

DFO-MPO

## STEAM GENERATORS RENEWAL

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F7049-16103 ANNEX A - MOD. 03

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## **1.0 GENERAL CONDITIONS AND REQUIREMENTS**

### **1.1 BACKGROUND**

- 1.1.1 The purpose of both Clayton steam generator replacement specification is to provide the necessary instructions, procedures, TCMS approved documentation and drawings to undertake the replacement aboard the CCGS Martha L. Black.
- 1.1.2 The contractor shall supply all equipment, tools, and man-power needed to:
- 1.1.2.1 Fabricate and install a temporary support and lifting structure,
  - 1.1.2.2 Remove equipment and piping to clear the steam generators platform,
  - 1.1.2.3 Proceed with the dismantling of both unit in the E/R,
  - 1.1.2.4 Remove from the ship the old steam generators and the obsolete dismantled parts
  - 1.1.2.5 If necessary, modify the generators beds in order to install the new ones.
  - 1.1.2.6 The new steam generators must be delivered at the contractor facilities by March 31<sup>st</sup> 2017, stored in a dry, heated space until their installation in August 2017. Insert the generators inside the ship and onto the generators beds.
  - 1.1.2.7 Proceed at the reassembling of both units in the E/R.
  - 1.1.2.8 Reconnect, and modify, if necessary, the piping and electrical cables for both steam generators
  - 1.1.2.9 Install the equipment and piping that was removed to clear the steam generators platform,
  - 1.1.2.10 Proceed with the described start-up and tests required by the manufacturer.
  - 1.1.2.11 A supplier FSR (Clayton or equivalent) will assist the contractor as needed to perform these unit installation requirements, with final installation, pre-test and start-up.
  - 1.1.2.12 The synchronisation of the steam generators transfer in and out of the vessel E/R is to be done while other important works will be done in the E/R.
- 1.1.3 The Engine room access is situated on the navigation deck, fwd of the funnel.

### **1.2 PARTICULARS & CAPACITIES**

- 1.2.1 Both Clayton steam generators to remove, are,
- EO-100, length 69" x width 49" x high 87", weight 3800 lbs;
  - EO-150, length 77" x width 55" x high 97", weight 5000 lbs;

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1.2.2

- Supply two (2) marine steam generators types to replace existing Clayton steam generators on Martha L Black Coast Guard vessel.
  - Clayton Generator Mod. Sigma fire SFO-100# S-1 or equivalent;
  - Capacity 100 BHP, 3,347 mbh output, 3450 lb/hr steam at 212F;
  - Operation fuel # 2 , MDO;
  - Design pressure 150 psi, 100 psi operating pressure;
  - Modular burner operation,
  - Self-sufficient with pressure air, water or fuel, there is no need for external pressurization system or booster pump;
  - Ready to be in service within 30 minutes after a cold start;
  - Equipped with a fan and burner with electric motor, 600V, 3 ph., 60hz;
  - Equipped with a steam separator with steam trap, thermometer and safety valves;
  - Safety control and operation with electrical/electronic components;
  - Independant feed pump with a variable speed drive control;`
  - The generators must use the main ship supply 600 volts, 3 phases, 60Hz;
  - Universal alarm group, self check IR scanner;
  - Certification/Approval of a marine classification society recognized such as Lloyd's, ABS, USCG, BV etc and provide original certificates; TC approval is not considered sufficient approval.
  - Maximum dimensions 83" long, 78" wide, 85" high;
  - Provide 3 paper copies of french/english textbooks, which includes the following sections : installation instructions, operation, maintenance and detailed spare parts lists;
  - The feed pumps, control panel and other accessories are independent of the generators, and can be arrange adequately in a modular organization.
  
- Supply one (1) spare steam coil with complete insulation (coil, shell and insulation assembly);

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### **1.3 RULES AND REGULATIONS**

Other regulations for this type of repair shall apply, including:

- ☐ Lloyds Register of Shipping
- ☐ TCMS Machinery Regulations

### **1.4 STRUCTURAL ANALYSIS**

If the new equipment is similar and lighter than the old ones, no analysis is required except at the lifting lug, if required.

If the new equipment is heavier than the old ones, the contractor must perform a structural analysis to confirm the existing structure can accept the load, including at the lifting lugs.

### **1.5 DRAWINGS**

Following drawings are attached

- ☐ Clayton, installation, dimensions R-12463
- ☐ General arrangement, forward engine room

### **1.6 TESTS**

- 1.6.1 The contractor must confirm lifting points have the SWL required.
- 1.6.2 The contractor must perform a hydrostatic test and in-service leak test on all piping temporarily removed and the new one.
- 1.6.3 The contractor shall perform all preparations required before running the steam generator pre-test as prescribed by the FSR and required by TCMS, and all required start-up running sequences established by the FSR and CCG.

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**1.7 GENERAL REPAIR FACILITY REQUIREMENTS**

- 1.7.1 The vessel is to be returned to pre-repair condition or better.
- 1.7.2 The Contractor shall be responsible for arranging the attendance of CCG inspection authority (IA) when and as required for survey and inspection items.
- 1.7.3 Asbestos Notice: There is no asbestos content in the equipment and piping to be removed.
- 1.7.4 Contractor shall ensure that the Engine room opening is fitted with temporary protection to prevent ingress of wind and rain.

**2.0 PROCEDURES FOR DISMANTLING AND REMOVAL**

**2.1 DISMANTLING**

- 2.1.1 Certain equipment and piping requires to be temporarily removed in order that to be able to replace the steam generators. Care is to be taken during removal and storage to minimize damage both to the equipment and the surrounding ship's systems and structure. Equipment removed is to be stored in the engine room and protected until re-installation. Open end of removed piping is to have robust end caps fitted to prevent the entry of foreign matter and dirt.
- 2.1.2 The contractor must confirm that work areas shall be certified gas-free and safe for hot work prior to the performance of any burning/welding activity.
- 2.1.3 When burning or welding at a compartment boundary, a fire watch is to be maintained in the adjacent compartment.
- 2.1.4 The contractor must confirm that all lifting and handling of equipment, piping and associated hardware is to be conducted using correct safety practices in accordance with CCG Fleet Safety Manual and the Repair Facilities Safety Program. All lifting and handling equipment is to be inspected and certified for the appropriate Safe Working Load (SWL) required. The use of ship's structure as an anchor to clamp or temporary fasten lifting gear is allowable provided due care is taken not to damage or to compromise the associated structure in any way. Any scarring or scratches to structure caused by the lifting gear is to be restored to original condition.

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| <b>WARNING</b> |
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- 2.1.5 Prior to commencement of work, the Contractor shall verify that circuit breakers and power sources associated with equipment affected by this steam generator specification are switched off, properly locked out and tagged “DO NOT SWITCH ON” for the duration of the removals and installations. CCG Fleet Safety Manual and the Repair Facilities Safety Program as applicable.

Prior to commencement of work, the Contractor shall verify that pipe system isolation valves associated with equipment temporarily removed and piping I.W.O. the ship’s side being temporarily removed are closed, properly locked out and tagged “DO NOT OPEN” for the duration of the removals and installations, . CCG Fleet Safety Manual and the Repair Facilities Safety Program as applicable.

- 2.1.6 The following equipment, piping and miscellaneous items are to be removed and temporarily stored or relocated to an area outside of the intended steam generator removal and re-installation route. NOTE: only major items have been listed, a ship visit is recommended to identify total scope.
- 2.1.7 The steam distribution piping and main stop valves above both units are to be temporarily removed to permit the removal of the generators.
- 2.1.8 Both steam generators are to be removed out of the vessel, and disposed by the contractor.

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The following photographs are provided for ease of identification of above items.  
Steam generator EO-100, starboard side



Steam generator EO-150, port side



Steam generators EO-100 and 150, forward view, above center DG



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## **2.2 LOCATION AND INSTALLATION**

### **2.2.1 INSTALLATION**

- 2.2.1 The contractor will supply the crane and other lifting tools to remove the old steam generator and transfer the new ones into the E/R on the platform. The new steam generators modules shall be partially dismantle in separate items (steam separator, frame, electric panel, feed pump, etc) to transfer them in place.
- 2.2.2 Both old Clayton steam generators are to be moved out and the new ones moved in to their platform. The supplier FSR will be required at this time to ensure the exact location of the generators and its auxiliary equipment. The FSR will make recommendation to reconnect all piping and electric cables. The contractor is to supply all new piping, fittings, and flexible, insulation cover and electric cables, from the closest junction box, to reconnect the new equipment and ensure the adequate performance of the units.
- 2.2.3 The new feed pumps are independent of the unit, and shall be installed on the port side of the platform, the existing equipment in this area is required (chemical treatment tank and sand box) to be moved and the existing platform to be modified to include the new pumps.
- 2.2.4 The dismantled, modified or new piping should be cleaned according to the quality control policy of the Contractor and a protective cover shall be installed at removal until re-installation.

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**2.3 REINSTALLATION OF EQUIPMENT AFTER TEMPORARY REMOVAL**

- 2.3.1 Upon re-installation of new steam generators, equipment, piping and cables temporarily removed are to be re-installed and the vessel returned to its pre-work period condition. The contractor shall supply new materials and install new gasket at any disturbed pipe flanged joints.
- 2.3.2 Prior to the application of paint, the surfaces are to be freed from rust, oil, moisture, ice, dust and other foreign substances.
- 2.3.3 Prior to the priming of sandblasted cleaned surfaces, all grit and dust shall be removed by brushing and pressure air jets. Paint all new and disturbed surfaces with two coat of white steel primer paint.
- 2.3.4 Re-apply reusable or new insulation to piping after successful hydrostatic and in-service leak test. The solid insulation material, 2" thick with cloth wrapping, for steam application up to 300C. Flanges and removable piping sections must have removable insulation blanket.
- 2.3.5 Upon completion of the re-installation procedure and prior to the performance of inspections, tests and trials, all debris, foreign materials and protective coverings shall be removed from the work area and the work area cleaned to the satisfaction of Fisheries and Oceans.

**2.4 REINSTALLATION OF EQUIPMENT AFTER TEMPORARY REMOVAL**

- 2.4.1 The Contractor shall visually inspect 100% of all welds. All defects shall be reported to the on-site CCG IA and repaired.
- 2.4.2 The removed pipe systems are to be hydro tested if any pipe welds have been dismantled for re-installation. Hydro test pressure to be in accordance with system functional design. An in-service leak test to be conducted on those systems which utilized flanged or threaded joints only for take down and re-installation.
- 2.4.3 The equipment reinstalled in Para 2.3 are to be functionally tested to the satisfaction of the CCG IA.
- 2.4.4 The contractor shall supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.
- 2.4.5 Before performing any trials and start-up procedure, the CCG staff will ensure that all valves are in working position, a 4 hour notice will be given by the contractor to the CCT.

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- 2.4.6 Contractor to include an FSR for the services of a Clayton FSR or equivalent for the duration of the contract, at the beginning to supervise the equipment positions and at the end to complete the start-up and trials

### **3.0 CERTIFIED WELDING PROCEDURES**

#### **3.1 GENERAL**

##### **3.1.1 Welding certification**

- a) For any work requiring fusion welding of steel, the contractor or its sub-contractors must hold certification from the Canadian Welding Bureau in accordance with subsection 2.1 of the most recent version of W47.1-03 standard of the Canadian Standards Association.
- b) For any work requiring fusion welding of steel, the contractor or its sub-contractors must hold certification from the Canadian Welding Bureau in accordance with subsection 16 of the most recent version of CSA\ACNOR AWS standard of the Canadian Standards Association.
- c) For any work requiring fusion welding of steel, the contractor or its sub-contractors must hold certification from the Canadian Welding Bureau in accordance with subsection 2.1 of the most recent version of W47.2 standard of the Canadian Standards Association.
- d) The contractor must provide the technical authority with documents clearly indicating the welding certification for all the employees who will perform all the welding work planned in this specification.

##### **3.1.2 All piping removed temporary or modified to reconnect to the new steam generators, its pumps and accessories, are to be fit as described below:**

- Existing flanged and threaded joints are to be used for disassembly to the maximum extent possible;
- Where pipes are cut out, cognizance of re-installation butt /socket welds and/or pipe couplings to be taken;
- All open ends of pipes are to be capped;
- Where pipes are removed by cutting out or burning, cognizance to be taken of re-installation requirements with respect to the location of butt or socket welds for pipe couplings.

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**Part 4: PROOF OF PERFORMANCE:**

**4.1 Inspection**

- 4.1.1. The chief-engineer and project manager will perform inspection and work approval as per CCG approved contractor test inspection plan.
- 4.1.2. The Contractor is to schedule and ensure all relevant required inspections are performed by Transport Canada/Marine Safety.

**Part 5: DELIVERABLES:**

- 5.1 The steam generators shall be test ran as per the manufacturer installation/performance manual and under the direction of the FSR and the requirement of TCMS.
- 5.2 The contractor will supply an FSR work report of the installation and performance, readings of all measurements taken during renewal, and reading of all trials 2 weeks after work acceptance. Report should include any recommendations and confirm that the whole installation is up to the manufacturer's standard.
- 5.3 TCMS steam generator (division 3) (lines 2K0100, 3KK180 et 3KK200 pour port and starboard) clearance should be given after commissioning.