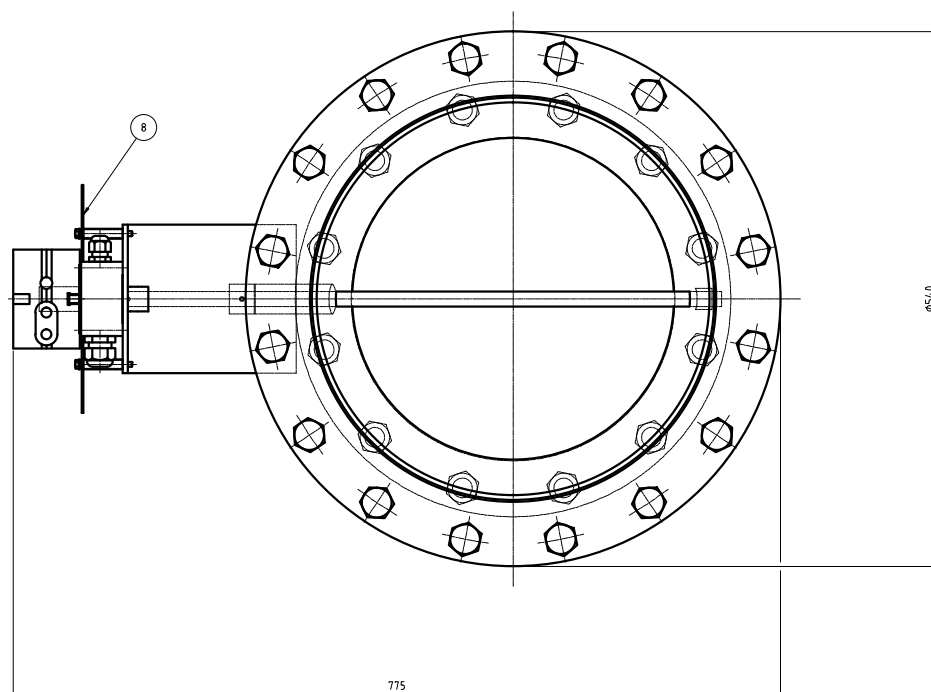
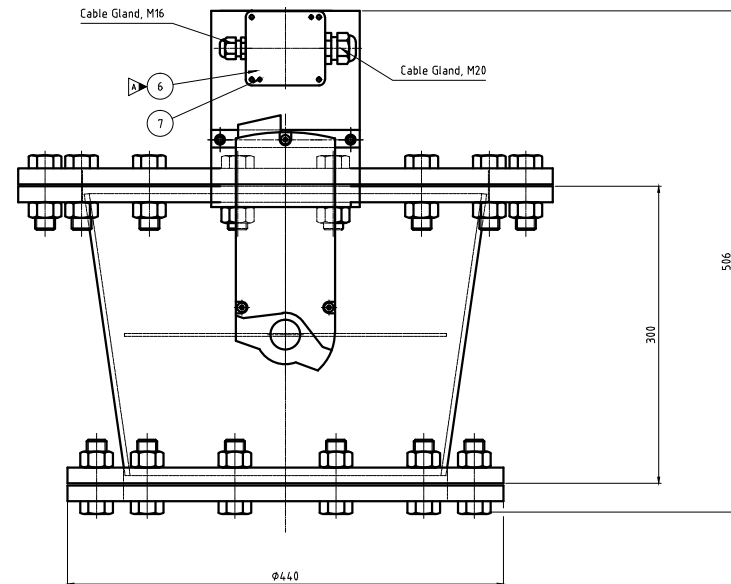
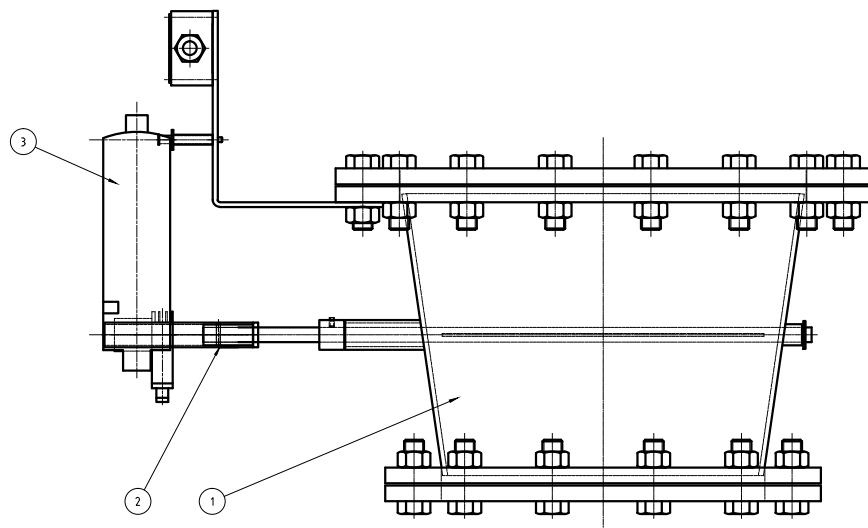
Flanges DN 400 and DN 300 drilled according NS 2525, DIN 2573A, BS 4506-6

Weight: 68 Kg.

C	1	Dim 506 was 436			MIM	02.04.04	
B		Was 65 Kg			EMO	02.04.03	
A		Added spacing bar between shaft and motor			JFS	27.11.98	
Rev.	Nos	Changing			Name	Date	
Date		Drawn by		Traced by		Scale	
22.09.98		JFS				1:5	
Checked by		Std. checked by		Approval		Format	
						A3	
Flue Gas Damper DN 400/300						Replacement for	Replaced of
						3007249	
Project		Reference		File name		Plot date	
317		SD		3007249			
Article no.		Page		3007249 - 06/10/			

UNLESS OTHERWISE SPECIFIED:
Tolerances: NS-ISO 2768-1-m

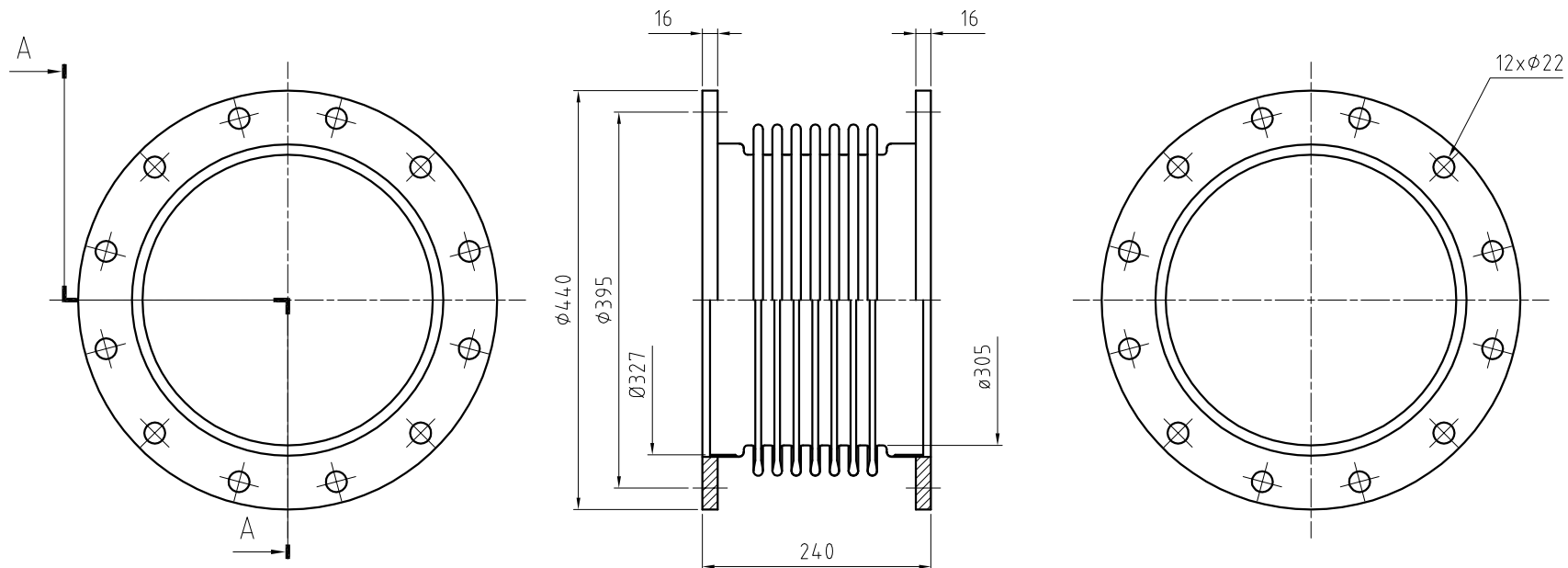
This drawing and the design is our property and must not
be disclosed to any third person without permission.



Weight: 68 Kg.

8	1	Mounting Bracket for Damper Motor			0.10	10453
7	2	Screw, cheese head, M4x20 EL Zn	ISO 1207	4.8	0.00	10119
6	1	Junction Box for Damper	3008495		0.30	3008495
3	1	Damper Motor	Landis&Stefana	GBB 131.1E	2.00	10452
2	1	Split pin Ø4x32	ISO 8752	SI	0.03	11601
1	1	Flue Gas Damper, Sub. Assy. DN 400/300	1006998		65.50	1006998
Item		Qty.	Description	Standard	Material	Weight Article No.
A	1		Pos 4 and 5 for cable gland removed. Pos 6 was art. no. 12277.			MM 22.04.03
Rev.	Rev.	Changing				Date
29.12.04	DW			1:2.5		
checked by	1st checked by	Approval	Formal	A1		
Flue Gas Damper. Assembly DN 400/300						Replacement for
1006999						Replaced by
06/18/2015						Rev. A
Project	Reference	File Name	Project No.	Page	Page	
		1006999			1006999	

Flanges drilled according to
NS 2525, DIN 2573, BS 4504-6




Section A - A

MAX. MOVMENT.	
AXIAL	LAT L
+/-50	+/-10

WKG PRESSURE : 1 BAR.
DESIGN PRESSURE : 2,5 BAR.
WKG TEMPERATUR : 500°C
PROD. TEST PRESSURE : 1 BAR.

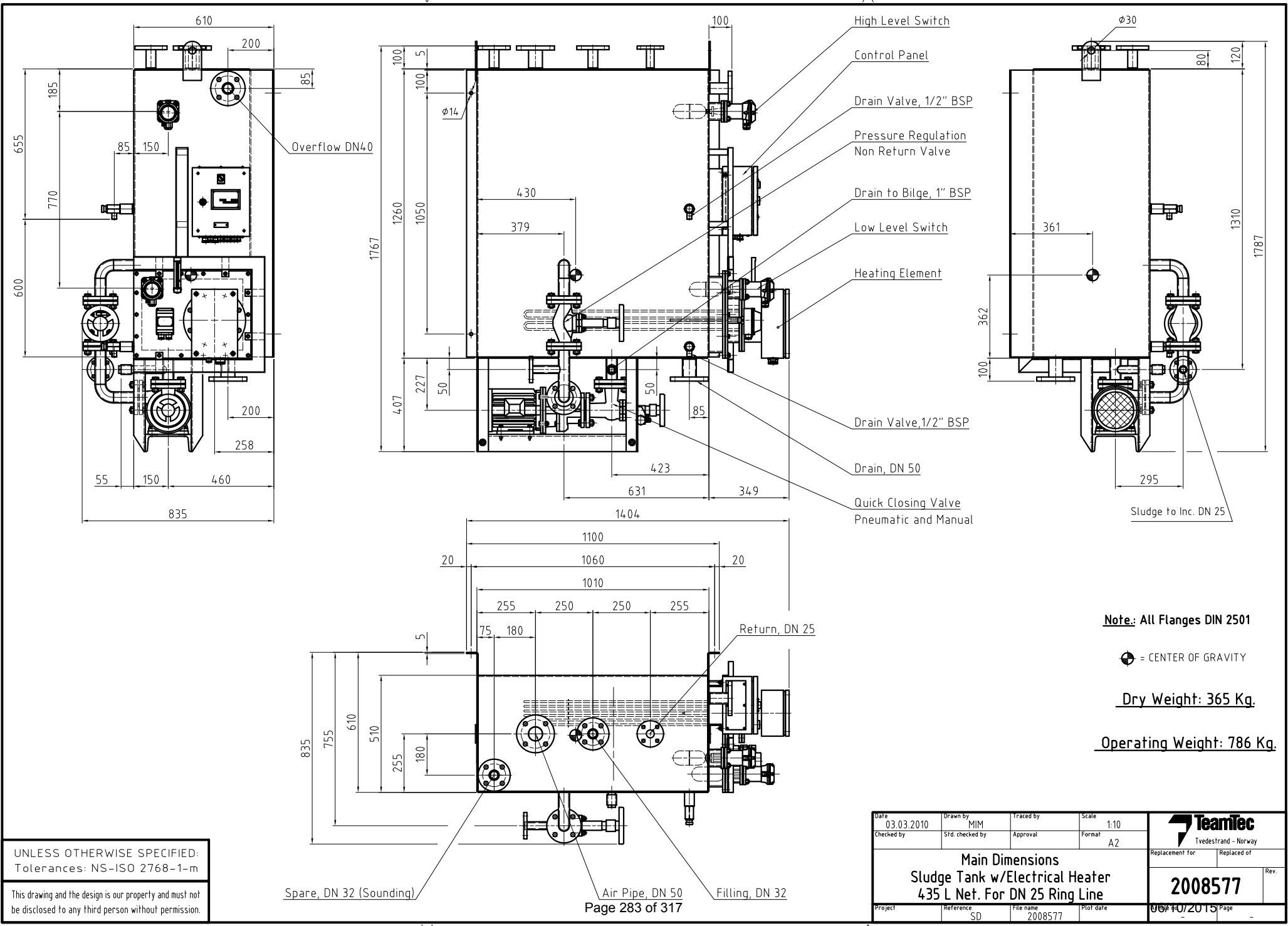
MATERIAL :
FLANGES: CARBON STEEL
BELLOWS : STAINLESS STEEL, TYPE 321
THICKNESS : 0,3mm X 2 PLY

Weight: 20 Kg.

Date 12.08.2008	Drawn by LF	Traced by	Scale 1:5	 Tvedestrand - Norway	
Checked by	Std. checked by	Approval	Format A3		
Expansion Compensator DN 300				Replacement for	Replaced of
				3009565	
Project	Reference	File name 3009565	Plot date	Article no. 3009565	Page 06/10/2015 -

UNLESS OTHERWISE SPECIFIED:
Tolerances: NS-ISO 2768-1-m

This drawing and the design is our property and must not
be disclosed to any third person without permission.



Note: All Flanges DIN 2501

⊕ = CENTER OF GRAVITY

Dry Weight: 365 Kg.

Operating Weight: 786 Kg.

UNLESS OTHERWISE SPECIFIED:
Tolerances: NS-ISO 2768-1-m

This drawing and the design is our property and must not be disclosed to any third person without permission.

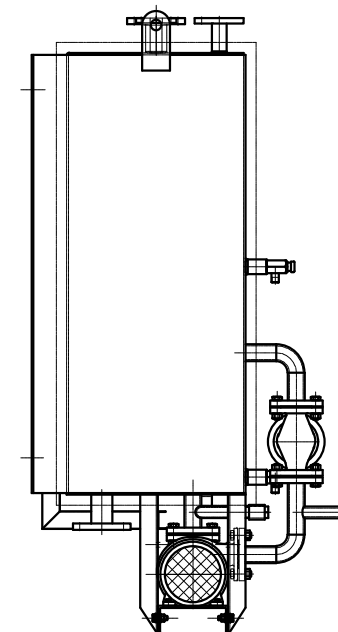
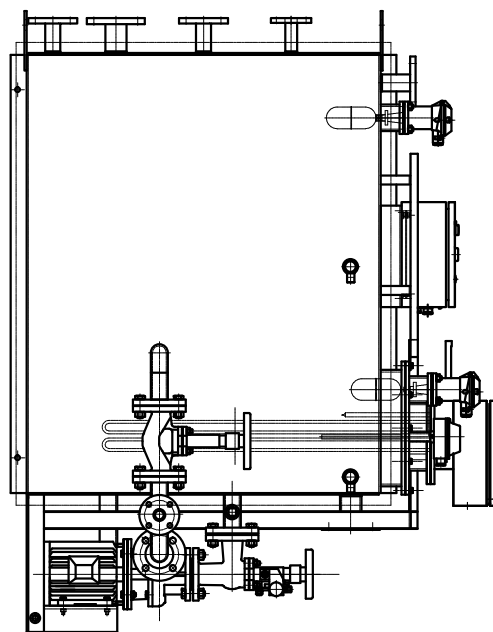
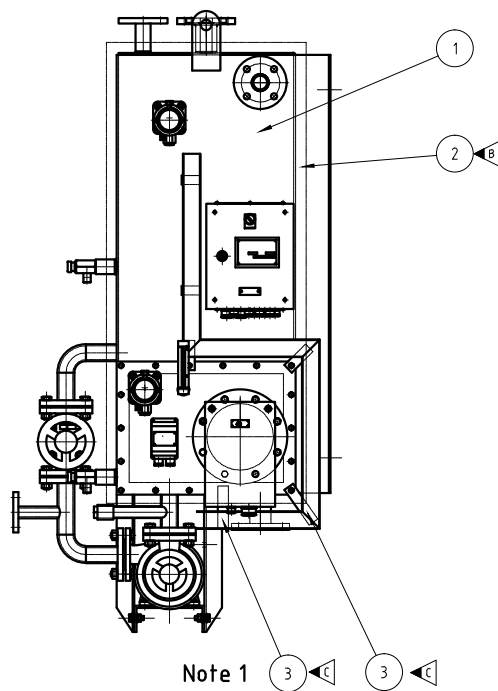
Page 283 of 317

Date 03.03.2010	Drawn by MIM	Traced by	Scale 1:10
Checked by	Std. checked by	Approval	Format A2
Main Dimensions Sludge Tank w/Electrical Heater 435 L Net. For DN 25 Ring Line			
Project	Reference SD	File name 2008577	Plot date 06/10/2015

Teamtec
Tvedestrand - Norway

Replacement for
2008577

Replaced of
Rev.



Note 1: Art. No. 9774 is to be replaced by Pos 3

Weight: 420 Kg.

C	2	Pos 3 added. Cable Bridge redrawn.	TP	01.08.2007
B	1	Art. no. 3008764 was 14922	MIM	21.03.06
A		Art.Nr. 14922 was 14022	LIC	08.09.2005
Rev.	Nos	Changing	Name	Date

This drawing and the design is our property and must not be disclosed to any third person without permission.

UNLESS OTHERWISE SPECIFIED:
Tolerances: NS-ISO 2768-1-m

3	2	Bracket for Cable Bridge, L=123	4007917		0.09	4007917
2	1	Insulation and Plates Assembly, 435 L Sludge Tank	3008764		53.20	3008764
1	1	Sludge Tank Assy. 435L, El. Heating	2007230		359.58	2007230
Item	Qty.	Description	Standard	Material	Weight	Article No
Date	16.03.2005	Drawn by	MIM	Traced by	Scale	1:10
Checked by		Std. checked by		Approval	Format	A2
Sludge Tank Assy. 435L w/ Pl. and Insul.						
Electrical Heating						
Project				Reference	File name	Plot date
					2007300	
Article no.				Page	Rev.	
2007300				06/10/2015	C	



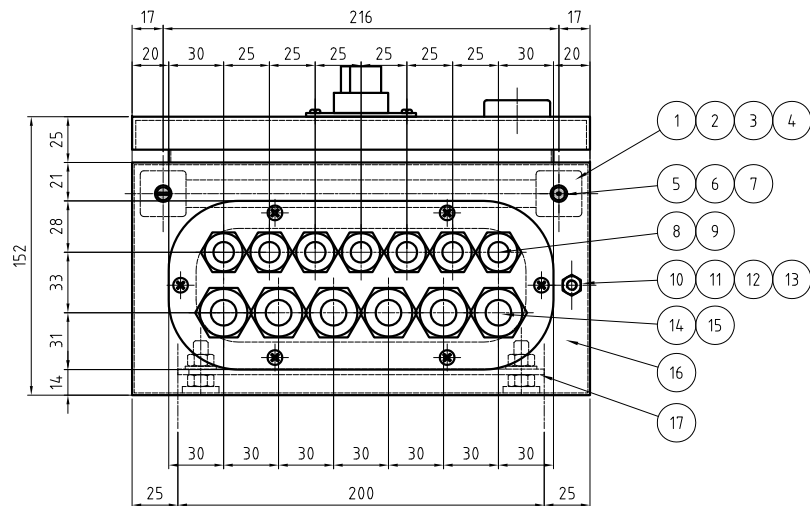
Replacement for

Replaced of

2007300

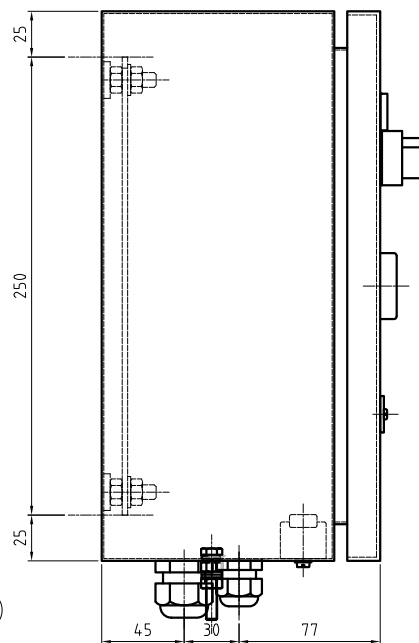
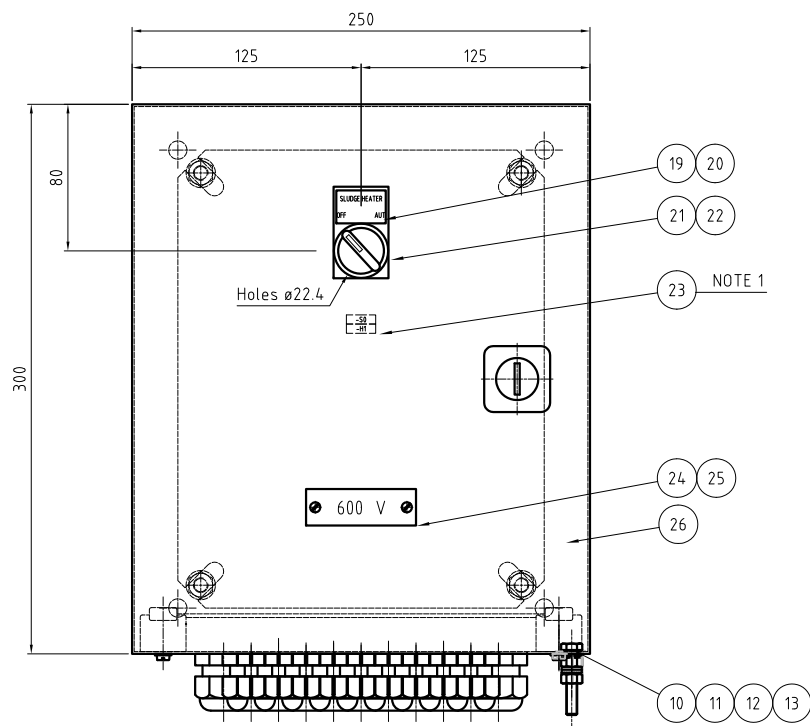
06/10/2015

-



NOTE 1: Labels, inside of door

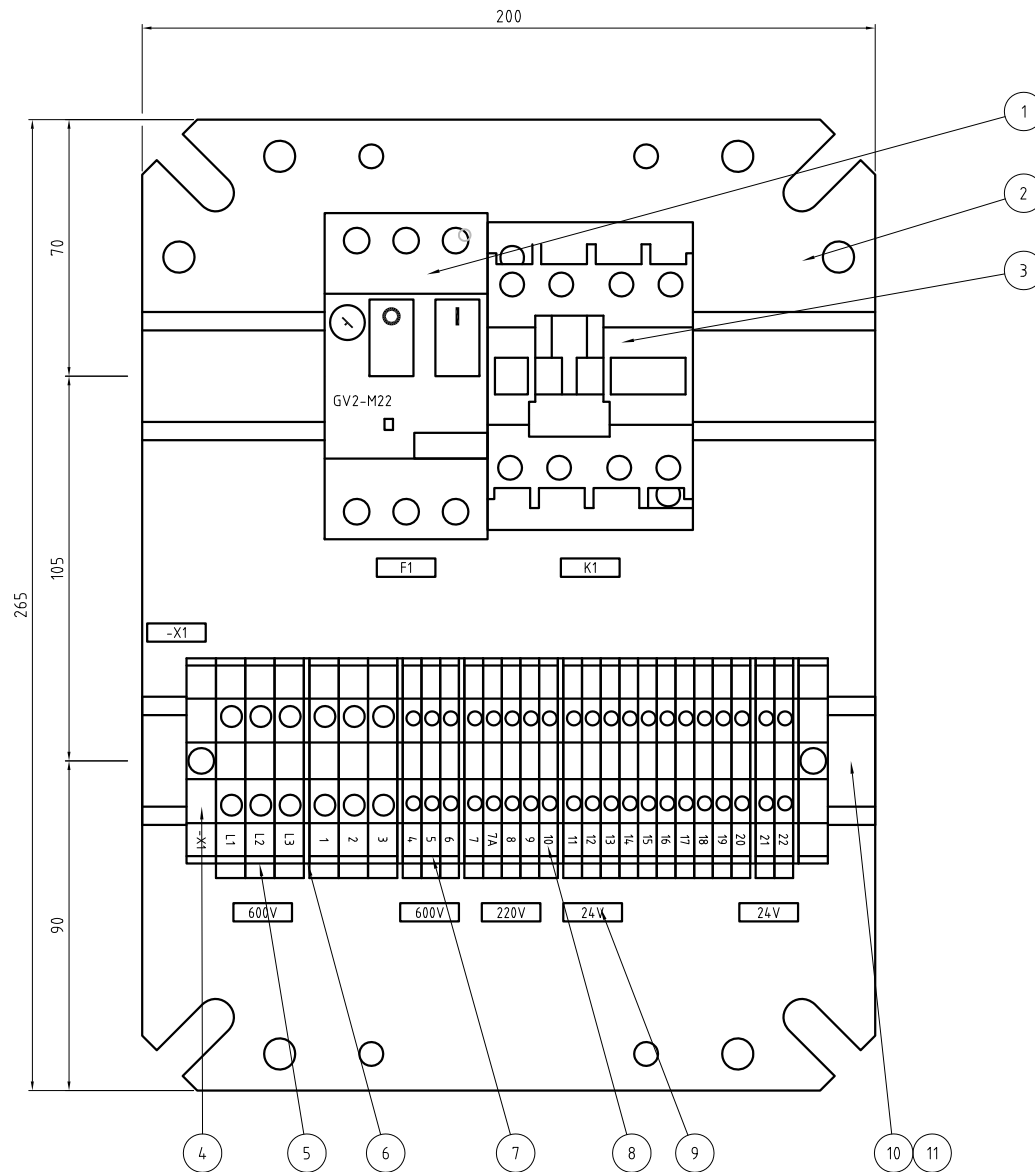
Weight: 5.7 Kg.



26	1	Electrical Diagram Sludge Tank with El. Heat, 600V-220V 60Hz	3010068		0.00	3010068
25	2	Screw, self tapping, 2.94x6.5	NS 1833	St.	0.00	4931
24	1	Name plate 600V	4007215	Red plast	0.00	12902
23	1	Labels 5x16, Brady	Brady	1674760000	0.00	4838
22	1	Select switch actuator, green	Telemec.	ZB4-BK1233	0.01	10870
21	1	Switch Body w/cont.bl. NO GN	Telemec.	ZB4-BW0M31	0.00	10869
20	1	Legend plate holder, 30x50	Telemec.	ZBZ-33	0.00	12415
19	1	Legend Plate in Sludge Heater ON/AUTO in	4007221		0.00	4007221
17	1	Mounting Plate Sludge Tank with El. Heat, 600V-220V 60Hz	2009427		0.00	2009427
16	1	Enclosure, 300x250x150		ACM-GV32515	3.16	9815
15	6	Nut, gray, M20			0.00	12595
14	6	Cable gland, gray M20, 7-14			0.02	12590
13	1	Bolt, hex M6x35		Brass	0.01	12614
12	3	Washer, 6		Brass	0.00	12616
11	1	Washer, Lock teeth, 6.4 Elzn		DIN 6798A	0.00	12617
10	2	Nut, hex M6		Brass	0.00	12615
9	7	Nut, gray, M16	Schlemmer	7211 97 00	0.01	11710
8	7	Cable gland, gray M16, 3.5-10			0.01	11709
7	2	Nut, hex, M4 ELZn	ISO 4032	8	0.00	1441
6	2	Washer, 4 ELZn	ISO 7089	St.	0.00	5568
5	2	Screw, Cheese Head, M4x10 ELZn	ISO 1207	4.8	0.00	4277
4	10	Washer	Weidmüller	St.	0.00	4579
3	10	Screw (M5x8)	Weidmüller	BS	0.00	4580
2	1	Earth Rail, NSch 15x2, 243mm	Weidmüller	Nsch 15x2	0.01	6279
1	2	Railholder, SH1PA	Weidmüller	SH1PA	0.01	4275

Date	23.07.2014	Drawn by	KK	Traced by		Scale	1:1
Checked by		Std. checked by		Approval		Format	A2
Control Panel 600V - 220V Sludge Tanks w/El. Heater				<div> <div>Teamtec</div> <div>Tvedestrand - Norway</div> </div> <div> <div>Replacement for</div> <div>2009426</div> </div> <div> <div>Replaced of</div> <div></div> </div> <div> <div>Rev.</div> <div></div> </div>			
Project	Reference	File name	Plot date	Page			
		2009426	06.10.2015	2009426			

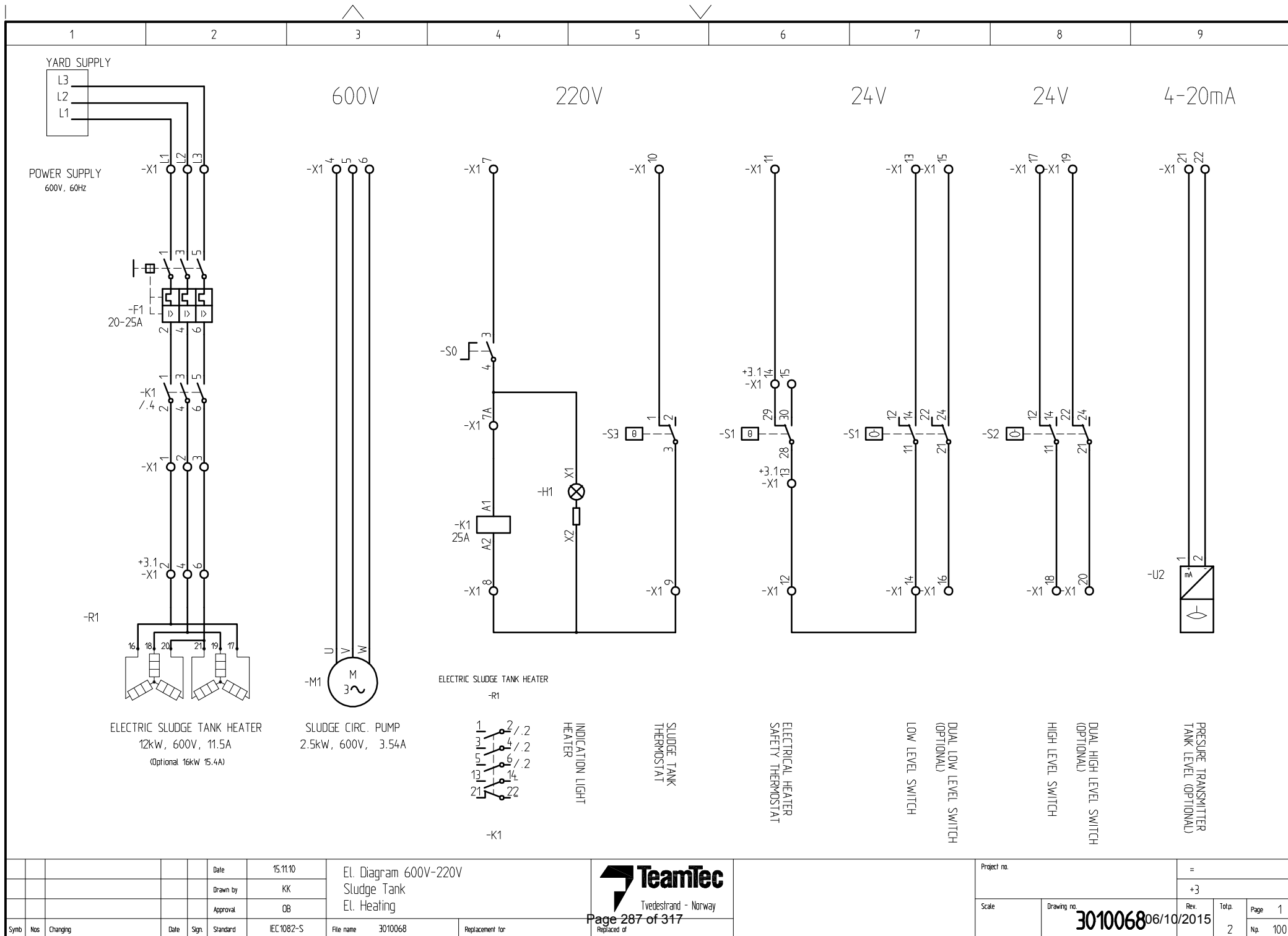
UNLESS OTHERWISE SPECIFIED: This drawing and the design is our property and must not be disclosed to any third person without permission.
Tolerances: NS-ISO

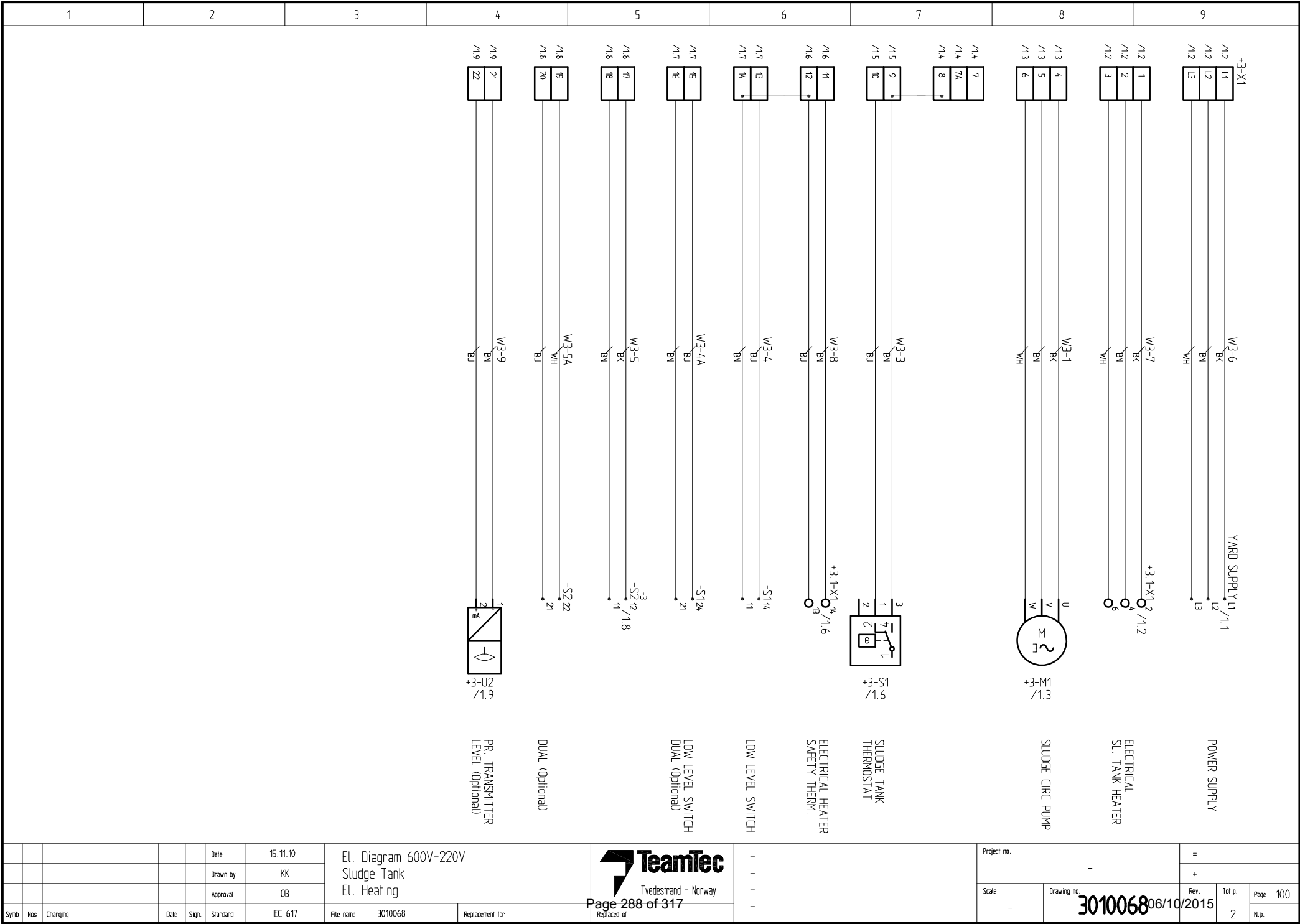


Weight: 2 Kg.

11	8	Blind rivet, ø4x10		St.	0.01	4267
10	2	Mounting Rail, TS 35/7.5, 200 mm	DIN 46277		0.40	14533
9	1	Labels 5x16. Brady	Brady	1674760000	0.00	4838
8	1	Marking set Terminal clamps Weidmüller WDU 2.5	Weidmüller	1609860000	0.00	5042
7	20	Terminal Clamp 2.5mm2		WDU 2.5	0.01	5041
6	6	End Plate		WAP 2.5-10	0.00	5043
5	6	Terminal clamp	Weidmüller	WDU 6	0.01	9406
4	2	End Bracket		WEW 35/2	0.01	5040
3	1	Starter contactor, 32A	Telemec.	LC1-D32P7	0.53	8577
2	1	Mounting Plate. 200x265 t=2	Telemec.	ACM-PE325	0.00	9785
1	1	Circuit breaker, 20-25A	Telemec.	GV2-M22	0.26	6819
Item	Qty.	Description	Standard	Material	Weight	Article No
Date	23.07.2014	Drawn by	KK	Traced by	Scale	1:1
Checked by		Std. checked by		Approval	Format	A2
Mounting Plate with EL. Components Sludge Tank w/El. Heater 600V - 220V						
Project	Reference	File name	Plot date	06.10.2015	Page	-
		2009427		2009427		
Teamtec Tvedestrand - Norway				Replacement for	Replaced of	Rev.
				2009427		

UNLESS OTHERWISE SPECIFIED: This drawing and the design is our property and must not be disclosed to any third person without permission.
Tolerances: NS-ISO





Installation and commissioning guide for

TEAMTEC INCINERATORS

Type OG200/400C

INDEX

1.0	General requirements to installation of incinerators
2.0	Location of incinerator
3.0	Supplied items from manufacturer
4.0	Required additional installation materials
5.0	Combustion chamber installation
6.0	Diesel oil piping system
7.0	Sludge oil and steam/air piping system
8.0	Drain piping
9.0	Electric panel installation
10.0	Flue gas fan installation
11.0	Flue gas damper installation
12.0	Temp. sensor installation
13.0	Electric wiring
14.0	Thermal insulation
15.0	Sludge Tank
16.0	Commissioning

1.0 General requirements to installation of incinerators type OG200/400 C

The classification societies have specific rules for installation of incinerators. In most cases the societies are using the rules applying for oil fired boilers.

We quote from the rules :

INSTALLATION

Incinerator

Incinerators and boilers for sludge oil may be installed in the engine room or in a separate room. Incinerators for garbage installed in the engine room are to be screened with due attention to size and location of the incinerator. If incinerators are installed in a separate room outside the engine room, bulkheads and decks of this room are to be approved as class "A" divisions having an insulating value of 60 minutes (as defined in SOLAS 1974) if adjacent to accommodation, oil tanks, cargo, etc.

If incinerators are installed in a separate room, the room is to have mechanical ventilation, automatic fire detecting and an approved fire-extinguishing system, operated from an easily accessible place outside the room. Stop of ventilation, oil burner and oil-booster pumps is also to be arranged outside the room. Ventilating ducts shall be possible to close by means of flaps.

Smoke-uptakes and surfaces of incinerators are not to be less than 500 mm from cargo, oil tank, or accommodation bulkheads.

Smoke-uptake and exhaust pipe are to be insulated and are to be located well away from electrical installations and inflammable items. Exhaust pipes in the casing are to be led to the top of the funnel.

Exhaust uptakes from incinerators, which are installed in separate rooms outside the engine room, are to be approved in each case.

Drip tray with drain to the sludge-oil tank is to be fitted under the burner.

Garbage chute

Any garbage-chute in the ship is to be provided with smoke-detector(s), fire-extinguishing equipment and walls with class "A" insulation (as defined in SOLAS 1974).

Unquote.

Therefore before proceeding with installation planning, check with your classification society to have their comment at this early stage.

2.0 Location of Incinerator

Having in mind para. 1.0 the following additional criteria have to be brought into your consideration :

- 2.1. Necessary space for the equipment.
 - 2.2. Easy transport of waste.
 - 2.3. Diesel oil supply.
 - 2.4. Sludge oil supply.
 - 2.5. Steam/air supply.
 - 2.6. Electrical supply.
 - 2.7. Flue gas uptake.
 - 2.8. Air supply.
-
- 2.1. The main dimension drawing for the individual incinerators clearly indicate the minimum and recommended space around the combustion chamber. The flue gas fan can be installed anywhere in the flue gas duct system
 - 2.2. The access to the incinerator should be as easy as possible in order to motivate the crew for using it.
 - 2.3. The particulars for diesel oil supply/return is listed in Piping & Instrument Diagram.
A ring line system w/circulating pump is an alternative to direct connection to a tank. It should be noted that the class societies require means to close the fuel valves from control station.
 - 2.4. See Piping & Instrument Diagram.
We recommend our special made sludge oil tank, which is equipped with a circulating pump, steam heating coil (electric heating coil as option) high and low level switches, quick closing valve, thermostat, solenoid valve (for steam heated tank) and 2 ea. check valves for level indication. A ring line system and two shut off valves, is recommended. See Piping and Instrument Diagram.
Means is required for closing fuel valves from control room.
 - 2.5. Steam is recommended for atomizing of the sludge burner and heating coil on the sludge oil tank.
If steam is not available, compressed air can be used for atomizing the sludge burner. See Piping & Instrument Diagram.
 - 2.6. The particulars for electric supply also appears in Piping & Instrument Diagram and Cable Arrangement.

-
- 2.7. The flue gas uptake, materials and size also appear in same appendix. Attention must be paid to the thermal expansion of steel ducts being exposed to temperatures up to 375° C which means an expansion at about 4 mm per 1 m straight ductwork. Expansion compensators must be fitted in areas where this expansion cannot be allowed. For the flue gas fan inlet/outlet expansion compensators must be fitted. It is also recommended to have a water trap w/drain in the duct system in order to prevent rain entering the incinerator.
 - 2.8. The incinerator has a max. air consumption listed in Piping & Instrument Diagram - make sure that the ventilation system can provide this amount.

3.0 Supplied items from manufacturer

- 3.1. Combustion chamber incl. counter flange for flue gas outlet and oil connections.
- 3.2. Flue gas fan incl. counter flanges for inlet/outlet and flue gas thermocouple
- 3.3. El. panel ready mounted on combustion chamber.
- 3.4. Flue gas damper w/counter flanges.
- 3.5. Sludge oil tank (Optional).

4.0 Required additional installation materials

- 4.1. El. cables acc. to Cable Arrangement - length according to the actual installation.
- 4.2. Cable bridge w/fasteners
- 4.3. Piping w/fittings for diesel oil system and sludge oil system. Pipes w/fittings for steam/air atomizing system, and heating system on sludge oil tank.
- 4.4. Steel parts for eventual foundation of combustion chamber and flue gas fan.
- 4.5. Flue gas ductwork w/necessary bends.

- 4.6. 2,5 m of heat resistant duct from the incinerator outlet. (Size acc. to Piping & Instrument Diagram.)
- 4.7. Thermal insulation for ductwork/flue gas fan. (The extension of the insulation to be indicated by the relevant classification society.)
- 4.8. Expansion compensators - 1 for each of the flue gas fan inlet/outlet - further acc. to the actual installation (see para. 2.5.)
- 4.9. Emergency stop switch.

5.0 Combustion chamber installation

The combustion chamber can be bolted or welded to the deck.
Some classification societies requires a small cofferdam around the combustion chamber having oil burner to prevent oil spill in case of leakage on the diesel and sludge piping system.

6.0 Diesel oil piping system

The diesel oil system, one supply line and one return line, to be connected to a diesel oil tank or to a circulating pump (booster pump).
See Piping & Instrument Diagram for pressure limitation and pipe sizes for the supply/return system.
The Incinerator has DN15 flanges for connection of diesel oil.
Manual isolating valve on suction line should be installed. It is also recommended to have a filter on the diesel oil supply line.
Flanges are marked for connections for both supply and return line.

7.0 Sludge oil and steam/air piping system

From sludge oil tank circulating pump. The hourly capacity of pump is recommended to be at least 1 - 2 times larger than tank volume, in order to have a well mixed oil from the tank. It is essential that the tank has a possibility for drainage of water. Install a pipeline from circulating pump to the Incinerator and back to the tank. In the ring system, there should be installed isolating valves for both supply and return line (see the arrangement diagram). Dimensions according to Piping & Instrument Diagram.

Steam/air piping. A manual isolating valve is recommended on the steam/air line before the Incinerator connection. The steam consumption is approx 20 kg/h at a pressure of 6 - 8 bar. For pipe size, see Piping & Instrument Diagram. If steam is not available on the ship, compressed air can be used instead. Consumption and pressure as above.

8.0 Drain piping

From spill collector a pipeline must be installed to lead the oil and water away. Connection size : See Piping & Instrument Diagram.

NOTE ! All pipelines, ductwork and flue gas fan must be cleaned before putting into operation.

9.0 Electric control panel (ECP) installation

The electric supply to the ECP to be connected to the main switch, Q1. Size of cables for ECP/terminal box on incinerator is listed in Cable Arrangement.

10.0 Flue gas fan installation

The flue gas fan to be installed after the flue gas damper. Both inlet and outlet should have expansion compensators to compensate for the thermal expansion of the ductwork.

The foundation must be plane and it may be installed on the deck or on a bracket fixed to a bulkhead.

11.0 Flue gas damper

The damper to be fitted in the flue gas uptake between the incinerator and the flue gas fan. It must not be installed closer than 2,5 m from the flue gas outlet on the incinerator.

12.0 Temp. sensors

The temperature sensors and transmitters are ready mounted on combustion chamber and the flue gas fan housing.

13.0 Electric wiring

The wiring to be made acc. to the relevant arrangement diagram and terminal diagram for the actual type of incinerator.
Details on the electric wiring system also appears on Cable Arrangement.

In general the following cables are to be drawn :

- Electric supply 380/440 V w/fuses to the ECP.
- Cable from ECP to the flue gas fan.
- Cable from ECP to flue gas thermocouple junction box on flue gas fan
- Cable from ECP to sludge circ. pump/sludge tank junction box.
- Cable from ECP to sludge tank junction box.
- Cable from ECP to a remote emergency stop switch.
- Cable from potential free contacts in the ECP to a remote alarm.
- Cable from potential free contacts in the ECP to a remote running signal.
- Cable from ECP to flue gas damper motor.

14.0 Thermal insulation

The flue gas uptake incl. the flue gas fan to be insulated acc. to the requirements from the relevant classification society. In general this means that all hot surfaces on the uptake that may cause injuries to the personnel have to be insulated.
The max. temperature on the flue gas is 375° C. It is recommended to install heat tracing on sludge ring line.

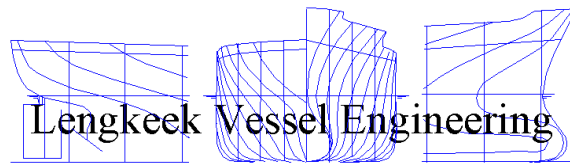
15.0 Sludge Tank

The sludge tank is normally supplied without insulation. Sludge oil vary in composition and quality. We therefore recommend operating temperatures between 80 and 90 °C.
Please note that for temperatures above 60 °C the sludge tank must be insulated in accordance with class requirements.
NOTE ! The sludge tank must be installed on the same level as the Incinerator, or lower.

16.0 Commissioning

- 16.1. The Emergency stop switch to be set in closed position. If the switch is not installed, fit a link between the actual terminals in ECP - see the electrical diagram.
- 16.2. Check the running direction for both the flue gas fan and burner. Arrows are fitted indicating the correct rotation direction.
- 16.3. Normal diesel oil pressure is min. 16 bar.
- 16.4. When starting the incinerator the flue gas fan automatically runs for about 1 min. before burner ignition.
- 16.5. When shutting off the incinerator the flue gas fan automatically keeps running until the temp. in combustion chamber is lower than 170 °C.
- 16.6. See the relevant "Instruction for Operation", either on the Incinerator or in the technical manual.

APPENDIX E.2



"CCGS Sir William Alexander"
Installation Specification for New
Sludge Tank and Associated Piping

For
Department of Fisheries & Oceans /
Canadian Coast Guard
Dartmouth, Nova Scotia



Prepared By:
Lengkeek Vessel Engineering Inc.
Report Number: J15003-R01, rev 0
Date: 12 Feb 2015

<i>Prepared By:</i>	<i>D. Careless</i>
<i>Checked By:</i>	<i>T. Newbury</i>
<i>LVE Form 72, rev0</i>	

11 Portland Street, Suite 301, Dartmouth, NS, Canada, B2Y 1H1
Telephone: (902) 468-3094 Fax: (902) 468-2910
Website: www.lengkeek.ca

Revision Matrix

<i>Rev</i>	<i>Brief description of revisions made</i>	<i>Issued to client</i>
Rev 0		

TABLE OF CONTENTS

1 SPECIFICATION DETAILS	1
1.1 SCOPE OF WORK	1
1.2 GENERAL INSTRUCTIONS	1
2 REFERENCES	1
3 GENERAL NOTES	2
3.1 ON-SITE PROJECT OFFICER:	2
3.2 SAFETY	2
3.3 SUB-CONTRACTORS	2
3.4 CHEMIST'S CERTIFICATES	3
3.5 DURATION OF SCHEDULED WORK	3
3.6 PROTECTION	3
3.7 WELDING	3
3.8 AUXILIARY SERVICES	3
3.9 SERVICE CONDITIONS	4
3.10 HOT WORK & FIRE WATCHES	4
3.11 RELOCATIONS	4
3.12 TEMPORARY LIGHTING & VENTILATION	4
3.13 VESSEL CLEANUP	4
3.14 MATERIALS & TOOLS	4
3.15 FIRE SAFETY SYSTEMS	5
3.16 SMOKING	5
3.17 ACCESS	5
3.18 AVAILABILITY OF FACILITIES	5
3.19 DOCKSIDE CLEANUP	6
4 STRUCTURE	7
4.1 RELEVANT DOCUMENTS	7
4.2 MATERIAL REQUIREMENTS	7
4.3 NEW SLUDGE TANK SUPPORTING STRUCTURE	7
4.4 NEW SLUDGE TANK DRIP TRAY	8
5 MECHANICAL	9
5.1 RELEVANT DOCUMENTS	9
5.2 MODIFICATIONS TO EXISTING FUEL LINE	9
5.3 MODIFICATION TO SLUDGE TANK PRESSURE REGULATION N.R. VALVE	9
5.4 ADDITION OF SLUDGE TANK VENT LINE	9
6 INSPECTION	11

6.1	GENERAL.....	11
6.2	INSPECTIONS	11
6.3	TRIALS.....	11

1 SPECIFICATION DETAILS

1.1 SCOPE OF WORK

This specification outlines the work to be completed onboard the CCGS “Sir William Alexander” to enable the installation at the Upper Deck, casing level, starboard side, of a new Sludge Tank and bulkhead mounted support structure. The installation will include the rerouting of an existing fuel line to clear the new tank installation, and also shall incorporate the installation of a new sludge tank vent, that shall run from the Sludge Tank installation up the ship’s casing to the starboard side of the existing funnel at the Bridge Deck level.

1.2 GENERAL INSTRUCTIONS

- .1 This specification shall be read in conjunction with the guidance drawings, J15003-S01 and J15003-M01, indicating the precise extent of work and the use and location of specific materials.
- .2 Where ever the words “approved by”, “equivalent” or similar phrases are used in this specification, they shall be understood to mean the material, process, or item referred to.
- .3 Approval from the DFO/CCG is required if the Contractor wishes to deviate from any of the specified methods or recommended materials.

2 REFERENCES

- .1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel
- .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding)
- .3 CSA 17, Canada Shipping Act - Tackle Regulations
- .4 CSA 28, Canada Shipping Act - Hull Construction Regulations
- .5 CSA 33, Canada Shipping Act – Marine Machinery Regulations
- .6 CSA 29, Canada Shipping Act - Hull Inspection Regulations
- .7 CSA 57, Canada Shipping Act – Safe Working Practices Regulations
- .8 MOSHR, Canada Labour Code – Marine Occupational Safety and Health Regulations
- .9 TP 127E, Transport Canada Marine Safety – Ship Electrical Standards
- .10 IEEE STD 45 – 1998 Recommended Practice for Shipboard Electrical Installations

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

3 GENERAL NOTES

3.1 ON-SITE PROJECT OFFICER:

All work to be completed to the satisfaction of the on-site Project Officer who, unless otherwise advised, will be the Chief Engineer of the ship, or his designated representative.

Upon completion of each item of the specification, the Chief Engineer shall be notified so that he may inspect the work prior to the complete closing up of any work.

Failure to give notification does not absolve the Contractor of the responsibility of providing the Chief Engineer with 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 (TCMS), and/or Lloyds Register (LR), Public Works and Government Services Canada (PWGSC) or Health Canada (HC).

3.2 SAFETY

There is a safety annex attached to this specification entitled "FLEET SAFETY MANUAL REQUIREMENTS". In addition to the detailed requirements within the specification, this annex contains excerpts from the document DFO 5737, "FLEET SAFETY MANUAL", that are applicable to contracted refit and dry-docking situations.

All contracted work shall be conducted in compliance with the requirements of the Canada Labour Code, Part 2.

Potential Contractors shall include with their bids the name of their Safety Manager or Supervisor who will ensure that these requirements for workplace safety are met

NOTE: Under the Canada Labour Code, Part 2, the Coast Guard has an obligation to exercise due diligence to ensure the safety of Contractors' workers as well as the ship's crew.

3.3 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.

3.4 CHEMIST'S CERTIFICATES

The Contractor shall supply the Chief Engineer with Marine Chemist's Certificates in accordance with TCMS TP 3177E before any cleaning, painting or hot work is commenced in confined spaces or machinery compartments.

Certificates shall clearly state the type of work permitted and shall be renewed as required by the regulations.

The Contractor and his 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.

3.5 DURATION OF SCHEDULED WORK

The Contractor shall provide sufficient personnel, material, and equipment resources to complete the specified work, within the period of the contract.

Extra effort required due to the Contractor's failure to maintain his production schedule will not be paid for by CCG.

3.6 PROTECTION

The Contractor shall provide adequate temporary protection for any equipment or areas affected by his work.

The Contractor shall take proper precautions to maintain in a proper state of preservation any machinery, equipment, fittings, stores or items of outfit which might become damaged by exposure, movement of materials, paint, sand, grit or shot blasting, airborne particles from sand, grit or shot blasting, welding, grinding, burning, gouging and painting.

Any damage shall be the responsibility of the Contractor.

3.7 WELDING

The Contractor shall be currently certified by the Canadian Welding Bureau in accordance with Standard W47.1-03 "Certification of Companies for Fusion Welding of Steel Structures," Division 1, 2.1 or 2.2.

All personnel performing welding shall be approved by the Canadian Welding Bureau.

Welding materials to CSA W59-03.

3.8 AUXILIARY SERVICES

Contractor shall include in the quotation the costs of any and all transportation, rigging, staging, slinging, crantage, removals, and installations of parts and equipment such as may be required to carry out work.

3.9 SERVICE CONDITIONS

All materials supplied and work carried out by the Contractor shall be adequate to meet service conditions of outside air temperature of minus (-) 40⁰ C to plus (+) 35⁰ C; for exterior installations.

All materials supplied and work carried out by the Contractor shall be adequate to meet service conditions of wind velocity of 50 knots; for exterior installations.

All materials supplied and work carried out by the Contractor shall be adequate to meet service conditions of water temperature of minus (-) 2⁰ C to plus (+) 30⁰ C; for exterior installations.

All materials supplied and work carried out by the Contractor shall be adequate to meet service conditions of shock loading of 2.5g horizontal, 1.5g vertical; for all installations.

3.10 HOT WORK & FIRE WATCHES

Any item of work involving the use of heat in its execution requires that the Contractor advises the Chief Engineer prior to starting such heating and upon its completion.

The Contractor shall provide sufficient suitable fire extinguishers and a fire watch during any heating and until the work has cooled.

Ship's extinguishers are not to be used except in an emergency.

3.11 RELOCATIONS

Any piping, manholes, parts and/or equipment requiring removal to carry out specified work and/or to gain access shall be refitted upon completion with new jointing, anti-seize compound, clamps and brackets as applicable (Contractor supply).

3.12 TEMPORARY LIGHTING & VENTILATION

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

3.13 VESSEL CLEANUP

The principal work areas, as defined by this specification, shall be cleaned to "as new condition" on completion of the contracted work.

The Contractor shall ensure that all spaces, compartments and areas of the ship outside of the principal areas of work are "as clean as found" when work is completed.

3.14 MATERIALS & TOOLS

All materials, unless otherwise specified, to be supplied by the Contractor.

Contractor to supply all necessary tools to perform specified work.

Ship's tools and equipment will not be available for Contractor's use except for specialty tools that will be issued by and returned to the Chief Engineer in good condition.

3.15 FIRE SAFETY SYSTEMS

Whenever any work is being carried out involving a ship's firefighting or fire detecting system, it shall be done in such a way as to leave the vessel and any persons aboard with adequate protection against fire at all times. This may be so accomplished by the removal or disarming of only a portion of the system at a time, by replacement with spares while work is in progress or by other reasonable means acceptable to the Chief Engineer.

3.16 SMOKING

The Public Service Smoking Policy forbids smoking in Government ships in all areas inside the ship where Contractor personnel will be working.

Contractor shall inform workers of the smoking policy and ensure that it is complied with in all cases.

3.17 ACCESS

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

Contractors to ensure that no workers bring meals onboard the ship.

3.18 AVAILABILITY OF FACILITIES

The modifications to the vessel will be carried out at a facility yet to be determined.

If the Contractor does not have access to washroom facilities off the ship, a designated washroom on board will be open during regular working hours for Contractor's use. If the cleanliness of the washroom is adversely affected by this usage, Coast Guard reserves the right to stop Contractor use of the facility.

Contractors are advised that normal working hours for ship's personnel during alongside refit periods are from 0800 hours to 2000 hours, seven (7) days a week, excluding statutory holidays. Permission to work outside of these hours on the ship must be obtained by the Contractor from the Chief Engineer in advance.

Contractor machinery located on the ship or the dock can only be run from 0700 hours to 1900 hours, Monday to Saturday. Contractor to ensure that any equipment used meets the current noise abatement regulations.

3.19 DOCKSIDE CLEANUP

The Contractor is responsible for the complete cleanup of adjacent dock areas used by his personnel and/or equipment during and after completion of the contracted work. This shall include, but not be limited to the following:

- 1) Removal of all dirt, grit and debris;
- 2) Removal of all staging, containers and equipment
- 3) Immediate cleanup and legal disposal of any leaked oils, solvents or other hazardous materials.

4 STRUCTURE

4.1 RELEVANT DOCUMENTS

Drawings

Drawing No: J15003-S01 Structural Modifications To Suit New Sludge Tank Installation

References

CSA 28	Canada Shipping Act - Hull Construction Regulations
CSA 33	Canada Shipping Act – Marine Machinery Regulations
CSA 29	Canada Shipping Act - Hull Inspection Regulations
CSA 57	Canada Shipping Act – Safe Working Practices Regulations
MOSHR	Canada Labour Code – Marine Occupational Safety and Health Regulations

4.2 MATERIAL REQUIREMENTS

All new steel plate and shapes shall be minimum Lloyds Grade 'A' or equivalent.

The Contractor shall supply all material required, including any material required to complete the work which is not explicitly identified in this specification. See also applicable structural guidance drawings for material requirements.

4.3 NEW SLUDGE TANK SUPPORTING STRUCTURE

The new sludge tank is to be fitted at the forward side of the bulkhead at frame 72. The existing insulation and metal sheathing on the bulkhead shall be removed at the locations of new angle supports that shall be welded on the bulkhead. These supports shall be as shown on the guidance drawing, J15003-S01, and shall be drilled to suit the bolt holes in the framing which makes up the tank structure.

Additional bolt holes shall be drilled in the Sludge Tank support structure, and these two additional holes per side shall be drilled through both the new support angles and the support structure of the Sludge Tank.

All metal sheathing and insulation that was removed to facilitate installation of the support structure for the new sludge tank, shall be reinstalled as per the existing arrangement. If damaged during removals, new insulation of the same type shall be installed along with new metal sheathing and insulation pins/clips.

4.4 NEW SLUDGE TANK DRIP TRAY

The sludge tank and its associated valves require a steel drip tray to be fitted underneath, to catch any of the contents that might leak. The general outline of the tray shall be generally as shown on the guidance drawing, J15003-S01. It shall be formed of 3/16" plate and shall have an upstand all round of approx. 65mm. The existing grating at the flat underneath the sludge tank shall be cut and removed in way of the area of the drip tray. The drip tray shall be intermittently welded to the existing grating support structure underneath. The existing coaming structure around the exhaust pipe shall be modified also to suit the new drip tray structure.

An existing drip tray fitted at this level in way of the new tank installation shall be removed.

5 MECHANICAL

5.1 RELEVANT DOCUMENTS

Drawings

Drawing No: J15003-M01 Piping Modifications To Suit New Sludge Tank Installation

5.2 MODIFICATIONS TO EXISTING FUEL LINE

The existing 1½" NB fuel line running down the forward face of the bulkhead at frame 72 shall be modified in order to remain clear of the tank and the new drip tray installation. Immediately above the location of the tank, there is an existing overhang in the insulation and metal sheathing on bulkhead 72 where the fuel piping is situated. The existing fuel line is to be cut immediately below this overhang, and a 90° elbow welded on to the end of the pipe. A new section of 1 1/2" NB fuel piping shall then be fitted, to run to starboard and then forward just above the top of the tank, and shall then turn down clear of the drip tray, to the underside of the level of the grating.

The new line shall run aft below the level of the existing grating, and tie-in to the existing fuel line at a point below the existing radiused section of pipework. The new connection to the existing line shall be carried out using a new 90° elbow and a straight spool of new piping, which can either weld to the existing line where it will be cut, or if space permits between the pipe and the face of the metal sheathing over the insulation, a pair of new 1½" pipe flanges. Contractor shall allow for fitting the flanges.

5.3 MODIFICATION TO SLUDGE TANK PRESSURE REGULATION N.R. VALVE

The forward face of the Sludge Tank has a flanged Pressure Regulation Non-Return Valve fitted. In order to clear the existing exhaust pipe within the space, the flanged valve shall be rotated 180° from its current location, so that the hand wheel is facing away from the existing exhaust pipe.

5.4 ADDITION OF SLUDGE TANK VENT LINE

The sludge tank will require a DN50 (2" NB) vent line to be fitted at the flanged connection on the top of the tank. The intention is to run the line forward from the tank connection, and then starboard to a suitable location, where the pipe can then turn 90° and run vertically through a clear space between existing pipework within the casing.

At 300mm above the Bridge Deck level, the pipe shall turn 90° to starboard, and run horizontally and pass through the starboard side of the funnel plating. Immediately outboard of the funnel side, the pipe shall run vertically 300mm and shall be fitted with a welded flange. The flange shall be suitable for mounting a DN50 (2") Winteb WIN2000 Air Pipe Head. The flanges are to be fitted with a suitable gasket to isolate the aluminum vent head from the steel piping. See guidance drawing J15003-M01.

The other piping connections to the sludge tank are to be carried out separately, and are not included within the scope of the guidance drawings or this technical specification.

6` INSPECTION

6.1 GENERAL

The work shall be carried out to the satisfaction of the vessel's Chief Engineer and the Project Manager from Department of Fisheries and Canadian Coast Guard.

6.2 INSPECTIONS

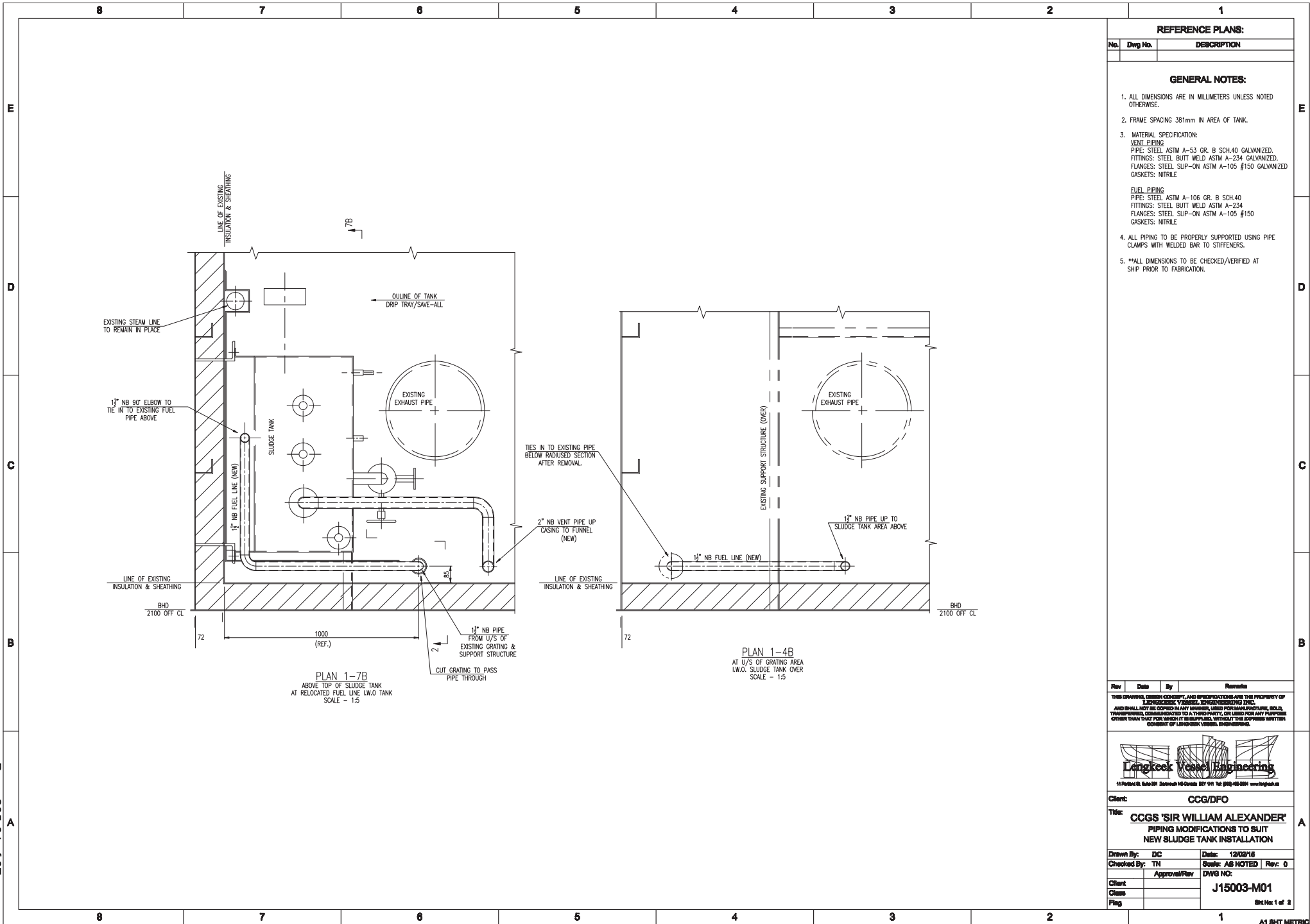
Inspections shall be carried out by the Chief Engineer and/or the Project Manager from Department of Fisheries and Canadian Coast Guard. The representative shall conduct a final inspection to determine acceptance of the work. The work shall also be inspected by the Contractor to ensure the methods of installation and workmanship conform to the drawings and specification.

A physical inspection of all welding with respect to the tank supports and the piping associated with the new tank installation shall be carried out by the Contractor to ensure that all welds are satisfactory and contain no visible defects or deficiencies.

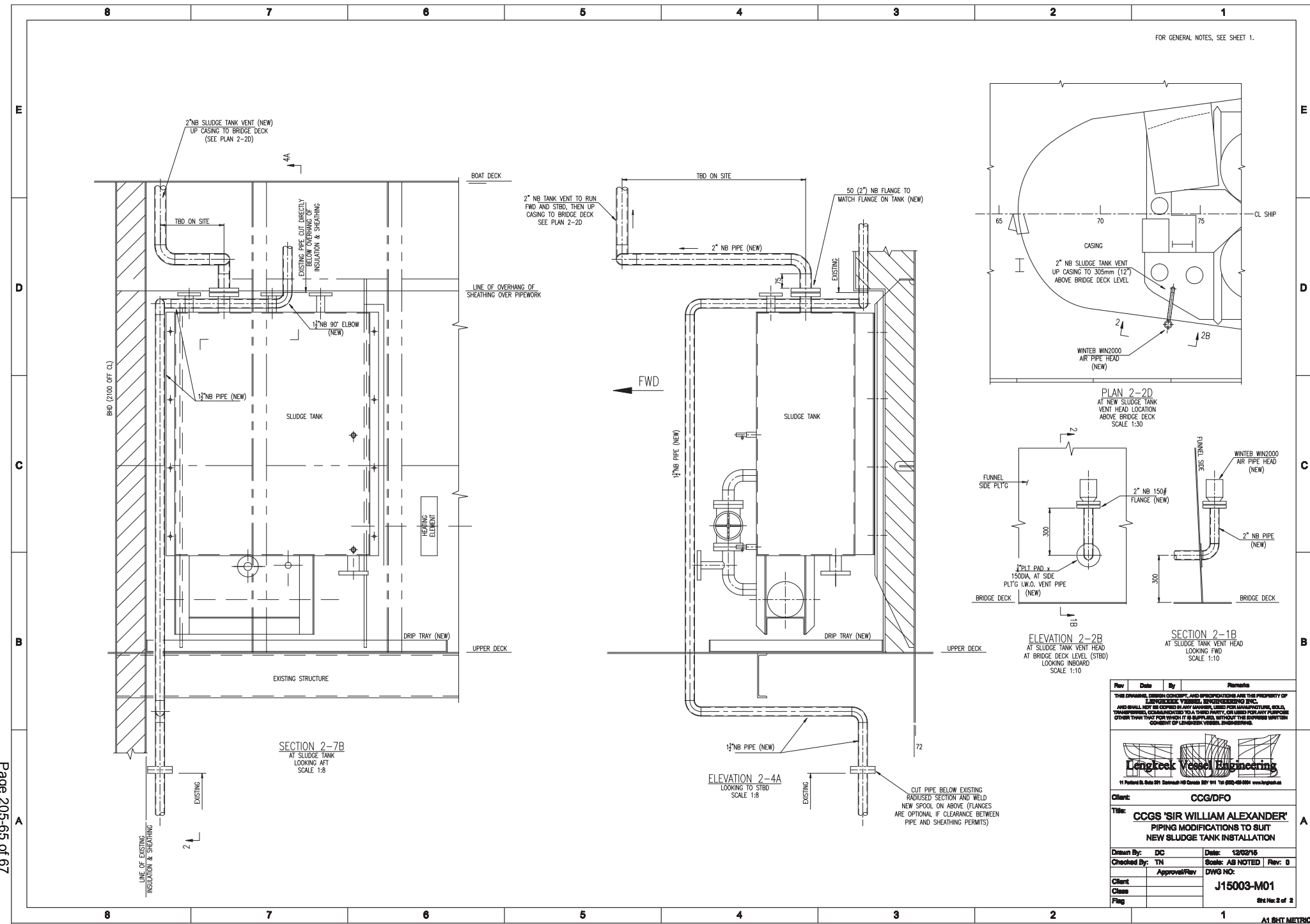
Weld deficiencies shall be recorded, reported and repaired, and then re-inspected and re-tested by the Contractor.

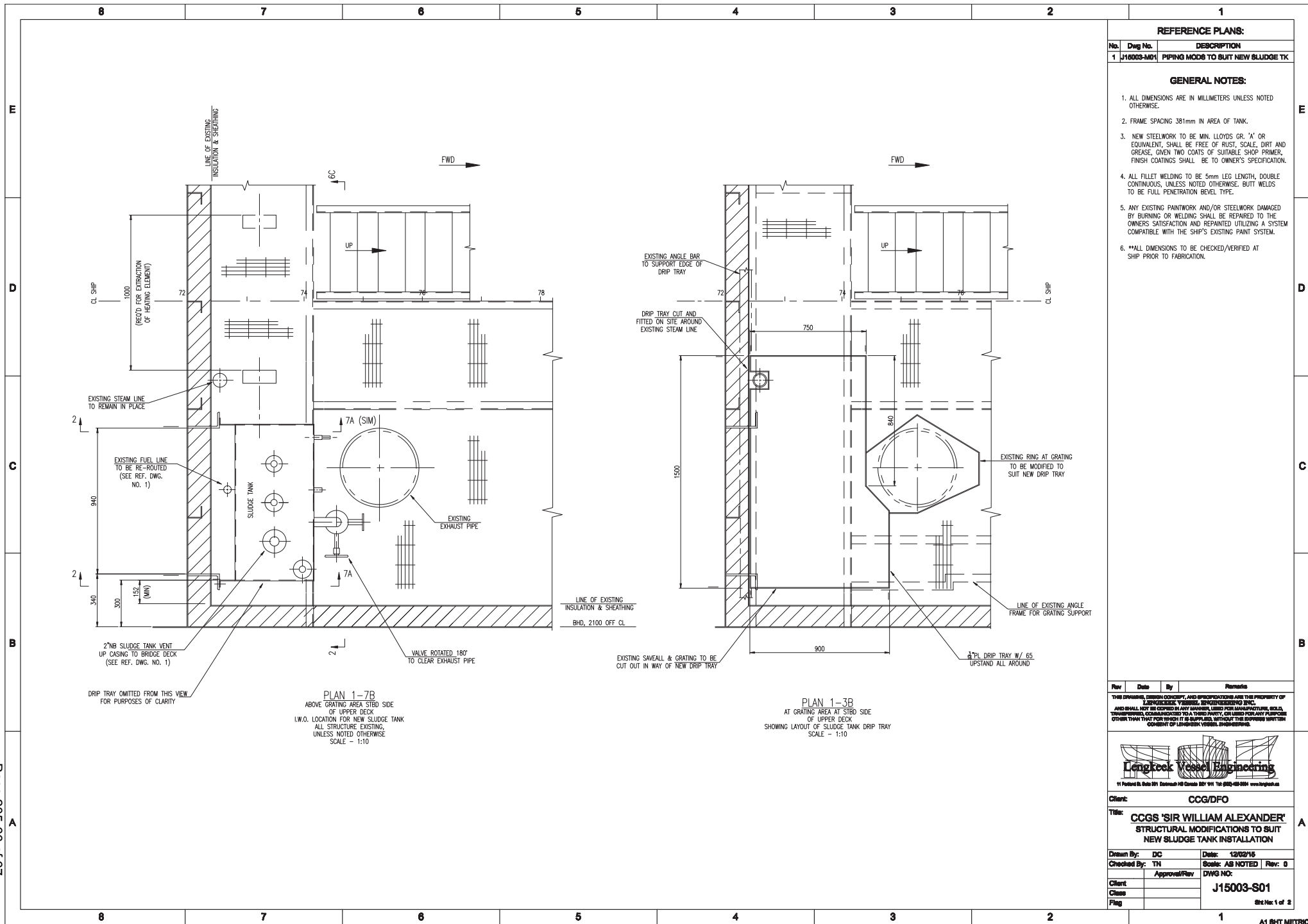
6.3 TRIALS

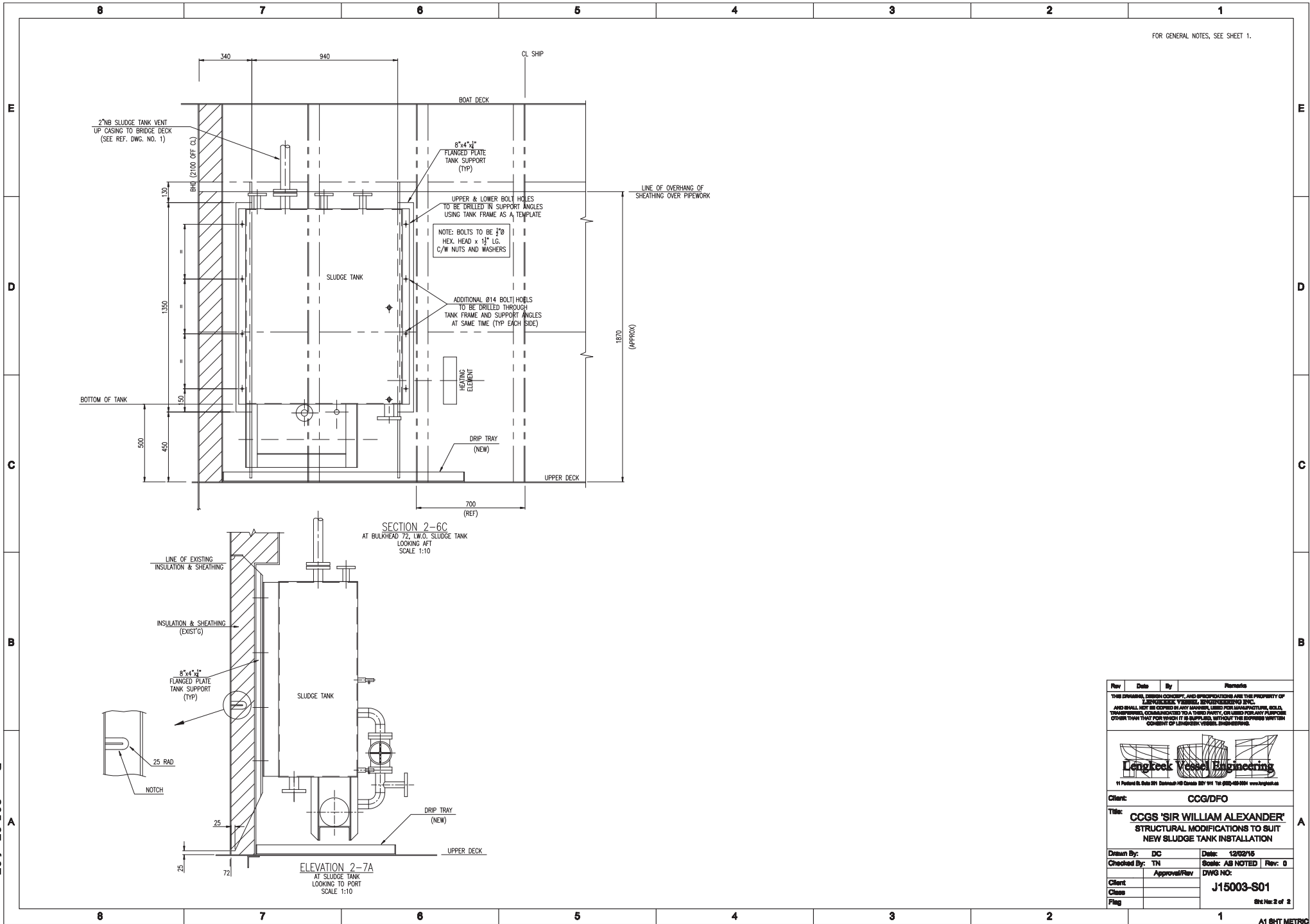
The sludge tank installation shall be tested and trialled to ensure correct installation and operation as per the tank manufacturer's recommendations.




Page 205-65 of 67



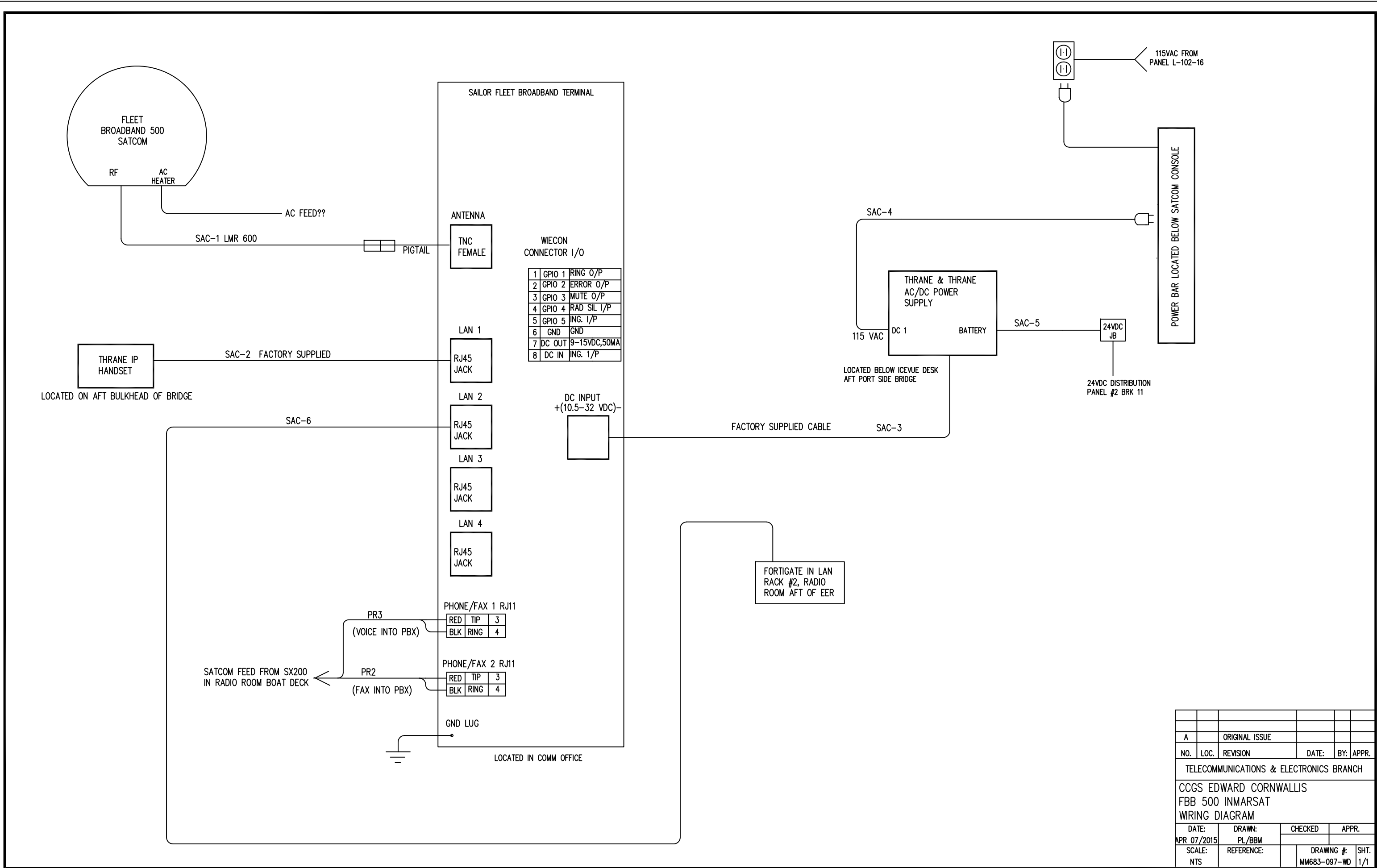




Rev	Date	By	Remarks
THIS DRAWING, DESIGN CONCEPT, AND SPECIFICATIONS ARE THE PROPERTY OF LENSENKEE VESSEL ENGINEERING INC. AND SHALL NOT BE COPIED, REPRODUCED, USED FOR MANUFACTURE, SOLD, TRANSMITTED, COMMUNICATED TO A THIRD PARTY, OR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED, WITHOUT THE EXPRESS WRITTEN CONSENT OF LENSENKEE VESSEL ENGINEERING.			
 11 Potters B. Bldg 6th Floor 100 Canada St. W. 1st Fl. 9th Floor 1000 W. 1st Fl.			
Client:			CCG/DFO
Title:			CCGS 'SIR WILLIAM ALEXANDER' STRUCTURAL MODIFICATIONS TO SUIT NEW SLUDGE TANK INSTALLATION
Drawn By:	DC	Date:	12/02/16
Checked By:	TH	Scale:	AS NOTED
Approval/Rev		DWG NO:	J15003-S01
Client			
Class			
Flag			
			Sheets 2 of 2

Appendix F

Fleet Broadband 500



A		ORIGINAL ISSUE			
NO.	LOC.	REVISION	DATE:	BY:	APPR.
TELECOMMUNICATIONS & ELECTRONICS BRANCH					
CCGS EDWARD CORNWALLIS					
FBB 500 INMARSAT					
WIRING DIAGRAM					
DATE:	DRAWN:	CHECKED	APPR.		
APR 07/2015	PL/BBM				
SCALE:	REFERENCE:	DRAWING #:		SHT.	
NTS		MM683-097-WD		1/1	

