Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Réception des soumissions - TPSGC / Bid Receiving - PWGSC
1550, Avenue d'Estimauville
1550, D'Estimauville Avenue
Québec
Québec
G1J 0C7

INVITATION TO TENDER
APPEL D'OFFRES

Tender To: Public Works and Government Services Canada

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

Soumission aux: Travaux Publics et Services Gouvernementaux Canada

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici et sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaires

Title - Sujet
Martha L. Black - Drydock 2018

Solicitation No. - N° de l'invitation F3012-18N014/B	**Date** 2018-07-26
Client Reference No. - N° de référence du client F3012-18N014	**GETS Ref. No. - N° de réf. de SEAG** PW-$QCL-037-17446
File No. - N° de dossier QCL-7-40338 (037)	**CCC No./N° CCC - FMS No./N° VME**

Solicitation Closes - L'invitation prend fin
at - à 02:00 PM
on - le 2018-08-14

Time Zone
Fuseau horaire
Heure Avancée de l'Est
HAE

F.O.B. - F.A.B.
Plant-Usine: ☐ **Destination:** ☑ **Other-Autre:** ☐

Address Enquiries to: - Adresser toutes questions à: Woods, Michael	**Buyer Id - Id de l'acheteur** qcl037
Telephone No. - N° de téléphone (418) 649-2715 ( )	**FAX No. - N° de FAX** (418) 648-2209

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:
Pêches et Océans
NGCC Martha L. Black
101 Boul Champlain
Att. C/E
QUEBEC
Québec
G1K7Y7
Canada

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Delivery Required - Livraison exigée Voir doc	**Delivery Offered - Livraison proposée**

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Telephone No. - N° de téléphone
Facsimile No. - N° de télécopieur

Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)
Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)

Signature **Date**

Issuing Office - Bureau de distribution
TPSGC/PWGSC
601-1550, Avenue d'Estimauville
Québec
Québec
G1J 0C7

Canada

This bid solicitation cancels and supersedes previous bid solicitation number **F3012-188N014/A** dated **2018-06-07** with a closing of **2018-07-12** at 14:00 Eastern Daylight Time (EDT). A debriefing or feedback session will be provided upon request to bidders/offerors/suppliers who bid on the previous solicitation.

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PART 1 - GENERAL INFORMATION

1.1 Introduction

The bid solicitation and resulting contract document is divided into seven parts plus annexes as follows:

Part 1 General Information: provides a general description of the requirement;

Part 2 Bidder Instructions: provides the instructions, clauses and conditions applicable to the bid solicitation and states that the Bidder agrees to be bound by the clauses and conditions contained in all parts of the bid solicitation;

Part 3 Bid Preparation Instructions: provides bidders with instructions on how to prepare their bid;

Part 4 Evaluation Procedures and Basis of Selection: indicates how the evaluation will be conducted, the evaluation criteria that must be addressed in the bid, if applicable, and the basis of selection;

Part 5 Certifications: includes the certifications to be provided;

Part 6 Security, Financial and Other Requirements: includes specific requirements that must be addressed by bidders; and

Part 7 Resulting Contract Clauses: includes the clauses and conditions that will apply to any resulting contract.

The Annexes include the Requirement, the Basis of Payment and other annexes.

1.2 Summary

(i) Requirement**:**

a) to carry out the docking and related work regarding the Canadian Coast Guard Ship (C.C.G.S.) Martha L. Black in accordance with the associated Technical Statement of Requirement attached as Annex A and all related drawings.

b) to carry out any approved unscheduled work not covered in paragraph a) above.

(ii) As per the Integrity Provisions under section 01 of Standard In*structions* 2003, bidders must provide a list of all owners and/or Directors and other associated information as required*.* Refer to section 4.21 of the *Supply Manual* for additional information on the Integrity Provisions*.*

(iii) The requirement is exempt from the provisions of the World Trade Organization Agreement on Government Procurement (WTO-AGP), Annex 4 and the North American Free Trade Agreement (NAFTA), Chapter Ten Annex 1001.2b Paragraph 1, however, it is subject to the Canadian Free Trade Agreement (CFTA) and will be limited to suppliers in Eastern Canada in accordance with Shipbuilding, Refit, Repair and Modernization Policy (1996-12-19).

PART 2 - BIDDER INSTRUCTIONS

2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the *Standard Acquisition Clauses and Conditions Manual* (https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The 2003 (2017-04-27) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

2.2 Submission of Bids

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

2.3 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than **seven (7) *calendar days*** before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a "proprietary" nature must be clearly marked "proprietary" at each relevant item. Items identified as proprietary will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that the Bidder do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

2.4 Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the Province of _____ .

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the bidders.

2.5 Bidders' Conference – Vessel

No bidders' conference is scheduled.

2.6 Viewing – Vessel

No visit of the vessel is scheduled.

2.7 Work Period – Marine - Bid

Work must commence and be completed as follows:

Start: August 27, 2018, or as per ship availability (at the earliest date)
End: November 05, 2018, or seventy (70) days after ship availability (at the earliest date)

The Bidder agrees through submission of its response to the bid solicitation that the above time frame provides an adequate period to perform the subject work and absorb a reasonable amount of unscheduled work; and further, that they have sufficient material and human resources allocated or available to complete the subject work and a reasonable amount of unscheduled work within the Work period.

2.8 Docking Facility

Before award of Contract, the successful Bidder may be required to demonstrate to the satisfaction of Canada that the certified capacity of the dry docking facility to be used for the work is adequate for the anticipated loading as specified in the related dry docking plans and other documents. The successful Bidder will be notified in writing and be allowed a reasonable period of time to provide detailed keel block load distribution sketches and blocking stability considerations, along with the supporting calculations to clearly show the adequacy of the proposed docking arrangement.

Upon written request from the Contracting Authority, the Bidder must provide current (providing there is no end date on the certificate submitted, then it is to have been issued within the past two years) and valid certification of the capacity and condition of the docking facility to be used for the Work.

Although a dry docking facility may have a total capacity greater than the vessel to be docked, the weight distribution of the vessel may cause individual block loading to be exceeded. Also, while the physical dimensions of a *dry docking facility* may indicate acceptability for docking of a specific vessel, other limitations such as spacing of rails on a marine railway, concrete piers of abutments adjoining the dry dock may, in fact, preclude the facility from being considered as a possible dry docking site.

2.9 List of Proposed Sub-contractors

If the bid includes the use of subcontractors, the Bidder agrees, upon written request from the Contracting Authority, to provide a list of all subcontractors including a description of the things to be purchased, a description of the work to be performed by specification section and the location of the performance of that work. The list should not include the purchase of off-the-shelf items, software and such standard articles and materials as are ordinarily produced by manufacturers in the normal course of business, or the provision of such incidental services as might ordinarily be subcontracted in performing the Work, i.e. subcontract work valued at less than $5000.00

2.10 Quality Plan - Solicitation

Upon written request from the Contracting Authority, the Bidder shall provide an example of its Quality Plans applied to similar former projects. The Plan must be in the same format that will be used after award of contract.

2.11 Inspection and Test Plan

Upon written request from the Contracting Authority, the Bidder may be required to provide an example of its Inspection Plans for each item of the specifications.

2.12 Vessel Refit, Repair or Docking - Cost

All charges, fees expenses and disbursements incidental to the carrying out of the Work, including all items described in Supplemental General Conditions 1029 (2010-08-16) Ship Repair, section (07), are included in the Evaluation Price (and in the Contract Price under the Contract), including, without limitation:

1. **Services:** include all costs for ship services such as water, steam, electricity, etc., required for vessel maintenance for the duration of the Contract.

2. **Docking and Undocking includes**:

   (a) all costs resulting from dry docking, wharfage, security, shoring, shifting and/or moving of the vessel within the successful Bidder's facility;

   (b) the cost of services to tie up the vessel alongside and to cast off.

   Unless specified otherwise, the vessel will be delivered by Canada to the successful Bidder's facility alongside a mutually agreed safe transfer point, afloat and upright, and the successful Bidder will do the same when the Work is completed. The cost of services to tie up the vessel alongside and to cast off is included in the Evaluation Price

3. **Field Service Representatives/Supervisory Services:** include all costs for field service representatives/supervisory services including manufacturers' representatives, engineers, etc.

4. **Removals**: include all costs for removals necessary to carry out the Work and will be the responsibility of the successful Bidder whether or not they are identified in the specifications, except those removals not apparent when viewing the vessel or examining the drawings. The successful Bidder will also be responsible for safe storage of removed items and reinstalling them on completion of the Work. The successful Bidder will be responsible for renewal of components damaged during removal.

5. **Sheltering, Staging, Cranage and Transportation:** include the cost of all sheltering, staging including handrails, cranage and transportation to carry out the Work as specified.

   The successful Bidder will be responsible for the cost of any necessary modification of these facilities to meet applicable safety regulations.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

3.1.1 Canada requests that bidders provide their bid in separately bound sections as follows:

Section I: Management Bid (**1** hard copy)
Section II: Financial Bid (**1** hard copy)
Section III: Certifications Requirements (**1** hard copy)

Prices must appear in the financial bid only (Annex I) and Appendix 1 to Annex I. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of their bid:

(a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
(b) use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process Policy on Green Procurement (http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html). To assist Canada in reaching its objectives, bidders are encouraged to :

1) use paper containing fibre certified as originating from a sustainably-managed forest and/or containing minimum 30% recycled content; and

2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

Section I: Management Bid

The Management Bid should be concise and should include all the certifications and other requirements as noted in Parts 4 and 6.

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Financial Bid Presentation Sheet Annex I and the detailed Pricing Data Sheet, Appendix 1 to Annex I. The total amount of applicable taxes is to be shown separately, if applicable.

Section III: Certification Requirements

Bidders must submit the certifications required under Part 5.

3.1.2 Unscheduled Work and Evaluation Price

In any vessel refit, repair or docking contract, unscheduled work will arise after the vessel and its equipment is opened up and surveyed. The anticipated cost of the Work will be included in the evaluation of bids. The overall total cost will be calculated by including an estimated amount of additional personhours (and/or material) multiplied by a firm hourly charge-out labour rate and is added to the firm price for the Work.

The overall total referred to as the "Evaluation Price" will be used for evaluating the bids. The estimated work will be based on historical experience and there is no minimum or maximum amount of unscheduled work nor is there a guarantee of such work.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

4.1 Evaluation Procedures

(a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical, management and financial evaluation criteria specified below.

(b) An evaluation team composed of representatives of Canada will evaluate the bids.

4.1.1 Financial Bid

Bidders must submit their financial bid in accordance with the Financial Bid Presentation Sheet Annex “I” and the detailed Pricing Data Sheet, Appendix 1 to Annex “I”. The total amount of Goods and Services Tax or Harmonized Sales Tax is to be shown separately, if applicable.

4.1.1.1 Unscheduled Work and Evaluation Price

In any vessel refit, repair or docking contract, unscheduled work will arise after the vessel and its equipment is opened up and surveyed. The anticipated cost of the Work will be included in the evaluation of bids. The overall total cost will be calculated by including an estimated amount of additional person-hours (and/or material) multiplied by a firm hourly charge-out labour rate and is added to the firm price for the Work.

The overall total referred to as the "Evaluation Price" will be used for evaluating the bids. The estimated work will be based on historical experience and there is no minimum or maximum amount of unscheduled work nor is there a guarantee of such work.

4.1.2 Mandatory Requirements

Bids will be assessed in accordance with the entire requirement of the bid solicitation including compliance with the mandatory certifications and table of deliverable requirements as detailed in Parts 2, 4, 5 and 6. Only those bids which are found to meet all the mandatory requirements within the specified time frames will be deemed responsive.

4.1.3 Table of Mandatory Requirements to be met by bid closing

Notwithstanding deliverable requirements specified anywhere else within this solicitation and its associated Technical Specification, the following are the only mandatory deliverables that must be submitted with the Bid at the time of bid closing. The following are mandatory and the Bidder must be compliant on each item to be considered responsive.

Item	Description	Completed and attached
1	Completed Annex “I” Financial Bid presentation Sheet;	
2	Completed Appendix 1 to Annex “I” Price per item sheet;	
3	Information regarding Financial Security as per Part 6 Article 6.2.2	
4	Letter or proof of Insurance as per article 6.13 of Part 6;	
5	Annex “K” – Equivalent products data sheet and other	

4.1.4 Other information upon request only

The following information, which supports the bid, may be requested by the Contracting Authority from the bidder and it must be provided within **two (2)** working days of the written request:

Item	Description	Completed and attached	To be forwarded if requested by the CA
1	Current and valid certification of the capacity and condition of the docking facility, as per clause 2.8 of Part 2;		Prior to contract award
2	Examples of quality and inspections plans, as per articles 2.10 and 2.11		Prior to contract award
3	Financial Capability and information, as per article 6.2.1		Prior to contract award
4	Proof of good standing with Worker's Compensation Board as per clause 6.6 of Part 6;		Prior to contract award
5	Proof of welding certification, as per clause 6.7 of Part 6;		Prior to contract award
6	Proof of valid Labor Agreement or similar instrument covering the work period as per clause 6.8 of Part 6;		Prior to contract award
7	ISO Registration Certificate or Quality Assurance Documentation, as per article 11 of Part 6		Prior to contract award
8	Environment Protection as per article 6.12 Part 6		Prior to contract award
9	List of Proposed Sub-contractors		Prior to contract award
10	Annex "J" – Pricing Data Sheets		Prior to contract award
11	Supply a plan of the dry dock		Prior to contract award
12	Supply all information as per Annex A, Item 16.1.C.1.12		Prior to contract award

4.1.5 Deliverables after Contract award

Item	Description	Must be supplied after contract award, within
1	Insurance Requirements as per article 7.11, Part 7;	5 calendar days
2	Work Schedule and reports as per item 7.16, Part 7.	5 calendar days

4.2 Basis of Selection

A bid must comply with the requirements of the bid solicitation and meet all mandatory evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price will be recommended for award of a contract.

4.2.1 Equivalent Products

SACC Manual Clause B3000T (2006-06-16) Equivalent Products

4.3 Public Bid Opening

A public bid opening will be held in Public Works and Government Services Canada, 601-1550, D'Estimauville Ave., Québec, Qc at 02:00 PM (EDT) on the date show at the first page.

Following solicitation closing, bid results may be obtained by calling at No. (418) 649-2888.

PART 5 - CERTIFICATIONS

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Unless specified otherwise, Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid**.**

5.1.1 Integrity Provisions - Declaration of Convicted Offences

In accordance with the Ineligibility and Suspension Policy (http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html), the Bidder must provide with its bid the required documentation, as applicable, to be given further consideration in the procurement process.

5.2 Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be submitted with the bid, but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame provided will render the bid non-responsive.

5.2.1 Integrity Provisions – Required Documentation

In accordance with the Ineligibility and Suspension Policy (http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

5.2.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the Employment and Social Development Canada (ESDC) - Labour's website (http://www.esdc.gc.ca/en/jobs/workplace/human_rights/employment_equity/federal_contractor_program.page?&_ga=1.229006812.1158694905.1413548969).

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

PART 6 - SECURITY, FINANCIAL AND OTHER REQUIREMENTS

6.1 Security Requirement *(Not used)*

6.2 Financial Requirements

6.2.1 Financial Capability

1. Financial Capability Requirement: The Bidder must have the financial capability to undertake this requirement. To determine the Bidder's financial capability, the Contracting Authority may, by written notice to the Bidder, require the submission of some or all of the financial information detailed below during the evaluation of bids. The Bidder must provide the following information to the Contracting Authority within two (2) working days of the request or as specified by the Contracting Authority in the notice:

   (a) Audited financial statements, if available, or the unaudited financial statements (prepared by the Bidder's outside accounting firm, if available, or prepared in-house if no external statements have been prepared) for the Bidder's last three fiscal years, or for the years that the Bidder has been in business if this is less than three years (including, as a minimum, the Balance Sheet, the Statement of Retained Earnings, the Income Statement and any notes to the statements).

   (b) If the date of the financial statements is more than five months before the date of the request for information by the Contracting Authority in (a) above, the Bidder must also provide the last quarterly financial statements (consisting of a Balance Sheet and a year-to-date Income Statement) as of two months before the date on which the Contracting Authority requests the information.

   (c) If the Bidder has not been in business for at least one full fiscal year, the following must be provided:

      (i) the opening Balance Sheet on commencement of business (in the case of a corporation, the date of incorporation); and

      (ii) the last quarterly financial statements (consisting of a Balance Sheet and a year-to-date Income Statement) as of two months before to the date on which the Contracting Authority requests the information.

   (d) A certification from the Chief Financial Officer or an authorized signing officer of the Bidder that the financial information provided is complete and accurate.

   (e) A confirmation letter from all of the financial institution(s) that have provided short-term financing to the Bidder outlining the total of lines of credit granted to the Bidder and the amount of credit that remains available and not drawn upon as of one month prior to the date on which the Contracting Authority requests this information.

(f) A detailed monthly Cash Flow Statement, covering all the Bidder's activities (including the requirement) for the first two years of the requirement that is the subject of the bid solicitation. This statement must detail the Bidder's major sources and amounts of cash and the major items of cash expenditures on a monthly basis, for all the Bidder's activities. All assumptions made should be explained as well as details of how cash shortfalls will be financed.

(g) A detailed monthly Project Cash Flow Statement covering the first two years of the requirement that is the subject of the bid solicitation. This statement must detail the Bidder's major sources and amounts of cash and the major items of cash expenditures, for the requirement, on a monthly basis. All assumptions made should be explained as well as details of how cash shortfalls will be financed.

2. If the Bidder is a joint venture, the financial information required by the Contracting Authority must be provided by each member of the joint venture.

3. If the Bidder is a subsidiary of another company, then any financial information required by the Contracting Authority in 1. (a) to (f) must be provided by each level of parent company, to and including the ultimate parent company. Provision of parent company financial information does not satisfy the requirement for the provision of the financial information of the Bidder and the financial capability of a parent cannot be substituted for the financial capability of the Bidder itself, unless a duly executed Parental Guarantee is provided with the required information.

4. **Other Information**: Canada reserves the right to request from the Bidder any other information that Canada requires to conduct a complete financial capability assessment of the Bidder.

5. **Confidentiality**: Should the Bidder provide the information required above to Canada in confidence while indicating that the disclosed information is confidential, then Canada will treat the information in a confidential manner as permitted by the *Access to Information Act*, R.S., 1985, c. A-1, Section 20(1) (b) and (c).

6. **Security**: In determining the Bidder's financial capability to undertake this requirement, Canada may consider any security the Bidder is capable of providing, at the Bidder's sole expense (for example, an irrevocable letter of credit from a registered financial institution drawn in favour of Canada, a performance guarantee from a third party or some other form of security, as determined by Canada).

6.2.2 Contract Financial Security

1. Bidders must specify in their bid, which of the following 2 types of Financial Security they will provide: EITHER

(a) a performance bond (form PWGSC-TPSGC 505) and a labour and material payment bond (form PWGSC-TPSGC 506), each in the amount of 20 percent of the contract price for the Known Work.

Any bond must be issued by one of the bonding companies whose bonds are accepted as security by the government of Canada and which are listed in Treasury Board Contracting Policy, Appendix L, Acceptable BondingCompanies (http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/contracting/contractingpol_l_e.asp). The bond forms mentioned in (a) above are available at: http://www.tpsgc-pwgsc.gc.ca/acquisitions/text/forms/forms-e.html

OR

(b) a security deposit (government guaranteed bonds, bills of exchange, irrevocable standby letters of credit, certified cheque) to the value of 10 percent of the contract price.

2. Security deposits in the form of government guaranteed bonds with coupons attached will be accepted only if all coupons that are unmatured, at the time the security deposit is provided, are attached to the bonds. The Contractor must provide written instructions concerning the action to be taken with respect to coupons that will mature while the bonds are pledged as security, when such coupons are in excess of the security deposit requirement.

3. The cost to the Bidder of the Contract Financial Security is to be indicated in Annex “I”.

4. If the Bid is accepted, the Bidder shall be required to provide the Contract Financial Security within five (5) calendar days of Contract Award, or prior to Contract award if Canada so specifies.

5. If, for any reason, Canada does not receive, within the specified period, the required Contract Financial Security, Canada may terminate the Contract if it has been awarded, may accept another offer, seek new bids, negotiate a contract or not accept any bids, as Canada may deem advisable. Canada may, in its absolute discretion, require the successful bidder to deliver the Contract Financial Security described herein before Contract award, and in that event may not award a Contract prior to delivery by the bidder of the Contract Financial Security.

6.2.3 Security Deposit Definition

1. "security deposit" means

(a) a bill of exchange that is payable to the Receiver General for Canada and certified by an approved financial institution or drawn by an approved financial institution on itself; or
(b) a government guaranteed bond; or
(c) an irrevocable standby letter of credit, or
(c) such other security as may be considered appropriate by the Contracting Authority and approved by Treasury Board;

2. "approved financial institution" means

(a) any corporation or institution that is a member of the Canadian Payments Association;
(b) a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the "Régie de l'assurance-dépôts du Québec" to the maximum permitted by law;
(c) a credit union as defined in paragraph 137(6) of the Income Tax Act;
(d) a corporation that accepts deposits from the public, if repayment of the deposits is guaranteed by a Canadian province or territory; or
(e) the Canada Post Corporation.

3. "government guaranteed bond" means a bond of the Government of Canada or a bond unconditionally guaranteed as to principal and interest by the Government of Canada that is:

   (a) payable to bearer;
   (b) accompanied by a duly executed instrument of transfer of the bond to the Receiver General for Canada in accordance with the Domestic Bonds of Canada Regulations;
   (c) registered in the name of the Receiver General for Canada.

4. "irrevocable standby letter of credit"

   (a) means any arrangement, however named or described, whereby a financial institution (the "Issuer"), acting at the request and on the instructions of a customer (the "Applicant"), or on its behalf,

      i. will make a payment to or to the order of Canada, as the beneficiary;

      ii. will accept and pay bills of exchange drawn by Canada;

      iii. authorizes another financial institution to effect such payment, or accept and pay such bills of exchange; or

      iv. authorizes another financial institution to negotiate, against written demand(s) for payment, provided that the conditions of the letter of credit are complied with.

   (b) must state the face amount which may be drawn against it;
   (c) must state its expiry date;
   (d) must provide for sight payment to the Receiver General for Canada by way of the financial institution's draft against presentation of a written demand for payment signed by the authorized departmental representative identified in the letter of credit by hisher office;
   (e) must provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face amount of the letter of credit;
   (f) must provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice (UCP) for Documentary Credits, 2007 Revision, ICC Publication No. 600. Pursuant to the ICC UCP, a credit is irrevocable even if there is no indication to that effect; and
   (g) must be issued (Issuer) or confirmed (Confirmer), in either official language, by a financial institution that is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.

6.3 Accommodation

Bidder shall be responsible to provide accommodation in accordance with item 2 of the Technical Statement of Requirement of Annex A for the duration of the Contract.

6.4 Parking

Bidder shall be responsible to provide parking and services in accordance with item 2 of the Technical Statement of Requirement of Annex A for the duration of the Contract.

6.5 Material and Supply Support *(Not used)*

6.6 Workers' Compensation - Letter of Good Standing

It is mandatory that the Bidder has an account in good standing with the Provincial Workers Compensation Board/Commission.

Upon written request from the Contracting Authority, the Bidder must submit a certificate or Letter of Good Standing from the applicable Workers Compensation Board/Commission. Failure to provide this information will render the bid non responsive.

6.7 Welding Certification

Welding must only be undertaken by a company Certified by the Canadian Welding Bureau (CWB) to the requirements of the following Canadian Standards Association (CSA) standards:

(a) CSA W47.1, Certification of Companies for Fusion Welding of Steel, section 2;
(b) CSA W59, Welded steel construction (metal arc welding); and

In addition, welding must be done in accordance with the requirements of the applicable drawings and specifications.

Before the commencement of any fabrication work, and upon request from the Inspection Authority, the Contractor must provide approved welding procedures and/or a list of welding personnel intended to be used in the completion of the work. The list must identify the CWB welding procedure qualifications attained by each of the personnel listed and must be accompanied by a copy of each person's current CWB welding certification.

6.8 Valid Labour Agreement

If the Bidder has a labour agreement, or other suitable instrument, in place with its unionized labour or workforce, it must be valid for the proposed period of any resulting contract.

Upon written request from the Contracting Authority, the Bidder must provide evidence of that agreement or other suitable instrument.

6.9 Work Schedule and Reports *(Not used)*

6.10 Supervision of Fueling and Disembarking Fuel

SACC Manual Clause A9056C (2008-05-12) Supervision of Fueling and Disembarking Fuel

6.11 ISO 9001:2008 - Quality Management Systems

Upon written request from the Contracting Authority, the Bidder must provide its current ISO Registration Documentation indicating its registration to ISO 9001:2008.

Documentation and procedures of bidders not registered to the ISO standards may be subject to a Quality System Evaluation (QSE) by the Inspection Authority before award of a contract.

6.12 Environmental Protection

Upon written request from the Contracting Authority, the Bidder must submit details of its environmental emergency response plans, waste management procedures and/or formal environmental training undertaken by its employees.

6.13 Insurances Requirements

At bids closing date the Bidder must provide a letter from an insurance broker or an insurance company licensed to operate in Canada stating that the Bidder, if awarded a contract as a result of the bid solicitation, can be insured in accordance with the Insurance Requirements specified in Annex "C".

PART 7 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

1. Requirement

The contractor must:

a) to carry out the docking and related Work regarding the Canadian Coast Guard Ship (C.C.G.S.) Martha L. Black in accordance with the associated Technical Specifications attached as Annex A and all related drawings.

b) carry out any approved unscheduled work not covered in paragraph **a**) above.

2. Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the *Standard Acquisition Clauses and Conditions Manual*(https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) issued by Public Works and Government Services Canada.

2.1 General Conditions

2030, (2016-04-04), General Conditions - Higher Complexity - Goods, apply to and form part of the Contract. (except for paragraph 26 "*Liability*" which is deleted in its entirety and replace by the item 7.42 below).

Paragraph 22 "Warranty" of 2030, General Conditions – Higher Complexity – Goods, is amended in the Annex " E " - Warranty.

2.2 Supplemental General Conditions

From beginning to end of work:

Unmanned ship:

1029 (2010-08-16) Ship Repairs, excluding section 08 apply to and form part of the Contract.

On required basis only:

Manned ship:

1029 (2010-08-16) Ship Repairs, excluding section 09 apply to and form part of the Contract.

3. Security Requirement

There is no security requirement associated with this Statement of Work

4. Term of Contract

The contract period is from Contract award date until the end of the warranty period inclusively.

4.1. Work Period – Marine – Contract

Work must commence and be completed as follows:

Start: August 27, 2018, or as per ship availability (at the earliest date)
End: November 05, 2018, or seventy (70) days after ship availability (at the earliest date)

The Contractor agrees that the above time frame provides an adequate period to perform the subject work and absorb a reasonable amount of unscheduled work; and further, that it has sufficient material and human resources allocated or available to complete the subject work and a reasonable amount of unscheduled work within the Work Period.

5. Authorities

5.1 Contracting Authority

The Contracting Authority for the Contract is:

Michael Woods
Marine Supply Chief
Public Works and Government Services Canada
Québec area – Marine division
1550, avenue D'Estimauville, Québec, (Québec) G1J 0C4,
Quebec, Canada

michael.woods@tpsgc-pwgsc.gc.ca
Phone: (418) 649-2715
Fax: (418) 648-2209

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

5.2 Technical Authority (Will be filled in at contract award)

The Technical Authority for the Contract is:
Name: _____
Title: _____
Telephone: _____
Facsimile: _____
E-mail address: _____

The Technical Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Technical Authority; however, the Technical Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

5.3 Inspection Authority/Inspector

The Inspection Authority for the Contract is:

Same as paragraph 5.2 above.

The Inspection Authority is the representative of the department or agency for whom the Work is being performed under the Contract and is responsible for inspection of the Work and acceptance of the finished work. The Inspection Authority may be represented on-site by a designated inspector and any other Government of Canada inspector who may from time to time be assigned in support of the designated Inspector.

6. Payment

6.1 Basis of Payment - Firm Price

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid the firm price indicated in Annex B. Goods and Services Tax or Harmonized Sales Tax is extra, if applicable. Payment for unscheduled work will be done in accordance with Basis of Payment outlined at Annex B.

6.2 Payment Terms - Progress Payments

1. Canada will make progress payments in accordance with the payment provisions of the Contract, no more than once a month, for cost incurred in the performance of the Work, up to 90 percent of the amount claimed and approved by Canada if:

   (a) an accurate and complete claim for payment using form PWGSC-TPSGC 1111, Claim for Progress Payment, and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;

   (b) the amount claimed is in accordance with the basis of payment;

   (c) the total amount for all progress payments paid by Canada does not exceed 90 percent of the total amount to be paid under the Contract;

   (d) all certificates appearing on form PWGSC-TPSGC 1111 have been signed by the respective authorized representatives.

2. The balance of the amount payable will be paid in accordance with the payment provisions of the Contract upon completion and delivery of all work required under the Contract if the Work has been accepted by Canada and a final claim for the payment is submitted.

3. Progress payments are interim payments only. Canada may conduct a government audit and interim time and cost verifications and reserves the rights to make adjustments to the Contract from time to time during the performance of the Work. Any overpayment resulting from progress payments or otherwise must be refunded promptly to Canada.

6.3 Method of Payment

SACC Manual Clause	C6000C (2017-08-17)	Limitation of Price
SACC Manual Clause	H4500C (2010-01-11)	Lien - Section 427 of the Bank Act

7. Invoicing Instructions

7.1 Invoicing Instructions - Progress Payment Claim

The Contractor must submit invoices that contain the information required by the General Conditions 2030(2016-04-04) Part 13.

7.2 Invoicing

Invoice to be made to the name of:
DFO.invoicing-facturation.MPO@canada.ca

Write the name of the contact person:
[redacted]

Electronic Copy to be sent for verification to: michael.woods@tpsgc-pwgsc.gc.ca

7.3 Warranty Holdback

A warranty holdback of **10%** of the total contract price as last amended (applicable taxes excluded) will be applied to the final claim for payment. This holdback will be payable by Canada upon the expiry of the 90 day warranty period(s) applicable to the work. Applicable taxes are to be calculated and paid on the total amount of the claim before the 10% holdback is applied. At the time that the holdback is released, there will be no applicable taxes payable, as it was included in previous payments.

8. Certifications

8.1 Compliance with the certifications provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the entire contract period. If the Contractor does not comply with any certification or it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

9. Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in _____.

10. Priority of Documents

If there is a discrepancy between the wordings of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

a) the Articles of Agreement;
b) the Supplemental General Conditions 1029, (2010-08-16), Ship Repairs;
c) the General Conditions 2030, (2016-04-04), General Conditions - Higher Complexity - Goods
d) Annex A, Requirement;
e) Annex B, Basis of Payment;
f) Annex C, Insurance Requirements;
g) Annex D, Inspection/Quality Assurance/Quality Control;
h) Annex E, Warranty;
i) Annex F, Vessel Custody
j) the Contractor's bid dated _____

11. Insurance Requirements

The Contractor must comply with the insurance requirements specified in Annex C. The Contractor must maintain the required insurance coverage for the duration of the Contract. Compliance with the insurance requirements will not release the Contractor from or reduce its liability under the Contract.

The Contractor is responsible to decide if additional insurance coverage is necessary to fulfill its obligation under the Contract and to ensure compliance with any applicable law. Any additional insurance coverage will be at the Contractor's expense, and for its own benefit and protection.

The Contractor must forward to the Contracting Authority within **five (5)** calendar days after the date of award of the Contract a Certificate of Insurance including details of the insurance coverage, exclusions, deductibles and conditions and confirming that the insurance policy complying with the requirements is in force. The Contractor must, if requested by the Contracting Authority, forward to Canada a certified true copy of all applicable insurance policies.

12. Financial Security

12.1 Contract Financial Security

1. The Contractor must provide one of the following contract financial securities within five (5) calendar days after the date of contract award:

   (a) a performance bond (form PWGSC-TPSGC 505) and a labour and material payment bond (form PWGSC-TPSGC 506), each in the amount of 20 percent of the Contract Price for the Known Work; or
   (b) a security deposit as defined in clause E0008C in the amount of 10 percent of the Contract Price for the Known Work.

   Any bond must be issued by by one of the bonding companies listed in Treasury Board Contracting Policy, Appendix L, Acceptable Bonding Companies, at the following web address: http://www.tbs-sct.gc.ca/pubs_pol/dcgpubs/contracting/contractingpol_l_e.asp

2. Security deposits in the form of government guaranteed bonds with coupons attached will be accepted only if all coupons that are unmatured, at the time the security deposit is provided, are attached to the bonds. The Contractor must provide written instructions concerning the action to be taken with respect to coupons that will mature while the bonds are pledged as security, when such coupons are in excess of the security deposit requirement.

3. If Canada does not receive the required financial security within the specified period, Canada may terminate the Contract for default pursuant to the Contract default provision.

12.2 Clause of SACC manual

SACC Manual E0008C (2014-09-25) Security Deposit Definition

13. Accommodation

Contractor shall be responsible to provide accommodation in accordance with the Technical Statement of Requirement of Annex A for the duration of the Contract.

14. Parking

Bidder shall be responsible to provide parking spots and services in accordance with the technical Statement of Requirement of Annex A for the duration of the Contract.

15. Sub-contracts and Sub-contractor List

The Contracting Authority is to be notified, in writing, of any changes to the list of subcontractors before commencing the work.

When the Contractor sub-contracts work, a copy of the sub-contract purchase order is to be passed to the Contracting Authority. In addition, the Contractor must monitor progress of sub-contracted work and inform the Inspection Authority on pertinent stages of work to permit inspection when considered necessary the Inspection Authority.

16. Work Schedule and Reports

No later than **five (5)** calendar days after contract award, the preliminary schedule must be revised and expanded as necessary and resubmitted before commencement of the Work.

The Contractor must provide a detailed work schedule showing the commencement and completion dates for the Work in the available work period, including realistic target dates for significant events. During the Work Period the schedule is to be reviewed on an ongoing basis by the Inspection Authority and the Contractor, updated when necessary, and available in the Contractor's office for review by Canada's authorities to determine the progress of the Work.

Production work schedules must be revised and resubmitted before each Progress Meeting. The revised schedules must show the effect of progressed work and approved work arisings. Changes in scheduled completion dates due to unscheduled work will not be accepted except as negotiated under Design Change or Additional Work, Article 26.

17. Insulation Materials - Asbestos Free

All materials used to insulate or re-insulate any surfaces on board the vessel must meet Transport Canada Marine standards, for commercial marine work, and, for all work, be free from asbestos in any form. The Contractor must ensure that all machinery and equipment located below or adjacent to surfaces to be re-insulated are adequately covered and protected before removing existing insulation.

18. Loan of Equipment - Marine

The Contractor may apply for the loan of the Government special tools and test equipment particular to the subject vessel as identified in the Specifications. The provision of other equipment required for the execution of work in the Specifications is the sole responsibility of the Contractor.

Equipment loaned under this provision must be used only for work under this Contract and may be subject to demurrage charges if not returned on the date required by Canada. In addition, equipment loaned under the above provision must be returned in a like condition, subject to normal wear and tear.

A list of Government equipment that the Contractor intends to request must be submitted to the Contracting Authority within ten (10) calendar days of Contract Award to permit timely supply or for alternate arrangements to be made. The request must state the time frame for which the equipment is required.

19. Trade Qualifications

The Contractor must use qualified, certificated **(**if applicable) and competent trades people and supervision to ensure a uniform high level of workmanship. The Inspection Authority may request to view and record details of the certification and/or qualifications held by the Contractor’s trades’ people. This request should not be unduly exercised but only to ensure qualified trades people are on the job

20. Material and Supply Support *(Not used)*

21. ISO 9001:2008 - Quality Management Systems

21.1 In the performance of the Work described in the Contract, the Contractor must comply with the requirements of:

ISO 9001:2008 - Quality management systems - Requirements, published by the International Organization for Standardization (ISO), current edition at date of submission of the Contractor's bid with the exclusion of the following requirement: 7.3 Design and development.

It is not the intent of this clause to require that the Contractor be registered to the applicable standard; however, the Contractor's quality management system must address each requirement contained in the standard.

21.2 Assistance for Government Quality Assurance (GQA):

The Contractor must provide the Inspection Authority with the accommodation and facilities required for the proper accomplishment of GQA and must provide any assistance required by the Inspection Authority for evaluation, verification, validation, documentation or release of product.

The Inspection Authority must have the right of access to any area of the Contractor's or Subcontractor's facilities where any part of the Work is being performed. The Inspection Authority must be afforded unrestricted opportunity to evaluate and verify Contractor conformity with Quality System procedures and to validate product conformity with contract requirements. The Contractor must make available, for reasonable use by the Inspection Authority, the equipment necessary for all validation purposes. Contractor personnel must be made available for operation of such equipment as required.

When the Inspection Authority determines that GQA is required at a subcontractor's facilities, the Contractor must provide for this in the purchasing document and forward copies to the Inspection Authority, together with relevant technical data as the Inspection Authority may request.

The Contractor must notify the Inspection Authority of non-conforming product received from a subcontractor when the product has been subject to GQA.

22. Quality Control Plan

The Contractor must implement and follow the Quality Control Plan (QCP) prepared according to the latest issue (at contract date) of ISO 10005 Quality management - Guidelines for quality plans, approved by the Inspection and Technical Authorities. The QCP shall describe how the Contractor will conform to the specified quality requirements of the Contract and specify how the required quality activities are to be carried out, including quality assurance of subcontractors. The Contractor must include a traceability matrix from the elements of the specified quality requirements to the corresponding paragraphs in the QCP.

The documents referenced in the QCP shall be made available when requested by the Inspection Authority.

The Contractor must make appropriate amendments to the QCP throughout the term of the contract to reflect current and planned quality activities. Amendments to the QCP must be acceptable to the Inspection and Technical Authorities.

Refer to Annex "D" for further details on the Quality Control Plan requirements.

23. Welding Certification

Welding must only be undertaken by a company Certified by the Canadian Welding Bureau (CWB) to the requirements of the following Canadian Standards Association (CSA) standards:

(a) CSA W47.1, Certification of Companies for Fusion Welding of Steel, section 2;
(b) CSA W59, Welded Steel Construction (Metal Arc Welding). And

In addition, welding must be done in accordance with the requirements of the applicable drawings and specifications.

Before the commencement of any fabrication work, and upon request from the Inspection Authority, the Contractor must provide approved welding procedures and/or a list of welding personnel intended to be used in the completion of the work. The list must identify the CWB welding procedure qualifications attained by each of the personnel listed and must be accompanied by a copy of each person's current CWB welding certification.

24. Environmental Protection

The Contractor and its sub-contractors engaged in the Work on a Crown vessel must carry out the Work in compliance with applicable municipal, provincial and federal environmental laws, regulations and industry standards.

The Contractor must have detailed procedures and processes for identifying, removing, tracking, storing, transporting and disposing of all potential pollutants and hazardous material encountered, to ensure compliance as required above.

All waste disposal certificates are to be provided to the Inspection Authority, with information copies sent to the Contracting Authority. Furthermore, additional evidence of compliance with municipal, provincial and federal environmental laws and regulations is to be furnished by the Contractor to the Contracting Authority when so requested.

The Contractor must have environmental emergency response plans and/or procedures in place. Contractor and subcontractor employees must have received the appropriate training in emergency preparedness and response. Contractor personnel engaging in activities which may cause environmental impacts or potential non-compliance situations, must be competent to do so, on the basis of appropriate education, training, or experience.

25. Supervision of Fueling and Disembarking Fuel

SACC Manual Clause A9056C (2008-05-12) Supervision of Fueling and Disembarking Fuel

26. Procedure for Design Change or Additional Work

SACC Manual Clause B5007C (2010-01-11) Design Change or Additional Work

26.1 Price Breakdown:

The Contractor must, upon request, provide a price breakdown for all unscheduled work, by specific activities with trades, person-hours, material, subcontracts and services.

26.2 Pro-rated Prices:

Hours and prices for unscheduled work will be based on comparable historical data applicable to similar work at the same facility, or will be determined by pro-rating the quoted work costs in the Contract when in similar areas of the vessel.

27. Equipment/Systems: Inspection/Test

Refer to Annex D for details on equipment and systems inspections and testing requirements.

28. Inspection and Test Plan

The Contractor shall, in support of their QCP, implement an approved Inspection & Test Plan (ITP).

The Contractor shall provide at no additional cost to the Crown, all applicable test data, all Contractor technical data, test pieces and samples as may reasonably be required by the Inspection Authority to verify conformance to contract requirements. The Contractor shall forward at his expense such technical data, test data, test pieces and samples to such location as the Inspector may direct.

Refer to Annex "D" for details on Inspection and Test Plan Requirements.

29. Vessel Custody

1. This work is going to take place with the vessel "out of commission" and therefore in the "care, control and custody" of the Contractor.
2. An "ACCEPTANCE CERTIFICATE - ASSUMPTION OF CUSTODY OF FEDERAL GOVERNMENT SHIPS BY SHIPYARDS" Appendix 1 of Annex "F" must be completed as required and a copy passed to the Inspection Authority.
3. To facilitate this turnover, representatives of the Contractor and Canada must confirm the condition of the vessel.
4. A vessel condition report must be appended to the above noted certificate and must be accompanied by colour photographs or videos in either conventional or digital format.
5. When the vessel is to be returned to the "care, control and custody" of Canada, an "ACCEPTANCE CERTIFICATE - RESUMPTION OF CUSTODY OF FEDERAL GOVERNMENT SHIPS BY THE CLIENT DEPARTMENT" Appendix 2 of Annex "F" must be completed and a signed copy passed to Canada for distribution.

30 a. Vessel Unmanned Refits – From beginning to end of Work

The vessel will be unmanned during the work period and will be considered to be out of commission. The vessel during that period will be in the care or custody of the Contractor and under its control.

30 b. Vessel Manned Refits - On a required basis only

1. The vessel will be manned during the work period and will be considered to be in commission. The vessel during that period will remain in the care or custody of Canada and under its control.

2. Firefighting equipment must be readily accessible and made available by the Contractor should a fire emergency arise. The Contractor must take adequate precautions when burning or welding is carried out in compartments or other confined areas of the vessel.

31. Pre-Refit Meeting

A Pre-Refit meeting will be convened and chaired by the Contracting Authority at the Contractor's facility before the commencement of the work period.

32. Meetings

Progress meetings, chaired by the Contracting Authority, will take place at the Contractor's facility as and when required, generally once a month. Interim meetings may also be scheduled. Contractor attendees at these meetings will, as a minimum, be its Contract (Project) Manager, Production Manager (Superintendent) and Quality Assurance Manager. Progress meetings will generally incorporate Technical meetings to be chaired by the Technical Authority**.**

33. Outstanding Work and Acceptance

The Inspection Authority, in conjunction with the Contractor, will prepare a list of outstanding work items towards the end of the vessel Work Period. This list will form the annexes to the formal acceptance document for the vessel. A Contract Completion Meeting will be convened by the Inspector on the work completion date to review and sign off the Acceptance Document. In addition to any amount held under the Warranty Holdback Clause (see section 7.3 above), a holdback of twice the estimated value of outstanding work will be held until completion of said work.

The PWGSC-TPSGC 1205 Acceptance Document is to be completed and distribution is to be made by the Public Works and Government Services Canada Inspection Authority as follows:

(a) original to the PWGSC Contracting Authority
(b) one copy to the Technical Authority
(c) one copy to contractor

34. Licensing

The Contractor must obtain and maintain all permits, licenses and certificates of approval required for the work to be performed under any applicable federal, provincial or municipal legislation. The Contractor is responsible for any charges imposed by such legislation or regulations. Upon request, the Contractor must provide a copy of any such permit, license or certificate to Canada.

35. Hazardous Waste - Vessels

1. The Contractor acknowledges that sufficient information has been provided by Canada with respect to the location and estimated amount of hazardous materials such as asbestos, lead, PCBs, silica or other hazardous materials or toxic substances.

2. The price includes all costs associated with the removal, handling, storage, disposal and/or working in the vicinity of hazardous materials such as asbestos, lead, PCBs, silica and other hazardous materials or toxic substances on board the vessel, including those costs resulting from the need to comply with applicable laws and regulations in relation to the removal, handling, disposal or storage of hazardous materials or toxic substances.

3. The completion date for the Work takes into account the fact that the removal, handling, storage, disposal and/or working in the vicinity of hazardous materials such as asbestos, lead, PCBs, silica and other hazardous materials or toxic substances may be affected by the need to comply with applicable laws or regulations and that this will not be considered to be an excusable delay.

36. Government Site Regulations

SACC Manual Clause A9068C (2010-01-11), Government Site Regulations

37. Scrap and Waste Material

SACC Manual Clause A9055D (2010-08-16), Scrap and Waste Material

38. Stability and Weight Management

SACC Manual Clause B6100C (2008-05-12), Stability and Weight Management

39. Vessel - Access by Canada

SACC Manual Clause A9066C (2008-05-12), Vessel - Access by Canada

40. Title to Property - Vessel

SACC Manual Clause A9047C (2008-05-12), Title to Property - Vessel

41. Defence Contract

SACC Manual Clause A9006C (2012-07-16) Defence Contract

42. Limitation of Contractor's Liability for Damages to Canada

1. This section applies despite any other provision of the Contract and replaces the section of the general conditions entitled "Liability". Any reference in this section to damages caused by the Contractor also includes damages caused by its employees, as well as its subcontractors, agents, and representatives, and any of their employees.

2. Whether the claim is based in contract, tort, or another cause of action, the Contractor's liability for all damages suffered by Canada caused by the Contractor's performance of or failure to perform the Contract is limited to $10 million per incident or occurrence to an annual aggregate of $20 million for losses or damage caused in any one year of carrying out the Contract, each year starting on the date of coming into force of the Contract or its anniversary. This limitation of the Contractor's liability does not apply to nor include:

   (a) Any infringement of intellectual property rights;

   (b) Any breach of warranty obligations;

   (c) Any liability of Canada to a third party arising from any act or omission of the Contractor in performing the Contract; or

   (d) Any loss for which the policies of insurance specified in the Contract or any other policies of insurance held by the Contractor would provide insurance coverage.

3. Each Party agrees that it is fully liable for any damages that it causes to any third party in connection with the Contract, regardless of whether the third party makes its claim against Canada or the Contractor. If Canada is required, as a result of joint and several liability, to pay a third party in respect of damages caused by the Contractor, the Contractor must reimburse Canada for that amount.

4. The Parties agree that nothing herein is intended to limit any insurable interest of the Contractor nor to limit the amounts otherwise recoverable under any insurance policy. The Parties agree that to the extent that the insurance coverage required to be maintained by the Contractor under this Contract or any additional insurance coverage maintained by the Contractor, whichever is greater, is more than the limitations of liability described in sub article (2), the limitations provided herein are increased accordingly and the Contractor shall be liable for the higher amount to the full extent of the insurance proceeds recovered.

5. If, at any time, the total cumulative liability of the Contractor for losses or damage suffered by Canada caused by the Contractor's performance of or failure to perform the Contract, excluding liability described under subsection 2(a), (b), (c) and (d) exceeds $40 million, either Party may terminate the Contract by giving notice in writing to the other Party and neither Party will make any claim against the other for damages, costs, expected profits or any other such loss arising out of the termination. However, no such termination or expiry of the Contact shall reduce or terminate any of the liabilities that have accrued to the effective date of the termination but which liabilities are subject to the limitations as specified in sub-article (1) through (4) above.

6. The date of termination pursuant to this Article, shall be the date specified by Canada in its notice to terminate, or, if the Contractor exercises the right to terminate, in a notice to the Contractor from Canada in response to the Contractor's notice to terminate. The date of termination shall be in Canada's discretion to a maximum of 12 months after service of the original notice to terminate served by either Party pursuant to sub-article 5, above.

7. In the event of a termination under this Article, the Contract will automatically remain in force subject to all of the same terms and conditions until the date of termination and the Contractor agrees that it will be paid in accordance with the applicable provisions as set out in the Basis of Payment, Annex B and that the Contractor's liability remains as specified in subarticles (1) through (4), above.

8. Nothing shall limit Canada's other remedies, including Canada's right to terminate the Contract for default for breach by the Contractor of any of its obligations under this Contract, notwithstanding that the Contractor may have reached any limitation of its liability hereunder.

ANNEX A

REQUIREMENT - SPECIFICATION

See electronic Annex.

ANNEX B

BASIS OF PAYMENT FIRM PRICE

***Remark to Bidder: Annex B will form the Basis of Payment for the resulting contract and should not be filled in at the bid submission stage. See annex 'I'* – Financial Bid Presentation Sheet.**

B1 Contract Firm Price

A)	**Known Work** For work as stated in Clause 1.a) of the contract, specified in Annex "A" and detailed in the attached Price Per Item Sheet Appendix 1 of Annex "I", ***for a FIRM PRICE of:***	$_____
B)	**Total Firm Price :**	**$**_____

B2 Unscheduled Work

Payment for Unscheduled Work:

The Contractor will be paid for unscheduled work arising, as authorized by Canada. The authorized unscheduled work will be calculated as follows:

Number of hours (to be negotiated) X $_____, being the Contractor's firm hourly charge-out labour rate which includes overhead and profit, plus net laid-down cost of materials to which will be added a mark-up of ten (10) percent, plus Goods and Services Tax or Harmonized Sales Tax, if applicable, calculated at five (5) percent of the total cost of material and labour. The firm hourly charge-out labour rate and the material mark-up will remain firm for the term of the Contract and any subsequent amendments.

B2.1: Notwithstanding definitions or useage elsewhere in this document, or in the Bidder's Cost Management System, when negotiating *Hours* for unscheduled work, PWGSC will consider only those hours of labour directly involved in the production of the subject work package.
Elements of *Related Labour Costs* identified in B2.2 below, will not be negotiated, but will be included in the firm hourly Charge-out Labour Rate in accordance with paragraph B2.2

B2.2: Allowance for *Related Labour Costs* such as: Management, Direct Supervision, Purchasing and Material Handling, Quality Assurance and Reporting, First Aid, Gas Free Inspecting and Reporting, and Estimating will be included as *Overhead* within the *firm hourly Charge-out Labour Rate* entered in line B2 above.

B2.3: The 10% mark-up rate for materials will also apply to subcontracted costs. The mark-up rate includes any allowance for material and subcontract management not allowed for in the Chargeout Labour Rate. The Contractor will not be entitled to a separate labour component for the purchase and handling of materials or subcontract administration.

B3 Overtime

No overtime work shall be compensated for under the Contract unless authorized in advance and in writing by the Contracting Authority. Any request for payment must be accompanied by a copy of the overtime authorization and a report containing such details as Canada may require with respect to the overtime work performed. Compensation for authorized overtime will be calculated in the following manner:

a. For Known Work, the Contractor will be paid the original contract price plus agreed overtime hours paid at the following premium rates;

b. For Unscheduled Work, the Contractor will be paid for agreed overtime hours paid at the *firm hourly Charge-out Labour Rate* above plus the following premium rates:

Time and one half: $ _____ per hour; *or,*

Double time: $ _____ per hour

The above premiums rates shall be calculated as follows:

Premium for time and one half:

½ (that portion of the firm Hourly Charge-out Labour Rate in B2 that is directly attributable to salary cost plus related certified fringe benefits) times 7.5% (representing profit)

Premium for double time:

½ (that portion of the Unscheduled Work firm Charge-out Labour Rate in B2 that is directly attributable to salary cost plus related certified fringe benefits) times 7.5% (representing profit)

These premiums will remain firm for the duration of the Contract, including all amendments and are subject to audit by Canada, and to retroactive adjustment if Canada discovers that the premiums have not been calculated in accordance with the formulae, above.

B4 Daily Services Fee

In the event of a delay in the performance of the Work that lengthens the Work Period beyond the date specified in this Contract, and if such delay is recognized and agreed upon by the Contracting Authority as being attributable to Canada, Canada agrees to pay the Contractor the daily services fee, described below, for each day of such delay. This fee shall be the sole liability of Canada to the Contractor for the delay.

The firm daily services fee is:

(a) For a working day in drydock: $_____

(b) For a non-working day in drydock: $_____

(c) For a working day alongside: $_____

(d) For a non-working day alongside: $_____

The above fees shall include but not be limited to, all aspects of the following costs: Administrative Support, Production Services, Quality Assurance, Material Support, Planned Maintenance and Ship Services, and all other resources and direct costs needed to maintain the Vessel at the Contractor's facility, including all items listed in **B5**. These fees are firm and not subject to any additional charges for mark-up or profit.

B5 Cost of all Services is Included in Contract Price

All charges, fees expenses and disbursements incidental to the carrying out of the Work, including all items described in Supplemental General Conditions 1029 (2010-08-16) Ship Repair, section (07), are included in the Contract Price for the Work, including, without limitation:

1. **Services:** include all costs for ship services such as water, steam, electricity, etc., required for vessel maintenance for the duration of the Contract.

2. **Docking and Undocking** include:

   (a) all costs resulting from drydocking, wharfage, security, shoring, shifting and/or moving of the vessel within the Contractor’s facility;

   (b) the cost of services to tie up the vessel alongside and to cast off.

   Unless specified otherwise, the vessel will be delivered by Canada to the Contractor’s facility alongside a mutually agreed safe transfer point, afloat and upright, and the Contractor will do the same when the Work is completed.

3. **Field Service Representatives/Supervisory Services:** include all costs for field service representatives/supervisory services including manufacturers' representatives, engineers, etc.

4. **Removals**: include all costs for removals necessary to carry out the Work and will be the responsibility of the Contractor whether or not they are identified in the specifications, except those removals not apparent when viewing the vessel or examining the drawings. The Contractor will also be responsible for safe storage of removed items and reinstalling them on completion of the Work. The Contractor will be responsible for renewal of components damaged during removal.

5. **Sheltering, Staging, Cranage and Transportation:** include the cost of all sheltering, staging including handrails, cranage and transportation to carry out the Work as specified.

   The Contractor will be responsible for the cost of any necessary modification of these facilities to meet applicable safety regulations.

ANNEX C

INSURANCE REQUIREMENTS

C.1 Ship Repairers' Liability Insurance – G5001C (2014-06-26)

1. The Contractor must obtain Ship Repairer's Liability Insurance and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature, but for not less than $10,000,000 per accident or occurrence and in the annual aggregate.

2. The Ship Repairer's Liability insurance must include the following:

   a. Additional Insured: Canada is added as an additional insured, but only with respect to liability arising out of the Contractor's performance of the Contract. The interest of Canada as additional insured should read as follows: Canada, represented by Public Works and Government Services Canada.

   b. Waiver of Subrogation Rights: Contractor's Insurer to waive all rights of subrogation against Canada as represented by Fisheries and Oceans Canada – Canadian Coast Guard and Public Works and Government Services Canada for any and all loss of or damage to the vessel, however caused.

   c. Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of cancellation.

   d. Contractual Liability: The policy must, on a blanket basis or by specific reference to the contract, extend to assumed liabilities with respect to contractual provisions.

   e. Cross Liability/Separation of Insureds: Without increasing the limit of liability, the policy must protect all insured parties to the full extent of coverage provided. Further, the policy must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.

C.2 Commercial General Liability Insurance – G2001C (2014-06-26)

1. The Contractor must obtain Commercial General Liability Insurance, and maintain it in force throughout the duration of the Contract, in an amount usual for a contract of this nature, but for not less than $10,000,000 per accident or occurrence and in the annual aggregate.

2. The Commercial General Liability policy must include the following:

   a) Additional Insured: Canada is added as an additional insured, but only with respect to liability arising out of the Contractor's performance of the Contract. The interest of Canada should read as follows: Canada, as represented by Public Works and Government Services Canada.

   b) Bodily Injury and Property Damage to third parties arising out of the operations of the Contractor.

c) Personal Injury: While not limited to, the coverage must include Violation of Privacy, Libel and Slander, False Arrest, Detention or Imprisonment and Defamation of Character.

d) Cross Liability/Separation of Insureds: Without increasing the limit of liability, the policy must protect all insured parties to the full extent of coverage provided. Further, the policy must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.

e) Blanket Contractual Liability: The policy must, on a blanket basis or by specific reference to the Contract, extend to assumed liabilities with respect to contractual provisions.

f) Employees and, if applicable, Volunteers must be included as Additional Insured.

g) Employers' Liability (or confirmation that all employees are covered by Worker's compensation (WSIB) or similar program)

h) Notice of Cancellation: The Insurer will endeavour to provide the Contracting Authority thirty (30) days written notice of policy cancellation.

i) If the policy is written on a claims-made basis, coverage must be in place for a period of at least 12 months after the completion or termination of the Contract.

j) Owners' or Contractors' Protective Liability: Covers the damages that the Contractor becomes legally obligated to pay arising out of the operations of a subcontractor.

k) Sudden and Accidental Pollution Liability (minimum 120 hours): To protect the Contractor for liabilities arising from damages caused by accidental pollution incidents.

C.3 Limitation of Contractor's Liability for Damages to Canada

1. This section applies despite any other provision of the Contract and replaces the section of the general conditions entitled "Liability". Any reference in this section to damages caused by the Contractor also includes damages caused by its employees, as well as its subcontractors, agents, and representatives, and any of their employees.

2. Whether the claim is based in contract, tort, or another cause of action, the Contractor’s liability for all damages suffered by Canada caused by the Contractor’s performance of or failure to perform the Contract is limited to $10 million per incident or occurrence to an annual aggregate of $20 million for losses or damage caused in any one year of carrying out the Contract, each year starting on the date of coming into force of the Contract or its anniversary. This limitation of the Contractor’s liability does not apply to nor include:

   a) any infringement of intellectual property rights; or
   b) any breach of warranty obligations.

3. Each Party agrees that it is fully liable for any damages that it causes to any third party in connection with the Contract, regardless of whether the third party makes its claim against Canada or the Contractor. If Canada is required, as a result of joint and several liability, to pay a third party in respect of damages caused by the Contractor, the Contractor must reimburse Canada for that amount.

ANNEX D

INSPECTION/QUALITY ASSURANCE/QUALITY CONTROL

D.1 Inspection and Test Plan (ITP):

1. The Contractor must prepare an Inspection and Test Plan (ITP) comprising individual inspection and test plans for each specification item of this project, in accordance with the Quality Standard and its Quality Control Plan. The ITP must be submitted to the Inspection Authority for review and amended by the Contractor to the satisfaction of the Inspection Authority.
   (a) Each ITP must contain all inspection points identified in the Technical Specification highlighting any mandatory points that must be witnessed by the Inspection Authority and other "hold" points imposed by the Contractor to ensure the quality of the work.
   (b) Milestone delivery date for the ITP is given in the Contract, however individual ITPs should be forwarded for review as developed.

2. Coding:

   (a) Each Inspection and Test Plan (ITP) is to be coded for identification clearly demonstrating a systematic approach similar to the following (Contractor's system should be defined in its Quality Control Plan):
      (i) Prefixes for Inspections, Test and Trials:

      Prefix "1" is a Contractor inspection, i.e. 1H-10-01, 1H-10-02;

      prefix "2" is a Contractor post repair test, i.e. 2H-10-01; and

      prefix "3" is a Contractor post repair trial, i.e. 3H-10-01.

   (b) Specification items followed by assigned sequence numbers for inspection processes within each Specification Item; and

   (c) Cross reference to a verification document number

3. Inspection and Test Plan Criteria:

   Inspection criteria, procedures and requirements are stated in the specifications, drawings, technical orders and reference standards invoked by the Specifications. Test and trial documentation may also be included or referenced in the Specifications. An individual Inspection and Test Plan (ITP) is required for each Specification item.

   (a) All ITPs must be prepared by the Contractor in accordance with the above criteria, its Quality Plan, and must provide the following reference information:

      (i) the ship's name;
      (ii) the Specification item number;
      (iii) equipment/system description and a statement defining the parameter which is being inspected;

(iv) a list of applicable documents referenced or specified in the inspection procedure;
(v) the inspection, test or trial requirements specified in the Technical Specification;
(vi) the tools and equipment required to accomplish the inspection;
(vii) the environmental conditions under which the inspections are to be conducted and the tolerances on the inspection conditions;
(viii) a detailed step-by step procedure of how each inspection is to be performed, conformance parameters, accept/reject criteria and recording of results, deficiencies found and description of corrective action(s) required;
(ix) name and signature of the person who prepared the plan, date prepared and amendment level; and,
(x) names and signatures of the persons conducting and witnessing the inspection, test or trial.

4. Contractor Imposed Testing:

Tests and trials in addition to those given in the Techncial Specification must be approved by the Inspection Authority.

(a) Amendments: Amendment action for the Inspection and Test Plans must be ongoing throughout the refit and reflect the inspection requirements for unscheduled work. Amendments must be submitted as developed, but not less frequently than once every second week.

D.2 Conduct of Inspection

1. Inspections must be conducted in accordance with the ITP.

2. The Contractor must provide its own staff or subcontracted staff to conduct inspections, tests and trials; excepting that Technical Authority or Inspection Authority personnel may be designated in the specifications, in which case the Contractor must ensure that its own staff are provided in support of such inspection/test/trial.

3. The Contractor must ensure that the required conditions stated in the ITP prevail at the commencement of, and for the duration of, each inspection/test/trial.

4. The Contractor must ensure that personnel required for equipment operation and records taking during the inspection/test/trial are briefed and available at the start and throughout the duration of the inspection/test/trial. Tradesmen or FSRs who may be required to effect minor changes or adjustments in the installation must be available at short notice.

5. The Contractor is to coordinate the activities of all personnel taking part in each inspection/test/trial and ensure that safe conditions prevail throughout the inspection/test/trial.

D.3 Inspection Records and Reports

1. The Contractor on the inspection record, test or trials sheets as applicable must record the results of each inspection. The Contractor must maintain files of completed inspection records consistent with the Quality Standard and its Quality Plan for this project.

2. The Contractor's QC representative (and the FSR when required) must sign as having witnessed the inspection, test or trial on the inspection record. The Contractor must forward originals of completed inspection records, together with completed test(s) and/or trials sheets to the Inspection Authority as they are completed.

3. Unsatisfactory inspection/test/trial results, for which corrective action cannot be completed during the normal course of the inspection/test/trial, will require the Contractor to establish and record the cause of the unsatisfactory condition to the satisfaction of the Inspection Authority. Canada representatives may assist in identification where appropriate.

4. Corrective action to remove cause of unsatisfactory inspections must be submitted to the Inspection Authority in writing by the Contractor, for approval before affecting such repairs and rescheduling of the unsatisfactory inspection/test/trial. Such notices must be included in the final records passed to the Inspection Authority.

5. The Contractor must undertake rectification of defects and deficiencies in the Contractor's installation or repair as soon as practicable. The Contractor is responsible to schedule such repairs at its own risk.

6. The Contractor must reschedule unsatisfactory inspections after any required repairs have been completed.

7. Quality Control, Inspection and Test records that substantiate conformance to the specified requirements, including records of corrective actions, must be retained by the Contractor for three (3) years from the date of completion or termination of the Contract and must be made available to the Inspection Authority upon request.

D.4 Inspection and Trials Process

1. Drawings and Purchase Orders
   (a) Upon receipt of two (2) copies of each drawing or purchase order, the designated Inspection Authority will review its content against the provisions of the Specifications. Where discrepancies are noted, the Inspection Authority will formally advise all concerned, in writing using a Discrepancy Notice. The resolution of any such discrepancy is a matter for consultation between the Contractor and other Crown Authorities.

The Inspection Authority is NOT responsible for the resolution of discrepancies.

2. Inspection

   (a) Upon receipt and acceptance of the Contractor’s ITP, inspection will consist of a number of Inspection Points supplemented by such other inspections, tests, demonstrations and trials as may be deemed necessary by the Inspection Authority to permit him to certify that the work has been performed in compliance with the provisions of the Specifications. The Contractor must be responsible for notifying the designated Inspection Authority of when the work will be available for inspection, sufficiently in advance to permit the designated Inspection Authority to arrange for the appropriate inspection.

   (b) The Inspection Authority will inspect the materials, equipment and work throughout the project against the provisions of the Techncial Specification and, where non-conformances are noted, will issue appropriate **INSPECTION NON-CONFORMANCE REPORTS.**

(c) The Contract requires the implementation of a Quality Assurance/Quality Control system, so the Inspection authority must require that the Contractor provide a copy of its internal inspection report pertaining to a work item before conducting the requested inspection. If third party inspections are required by the Contract (e.g. inspections by a certified CWB 178.2 welding inspector), the reports of these inspections must be required before the Work is inspected by the Inspection Authority.

(d) The QA/QC system is a requirement, so if the documentation is presented to the Inspection Authority before an inspection stating that the Work is satisfactory but the Inspection Authority finds that the Work has not been satisfactorily inspected, the Inspection Authority must issue an Inspection Non-conformance Report against the Work and another against the failure of the Contractor's QA/QC system.

(e) Before carrying out any inspection, the Inspection Authority must review the requirements for the Work and the acceptance and/or rejection standards to be applied. Where more than one standard or requirement is called up and they are potentially conflicting, the Inspection Authority must refer to the order of precedence in the Contract to determine the standard or requirement to be applied.

3. Inspection Non-conformance report

(a) An Inspection Non-conformance report will be issued for each non-conformance noted by the Inspection Authority. Each report will be uniquely numbered for reference purposes, will be signed and dated by the Inspection Authority, and will describe the non-conformance.

(b) When the non-conformance has been corrected by the Contractor and has been re-inspected and accepted by the Inspection Authority, the Inspection Authority will complete the Report by adding an applicable signed and dated notation.

(c) At the end of the project, the content of all Inspection Non-conformance Reports which have not been signed-off by the Inspection Authority will be transferred to the Acceptance Documents before the Inspection Authority's certification of such documents.

4. Tests, Trials, and Demonstrations

(a) To enable the Inspection Authority to certify that the Work has been performed satisfactorily, in accordance with the Contract and Specifications, the Contractor must schedule, co-ordinate, perform, and record all specified Tests, Trials and Demonstrations required by the Inspection Authority.

(b) Where the Specifications contain a specific performance requirement for any component, equipment, sub-system or system, the Contractor must test such component, equipment, sub-system or system to the satisfaction of the Inspection Authority, to prove that the specified performance has been achieved and that the component, equipment, sub-system or system performs as required by the specifications.

(c) Tests, trials and demonstrations must be conducted in accordance with a logical, systematic schedule which must ensure that all associated components and equipment are proven before sub-systems demonstration or testing, and that sub-systems are proven before system demonstration or testing.

(d) Where the Specifications do not contain specific performance requirements for any component, equipment, sub-system or system, the Contractor must demonstrate such component, equipment, sub-system or system to the satisfaction of the Inspection Authority.

(e) The contractor must submit its Test and Inspection Plan as indicated in section D.1 above.

(f) The Contractor must co-ordinate each test, trial and demonstration with all interested parties, including the Inspection Authority; Contracting and Technical Authorities; regulatory authorities; Classification Society; Sub-contractors; etc. The Contractor must provide the Inspection Authority and other Crown Authorities with a minimum of **five working days**' notice of each scheduled test, trial, or demonstration.

(g) The Contractor must keep written records of all tests, trials, and demonstrations conducted.

(h) The Contractor must in all respects be responsible for the conduct of all tests and trials in accordance with the requirements of the Contract.

(i) The Inspection Authority and the Technical Authority reserve the right to defer starting or continuing with any sea trials for any reasonable cause including but not limited to adverse weather, visibility, equipment failure or degradation, lack of qualified personnel and inadequate compliance with safety standards.

ANNEX E

WARRANTY

General Conditions 2030 (2016-04-04) - Higher Complexity Goods, are hereby amended by deleting section 2030 22 (2014-09-25), Warranty and replacing it as follows:

E.1 Section 22 Warranty

1. At the discretion of the Minister, the Contractor will replace or make good at its own expense any finished work, excluding Government Issue incorporated therein, which becomes defective or which fails to conform to contract requirements as a result of faulty or inefficient manufacture, material or workmanship.

2. Notwithstanding prior acceptance of the finished work, and without restricting any other term of the Contract or any condition, warranty or provision implied or imposed by law, the Contractor hereby warrants that the following shall be free from all defects and shall conform with the requirements of the contract:

(a) The painting of the underwater portion of the hull for a period of three hundred and sixty-five (365) days commencing from the date of undocking, except that the Contractor will only be liable to repair and/or replace to a value to be determined as follows:

Original cost to Canada of the underwater painting Work, divided by three hundred and sixty-five (365) days and multiplied by the number of days remaining in the warranty period. The resultant would represent the "Dollar Credit" due to Canada from the Contractor.

(b) All other painting Work for a period of three hundred and sixty-five (365) days commencing from the date of acceptance of the Work;

(c) All parts and material provided by the Contractor for a period of three hundred and sixty-five (365) days commencing from the date of acceptance of such parts or material;

(d) All other items of Work for a period of ninety (90) days commencing from the date of acceptance of the Work, except that:

(i) the warranty on the Work related to any system or equipment not immediately placed in continuous use or service shall extend for a period of ninety (90) days from the date of acceptance of the vessel;

ii) for all outstanding defects, deviations, and Work items listed on the Acceptance Document at Delivery, the Warranty will be ninety (90) days from the subsequent date of acceptance for each item.

3. If more than one warranty period applies, in accordance with the above, to any Work, then the warranty shall be for the longest period.

4. The Contractor agrees to pass to Canada, and exercise on behalf of Canada, all warranties on the Materials supplied or held by the Contractor which exceed the periods indicated Above.

E.2 Warranty Procedures

E2.1 Scope

a. The following are the procedures which suit the particular requirements for warranty considerations for a vessel on completion of a refit.

E2.2 Definition

a. There are a number of definitions of “warranty” most of which are intended to describe its force and effect in law. One such definition is offered as follows:

“A warranty is an agreement whereby the vendor’s or manufacturer’s responsibility for performance of its product is extended for a specific period of time beyond the date at which the title to the product passes to the buyer.”

E2.3 Warranty Conditions

a. General Conditions 2030, Higher Complexity - Goods are augmented by clauses incorporated into the subject Contract.

b. The warranty periods may be stated in more than one part.

   i. 90 days commencing from the day the PWGSC 1205 Acceptance Document is signed for workmanship provided by the contractor for the refit work specified;
   ii. 365 days from the date of undocking the vessel for the specified areas of underwater paint and topside painting;
   iii. 365 days commencing from the day the PWGSC 1205 Acceptance Document is signed for parts and material provided by the contractor for the refit work specified;
   iv. Any other specific warranty periods that may be required in the contract or offered by the Contractor.

c. The foregoing does not cover the disposition of other deficiencies that will be directly related to Technical Authority problem areas of the following nature:

   i. items becoming unserviceable that were not included in the refit specification;
   ii. refit specifications or other related documentation requiring amendments or corrections to increase viability; and
   iii. work performed that is directly related to the Technical Authority.

E2.4 Reporting Failures With Warranty Potential

a. The initial purpose of a report of a failure is to facilitate the decision as to whether or not to involve warranty and to generate action to effect repairs. Therefore in addition to identification, location data, etc. the report must contain details of the defect. Warranty decisions as a general rule are to be made locally and the administrative process is to be in accordance with procedures as indicated.

b. These procedures are necessary as invoking a warranty does not simply mean that the warrantor will automatically proceed with repairs at his expense. A review of the defect may well result in a disclaimer of responsibility, therefore, it is imperative that during such a review the Department is directly represented by competent technical authority qualified to agree or disagree with the warrantor’s assertions.

E2.5 Procedures

a. Immediately it becomes known to the Ship's Staff that an equipment/system is performing below accepted standards or has become defective, the procedures for the investigation and reporting are as follows:

   i. The vessel advises the Technical Authority when a defect, which is considered to be directly associated the refit work, has occurred.
   ii. On review of the Specification and the Acceptance Document, the Technical Authority in consort with Ship's Staff is to complete the Tombstone Data and section 1 of the Warranty Claim Form and forward the original to the Contractor for review with a copy to the PWGSC contracting Authority. If the PWGSC Contracting or Inspection Authority is unable to support warranty action, the Defect Claim Form will be returned to the originator with a brief justification. (It is to be noted that in the latter instance PWGSC will inform the Contractor of its decision and no further action will be required of the Contractor.

   Warranty defect claims may be forwarded in hard copy, by fax or by e-mail whichever format is the most convenient.

   iii. Assuming the Contractor accepts full responsibility for repair, the Contractor completes Section 2 and 3 of the Warranty Claim Form, returns it to the Inspection Authority who confirms corrective action has been completed, and who then distributes the form to the Technical Authority and the PWGSC Contracting Authority.

b. In the event that the Contractor disputes the claim as a warranty defect, or agrees to share, the contractor is to complete Part 2 of the Warranty Claim Form with the appropriate information and forward it to the Contracting Authority who will distribute copies as necessary.

c. When a warranty defect claim is disputed by the Contractor, the Technical Authority may arrange to correct the defect by in-house resources or by contracting the work out. All associated costs must be tracked and recorded as a possible charge against the contractor by PWGSC action. Material costs and man-hours expended in correcting the defect are to be recorded and entered in Section 5 of the warranty defect claim by the Technical Authority who will forward the warranty defect claim to the PWGSC Contracting Authority for action. Defective parts of equipment are to be retained pending settlement of claim.

d. Defective equipment associated with potential warranty should not normally be dismantled until the contractor’s representative has had the opportunity to observe the defect. The necessary work is to be undertaken through normal repair methods and costs must be segregated as a possible charge against a contractor by PWGSC action.

E2.6 Liability

a. Agreement between the Contracting Authority, Inspection Authority, Technical Authority and the Contractor will result in one of the following conditions:

i. The contractor accepts full responsibility for costs to repair or overhaul under the warranty provisions of the contract;

ii. The Technical Authority accepts full responsibility for repair and overhaul of item concerned; or

iii. The Contractor and the Technical Authority agree to share responsibility for the costs to repair or overhaul the unserviceable item, in such cases the PWGSC Contracting Authority will negotiate the best possible sharing arrangement.

b. In the event of a disagreement as in paragraph 5c, PWGSC will take necessary action with the contractor while the Technical Authority informs its Senior Management including pertinent data and recommendations.

c. The total cost of processing warranty claims must include accommodation and travel costs of the contractor's employees as well as equipment/system down time and operational constraints. Accordingly, the cost to remediate the defect, in man-hours and material, will be discussed between the Contracting/Inspection Authorities and the Technical Authority to determine the best course of action.

E2.7 Alongside Period For Warranty Repairs and Checks

a. If at all possible, an alongside period for the vessel is to be arranged just before the expiration of the 90 day warranty period. This alongside period is to provide time for warranty repair and check by the contractor.

b. In respect to the underwater paint, should it become defective during the associated warranty period the contractor is only liable to repair to a value determined as follows:

"Original cost to Canada for painting and preservation of the underwater section of the hull, divided by three hundred and sixty-five (365) days and multiplied by the number of days remaining in the three hundred and sixty-five (365) days warranty period. The resultant would represent the 'Dollar Credit' due to Canada from the Contractor."

c. The Underwater paint system, before expiration of the warranty, should be checked by divers. The Technical Authority, is to arrange the inspection and inform the Contracting Authority of any adverse results.

Appendix 1 of Annex E

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

Warranty Claim
Réclamation De Garantie

Vessel Name – Nom de navire	File No. – N° de dossier	Contract No. - N ° de contrat
Customer Department – Ministère client		Warranty Claim Serial No. Numéro de série de réclamation de garantie
Contractor – Entrepreneur		**Effect on Vessel Operations** **Effet sur des opérations de navire** Critical Degraded Operational Non-operational Critique Dégradé Opérationnel Non-opérationnel

1. Description of Complaint – Description de plainte

Contact Information – l'information de contact

Name – Nom

Tel. No. - N ° Tél

Signature – Signature

Date

2. Contractor's Investigative Report – Le rapport investigateur de l'entrepreneur

3. Contractor's Corrective Action – La modalité de reprise de l'entrepreneur

Contractor's Name and Signature – Nom et signature de l'entrepreneur

Date of Corrective Action - Date de modalité de reprise

Client Name and Signature - Nom et signature de client

Date

4. PWGSC Review of Warranty Claim Action – Examen d'action de réclamation de garantie par TPSGC

Signature – Signature

Date

ANNEX F

VESSEL CUSTODY

F1 Vessel Custody

1. This work is going to take place with the vessel “out of commission” and therefore in the “care, control and custody” of the Contractor.

2. An “ACCEPTANCE CERTIFICATE - ASSUMPTION OF CUSTODY OF FEDERAL GOVERNMENT SHIPS BY SHIPYARDS” (attached as Appendix 1 to this Annex F) shall be completed as required and a copy passed to the Inspection Authority.

3. To facilitate this turnover, representatives of the Contractor and Canada shall confirm the condition of the vessel.

4. A vessel condition report shall be appended to the above noted certificate and shall be accompanied by colour photographs or videos in either conventional or digital format.

5. When the vessel is to be returned to the “care, control and custody” of Canada, an “ACCEPTANCE CERTIFICATE - RESUMPTION OF CUSTODY OF FEDERAL GOVERNMENT SHIPS BY THE CLIENT DEPARTMENT” (Attached as appendix 2 to this Annex F) shall be completed and a signed copy passed to Canada for distribution.

UNMANNED REFIT:

During the majority of the contract period, the vessel shall be **unmanned.** As a result, the ship shall be placed in the care and custody of the Contractor as described in the Technical Specification. However, access to the vessel shall not be denied to CCG, PWGSC and TCMSB personnel by the Contractor. Every effort will be taken to ensure that vessel access by these personnel shall not interfere or conflict with the Contractor's work.

Cleaning: Contractor to ensure that all spaces, compartments and areas of the ship 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.

CCG / PWGSC Offices: notwithstanding the fact that the vessel will be unmanned, the Contractor shall respect the directives included in the Technical Specification in regard to the protection and the layout of the cabins onboard the vessel.

Parking: Sufficient parking for CCG and PWGSC representatives shall be provided conveniently close to the berthed or docked vessel. The available parking should be sufficient for a maximum of **six (6)** vehicles at any given time.

GENERAL (UNMANNED):

The services as described in item 2 of the Technical Statement of Requirement, shall be supplied, fitted and/or connected upon formal handover to the Contractor, and maintained **throughout the period that the ship is under the Contractor's control**. Contractor to be responsible for any additional disconnections and re-connections required when the ship is moved between dock / slipway and any berth at the Contractor's premises. The Contractor is to quote a global price and daily rates for these services according to his proposed schedule which will determine the planned length of time that the vessel is under his control.

Care and Custody: During the contract period, the ship shall be placed in the custody of the Contractor who shall be responsible for all safety and security matters pertaining to the vessel. As the ship will not be de-stored, the Contractor shall provide whatever security arrangements are required to safeguard CCG and DFO equipment and material that remains onboard during the contract period.

Security Watches: During the contract period, the 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 patroller 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.

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

As part of the initial turnover, the Contractor shall provide the services of a qualified photographer (who is to be identified as a Sub-contractor) to accompany the abovementioned persons and take a minimum of **six (6)** digital colour photographs of each compartment and passageway: **one (1)** each looking forward, aft, port, starboard, up and down. The Contractor shall supply **two (2)** sets of printed copies of the photographs, bound and organized by deck level and compartment name, to the Chief Engineer within **seven (7)** days of the ship's arrival at the Contractor's facilities.

In addition to the photographs, the Contractor is to prepare compartment inspection sheets for each space for signature at the time of turnover. After sign-off, copies of the inspection sheets are to be given to the Chief Engineer and placed on the door of each compartment or in each passageway.

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

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 the Chief Engineer.

The Contractor shall be responsible for the safe transfer of the ship between its pre/post-docking berth and its docking blocks. During docking and undocking of the ship, radio contact is to 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.

APPENDIX 1 OF ANNEX F

ACCEPTANCE CERTIFICATE
ASSUMPTION OF CUSTODY OF FEDERAL GOVERNMENT SHIPS BY SHIPYARDS

TURNOVER OF CUSTODY of CCGS _____

Contract Serial Number :_____

I, _____ (Contractor's Representative) on behalf of _____ _____ take over the responsibility for the said Vessel from the Department of Fisheries and Oceans. This take over of responsibilities is effective at _____, Province of _____ on the _____ day of _____, 2018, at ____ hours.

_____
(Signature - Contractor's Representative)

_____
(Witness)

I, _____ (Vessel's Master or Chief Engineer) on behalf of the Department of Fisheries and Oceans, turn over the custody and responsibility for the said Vessel to the Contractor. This turn-over effective at _____, Province of _____ on the ___ day of _____, 2018, at _____ hours.

_____
(Signature - Vessel's Master)

_____
(Witness)

APPENDIX 2 OF ANNEX F

ACCEPTANCE CERTIFICATE
RESUMPTION OF CUSTODY OF FEDERAL GOVERNMENT SHIPS
BY THE CLIENT DEPARTMENT

RESUMPTION OF CUSTODY of CCGS _____

Contract Serial Number :_____

I, _____ (Contractor's Representative) on behalf of _____ _____ turn-over the responsibility for the said Vessel to the Department of Fisheries and Oceans. This turn-over effective at _____, Province of _____ on the _____ day of _____, 2018, at ____ hours.

_____
(Signature - Contractor's Representative)

_____
(Witness)

I, _____ (Vessel's Master or Chief Engineer) on behalf of the Department of Fisheries and Oceans, accept the resumption of custody and responsibility for the said Vessel from the Contractor. This turn-over effective at,
_____ Province of _____ on the ___ day of _____, 2018, at _____ hours.

_____
(Signature - Vessel's Master)

_____
(Witness)

ANNEX G

SECURITY REQUIREMENTS CHECK LIST

(Not used)

ANNEX H

PROJECT MANAGEMENT SERVICES

(not used)

ANNEX I

FINANCIAL BID PRESENTATION SHEET

I0 Proposed Docking Facility Location: _____

I1 Price for Evaluation

A)	**Known Work** For work as stated in Clause 1.2 (i) a), specified in Annex "A" and detailed in the attached Price Per Item Sheet, Appendix 1 of Annex "I", ***for a FIRM PRICE of:***	$ _____
B)	**Unscheduled Work** Contractor *Labour Cost*: Estimated labour hours at a firm *hourly Charge-out Labour Rate*, including overhead and profit for evaluation purpose only: **3 500** person hours X $ _____ per hour ***for a PRICE of :*** *See Note I2.1 and I2.2 below.*	$ _____
C)	**Daily Service Fees for evaluation purpose only** *As per Clause I4 below* i) Eight (8) in drydock working days X $ _____ /firm daily service fee = $ _____; **plus** ii) Four (4) in drydock non-working days X $ _____ /firm daily service fee = $ _____ iii) Eight (8) alongside working days X $ _____ /firm daily service fee = $ _____; **plus** iv) Four (4) alongside non-working days X $ _____ /firm daily service fee = $ _____	$ _____
D)	**Vessel Transfer Cost** *As per paragraph I6 below*	$ _____
E)	**Cost of Financial Security**	$ _____
F)	**EVALUATION PRICE** Applicable taxes excluded [A + B + C + D + E]: **TOTAL EVALUATION PRICE of :**	**$**_____

I2 Unscheduled Work

The Contractor will be paid for unscheduled work arising, as authorized by the Minister, calculated in the following manner:

"Number of hours (to be negotiated) X $ _____ your firm hourly *Charge-out Labour Rate* which includes *Overhead* and profit, plus net laid-down cost of materials to which shall be added a **10% mark-up**, plus Applicable Taxes. The firm hourly *Charge-out Labour Rate* and the material mark-up will remain firm for the duration of the Contract and any subsequent amendments thereto."

I2.1: Notwithstanding definitions or useage elsewhere in this document, or in the Bidder's Cost Management System, when negotiating *Hours* for unscheduled work, PWGSC will consider only those hours of labour directly involved in the production of the subject work package.
Elements of Related Labour Costs identified in I2.2 below, will not be negotiated, but will be compensated for in accordance with paragraph I2.2 It is therefore incumbent upon the Bidder to enter values in the above table which will result in fair compensation, regardless of the structure of their Cost Management System.

I2.2: Allowance for *Related Labour Costs* such as: Management, Direct Supervision, Purchasing and Material Handling, Quality Assurance and Reporting, First Aid, Gas Free Inspecting and Reporting, and Estimating will be included as *Overhead* for the purposes of determining the *Charge-out Labour Rate* entered in line I2 above.

I2.3: The **10% mark-up** rate for materials will also apply to subcontracted costs. The mark-up rate includes any allowance for material and subcontract management not allowed for in the Chargeout Labour Rate. The Contractor will not be entitled to a separate labour component for the purchase and handling of materials or subcontract administration.

I3 Overtime

No overtime work shall be compensated for under the Contract unless authorized in advance and in writing by the Contracting Authority. Any request for payment must be accompanied by a copy of the overtime authorization and a report containing such details as Canada may require with respect to the overtime work performed. Compensation for authorized overtime will be calculated in the following manner:

a. For Known Work, the Contractor will be paid the original contract price plus agreed overtime hours paid at the following premium rates;
b. For Unscheduled Work, the Contractor will be paid for agreed overtime hours paid at the quoted *Charge-out Labour Rate* plus the following premium rates:

Time and one half: $ _____ per hour; or,

For Double time: $ _____ per hour

The above described premiums will be calculated as follows:

Premium for time and one half:

½ (that portion of the firm Hourly Charge-out Labour Rate in I2 that is directly attributable to salary cost plus related certified fringe benefits) times 7.5% (representing profit)

Premium for double time:

(that portion of the Unscheduled Work firm Charge-out Labour Rate in I2 that is directly attributable to salary cost plus related certified fringe benefits) times 7.5% (representing profit)

These premiums will remain firm for the duration of the Contract, including all amendments and are subject to audit by Canada, and to retroactive adjustment under the Contract if Canada discovers that the premiums have not been calculated in accordance with the formulae, above.

I4 Daily Services Fee

In the event of a delay in the performance of the Work that lengthens the Work Period beyond the date specified in this Contract,, and if such delay is recognized and agreed upon by the Contracting Authority as being attributable to Canada, Canada agrees to pay the Contractor the daily services fee, described below, for each day of such delay. This fee shall be the sole liability of Canada to the Contractor for the delay.

The firm daily services fee is:

(a) For a working day in drydock: $_____

(b) For a non-working day in drydock: $_____

(c) For a working day alongside: $_____

(d) For a non-working day alongside: $_____

The above fees shall include but not be limited to, all aspects of the following costs: Administrative Support, Production Services, Quality Assurance, Material Support, Planned Maintenance and Ship Services, and all other resources and direct costs needed to maintain the Vessel at the Contractor's facility, **including all items listed in I5.** These fees are firm and not subject to any additional charges for mark-up or profit.

I5 Cost of all Services is Included in Contract Price

All charges, fees expenses and disbursements incidental to the carrying out of the Work, including all items described in Supplemental General Conditions 1029 (2010-08-16) Ship Repair, section (07), are included in the Evaluation Price for the Work, including, without limitation:

1. **Services:** include all costs for ship services such as water, steam, electricity, etc., required for vessel maintenance for the duration of the Contract.

2. **Docking and Undocking** include:

   (a) all costs resulting from drydocking, wharfage, security, shoring, shifting and/or moving of the vessel within the successful Bidder's facility;

   (b) the cost of services to tie up the vessel alongside and to cast off.

   Unless specified otherwise, the vessel will be delivered by Canada to the successful Bidder's facility alongside a mutually agreed safe transfer point, afloat and upright, and the successful Bidder will do the same when the Work is completed.

3. **Field Service Representatives/Supervisory Services:** include all costs for field service representatives/supervisory services including manufacturers' representatives, engineers, etc.

4. **Removals**: include all costs for removals necessary to carry out the Work and will be the responsibility of the Contractor whether or not they are identified in the specifications, except those removals not apparent when viewing the vessel or examining the drawings. The successful Bidder will also be responsible for safe storage of removed items and reinstalling them on completion of the Work. The successful Bidder will be responsible for renewal of components damaged during removal.

5. **Sheltering, Staging, Cranage and Transportation:** include the cost of all sheltering, staging including handrails, cranage and transportation to carry out the Work as specified.

   The successful Bidder will be responsible for the cost of any necessary modification of these facilities to meet applicable safety regulations.

I6 Vessel Transfer Costs

1. The Evaluation Price shall include the cost for transferring the vessel from its home port to the shipyard/ship repair facility where the majority of the Work will be undertaken and the cost of returning the vessels to their home port following completion of the Work, in accordance with the following:
   (a) The bidder shall enter on Line **I0**, the location of the shipyard/ship repair facility where it proposes to undertake the Work. The applicable vessels' transfer costs provided under section 3. of this clause shall be entered into table I1.

   (b) Should the list in section 3. of this clause not provide the shipyard/ship repair location where the bidder intends to undertake the Work, then the bidder must advise the Contracting Authority, in writing, no later than **five calendar days** prior to the bid closing date, of its proposed location for undertaking the Work. The Contracting Authority will acknowledge to the bidder, in writing, no later than **three calendar** days prior to the bid closing date, the location of the shipyard/ship repair and confirm the applicable vessel transfer cost.

A Bid that specifies a location for undertaking the Work which is not in the list under section 3. of this clause, and for which a notification in writing has not been received by the Contracting Authority five days prior to the bid closing date, shall be deemed to be non-responsive.

2. Transfer costs, in this case, are based on using a government delivery crew and include the fuel cost at the vessel's most economical speed of transit and crew transportation costs for the delivery crew based on the location of the vessel's home port and the shipyard/ship repair facility.

3. Round trip transfer costs applicable to the following facilities are:

Company	City	Unmanned Transfer Cost
Davie Inc.	Levis, QC	**$ 0**
Heddle Marine Service Inc.	Hamilton, ON	**35 739,00 $**
Irving Shipbuilding Inc. (Halifax Shipyard)	Halifax, NS	**58 739,00 $**
NewDock- St-John's Dockyard Ltd.	St. John's, NF	**74 909,00 $**
Verreault Navigation Inc.	Les Méchins, QC	**34 081,00 $**

Appendix 1 of Annex I

A) KNOWN SCHEDULED WORK

PRICE PER ITEM SHEET			
Item	**Description**		**Firm Price**
1	**GENERAL NOTES**		_____ **$**
2	**GENERAL TEHCNICAL**		_____ **$**
3	**MECANICAL CHARACTERISTICS**		_____ **$**
4	**ELECTRONIC AND ELECTRICAL CHARACTERISTICS**		_____ **$**
5	**DOCUMENTS**		_____ **$**
6	**TESTS, DOCK TRIALS AND SEA TRIALS**		_____ **$**
7	**BERTHING, MOORING, DRY-DOCKING AND REFLOATING**		_____ **$**
8	**SERVICES**		_____ **$**
9	**ADDITIONAL WORK**		**N/A**
10	**SAFETY AND SECURITY EQUIPMENT** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)	_____ **$**	
	10.1 Lifeboat and davit replacement	_____ **$**	
	10.2 Fire fighting systems	_____ **$**	
	10.3 Alarm and monitoring systems upgrade	_____ **$**	
	10.4 Weathertight doors repairs	_____ **$**	
	Total for item 10		_____ **$**
11	**HULL AND RELATED STRUCTURES** (Price Excluding optional item(s) at table: **B) OPTIONAL SCHEDULED WORK** and sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)	_____ **$**	
	11.1 Cleaning and painting	_____ **$**	
	11.2 Hull plating above the load line	_____ **$**	
	11.3 Hull plaing welding joints	_____ **$**	
	11.4 Cargo hold DB tahnk plate replacement	_____ **$**	
	11.5 Chain locker	_____ **$**	
	11.6 Searchlights replacement	_____ **$**	
	11.7 Magnetic compass kingpost replacement and insulation	_____ **$**	
	11.8 Ballast water tanks and cofferdams – Cleaning, inspection and painting	_____ **$**	
	11.9 Welding works in cargo hold	_____ **$**	
	11.10 Fore castle stairway – Guard rail	**N/A**	
	11.11 Freeboard, draught and vessel's identity markings	_____ **$**	
	11.12 Strainers, sea boxes and sea bays	_____ **$**	
	Total for item 11		_____ **$**
12	**PROPULSION AND MANEUVERING** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees	_____ **$**	

	are not distributed an amount must be indicated in the price box.)		
	12.1 Starboard thrust bearing	_____ **$**	
	12.2 Propulsion shafting brakes	_____ **$**	
	12.3 Bellow assy on Stbd tail shaft's mechanical seal	_____ **$**	
	12.4 Bow truster replacement	_____ **$**	
	Total for item 12		_____ **$**
13	**SHIP'S SERVICE ELECTRICAL POWER GENERATION** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)	_____ **$**	
	13.1 Installation C-32	_____ **$**	
	13.2 Integration C-32	_____ **$**	
	Total for item 13		_____ **$**
14	**ELECTRICAL POWER DISTRIBUTION**		**N/A**
15	**AUXILIARY SYSTEMS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)	_____ **$**	
	15.1 Fuel oil, helicopter fuel and oily water tanks	_____ **$**	
	15.2 Lub. Oil tank cleaning and inspection	_____ **$**	
	15.3 Maintenance of scuba air compressor	_____ **$**	
	15.4 Boiler safety valves	**N/A**	
	15.5 Fuel oil transfer pumps replacement	_____ **$**	
	15.6 Diesel, Gas and Jet A-1 hose certification	_____ **$**	
	Total for item 15		_____ **$**
16	**DOMESTIC SYSTEMS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)	_____ **$**	
	16.1 Cleaning, painting and disinfection of potable water and boiler feed tanks	_____ **$**	
	16.2 HVAC plants replacement	_____ **$**	
	16.3 Galley hood cleaning	_____ **$**	
	16.4 Domestic refrigeration	_____ **$**	
	Total for item 16		_____ **$**
17	**DECK EQUIPMENT/ SHIP SUPPORT SYSTEMS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)	_____ **$**	
	17.1 Windlass, mooring winches and fairleads	_____ **$**	
	17.2 Speed crane – Five year maintenance	_____ **$**	
	17.3 Dumbwaiter	_____ **$**	
	Total for item 17		_____ **$**
18	**VESSEL COMMUNICATIONS AND NAVIGATION EQUIPMENT** (Price Excluding sub item(s) below)	_____ **$**	

	(Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		
	18.1 Speed log transducer suction valve	_____ $	
	Total for item 18		_____ $
	A) KNOWN SCHEDULED WORK – TOTAL FIRM PRICE		_____$

B) OPTIONAL SCHEDULED WORK

PRICE PER ITEM SHEET		
Item	**Description**	**Firm Price**
11	**11.1.C.4.1 a) Supply and install a temporary shelter.**	_____ $
	B) OPTIONAL SCHEDULED WORK – TOTAL FIRM PRICE	_____$

Note: PWGSC reserves the right to exercise all the options or partial options.

The Contractor grants to Canada the irrevocable option to acquire the goods, services or both described at Annex A of the Contract under the same conditions and at the prices and/or rates stated in the Contract. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment. The Contracting Authority may exercise the option within **10 days** after beginning of work by sending a written notice to the Contractor.

TOTAL (A) SCHEDULED WORK	TOTAL (B) OPTIONAL SHEDULED WORK	TOTAL KNOWN WORK FIRM PRICE ((A) + (B))
$ _____	$ _____	$ _____

Remark to Bidders:

Canada may reject the bid if any of the prices submitted do not reasonably reflect the cost of performing the part of the work to which that price applies.

Annex J

A) KNOWN SCHEDULED WORK

PRICING DATA SHEETS				
Item	**Description**			**Firm Price**
A) KNOWN SCHEDULED WORK				
1	**GENERAL NOTES** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	1.6.1 Facilities for use by personnel of Canada			
	1.6.1 a) Two (2) lockable offices = _____ $			
	1.6.1 b) Conference room = _____ $			
	1.6.1 h) Hands free phone = _____ $			
	1.6.1 i) Telephone services = _____ $			
	1.6.1 k) High speed internet = _____ $			
	1.6.1 l) Color printer = _____ $			
	Total firm price for item 1.6.1	_____ $		
	1.6.2 a) Washroom facilities must be nearby = _____ $			
	1.6.2 b) Six parking spaces = _____ $			
	Total firm price for item 1.6.2	_____ $		
	Total firm price for item 1.6		_____ $	
	1.7 Storage Space		_____ $	
	1.7.5 Three-ton truck services (Final amount prorated) Price per hour: ____ $ x 64 hours	_____ $		
	1.7.5 Forklift services (Final amount prorated) Price per hour: ____ $ x 64 hours	_____ $		
	Total firm price for item 1.7		_____ $	
	Total for item 1			_____ $
2	**GENERAL TECHNICAL** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	2.10.3 Pumping and disposal (bilge waste) (Final amount prorated) Price ____ $ /L x 5 000L	_____ $		
	2.10.3 Pumping and disposal (bilge waste) (Final amount prorated) Price ____ $ /L x 100L	_____ $		
	Total firm price for item 2.10		_____ $	
	Total for item 2			_____ $
3	**MECANICAL CHARACTERISTICS**			_____ $
4	**ELECTRONIC AND ELECTRICAL CHARACTERISTICS**			_____ $
5	**DOCUMENTS**			_____ $
6	**TESTS, DOCK TRIALS AND SEA TRIALS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees		_____ **$**	

	are not distributed an amount must be indicated in the price box.)			
	6.3 Ship performance sea trials		_____ **$**	
	Total firm price for item 6			_____ $
7	**BERTHING, MOORING, DRY-DOCKING AND REFLOATING** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	7.1 Berthing and Mooring		_____ **$**	
	7.3 Dry docking	_____ **$**		
	7.3.26 Installation of (5) temporary drains	_____ **$**		
	Total firm price for item 7.3		_____ **$**	
	7.4 Numbering		_____ **$**	
	7.5 Undocking		_____ **$**	
	Total firm price for item 7			_____ **$**
8	**SERVICES** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	8.2 Telephone + High-speed internet lines		**See 1.6.1**	
	8.3 Temporary protection of decks and bulkheads		_____ **$**	
	8.4 Electrical power 600 VAC, three-phase, 300 amps/connection			
	Connect	_____ **$**		
	Disconnect	_____ **$**		
	Service (500 000 KW-hr) (Final amount prorated) Price _____ $ / KW-hr X 500 000 KW-hr	_____ **$**		
	Total firm price for item 8.4		_____ **$**	
	8.5 Heating		_____ **$**	
	8.6 Fresh water and Firemain seawater services (Final amount prorated)			
	8.6.2 a) Potable water - Connect	_____ **$**		
	8.6.2 a) Potable water - Disconnect	_____ **$**		
	8.6.2 a) Service / day (8 tons / day) : _____ $ / ton x 8 tonnes X 701 days	_____ **$**		
	8.6.2 a) Filling of Potable water tanks (100 m³ / tank) Price _____ $ / m³ x 200 m³	_____ **$**		
	8.6.2 b) Non-Potable water - Connect	_____ **$**		
	8.6.2 b) Non- Potable water - Disconnect	_____ **$**		
	8.6.2 b) Non-Potable water Service / day: Price _____ $ / ton x 130 tons x 70 days	_____ **$**		
	8.6.3 Sea water Price _____ $ / m³ x 200 m³ x 70 days	_____ **$**		
	Total firm price for item 8.6		_____ **$**	
	8.7 Overboard discharge and drainage connections		_____ **$**	
	8.8 Black water and grey water (Final amount prorated)			

	Connect	_____ **$**		
	Disconnect	_____ **$**		
	Pump and disposal of black and grey water (400 m³) (Final amount prorated) Price _____ $ / m³ x 400 m³	_____ **$**		
	Total firm price for item 8.8		_____ **$**	
	8.9 Oily bilge water			
	8.9.1 Oily bilge water 20 000L (Final amount prorated) Price _____ $ / m³ x 20 000 m³	_____ **$**		
	8.9.1 Oily bilge water 1 000L (for info) (Final amount prorated) Price _____ $ / m³ x 1 000 m³	_____ **$**		
	Total firm price for item 8.9		_____ **$**	
	8.10 Garbage removal (Final amount prorated) Service / (10 cubic yards) _____ $ / day X 70 days		_____ $	
	8.11 Cranes and Scaffolding			
	8.11.1 5 tons crane services with required personnel (Final amount prorated) Price _____ $ / hr x 5 hrs /week x 10 weeks	_____ **$**		
	8.11.2.1 Statement/report of all removed/added weights	_____ **$**		
	8.11.3 Powered platform Services (Final amount prorated) Price _____ $ / hr x 5 hrs / week x 10 weeks	_____ **$**		
	Total firm price for item 8.11		_____ **$**	
	8.12 Clean up		_____ **$**	
	8.13 Vessel security (Final amount prorated) Service / day _____ $ X 70 days		_____ **$**	
	8.14 Vermin protection		_____ **$**	
	Total firm price for item 8			_____ **$**
9	**ADDITIONAL WORK**			**N/A**
10	**SAFETY AND SECURITY EQUIPMENT** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	10.1 Lifeboat and Davit replacement			
	10.1.B.3 Drawings 'As fitted'	_____ **$**		
	10.1.C Delivery and taking charge of components	_____ **$**		
	10.1.D.1 Installation procedures	_____ **$**		
	10.1.D.2 Generals	_____ **$**		
	10.1.D.3 Reinstallation after work	_____ **$**		
	10.1.D.4 Lifting points	_____ **$**		
	10.1.D.5 Surface preparation for paint	_____ **$**		
	10.1.D.6 Paint	_____ **$**		
	10.1.D.7 Work to be carried out	_____ **$**		

	10.1.D.8 Dismantling of existing equipment	_____ **$**		
	10.1.D.8.1 Upper deck 10.1.D.8.1 a) Relocation of the winch = _____ $ 10.1.D.8.1 b) Price for winch cables: _____ $ each x 2 cables = _____ $ 10.1.D.8.1 c) Price for replacement of three (3) hoses : _____ $ 10.1.D.8.1 e) Price for fabrication and installation of new winch seat : _____ $ 10.1.D.8.1 g) Price for installation of new cables: _____ $			
	Total firm price for item 10.1.D.8.1	_____ **$**		
	10.1.D.8.2 Boat deck 10.1.D.8.2 a) Removal, storage and preparation of lifeboat = _____ $ 10.1.D.8.2 b) Removal of davit and all components = _____ $ 10.1.D.8.2 c) Price for preparation = _____ $ 10.1.D.8.2 c) Price for sandblasting = _____ $ 10.1.D.8.2 c) Price for paint = _____ $ 10.1.D.8.2 d) Price for manipulation and transport = _____ $ 10.1.D.8.2 e) Work IAW 10.1.D.8.2 e) = _____ $ 10.1.D.8.2 f) Work IAW 10.1.D.8.2 f) = _____ $ 10.1.D.8.2 g) Work IAW Work IAW 10.1.D.8.2 g) = _____ $ 10.1.D.8.2 h) Work IAW Work IAW 10.1.D.8.2 h) = _____ $ 10.1.D.8.2 i) Work IAW Work IAW 10.1.D.8.2 i) = _____ $ 10.1.D.8.2 j) Work IAW 10.1.D.8.2 j) = _____ $ 10.1.D.8.2 k) Work IAW 10.1.D.8.2 k) = _____ $			
	Total firm price for item 10.1.D.8.2	_____ **$**		
	10.1.D.8.3 Officer's deck	_____ **$**		
	10.1.D.9 Installation	_____ **$**		
	10.1.E.1 Supply the on-site services of a manufacturer's (Palfinger) accredited technician Mobilisation / Demobilisation : ((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day)) Hourly rate _____ $/hr weekday x 10 hrs/day x __ days = _____ $	_____ **$**		

	Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x __ days = _____ $ Materials supplied by sub-contractor = _____ $ 1st visit = _____ $ (2 full days on site) 2nd visit = _____ $ (5 full days on site)			
	Total firm price for item 10.1		_____ **$**	
	10.2 Fire fighting systems			
	10.2.C.1 Fixed CO2 and FM200 fire extinguishing and smothering systems	_____ **$**		
	10.2.C.2 Portable Fire Extinguishers			
	10.2.C.2.6 Unit price to carry out hydrostatic tests for each type of portable fire extinguishers: (Final amounts prorated)			
	10.2.C.2.6 a) ABC extinguishers Price for 2.5 lbs extinguisher = _____ $ Price for 5 lbs extinguisher = _____ $ Price for 10 lbs extinguisher _____ $ x 5 extinguishers = _____ $ Price for 20 lbs extinguisher = _____ $ **Total for 10.2.C.2.6 a) = _____ $**			
	10.2.C.2.6 b) CO2 extinguishers Price for 5 lbs extinguisher = _____$ Price for 10 lbs extinguisher = _____$ Price for 15 lbs extinguisher _____ $ x 2 extinguishers = _____ $ Price for 35 lbs extinguisher = _____$ **Total for 10.2.C.2.6 b) = _____ $**			
	10.2.C.2.6 c) BC extinguishers Price for 20 lbs extinguisher = _____ $ **Total for 10.2.C.2.6 c) = _____ $**			
	10.2.C.2.6 d) AFFF extinguishers Price for 9.5 liters extinguisher = _____$ **Total for 10.2.C.2.6 d) = _____ $**			
	10.2.C.3 Galley, Fixed Fire Extinguishing Pyrochem system = _____ $			
	10.2.C.4 Flight Deck Fire Extinguishing System = _____ $			
	Total firm price for item 10.2		_____ **$**	
	10.3 Alarm and monitoring systems upgrade			
	10.3.A.2 Services of an authorized supplier by GE-Cimplicity OEM (OEM) Mobilisation / Demobilisation :			

	((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day)) Hourly rate _____ $/hr weekday x 10 hrs/day x __ days = _____ $ Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x __ days = _____ $ Materials supplied by sub-contractor = _____ $ 1st task = _____ $ (20 full days on site) 2nd task = _____ $ (28 full days on site) 3rd task = _____ $ (8 full days on site)	_____ $		
	10.3.D Installation of equipment and cables	**_____ $**		
	10.3.E Dismantling and disposal of equipment	**_____ $**		
	10.3.F Fix and install the equipment	**_____ $**		
	10.3.G Commissionning requirements	**_____ $**		
	Total firm price for item 10.3		**_____ $**	
	10.4 Weatherthight doors repairs		**_____ $**	
	Total firm price for item 10			**_____ $**
11	**HULL AND RELATED STRUCTURES** (Price Excluding optional item(s) at table: B) OPTIONAL SCHEDULED WORK and sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		**_____ $**	
	11.1 Cleaning and painting of the shell (1 950 m2)			
	11.1.C.1.1 Hull surface preparation for coating application Preparation (30%) 570m² x _____ $/ m²	**_____ $**		
	11.1.C.1.2 Hull washing (1 950 m2) Washing 1 950 m² x _____ $/ m²	**_____ $**		
	11.1.C.2 Application of red color coating compatible with the vessel's existing coating system **Application of red**	**_____ $**		
	11.1.C.3 Application of black color coating compatible with the vessel's existing coating system. **Application of black**	**_____ $**		
	11.1.C.4 Recommendations and additional requirements **additional requirements**	**_____ $**		
	11.1.C.4.1 a) Supply and install a ventilated and heated temporary shelter	**See Optional Scheduled Work**		
	11.1.C.4.6 Renew the cement for fifty (50) welded plugs			

	(Final amounts prorated) Price per plug ____ $ x 50 plugs	_____ **$**	
	11.1.E.1 Supply a new docking plan	_____ **$**	
	Total firm price for item 11.1		_____ **$**
	11.2 Hull plating above the load line (15% of 953 m2). (Final amounts prorated) Surface preparation: 143 m² x _____$/ m² = _____ $ Washing of surface : 810 m² x _____$/ m² = _____ $ Paint application bare metal areas : 143 m² x _____$/ m² = _____ $ Paint application (two coats of 2 mils each) : 953 m² x 2 x _____$/ m² = _____ $		
	Total firm price for item 11.2		_____ **$**
	11.3 Hull plating welding joints		
	11.3.C.1 Preparation and inspection	_____ **$**	
	11.3.C.2 Welding		
	11.3.C.2.1 Welding joints (Final amounts prorated) _____ $/ foot x 500 linear feet x 12 passes of welding (6 000 linear ft total = _____ $)		
	11.3.C.2.10 Gouging (Final amounts prorated) _____ $/ foot x 500 linear feet of welding = _____ $		
	11.3.C.2.10 Grinding (Final amounts prorated) _____ $/ foot x 500 linear feet of grinding = _____ $		
	11.3.C.2.11 Weld seam (Final amounts prorated) _____ $/ foot x 6 000 linear feet of weld seam = _____ $		
	Total firm price for item 11.3.C.2	_____ **$**	
	11.3.C.4 Radiographic Inspection (Final amounts prorated) _____ **$/ film x 12 films de soudure**	_____ **$**	
	11.3.C.5 Completion of the work	_____ **$**	
	Total firm price for item 11.3		_____ **$**
	11.4 Cargo hold DB tahnk plate replacement		_____ **$**
	11.5 Chain locker (2 chain lockers) 1 400 sq ft, 700 sq ft each		
	11.5.C.4 Hydro-blast clean, scrape and brush with a steel brush	_____ **$**	
	11.5.C.5 Removing, transporting and the disposal of approximately two (2) cubic meters of mud and associated debris	_____ **$**	
	11.5.C.6 Analyze mud sample	_____ **$**	
	11.5.C.10 Ultrasonics shots _____ $/ shot x 20 shots	_____ **$**	
	11.5.C.12 Paint all bare interior surfaces	_____ **$**	
	Total firm price for item 11.5		_____ **$**

	11.6 Replacement of (2) Searchlights			
	11.6.C.1 Deck above wheelhouse – Searchlights CL38-11	_____ **$**		
	11.6.C.2 After Mast – Searchlight CL35-11	_____ **$**		
	Total firm price for item 11.6		_____ **$**	
	11.7 Magnetic compass kingpost replacement and insulation			
	11.7.E.1 Calibration of the magnetic compass during sea trials	_____ **$**		
	Total firm price for item 11.7		_____ **$**	
	11.8 Ballast water tanks and cofferdams – Cleaning, inspection and painting			
	11.8 Tanks:			
	Forepeak Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 309 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification **= _____ $**			
	Total price for Forepeak	_____ **$**		
	Aft peak Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 167 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification **= _____ $**			
	Total price for Aft peak	_____ **$**		
	Double bottom after (#3) Port Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 132 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification			

	= _____ $			
	Total price for Double bottom after (#3) Port	**_____ $**		
	Double bottom after (#4) Stbd Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 132 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification **= _____ $**			
	Total price for Double bottom after (#4) Stbd	**_____ $**		
	Double bottom #2 Port Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 162 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification **= _____ $**			
	Total price for Double bottom #2 Port	**_____ $**		
	Double bottom #2 Stbd Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 162 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification **= _____ $**			
	Total price for Double bottom #2 Stbd	**_____ $**		
	FWD Wing Port Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $			

	137 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for FWD Wing Port	**_____ $**		
	FWD Wing Stbd Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 137 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for FWD Wing Stbd	**_____ $**		
	Aft Wing Port Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 154 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Aft Wing Port	**_____ $**		
	Aft Wing Stbd Preparation, cleaning and inspection = _____ $			
	Draining and disposing 5 tons of water and debris (Final amounts prorated) Price _____ $ / ton x 5 tons = _____ $			
	Paint application on bare metal surfaces (40% expected surface) = _____ $ 154 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Aft Wing Stbd	_____ **$** x 2 coats		
	11.8 – Void Spaces:			
	VOID #1 Port Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated)			

	Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 46 m² x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #1 Port Outboard	_____ **$**		
	VOID #1 Stbd Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 46 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #1 Stbd Outboard	_____ **$**		
	VOID #2 Port Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 57 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #2 Port Outboard	_____ **$**		
	VOID #2 Stbd Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 57 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #2 Stbd Outboard	_____ **$**		
	VOID Double bottom Port Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			

	Paint application on bare metal surfaces (20% expected surface) = _____ $ 12 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID Double bottom Port	_____ **$**		
	VOID Double bottom Stbd Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 14,5 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID Double bottom Stbd	_____ **$**		
	VOID #3 Port Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 38 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #3 Port Outboard	_____ **$**		
	VOID #3 Stbd Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 38 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #3 Stbd Outboard	_____ **$**		
	VOID #4 Port Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $			

	56 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #4 Port Outboard	_____ **$**		
	VOID #4 Stbd Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 56m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #4 Stbd Outboard	_____ **$**		
	VOID #5 Port Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 57 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #5 Port Outboard	_____ **$**		
	VOID #5 Stbd Outboard Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 57 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for VOID #5 Stbd Outboard	_____ **$**		
	VOID Aft Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 12 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification			

	= _____ $			
	Total price for VOID Aft	**_____ $**		
	Cofferdam, Helicopter Fuel Tank Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 24 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Cofferdam, Helicopter Fuel Tank	**_____ $**		
	Port Echo Sounder Compartment Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (100% expected surface) = _____ $ 15 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Port Echo Sounder Compartment	**_____ $**		
	Stbd Echo Sounder Compartment Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (100% expected surface) = _____ $ 15 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Stbd Echo Sounder Compartment	**_____ $**		
	Fore Center Piping Tunnel Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (25% expected surface) = _____ $ 52,5 m² x 2 coats x _____$/ m² = _____ $			

	Closing, testing and certification = _____ $			
	Total price for Fore Center Piping Tunnel	_____ **$**		
	Aft Center Piping Tunnel Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (25% expected surface) = _____ $ 35 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Aft Center Piping Tunnel	_____ **$**		
	Port lateral double bottom VOID Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (20% expected surface) = _____ $ 5 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Port lateral double bottom VOID	_____ **$**		
	Stbd Cofferdam for centreboard trunk transducer Preparation, cleaning and inspection = _____ $			
	Draining and disposing 1 ton of water and debris (Final amounts prorated) Prix _____ $ / ton = _____ $			
	Paint application on bare metal surfaces (25% expected surface) = _____ $ 7,5 m² x 2 coats x _____$/ m² = _____ $			
	Closing, testing and certification = _____ $			
	Total price for Stbd Cofferdam for centreboard trunk transducer	_____ **$**		
	Total firm price for item 11.8		_____ **$**	
	11.9 Welding works in cargo hold			
	11.9.C.1.1 Item No.1	_____ **$**		
	11.9.C.1.2 Item No.2	_____ **$**		
	11.9.C.1.3 Item No.3	_____ **$**		
	11.9.C.1.4 Item No.4	_____ **$**		
	11.9.C.1.5 Item No.5	_____ **$**		
	11.9.C.1.6 Item No.6	_____ **$**		

	11.9.C.1.7 Item No.7	**_____ $**		
	11.9.C.1.8 Item No.8	**_____ $**		
	11.9.C.1.9 Item No.9	**_____ $**		
	11.9.C.1.9 Item No.10	**_____ $**		
	11.9.C.1.10 Item No.11	**_____ $**		
	11.9.C.1.11 Pillar	**_____ $**		
	11.9.C.1.12 Tension test	**_____ $**		
	11.9.C.1.13 Sand blast	**_____ $**		
	11.9.C.1.14 Primer	**_____ $**		
	Total firm price for item 11.9		**_____ $**	
	11.11 Freeboard, draught and vessel's identity markings		**_____ $**	
	11.12 Strainers, sea boxes and sea bays			
	11.12.C.1 Sea Strainers			
	11.12.C.1.1 Open the port and starboard (2) sea strainers = _____ $			
	11.12.C.1.2 Remove and sand blast the sea strainer grates to remove any marine growth or corrosion = _____ $			
	11.12.C.1.3 Mechanically clean to bare clean surfaces the strainer boxes for inspection = _____ $			
	11.12.C.1.4 Paint = _____ $			
	11.12.C.1.6 Reinstallation of strainers and covers = _____ $			
	11.12.C.1.7 Reconnect the vents and drain piping = _____ $			
	11.12.C.1.8 Cost to have the strainers hot galvanized = _____ $			
	Total firm price for item 11.12.C.1	**_____ $**		
	11.12.C.2 Seaboxes			
	11.12.C.2.1 Remove the manhole covers of all the sea chests and the access grates (on the hull) to the stern tube pump sea chest = _____ $			
	11.12.C.2.2 Clean the internal surfaces = _____ $			
	11.12.C.2.3 Carry ashore waste mud 10 m3 x _____ $/ m3 = _____ $			
	11.12.C.2.5 Mechanically ream all access grates' holes = _____ $			
	11.12.C.2.6 Supply and install new zink anodes = _____ $			
	11.12.C.2.7 Sand blast clean any bared areas and remove all dirt in preparation for painting = _____ $			

	11.12.C.2.9 Paint each sea chest with two (2) separate coats of paint compatible with the vessel's existing coating system ___ m² x _____$/ m² = _____ $			
	11.12.C.2.12 Close the seaboxes' access grates = _____ $			
	11.12.C.2.13 Close all manhole covers = _____ $			
	Total firm price for item 11.12.C2	_____ **$**		
	Total firm price for item 11			_____ **$**
12	**PROPULSION AND MANEUVERING** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	12.1 Starboard thrust bearing			
	12.1.C.1 Set-up	_____ **$**		
	12.1.C.2 Dismantling	_____ **$**		
	12.1.C.3 Inspection	_____ **$**		
	12.1.C.4 Reassembly	_____ **$**		
	Total firm price for item 12.1		_____ **$**	
	12.2 Propulsion shafting brakes		_____ **$**	
	12.3 Bellow assy on Stbd tail shaft's mechanical seal			
	12.3.C.1 Supply the services of a Wartsila certified FSR to supervise the work Mobilisation / Demobilisation : ((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day)) Hourly rate _____ $/hr weekday x 10 hrs/day x __ days = _____ $ Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x __ days = _____ $ Materials supplied by sub-contractor = _____ $ 1st task = _____ $ (2 full days on site) 2nd task = _____ $ (3 full days on site)	_____ **$**		
	12.3.D.1.1 Inside dry dock trials	_____ **$**		
	12.3.D.1.2 Sea trials	_____ **$**		
	Total firm price for item 12.3		_____ **$**	
	12.4 Bow truster replacement			
	12.4.D.1.1 Provide the services of a WCT to supervise the bow thruster installation and commissioning Mobilisation / Demobilisation :			

	((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day)) Hourly rate _____ $/hr weekday x 10 hrs/day x 40 days = _____ $ Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x 6 days = _____ $ Materials supplied by sub-contractor = _____ $ Cost per travel per visit: _____ $ x 5 visits (both ways) = _____ $	_____ **$**		
	12.4.E Bow Thruster removal	_____ **$**		
	12.4.F Work in accordance with 12.4.F	_____ **$**		
	12.4.G Work in accordance Winch room - Forecastle	_____ **$**		
	12.4.H Work in accordance Bow Thruster Compatment	_____ **$**		
	12.4.I Bow Thruster installation	_____ **$**		
	12.4.J Work in accordance Guidance Documents	_____ **$**		
	12.4.J.5 Supply and install any cabling not identified as being supplied by the CGTA	_____ **$**		
	12.4.J.11 Megger tests on new bow thruster motor	_____ **$**		
	12.4.J.12 Polarization Index tests (PI) on new bow thruster motor	_____ **$**		
	12.4.J.19 Supply and install communication cables	_____ **$**		
	12.4.J.20 Hire an OEM certified sub-contractor in order to incorporate the new Wartsila thruster alarm functions	_____ **$**		
	12.4.J.29 Installation of the cathodic protection system which consists of anode supports and aluminum anodes	_____ **$**		
	12.4.J.30 Installation of the hydraulic oil system, along with the header tank and starter cabinet	_____ **$**		
	12.4.J.32 Manufacture and install 2 grids	_____ **$**		
	12.4.K Modifications and additions to structure in way of the new Thruster Unit	_____ **$**		
	12.4.L Lubricating oil header tank and pump set	_____ **$**		
	12.4.M Monitor control in winch room/Forecastle compartment	_____ **$**		
	12.4.N Materials	_____ **$**		
	12.4.O Welding	_____ **$**		
	12.4.P Coatings, Paint Work and insulation	_____ **$**		
	12.4.Q Wheelhouse wing control boxes	_____ **$**		
	12.4.U Contractor supplied material (CSM)	_____ **$**		
	12.4.V.1 Inspection	_____ **$**		

	12.4.V.2 Testing	_____ **$**		
	12.4.V.3 Dock trials	_____ **$**		
	12.4.V.4 Sea trials	_____ **$**		
	Total firm price for item 12.4		_____ **$**	
	Total firm price for item 12			_____ **$**
13	**SHIP'S SERVICE ELECTRICAL POWER GENERATION** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	13.1 Installation C-32			
	13.1.D Work overview	_____ **$**		
	13.1.D.1 Supply the services of a Technician certified to work on Caterpillar products (TCC) Mobilisation / Demobilisation : ((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day)) Hourly rate _____ $/hr weekday x 10 hrs/day x __ days = _____ $ Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x __ days = _____ $ Materials supplied by sub-contractor = _____ $ 1st visit = _____ $ (2 full days on site) 2nd visit = _____ $ (5 full days on site)	_____ **$**		
	13.1.E Work preparation in engine room	_____ **$**		
	13.1.F Work preparation to dismantle existing diesel engine and alternator	_____ **$**		
	13.1.G Piping removal	_____ **$**		
	13.1.H Steel work	_____ **$**		
	13.1.I Extraction/removal of 3508 engine	_____ **$**		
	13.1.J Insertion/entrance Caterpillar C32	_____ **$**		
	13.1.K Reconnections	_____ **$**		
	13.1.L Tests and trials	_____ **$**		
	Total firm price for item 13.1		_____ **$**	
	13.2 Integration C-32			
	13.2.A.2 Supply the services of an authorized supplier by Woodward (OEM) Mobilisation / Demobilisation : ((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day))			

	Hourly rate _____ $/hr weekday x 10 hrs/day x __ days = _____ $ Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x __ days = _____ $ Materials supplied by sub-contractor = _____ $ 1st task : _____ $ (20 full days on site) / FSR x 3 FSR = _____ $ 2nd task = _____ $ (10 full days on site) / FSR x 3 FSR = _____ $ 3rd task = _____ $ (5 full days on site) / FSR x 3 FSR = _____ $	_____ **$**		
	13.2.D Installation of equipment and cables	_____ **$**		
	13.2.E Commissioning requirements	_____ **$**		
	Total firm price for item 13.2		_____ **$**	
	Total firm price for item 13.2			_____ **$**
14	**ELECTRICAL POWER DISTRIBUTION**			**N/A**
15	**AUXILIARY SYSTEMS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	15.1 Fuel oil, helicopter fuel and oily water tanks			
	15.1.C.1 Emptying and draining the tanks			
	15.1.C.1.2 Price to store ashore and pump back fifty (100 m³) cubic metres of diesel fuel 100 m³ x _____$/ m³	_____ **$**		
	15.1.C.1.2 Price to store ashore and pump back five (5 m³) cubic metres of diesel fuel 5 m³ x _____$/ m³	_____ **$**		
	15.1.C.1.2 a) Price to drain and disponse of five (5 m³) cubic metres of helicopter fuel 5 m³ x _____$/ m³	_____ **$**		
	15.1.C.1.4 Removal and disposal of approximately fifteen (15 m³) cubic metres of fuel residue and dirt which can be expected to be found in the tanks in 15.1.B 15 m³ x _____$/ m³	_____ **$**		
	15.1.C.2 Opening and cleaning of tanks, 15.1.C.3 Tanks inspection and 15.1.C.4 Tanks testing			
	Fuel tank No 1 port C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Fuel tank No 1 port	_____ $		
	Fuel tank No 2 starboard C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			

	Total firm price for Fuel tank No 2 starboard	_____ $		
	Fuel tank No 3 port C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Fuel tank No 3 port	_____ $		
	Fuel tank No 4 starboard C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Fuel tank No 4 starboard	_____ $		
	Fuel tank No 5 port C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Fuel tank No 5 port	_____ $		
	Fuel tank No 6 starboard C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Fuel tank No 6 starboard	_____ $		
	Double bottom No 7 port C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Double bottom No 7 port	_____ $		
	Double bottom No 8 starboard C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Double bottom No 8 starboard	_____ $		
	Double bottom No 9 port C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Double bottom No 9 port	_____ $		
	Double bottom No 10 starboard C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Double bottom No 10 starboard	_____ $		
	Overflow tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Overflow tank	_____ $		
	Fuel drain tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Fuel drain tank	_____ $		
	Oily water tank			

	C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Oily water tank	_____ $		
	Port used oil tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Port used oil tank	_____ $		
	Starboard oily water tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Starboard oily water tank	_____ $		
	Helicopter fuel tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Helicopter fuel tank	_____ $		
	Lower flume tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Lower flume tank	_____ $		
	Upper flume tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Upper flume tank	_____ $		
	Renovated oil tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Renovated oil tank	_____ $		
	Day tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Day tank	_____ $		
	Settling tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Settling tank	_____ $		
	Emergency generator tank C.2 Opening and cleaning of tank = _____ $ C.3 Tank inspection = _____ $ C.4 Tank testing = _____ $			
	Total firm price for Emergency generator tank	_____ $		
	15.1.D Proof of performance			
	15.1.D.1 Inspections **= _____ $**			
	15.1.D.2.1 Hydrostatic or air pressure test			

	= _____ $			
	15.1.D.2.2 Vacuum box tests = _____ $			
	Total firm price for item 15.1.D	_____ $		
	Total firm price for item 15.1		_____ **$**	
	15.2 Lub. Oil tank cleaning and inspection			
	15.2.C.1.2 Price to pump and store ashore and then pump on board the vessel back ten (10 m³) cubic metres of lubricating oil 10 m³ x _____$/ m³ =	_____ $		
	Total firm price for item 15.2		_____ **$**	
	15.3 Maintenance of scuba air compressor		_____ **$**	
	15.5 Fuel oil transfer pumps replacement		_____ **$**	
	15.6 Diesel, Gas and Jet A-1 hose certification		_____ **$**	
	Total firm price for item 15			_____ **$**
16	**DOMESTIC SYSTEMS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	16.1 Cleaning, painting and disinfecting of potable water and boiler feed tanks			
	Port potable water C.1 Preparation, cleaning and painting = _____ $ C.2 Overhaul of tanks' suction and discharge Valves = _____ $ C.3 Sterilization and commissioning of potable water tanks = _____ $			
	16.1.C.1.2 Replacement of two (2) piping sections	_____ **$**		
	Total firm price for Port potable water	_____ **$**		
	Starboard potable water C.1 Preparation, cleaning and painting = _____ $ C.2 Overhaul of tanks' suction and discharge Valves = _____ $ C.3 Sterilization and commissioning of potable water tanks = _____ $			
	16.1.C.1.2 Replacement of two (2) piping sections	_____ **$**		
	Total firm price for Starboard potable water	_____ **$**		
	Feed water C.1 Preparation, cleaning and painting = _____ $ C.2 Overhaul of tanks' suction and discharge Valves = _____ $ C.3 Sterilization and commissioning of potable water tanks = _____ $			
	Total firm price for Feed water	_____ **$**		
	16.1.C.12 Price on having a certified NACE International (NACE) inspector	_____		
	16.1.D Proof of performance			

	16.1.D.1 Inspections	_____ **$**		
	16.1.D.2 Water quality analysis	_____ **$**		
	16.1.E.4 NACE Certified report	_____ **$**		
	Total firm price for item 16.1		_____ **$**	
	16.2 HVAC plants replacement			
	16.2.E Work preparation	_____ **$**		
	16.2.F Dismantling	_____ **$**		
	16.2.G Work in accordance with 16.2.G	_____ **$**		
	16.2.H Port and starboard ventilation	_____ **$**		
	16.2.I Work in accordance with 16.2.I	_____ **$**		
	16.2.J Temporary access opening	_____ **$**		
	16.2.K HVAC units removal	_____ **$**		
	16.2.L New HVAC unit installation and pipe connections	_____ **$**		
	16.2.M Temporary access closure and finishes	_____ **$**		
	16.2.N HVAC unit trials and commissioning	_____ **$**		
	16.2.N.2.1 Service of an independent technician, certified to work on Bronswerk products (TCB) Mobilisation / Demobilisation : ((For info : ___ hrs expected for travel time per visit; Travel fees : ____ $ per visit; meals: ____ $/day; room: ____ $/day)) Hourly rate _____ $/hr weekday x 10 hrs/day x __ days = _____ $ Hourly rate _____ $/hr weekend day of public holiday x 10 hrs/day x __ days = _____ $ Materials supplied by sub-contractor = _____ $ 1st visit = _____ $ (2 full days on site) 2nd visit = _____ $ (5 full days on site)	_____ **$**		
	Total firm price for item 16.2		_____ **$**	
	16.3 Galley Hood cleaning		_____ **$**	
	16.4 Domestic Refrigeration		_____ **$**	
	Total firm price for item 16			_____ **$**
17	**DECK EQUIPMENT/ SHIP SUPPORT SYSTEMS** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ **$**	
	17.1 Windlass, mooring winches and fairleads			
	17.1.C.1 Windlass	_____ **$**		
	17.1.C.2 Port forward mooring winch brake	_____ **$**		
	17.1.C.3 Port-Colborne type fairlead, starboard, forward	_____ **$**		
	Total firm price for item 17.1		_____ **$**	
	17.2 Speed Crane – Five year maintenance		_____ **$**	

	17.3 Dumbwaiter		_____ $	
	Total firm price for item 17			_____ $
18	**VESSEL COMMUNICATIONS AND NAVIGATION EQUIPMENT** (Price Excluding sub item(s) below) (Bidders can enter $0.00 or indicate 'included' if the fees for this item are distributed in each of the items bellow. In case the fees are not distributed an amount must be indicated in the price box.)		_____ $	
	18.1 Speed log transducer suction valve			
	18.1.D Proof of performance			
	18.1.D.1 Inspection	_____ $		
	18.1.D.2 Testing	_____ $		
	Total firm price for item 18.1		_____ $	
	Total firm price for item 18			_____ $
	A) KNOWN SCHEDULED WORK – TOTAL FIRM PRICE			_____$

B) OPTIONAL SCHEDULED WORK

PRICE PER ITEM SHEET		
Item	**Description**	**Firm Price**
11	**11.1.C.4.1 a) Supply and install a temporary shelter.**	_____ $
	B) OPTIONAL SCHEDULED WORK – TOTAL FIRM PRICE	_____$

Remark to Bidders:

Canada may reject the bid if any of the prices submitted do not reasonably reflect the cost of performing the part of the work to which that price applies.

ANNEX K

EQUIVALENT PRODUCTS DATA SHEET AND OTHER

Description	Technical references within the bid documents (page #, paragraph, etc.)
Minimal performance criteria of the submitted equivalent products Section to complete by Bidders wishing to submit equivalent products to those indicated in Annex A.	
Item 2.2.7.1. **The bidder must read the contents of the study titled** *« 141-19427-16 Rapport Martha L. Black QAI FINAL 20170216 » et « 141-19427 –01 Rapp Martha L. Black HazMat FINAL 20170501 »*	**To provide with bid**
Item 2.2.7.2 Attestation certifying that the bidder read the document mentioned in 2.2.7.1	**To provide with bid**
Item 3.5.7.1 **Equivalence Product for « Manson AK Flex™ » waterproof ducting insulation**	**To provide with bid**
Make et model of proposed insulation	Make :_____ Model : _____
Item 3.5.7.1 **Equivalence Criteria for « Manson AK Flex™ » vapor seal ducting insulation**	**To provide within 2 working days after written request to this effect**
1. The insulation must have capacity to seal from vapor.	
2. The insulation thickness must be a minimum of two (2'') inches.	

3. The insulation must be a factory applied vapor barrier	
4. The vapour barrier dam must be a product with fiberglass cloth.	
Item 10.1.D.8.2.h.i) **Equivalent Product for «Hydrex 22» hydraulic oil**	**To provide with bid**
Make, type and grade of proposed hydraulic oil	Make :_____ Type : _____ Grade: _____
Item 10.1.D.8.2.h.i) **Equivalence Criteria for for «Hydrex 22» hydraulic oil**	**To provide within 2 working days after written request to this effect**
1. For use at a wide temperature range (-40°C to 40°C) The bidder must provide the manufacturer's documentation demonstrating that the proposed oil is recommended for the above temperatures.	
2. Thread For use in systems equipped with fine filters down to 3 microns without loss of additives or filter plugging: The bidder must provide the manufacturer's documentation demonstrating that the proposed oil fulfills this criterion.	
3. Nominal Physical properties to be respected : Pour point: (-50°C) or lower Flash point: 200°C or higher The bidder must provide the manufacturer's documentation demonstrating that the proposed oil fulfills these criterions.	

Item 10.1.D.9.5.a **Equivalent Product for « Rigid Q » marine lighting fixtures**	**To provide with bid**
Make et model of proposed fixtures	Make :_____ Model : _____
Item 10.1.D.9.5.a **Equivalence Criteria for the « Rigid Q » marine lighting fixtures**	**To provide within 2 working days after written request to this effect**
1. Exterior lighting fixture, Weather proof : The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill this criterion.	
2. Flood light : The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill this criterion.	
3. Marine type fixture : The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill this criterion.	
4. IP68 certified and MIL810-STDG Vibration certified : The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill these criterions.	
5. Operating temperature: between (-40°C) and 60°C. The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill this criterion.	
6. Maximum dimensions: (Length, width, depth): (20 cm x 20 cm x 12 cm). The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill this criterion.	
7. Electrical supply: 110/120 V AC. The bidder must provide the manufacturer's documentation demonstrating that the proposed fixtures fulfill this criterion.	

Item 10.1.E **Certificate for the technician verifying the davit installation, the electrical and electronic connections, supervising the preliminary and full tests and validate the static and dynamic tests.**	**To provide with bid**
1.The bidder must provide a certificate proving that the technician supervising the work performed on these equipments is certified by Palfinger	
Item 10.3.A.2 **Certificate for the authorized service supplier to complete all necessary connections, perform preliminary verifications to commissioning, and the commissioning of the new AMS system updated and redundant**	**To provide with bid**
1.The bidder must provide a certificate proving that the authorized service supplier performing the work is certified as a specialist integrator of GE - Cimplicity equipment.	
Item 11.12.B.1.a.i **Equivalent Product for type «Z-19» Zinc anodes**	**To provide with bid**
Proposed Zinc anodes	Make :_____ Dimensions : _____
Item 11.12.B.1.a.i **Equivalence Criteria for type «Z-19» Zinc anodes**	**To provide within 2 working days after written request to this effect**
1. Bolted type anode : The bidder must provide the manufacturer's documentation demonstrating that the proposed anodes fulfill this criterion.	

2. Weight : 23 lbs: The bidder must provide the manufacturer's documentation demonstrating that the proposed anodes fulfill this criterion.	
Item 11.12.B.1.b.i **Equivalent Product for type «B-4» Zinc anodes**	**To provide with bid**
Proposed Zinc anodes	Make :_____ Dimensions : _____
Item 11.12.B.1.b.i **Equivalence Criteria for type «B-4» Zinc anodes**	**To provide within 2 working days after written request to this effect**
1. Bolted type anode : The bidder must provide the manufacturer's documentation demonstrating that the proposed anodes fulfill this criterion.	
2. Weight : 32 lbs: The bidder must provide the manufacturer's documentation demonstrating that the proposed anodes fulfill this criterion.	
Item 11.12.B.1.c.i **Equivalent Product for type « P-4-B-2 » Zinc anode**	**To provide with bid**
Proposed Zinc anode	Make :_____ Dimensions : _____

Item 11.12.B.1.c.i **Equivalence Criteria for type « P-4-B-2 » Zinc anode**	**To provide within 2 working days after written request to this effect**
1. Bolted type anode : The bidder must provide the manufacturer's documentation demonstrating that the proposed anode fulfills this criterion.	
2. Weight : 32 lbs: The bidder must provide the manufacturer's documentation demonstrating that the proposed anode fulfills this criterion.	
Item 12.3.C.1 **Certificate for the technician supervising the work on the bellow assembly**	**To provide with bid**
1.The bidder must provide a certificate proving that the FSR supervising the work is certified by Wartsila	
Item 12.4.A.2 **Certificate for the technician supervising the installation, start-up and sea trials of the new bow thruster**	**To provide with bid**
1.The bidder must provide a certificate proving that the technician (WCT) supervising the work is certified by Wartsila	
Item 12.4.J.20 **Certificate for the sub-contractor to update and incorporate the new Wartsila thruster alarm functions**	**To provide with bid**

1.The bidder must provide a certificate proving that the sub-contractor is certified as an OEM support for GE Cimplicity equipment..	
Item 13.1.D.1 **Certificate for the technician supervising the installation, final inspection, mechanical and electric testing of the new Caterpillar C-32 engine.**	**To provide with bid**
1.The bidder must provide a certificate proving that the technician (TCC) supervising the work is certified by Caterpillar.	
Item 13.2.A.2 **Certificate for the service supplier to complete all necessary connections, preliminary verifications to start-up, and the commissioning of the new control system of the new Caterpillar C-32 engine.**	**To provide with bid**
1. The bidder must provide a certificate proving that the service supplier is authorized by Woodward Governors as a specialist integrator of Woodward equipment.	
Item 13.1.G.5.9.a **Equivalent Product for « Duron SHP 10w30 » lubricating oil, for C-32 Caterpillar engine**	**To provide with bid**
Make, type and grade of proposed lubricating oil	Make :_____ Type : _____ Grade: _____

Item 13.1.G.5.9.a **Equivalence Criteria for « Duron SHP 10w30 » lubricating oil, for C-32 Caterpillar engine**	**To provide within 2 working days after written request to this effect**
1. Meets specification of Caterpillar engines: The bidder must provide the manufacturer's documentation demonstrating that the proposed oil fulfills this criterion.	
2. Nominal Physical properties to be respected : Pour point: (-40°C) or lower Flash point: 200°C or higher The bidder must provide the manufacturer's documentation demonstrating that the proposed oil fulfills these criterions.	
Item 16.2.N.2 **Certificate for the technician supervising the installation, electrical and electronic checks, leak tests and preliminary and full tests according to Bronswerk standards.**	**To provide with bid**
1. The bidder must provide a certificate proving that the technician (TCB) supervising the work is certified by Bronswerk.	

Annex A, Rev. 2

CCGS Martha L. Black

2018 Refit and VLE drydock

Annual maintenance

Specification number: F3012 – 18IN014

Prepared by:
Integrated Technical Services
Canadian Coast Guard
Central & Arctic Region
101, Blvd Champlain
Québec, Qc G1K 7Y7

TABLE OF CONTENTS

1.0 GENERAL NOTES

1.1 Introduction

1.1.1 These project requirements are provided to the Contractor to define the objectives, performance, engineering standards and requirements for the Vessel Life Extension (VLE) refit of the CCGS Martha L. Black for the Canadian Coast Guard, Department of Fisheries and Oceans Canada. This refit includes the fairing of the vessel, maintenance of the tanks, replacement of bow thruster, auxiliary generator, davit and lifeboat, HVAC system and upgrade of the alarm and monitoring system.

1.1.2 It is the Contractor's responsibility to ensure that:

a) The execution of the work specified herein meets the requirements described and those of Regulatory Bodies.

b) All items and equipment supplied are deemed necessary to ensure the seaworthiness and safe operation of the vessel, as required for a vessel of this class.

1.1.3 Sections 10 through 20 of this Specification package define the individual work items for which the Contractor must address as part of the VLE project for the CCGS Martha L. Black.

1.1.4 The performance requirements presented in Sections 1 through 9 of these project specifications must apply to Sections 10 to 20 in all respects. It is possible that the Specifications, in Sections 10 to 20, do not directly refer to Sections 1 to 9; however, they must still apply.

1.1.5 Abbreviations used in the Specification are provided in Appendix A.

1.1.6 A complete list of drawings for the CCGS Martha L. Black is provided in Appendix B.

1.1.7 Except for the first few days of the vessel at the Contractor's facilities and for the last days of work, when the vessel will be floating, part of the crew will be working on board for most of the refit period. Work will be scheduled so it will not interfere with the Contractor's work and will be performed from 06H00 to 18H00. Those personnel will not live on board the vessel and will only use the potable water and sewage systems.

1.1.8 However, a work supervision and approval team, led by the Chief Engineering Officer and the CGTA, will always be on board whenever work is going on. Just like the other crew members, they will not live on board the vessel and will only use the potable water and sewage systems, in addition to the offices made available in the Contractor's office and on board the vessel.

1.2 General Particulars of Ship

Name: CCGS Martha L. Black
Type: Type 1100 Navaids tender and light icebreaker
Year built: 1986
Builder: Versatile Pacific Shipyards, (BC)
Main dimensions;
Overall length: 83.0 m
Moulded breadth: 16.18 m
Draft (full load): 6.49 m
Gross tonnage: 3818.06 gross tons,
Net tonnage: 1529.43 gross tons
Propulsion system:
Three (3) ALCO 251, V16 cylinder diesel engines, 2200 kW each.
Two CGE AC electric propulsion motors, 2100 kW each

1.3 Acronyms

ACRONYMS	Definition
CA	Contract Authority (PWGSC)
CCG	Canadian Coast Guard
CFM	Contractor Furnished Material
CGTA	Coast Guard Technical Authority – Owner's Representative
CSA	Canadian Standards Association
DFT	Dry Film Thickness
FSM	Fleet Safety Manual (CCG)
FSR	Field Service Representative
GSM	Government Supplied Materials
HC	Health Canada
ID	Inside Diameter
IEEE	Institute of Electrical and Electronic Engineers
IWO	In Way Of
Kg	Kilogram
M	Meter
MPI	Magnetic Particle Inspection
MSDS	Material Safety Data Sheet
P	Port
PWGSC	Public Works and Government Services Canada
SSMS	Safety & Security Management System
STBD	Starboard
TCB	Technician Certified to work on Bronswerk products
TCC	Technician Certified to work on Caterpillar products
TCMS	Transport Canada Marine Safety
TA	Technical Authority – Owner's Representative (CCG)
WHMIS	Workplace Hazardous Material Information System
WCT	Wartsila Certified Technician

1.4 Technical Data Package

1.4.1 The following documents make up the technical data package and define the scope of work for the CCGS Martha L. Black VLE project:

- Technical specifications (This Specification document and appendixes)
- Design plans – electronic format
- Applicable CCG Standards and Guidelines – electronic format
- DFO 5847 – Paint and Hull Coating Standard
- DFO 9415 – Welding of Aluminum and Aluminum Alloys
- DFO 5737 – Fleet Safety Manual
- 30-000-000-ES-TE-001 – Colour Coding Standard for Piping Systems
- 141-19427-10 Asbestos Report – Hazardous Materials Management - CCGS Martha L. Black, (French version only)

1.4.2 Additional standards that apply to these Specifications (not provided by the CCG):

- ASTM F1321-92 (2004) – Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to determine the Light Ship Displacement and Centers of Gravity of a Vessel
- ASTM G82-95 (2003) – Standard Guide for Development and Use of a Galvanic Series for Predicting Galvanic Corrosion Performance
- CAN/CGSB-1.193-99 – High-Build Epoxy Marine Coating
- CAN/CGSB 1.61-2004 – Exterior and Interior Marine Alkyd Enamel
- CAN/CGSB 3-GP-11D – Naval Distillate Fuel, 2002-11-01
- CAN/CGSB 4.155-M88 – Flammability of Soft Floor Coverings - Sampling Plans
- CAN/CGSB 51.53-95 – Poly(Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- CAN/ULC-S102-03 – Surface Burning Characteristics of Building Materials and Assemblies
- CAN/ULC-S109-03 – Flame Tests of Flame-Resistant Fabrics and Films
- Canada Shipping Act, Machinery and Hull Regulations relating to a Research Vessel having general particulars as specified under Section 1.2
- CSA C22.1 SB-06 – Canadian Electrical Code, 1st part: Safety Standard for Electrical Installations
- CSA C22.2 – No 0-M91 (R2006) – Canadian Electrical Code, 2nd part – General Requirements
- CSA CAN3-Z299.3-85 (R2002) – Quality Assurance Program – Category 3
- CSA W47.1 039 – Certification of Companies for Fusion Welding of Steel
- CSA W47.2-11 M1987 (R2015) – Certification of Companies for Fusion Welding of Aluminum
- IEC 60092-504 3rd edition: 2001 – Electrical Installations in Ships - Part 504: Special Features – Control and Instrumentation
- CAN/CSA-C22.2 No 60529-05 Degrees of Protection Provided by Enclosures (IP Code)
- IEC 60533 Second Edition – Electrical and Electronic Installations in Ships - Electromagnetic Compatibility
- IEEE 45 STD -2002 – Recommended Practice for Electrical Installations Shipboard
- IEEE STD 315-1975 (1993) – Graphic Symbols for Electrical and Electronics Diagrams
- ISO 4405:1999 – Hydraulic fluid power – Fluids – Method for coding the level of contamination by solid particles
- ISO 18413:2002 – Hydraulic fluid power – Cleanliness of parts and components – Inspection document and principles related to contaminant collection, analysis, and data reporting
- ISO/TR 10949:2002 – Hydraulic fluid power – Component cleanliness – Guidelines for achieving and controlling cleanliness of components from manufacture to installation
- ISO/TS 16431:2002 – Hydraulic fluid power – Verification of cleanliness
- ISO 15748-1:2002 – Ships and marine technology – Potable water supply on ships and marine structures – Part 1: Planning and design

- ISO 15748-2:2002 – Ships and marine technology – Potable water supply on ships and marine structures – Part 2: Method of calculation
- ISO 2081:1986 – Metallic coatings – Electroplated coatings of zinc on iron or steel
- Lloyd's Classification Society Rules for the Classification of Ships
- SOR/2010-120 – Marine Occupational Safety and Health Regulations
- PMBoK Guide 5th edition – Project Management Institute Guidelines to Project Management
- Provincial Department of Labor Industrial Health Regulations respecting removal and disposal of Asbestos
- SNAME – Rules/Guidelines for Shop and Installation Trials – latest edition
- SNAME (3-47)*1989 – Rules/Guidelines for Sea Trials – latest edition
- SOLAS – Recommendations
- TP 11469 E – Guide to Structural Fire Protection
- TP 127 E (2002) – Ships Electrical Standards
- TP 11469 E – Guide to Structural Fire Protection – 1993
- TP 1861 E – Standards for Navigation Lights, Shapes, Sound Signal Appliances and Radar Reflectors (1991)
- TP 2072 E – Deck Cargo Safety Code (1974)
- TP 7301 – Stability, Subdivision and Load Line Standards (1975)
- Transport Canada Marine Safety Bulletin 06/1989 – “Grounding Safety in Drydock”
- UL 1309 – Standard for Safety for Marine Shipboard Cable

1.4.3 Transport Canada (TP) publications are available at the following address:

http://www.tc.gc.ca/eng/marinesafety/tp-menu-515.htm

1.4.4 CGSB Standards and publications are available at the following are available at the following address:http://www.scc.ca/

1.4.5 ULC Standards and publications are available at the following address:

http://canada.ul.com/

1.4.6 The standards of the Canadian Standards Association are available at the following address:

http://www.csagroup.org/global/en/services/codes-and-standards

1.4.7 The standards of the International Standards Organization are available at the following address:

http://www.iso.org/iso/home.html

1.4.8 The standards and publications of the Institute of Electrical and Electronics Engineers are available at the following address:

http://www.standards.ieee.org

1.4.9 The standards of the British Standards Institution are available at the following address:

http://www.bsi-global.com

1.4.10 The standards of the American National Standards Institute are available at the following address:http://www.ansi.org

1.4.11 The standards of the American Society for Testing and Materials are available at the following address:http://www.astm.org

1.4.12 The standards of the American Society of Mechanical Engineers are available at the following address:

http://www.asme.org

1.4.13 The rules and guidelines of the Society of Naval Architects and Marine Engineers are available at the following address:

http://www.sname.org

1.4.14 The guidelines of the Project Management Institute are available at the following address:

http://pmi.org

1.5 Meeting room and Project Meetings

1.5.1 The Contractor must invite and inform CCG personnel of daily production meetings. The Inspection Authority will usually participate in these meetings and will discuss production and inspection activities.

1.5.2 The Contractor must provide a room for progress meetings. These meetings will be held every four (4) weeks, or more often, in accordance with the directives of the Contracting Authority.

1.6 Facilities for use by personnel of Canada

1.6.1 The Contractor must make office spaces available to CCG and PSPC personnel that meet the following requirements:

a) Two lockable offices that are at least 19m^2 (200 ft^2) each;

b) A furnished conference room that can accommodate 10 people, including a large table and chairs for 10 people;

c) Four normal-sized desks with drawers;

d) Eight desk chairs in addition to those in the conference room;

e) A filing cabinet with four (4) lockable drawers;

f) Two shelves;

g) Two sets of keys must be provided for each lockable door, office, and filing cabinet;

h) One direct-line telephones, in the conference room; this telephone should be “hands-free” for conference calls;

i) The telephone line must be available 24 hours a day, ensuring communication with the outside at all times. Detailed billing of long distance calls will be sent to the attention of the CCG Technical Services representative. The Contractor must disconnect this line once the work is complete.

j) A list of the telephone numbers for the shipyard, fire and police services and emergency numbers must be provided upon the ship’s arrival to the shipyard.

k) High-speed Internet connection via Wi-Fi or three (3) LAN connections;

l) A multi-function color printer with copy, scanner, and fax functions, that can handle sheets measuring 8.5 x 11 in., 8.5 x 14 in., and 11 x 17 in. The multi-function color printer must be equipped with an automatic paper feeding mechanism and be serviceable within two (2) hours in the event of a breakdown. The contractor must supply the paper and ink for the printer.

m) The offices must be equipped with heating, air conditioning and lighting system, in accordance with provincial health and occupational regulations.

1.6.2 The following must be provided on the Contractor's site:

a) Washroom facilities must be located nearby;

b) Six parking spaces must be made available to Canada personnel. The spaces should be clearly marked. If necessary, passes must be provided to regular Canada project personnel;

c) All of the aforementioned equipment and facilities must be in good condition, to the satisfaction of Canada;

d) Canada must have access to the facilities listed above 7 days a week, including at night, from 14 days following the awarding of the contract and up to 14 days after the work is completed.

1.7 Storage Space

1.7.1 The Contractor must provide a minimum of 300 square metres secure storage space for the ship's equipment as required for this Specification package. The storage space must be climate controlled. In cold weather, the storage must be heated to 15 degrees Celsius. In summer, the relative humidity must be controlled and maintained below 80% throughout the duration of the contract period.

1.7.2 The Contractor must provide a sufficient number of shelves and pallets to meet storage and handling needs related to the work,

1.7.3 All items must be stored so that they can be easily accessible for inspection. No item must be stored directly on the ground,

1.7.4 The storage space must be located on the Contractor's site,

1.7.5 The Contractor must provide a three-ton truck with a driver and a forklift with an operator, totalling 64 hours each, to help Canada to empty and resupply the ship,

1.7.6 The Contractor must provide the means to transfer before and after, and to store the remaining fuel on board during the contract period.

1.8 OEM certified FSR

1.8.1 **At every mention of a requirement for an OEM certified technician in the specification, the following text is hereby included:**

1.8.2 The presence of OEM – certified technician is required while installing new equipment on board, testing and commissioning, certifying that the equipment is installed and working according to the OEM specifications and the equipment warranty is valid. One person, FSR, is required unless otherwise specified.

1.8.3 The FSR presence on-site, is to verify and validate the conformity of the equipment installation, conduct and supervise preliminary verifications and tests, commissioning the equipment to confirm its normal operation and performance according to the OEM standards. The FSR must complete a report of the installation, modifications, tests and commissioning results. Contractor must coordinate the presence of the ABS inspector at major milestone to confirm the certification when mandatory with the newly installed equipment. Thorough the specification the requirement of an OEM (original equipment manufacturer) – certified technician, or FSR (field service representative), or TCC (technician certified for Caterpillar), or WCT etc. is mentioned and requested. Basically, the technician must be an authorized certified specialist by the OEM to perform such work. In each section of the specification related to the FSR presence, some in-depth work description is made related to the each specific equipment, when needed.

1.8.4 The minimum FSR on-site presence is detailed in each case, excluding all travel time if not specified otherwise. All quotes must confirm working days 10 hours/day on weekdays, optional for weekend or public holidays. Expected travel time, travel fees (transportations, meals, room) must be detailed in the quote and separated cost from the on-site working days.

1.8.5 The Contractor's responsibility will be to coordinate the just on-time presence of the FSR, if however the FSR presence is not well schedule the Contractor will have to cover travel and daily cost due to the lack of coordination.

1.8.6 Shorter or longer FSR on-site presence will be discussed and negotiate between the Contractor and the government authority, before any modifications to the specifications.

1.9 Supplementary documentation and drawings

1.9.1 Documentation and drawings listed here are related to various items of the specification but are not necessarily mentioned in sections 10 to 18.

1.9.1.1 Intact Trim and Stability Conditions

1.9.1.2 141-19427-16_Rapport_Martha Black_QAI_FINAL_20170216.pdf

1.9.1.3 141-19427-01_Rapp_Martha Black_HazMat_20150114_FINAL.PDF

1.9.1.4 Paint maintenance Register June 2018.doc

1.10 Initial Inspection

1.10.1 In collaboration with the Technical Authority and the Inspection Authority, the Contractor must perform an inspection of the condition of the vessel, the operation of equipment and the systems. The Parties taking part in the assessment must sign the report. This must be performed before the Contractor assumes responsibility for the vessel. The Contractor is responsible for providing a photographic survey inspection to the Inspection Authority and to the Technical Authority.

1.10.2 This inspection must meet the requirements of Section 5.3 of this Specification package.

1.11 Government Property

1.11.1 General

1.11.1.1 All materials and equipment removed from the vessel by the Contractor remain the property of Canada, unless the project requirements explicitly provide for their disposal.

1.11.1.2 The Contractor must keep and maintain these materials and equipment in their original condition while awaiting instructions from the Technical Authority.

1.11.1.3 The Contractor may obtain the approval of the Technical Authority to dispose of the materials and equipment, whose market value is void after being removed from the vessel.

1.11.2 Categorization

1.11.2.1 Any property of Canada that must be removed from the vessel either temporarily or permanently must be placed in one of the following three categories:

1.11.2.2 Category A:

1.11.2.3 These items must be permanently removed from the vessel and remain the property of Canada. The Contractor must store and protect these parts from weather, physical damage, or loss. The Contractor must store these parts on palettes, platforms, or containers adapted for shipping until Canada has inspected them and has accepted to take charge and store them. The Contractor is responsible for storing these parts for Canada for the duration of the contract period. It is the responsibility of Canada to remove these parts from the Contractor's premises.

1.11.2.4 Category B:

1.11.2.5 These items remain the property of Canada and must be temporarily removed from their location on board the vessel during the contract work. They must be returned to their original location on board the vessel before it leaves the Contractor's facility. The Contractor must protect these items from weather, physical damage, or loss. These items must be stored to allow movement of the items to permit access for inspection, refurbishment and/or maintenance of these items as necessary. The Contractor must take care not to damage the equipment and the materials.

1.11.2.6 Category C:

1.11.2.7 Upon removal, these items become the property of the Contractor, who must dispose of them in accordance with all applicable laws, rules, and regulations.

1.11.2.8 Prior to removal of any item from the vessel, the items must be clearly identified with wire tags clearly indicating if it belongs to Category A, B, or C, in accordance with the instructions of the Technical Authority.

1.11.2.9 This requirement is in addition to those concerning any spare parts required for regulatory purposes. All such spare parts must be supplied packaged and individually identified with the description of the equipment, the model number, and the catalogue/part number.

1.12 Spare Parts

1.12.1 Unless otherwise indicated by the technical authority, all new equipment that is procured by the Contractor for installation on the vessel must be supplied complete with sufficient manufacturer's recommended original spare parts (OEM) for six months or 2,000 hours of operation whichever is greater.

1.12.2 All system spares must be provided in a spare parts list supplied by the Contractor in an electronic MS Excel spreadsheet format. The spreadsheet must identify, for each component of a system, the number of spare parts recommended in the previous paragraph. The list must include the following fields:

a) The supplier;

b) The manufacturer;

c) The manufacturer's part number;

d) The unit price;

e) The definition of the quantities (unit, case, etc.);

f) The recommended number;

g) The associated system/equipment

1.12.3 An electronic copy of the spare parts list must be must be submitted to both the Inspection Authority and the Technical Authority.

1.12.4 The Contractor must notify the Inspection Authority and the Technical Authority when such spare parts have been received.

1.12.5 The Contractor must store the spare parts in accordance with the manufacturer’s requirements and ensure that they are protected from weather, physical damage, or loss.

1.13 Project Management

1.13.1 Introduction

1.13.1.1 As part of this project, project management refers to the management needs for ensuring the integration of both upstream and downstream activities and sub-activities, technical control, and management of deadlines required for the VLE project of the CCGS Martha L. Black. The Contractor must provide, during the preparatory (pre-work) meeting for the refit, a draft of a dispatching and progress program, in MS Excel form or in a program compatible with MS Project 2013, in accordance with subsection 1.13.6.

1.13.2 Project Action Plan (PAP)

1.13.2.1 The Contractor must document the management of the project work in a PAP, and must update this plan every month or more frequently as required by the Contracting Authority.

1.13.2.2 As a minimum, the PAP must include organization structure charts, a schedule, support schedules, subcontractor schedules and work, and delivery dates for Government and Contractor furnished equipment (GFE and CFE).

1.13.2.3 The monthly updates to the PAP must include schedule updates, a progress report, and review meetings. The components of the PAP and the updates are described in the following sub-sections.

1.13.3 Project Integration Management

1.13.3.1 Included with its bid, the Contractor must provide an organization chart of the entire project, indicating all key personnel and subcontractors. In addition, the Contractor must identify, in whole or in part, the work attributed of the subcontractors.

1.13.4 Change Management Log

1.13.4.1 The Contractor must provide a Change Management Log that must be used for the duration of the project to manage changes to the project.

1.13.4.2 The Change Management Log must track project issues using the following criteria:

a) Individual tracking number;

b) Identification in the Specifications section;

c) Date issue was raised;

d) Expected resolution date;

e) Date issue was resolved;

f) Date resolution is accepted by the Inspection Authority;

g) Brief note of resolution on issue;

h) Individual who raised the issue;

i) Individual assigned to resolve issue;

j) Risk factor.

1.13.5 Risk management

1.13.5.1 Using an MS Excel spreadsheet, the Contractor must prepare a risk management plan of emerging risks, and classify them according to their impact on the work and the production schedule. Mitigation strategies must be developed for all high risks. This risk management plan must be updated at least every two weeks and submitted to both the Technical and Contracting Authorities. The Risk Management Plan must be included in the monthly progress meetings record of decisions.

1.13.6 Scheduling

1.13.6.1 The dispatching and progress program, under subsection 1.13.1, must contain a minimum of the following planning elements:

a) The Work Breakdown Structure (WBS) on at least three or more levels for each section of the Specification package. More specifically, the WBS must include the strip outs, production, assembly, installation, bench testing, system commissioning and tests and trials, the expected and required resources, and the necessary sea trials;

b) Predecessors and successors;

c) The start and end dates for each item;

d) The critical path to the acceptance of the work;

e) The subcontractors' schedules up to the same level;

f) Long lead items and GFE;

1.13.6.2 The Contractor must update the schedules for each progress meeting and present the updates to the Contracting Authority, the Inspection Authority, and the Technical Authority.

1.13.6.3 The schedules must identify all work in the project, main milestones, and all interrelationships between the tasks. The schedules must be baseline.

1.13.6.4 Unless otherwise indicated in the contract, the initial schedule must be delivered 21 calendar days after the contract is awarded.

1.13.6.5 A schedule of milestones must be provided in the bidder's presentation.

1.13.6.6 The Guide to the Project Management Body of Knowledge, 5th edition, must be used as a reference for planning.

1.13.7 Project reports

1.13.7.1 Three (3) working days before the progress review meeting, the Contractor must provide a progress report, in which the project's progress, costs, and performance are described in the introduction. The deadlines, costs, and performance will then be examined in detail to clearly demonstrate the value earned through the IPC and the IPS. The report must indicate significant risks for the program, and the measures taken to resolve them. The risk analysis must identify any impact on the project's completion and determine the measures taken to make up for the delays that may affect the completion date of the works. The report must be submitted on paper during the meeting, and sent electronically beforehand.

2.0 GENERAL TECHNICAL

2.1 Equipment Operating Conditions

2.1.1 All new machinery and equipment supplied and installed must be designed to operate under the following conditions:

a) Outside air temperatures: From −40°C to 35°C;

b) Water temperature: From 0°C to 30°C;

c) Wind speed: 80 knots;

d) Sea state: 10 on the Beaufort scale;

e) Ship inclination of up to 35 degrees roll on either side with a cycle frequency of 10 seconds;

f) Pitch of 10 degrees with a cycle frequency of 5 seconds and a maximum linear acceleration of 1 g;

g) Permanent list of 25 degrees to port or starboard, and a permanent trim of 10 degrees fore and aft.

2.1.2 Equipment below Decks:

All equipment must be capable of its intended operation at the ambient conditions of 95% relative humidity at temperatures up to 50 degrees Celsius.

2.1.3 Equipment above Deck:

2.1.4 Equipment must be protected by a shelter and be capable of its intended operation on the upper deck. The equipment must also be protected from sea spray.

2.1.5 Electronic equipment compartments:

2.1.5.1 Compartments containing electronic equipment must be provided with a system(s) to maintain the following interior conditions:

2.1.5.2 Manned Compartments:

- Room temperature : from 20°C to 25°C
- Relative humidity: From 5 to 70%
- Noise level: 65 dBA.

2.1.5.3 Unmanned Compartments:

- Room temperature: from 20°C to 25°C
- Relative humidity: From 40 to 70%

- Noise level: 80 dBA.

2.1.6 Vibration

2.1.6.1 All onboard equipment, structures, cables and other accessories must be mounted so as to be capable of performing their intended operation under the following conditions:

2.1.6.2 Shipboard vibrations:

2.1.6.3 Up to 13.2 Hz with a displacement amplitude of +/- 1 mm;

2.1.6.4 From 13.2 to 80 Hz with an amplitude of acceleration of ±0.7 g with a maximum acceleration of 1 g;

2.1.6.5 Natural frequencies of equipment supports or equipment parts must not be within the 0 to 80 Hz range, except where thy cannot be kept outside of this range by constructional design methods, the vibrations must be damped so that undue amplification is avoided

2.2 Protection of Personnel

2.2.1 General

2.2.1.1 The Contractor must make sure to eliminate all rough edges, points, sharp corners and protrusions created during the conduct of work.

2.2.1.2 Smoking on board the vessel is prohibited. (See Section 7.19)

2.2.2 Hot work

2.2.2.1 The Contractor must take the following precautions when hot work is required:

a) Degassing of compartments must be certified by an accredited chemist or other qualified person. The Contractor must submit copies of all certificates to the Inspection Authority before starting work. The certificates must specify “Safe for persons" or “Safe for hot work,” as applicable. The Contractor must post a copy of all certificates at the entrance of the affected spaces;

b) Protective material must be used to prevent the spread of sparks, protecting electrical cables, machinery and other services;

c) A fire watch must be provided in each space where welding, grinding and burning are performed and in all adjacent spaces. The persons undertaking this fire watch must be equipped with a fire extinguisher and trained in its correct use. They must maintain a watch at their designated location for at least thirty (30) minutes after completion of hot work.

2.2.2.2 Any hot work carried out onboard the vessel during the contract period must be performed in accordance with the procedures adopted by the shipyard. Contractor must

demonstrate to the IA that its procedure is being followed and is in line with present contract expectations.

2.2.3 Confined Space Entry

2.2.3.1 The Contractor must provide a copy of the "Gas Free" certificate from a certified chemist or other qualified personnel to the Inspection Authority prior to beginning work. The certificates must specify “Safe for persons” or “Safe for hot work.”

2.2.3.2 Any entry into confined spaces during the contract period must be conducted in accordance with during the contract period must be performed in accordance with the procedures adopted by the shipyard. The Contractor must demonstrate to the IA that its procedure is being followed and is in line with present contract expectations.

2.2.4 Rotating Machinery

2.2.4.1 New machinery installed must be equipped with a protective device to prevent any contact with rotating elements.

2.2.5 Electrical Equipment

2.2.5.1 When working on electrically operated equipment, electrical lock-outs must be used to isolate the equipment and electrical caution tags must be posted at the main power and distribution panel on those switches supplying the equipment under maintenance. Verification must be made at the terminals to ensure power is not present.

2.2.5.2 All electrical lockout requirements onboard the vessel during the contract period must be in accordance with the CCGFSMS procedures and individual shipboard work instructions. Contractor must demonstrate to the IA that its procedure is being followed and is in line with present contract expectations.

2.2.6 Working Aloft and Fall Protection

2.2.6.1 Any work aloft must be conducted in accordance with the procedures adopted by the shipyard. The Contractor must demonstrate that its procedure exists and is in line with expectations of the IA and with individual shipboard work instructions. Contractor must demonstrate to the IA that its procedure is being followed and is in line with present contract expectations.

2.2.7 Asbestos

Prior Information and Cautions

2.2.7.1 The Canadian Coast Guard has detected the presence of various materials containing non-friable asbestos on board the CCGS Martha L. Black. Two reports of materials containing asbestos, indicating the locations and quantities of materials is available for consultation from the Technical Authority. The studies on the vessel's materials (141-19427-16_Rapport_Martha L. Black_QAI_FINAL_20170216 et 141-19427-01_Rapp_ Martha L. Black _HazMat_FINAL_20150114 list the type of asbestos, quantities and locations where asbestos and other hazardous materials are found.

2.2.7.2 The Contractor must become familiar with the content of this report and attest to its content by adding an attestation to its bid as requested with Appendix K of the Call for Tenders.

2.2.7.3 The Contractor is responsible to ensure that its employees, subcontractors and the employees of subcontractors are informed of the presence of various materials containing non-friable asbestos or other dangerous materials onboard the CCGS Martha L. Black.

2.2.7.4 It is prohibited to use new materials or to reuse materials containing asbestos. If necessary, any handling of material containing asbestos must be done be trained and certified personnel. The Contractor must provide the certificates of certified personnel to the Inspection Authority prior to beginning any handling or work.

2.2.7.5 It is the Contractor's responsibility to eliminate all material containing asbestos in a safe manner and it must provide the Inspection Authority with copies of certificates pertaining to the disposal of material containing asbestos, in accordance with federal, provincial and municipal regulations.

2.3 Workplace Hazardous Materials Information System (WHMIS)

2.3.1 The Technical Authority will provide the Contractor with a list all hazardous materials onboard the vessel in accordance with the WHMIS.

2.3.2 The Technical Authority will also provide the Contractor with Material Safety Data Sheets (MSDS) for the hazardous materials onboard the vessel.

2.3.3 The Contractor is responsible for all Contractor supplied products and materials used aboard the vessel. The Contractor must inform the Technical Authority and the Inspection Authority of the use of such material and provide a copy of the Material Safety Data Sheets.

2.4 Protection of Equipment

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

2.4.2 The Contractor must ensure that electrical and electronic equipment and components are protected against direct or indirect physical damage and against the effects of temperature or other adverse environmental conditions, throughout the duration of the contract.

2.4.3 All surfaces, equipment, furniture and decor included in the work, which have been damaged, must be repaired to their original condition or replaced by the Contractor, at no cost to Canada.

2.4.4 All openings in machinery and/or systems must be kept covered by inserts, covers, plugs or blanks at all times until reconnected.

2.4.5 The Contractor must obtain and follow the directions of its suppliers or subcontractors regarding any special protection required the equipment they provide. These instructions must be transmitted to the Technical Authority and to the Inspection Authority.

2.4.6 The Contractor must ensure that the vessel's machinery, equipment and systems are protected against all hazards, including damage from ongoing work, corrosion, sandblasting (directly or indirectly), paint overspray, hot work, adverse temperatures or other environmental conditions and contaminants.

2.5 Access to Vessel and Equipment

2.5.1 Restricted Access Areas:

a) The Contractor's and subcontractor's personnel may not access the following areas, except to perform work provided for this Specification package: cabins, offices, wheelhouse, control room, gymnasium, public toilets, cafeteria, dining room and lounges. The Contractor must cover all floor carpets before starting the work. The Contractor must prohibit its employees from bringing their meals onto the vessel,

2.5.2 Installation and Removal Routes

2.5.2.1 If the Contractor intends to modify the vessel's structure to simplify a removal or an installation, it must first obtain the approval of the Technical Authority and the Inspection Authority.

2.5.2.2 All items and equipment that must be removed and reinstalled for the completion of specified work, or to allow access to certain locations, must be inspected before and after their removal/reinstallation by both the Contractor and the Inspection Authority.

2.5.2.3 Unless otherwise indicated, all items constituting an obstacle that are protected, removed or damaged during an overhaul, removal or installation, including insulation and heat-insulating coatings, must be returned to their original condition upon completion of the work.

2.5.3 Penetrations

2.5.3.1 Sealing of redundant penetrations must be performed in a manner acceptable by TCMS (Transport Canada Marine Safety). The Contractor must notify the Inspection Authority of any such penetrations that have been sealed and provide copies of all TCMS documentation.

2.5.4 Access for Maintenance

2.5.4.1 The layout of machinery and equipment must be designed so as to allow easy access for inspection, maintenance and repair without disturbing other machinery, structures or pieces of equipment. Provisions must be made for removal of machinery components.

2.6 Assembly of System Components and Equipment

2.6.1 Securing Arrangements of System Components and Equipment.

2.6.1.1 All new and existing systems, equipment and components installed or disturbed as a result of work, must be secured to prevent damage caused by the operating conditions of the vessel, as per section 2.1 of this Specification.

2.6.1.2 The Contractor must follow manufacturers' recommendations for installation arrangements. If this information is not available, securing arrangements must be approved based on the regulatory requirements prior to the Contractor commencing the securing activities.

2.6.1.3 The Contractor must respect the manufacturer's torque specifications. If the manufacturer does not provide this information, standard SAE bolt and nut torques must be used.

2.6.2 Cleaning

2.6.2.1 The Contractor must ensure that once the installation has been completed, assembled parts and equipment are cleaned to eliminate stains, spatter or excess solder, weld metal, metal shards or any other foreign matter. This includes any particles that could loosen or become dislodged during the normal expected life of the equipment. All corrosive material must be removed. This cleaning must take place before final assembly of the equipment parts. Any disturbed paint must be repaired prior to closing machinery.

2.6.3 Damaged Items

2.6.3.1 Panels, covers, components and equipment damaged by the Contractor must be repaired to their original condition or replaced at no cost to Canada.

2.7 Welding

2.7.1 General

2.7.1.1 All welds must comply with the CSA standard W47.1 "Welded Steel Construction (Metal Arc Welding) (Metric)." The Contractor must provide a copy of the welders' certificates.

2.7.1.2 The Contractor must submit CWB stamped welding specifications and weld procedure data sheets to TCMS where required. Welding procedures for joining pipe connections must be recorded and approved by CWB in accordance with ASME section IX.

2.7.1.3 All hot work methods described in Section 2.2.2 must be respected.

2.7.1.4 All aluminium welding must conform to the requirements of CSA standard W47.2 (Certification of Companies for Fusion Welding of Aluminium). The Contractor must provide a copy of the welders' certificates.

2.7.2 Removal of Attachments

2.7.2.1 Temporary cleats, lifting eyes, and fasteners used during maintenance of structures must be removed by burning or grinding, and any remaining irregularities must be ground flush with the surface of the parent plate. Any damaged paint must be repaired.

2.7.3 Weld Design Requirements

2.7.3.1 The size, length and details of welds must be approved by TCMS.

2.8 Painting

2.8.1 General

2.8.1.1 The Contractor must prepare a painting schedule and present it to the Technical Authority and to the Inspection Authority for review and acceptance. The painting schedule must list all areas and compartments on the vessel affected by the project work and indicated the proposed paint type, painting scheme, surface preparation, type of coating, number of coats, thickness and colors. All paint used must be compatible with the existing paint on the vessel.

2.8.1.2 All new and disturbed steel and aluminum work must be painted in accordance with publication DFO 5847 and with the paint manufacturer's specifications.

2.8.1.3 All paint must be suitable for use in the marine environment and comply with standards CAN/CGSB 1.61-2004 – Enamel Alkyd Exterior and Interior Marine Paint and CAN/CGSB 1.193-99 – Epoxy Resin Coatings, Marine. Paints, varnishes and other coatings used on interior surfaces must be included in the list of TCMS approved products, TP 438.

2.8.1.4 Each coat of paint must be of a different shade to indicate proper coverage, and must be completely dry before application of subsequent coats. At minimum, the first coat of primer must be applied by brush or airless spray.

2.8.1.5 The final topcoats must be protected from dirt or damage until the vessel is delivered to Canada. The Contractor must ensure that furnishings and equipment liable to more serious damage due to overspray are adequately protected during the painting process.

2.8.1.6 Without limitation, the following elements must NOT be painted. When in doubt, the Contractor must consult the Inspection Authority:

- screw threads;
- grease fittings;
- bronze pins;
- door screens;
- nameplates;
- gaskets;
- stainless steel or monel metal fittings;
- machined surfaces;
- instrumentation;
- interior gratings;
- electrical wires, insulation and fittings;
- electrical panels;
- rubber seals on watertight doors and hatches;
- fire door seals;
- in general, all working parts or other exceptions stipulated by the Inspection Authority.

2.8.2 Heavy Metal Based Coatings

2.8.2.1 Paint containing lead, mercury or copper must not be used.

2.8.3 Requirements for Paint Equivalents

2.8.3.1 Whenever the vessel existing coating system is mentioned, see the document named: Hull, masts and superstructures Coatings in order to allow the Contractor to supply a coating compatible with this system. Where partial repairs (touch ups) are required, the Contractor must use the same type of paint already in service, as to ensure good adherence thereof.

2.9 Identification

2.9.1 Nameplates

2.9.1.1 Nameplates must be affixed to all new equipment, compartments, doors and closures.

2.9.1.2 All nameplates must be written in both official languages.

2.9.1.3 Lettering must be clear and concise while minimizing the use of abbreviations. Primary information must be given in larger size lettering than secondary information.

2.9.2 The type of nameplate must correspond to the location on the vessel as specified below:

a) Plastic must be used in accommodation and navigation spaces where the nameplate is not exposed to mechanical damage and does not risk being covered by ice, paint, oil, grease or dirt.

b) Plastic nameplates must be laminated phenolic rigid type with machine engraved lettering and secured using stainless steel or brass screws. Unless otherwise indicated, nameplate must have white lettering on a black background for normal signs and white lettering on a red background for warning or emergency signs.

c) Laminated plastic nameplates, black with white core engraved through to the center core, must be provided for all devices secured to the exterior surfaces the distribution panels/switchboard.

d) Nameplates must be secured to the distribution panel/switchboard with machine screws. New nameplates to be fitted on the existing distribution panel/switchboard must be consistent in size and lettering with those already fitted. Nameplates for feeder circuits must identify each circuit by name and number and the fuse size and/or trip element rating.

e) Warning or caution nameplates must be in laminated plastic; red with white core engraved through to the center core. They must indicate the circuit breakers provided with trip coils requiring completion of remote circuits prior to being operated, as well as those having a potential power source connected to both sides, or to any other potentially hazardous condition.

f) Engraved metal, stainless steel or brass nameplates must be used in machinery spaces and where exposed to weather. Engraved metal nameplates must have lettering accentuated by means of black wax and secured with stainless steel or brass machine screws.

g) Before ordering or manufacturing nameplates, a complete drawing list of nameplate must be submitted, specifying the size of the plates, the size of the lettering and their inscription, for review and acceptance by the Inspection Authority and the Technical Authority.

2.9.3 Key Tags

2.9.3.1 Plastic labels must be provided for all new keys. Tags must be marked to identify the space or the item they lock. The description must be identical to that used for the identification nameplate for the space or the equipment. The complete list of new keys and labels must be submitted to the Inspection Authority and to the Technical Authority.

2.9.3.2 All new keys and tags must be turned over to the Technical Authority as part of the acceptance of the vessel.

2.9.4 Safety Related Signs

2.9.4.1 All new signs must be written in both official languages, French first.

2.9.4.2 Painted signs for muster station directions, fire stations, emergency equipment, etc., must be provided and installed in accordance with TCMS approval.

2.9.4.3 The Contractor must prepare and present a drawing indicating the location, type and size of lettering for all signs. This drawing must be submitted to TCMS for approval prior to fabrication or installation of the signs.

2.10 Cleanup

2.10.1 The Contractor must ensure cleanliness of the vessel. Debris and waste must be removed from the vessel and disposed of at the end of each work day.

2.10.2 Special attention must be given to hazardous materials, such as flammable products and toxic wastes. They must be disposed of in accordance with federal, provincial and municipal regulations.

2.10.3 Upon the arrival, the bilge in the machinery spaces will be cleaned to allow hot work. Cleaning must include pumping and disposal of bilge water, and cleaning bilges to remove grease, oil and contaminants. The disposal of additional waste performed by the shipyard, must comply with all federal, provincial and municipal regulations. Disposal certificates must be submitted to the Inspection Authority and to the Technical Authority within 24 hours after any disposal or any transfer from the vessel. The Contractor must submit a fixed price for disposal of 5,000 litres of bilge waste and a unit price per 100 litres. The PWGSC Form 1379 must be submitted to adjust the cost of bilge waste disposal up or down, as appropriate.

2.10.4 Vessel cleanliness must extend to the bilge areas which must be maintained free of oil, water, and debris for the duration of the project.

2.10.5 Prior to the acceptance or work, the Contractor must thoroughly clean all areas of the vessel to return them to their original condition, including all bilge areas. The contractor must perform an inspection in the presence of the IA to attest of their cleanness.

3.0 MECHANICAL CHARACTERISTICS

3.1 General

3.1.1 Unless otherwise indicated, the Contractor must supply all material or equipment necessary to complete the work in this Specification package.

3.1.2 All replacement machinery, equipment and fittings must be new and from a recognized manufacturer.

3.1.3 All machinery and equipment must be approved by a Classification Society and must meet all applicable TCMS regulations. The Contractor must provide the Inspection Authority and the Technical Authority with copies of Classification Society approval certificates. Approval certificates must be up to date and correspond with the type and model of equipment installed by the Contractor. The Contractor must refer to Section 6 to obtain all requirements relating to the documents.

3.1.4 All machinery must be capable of operating under the conditions established in Section 2.1 of these Specifications.

3.1.5 All machinery must be installed in accordance with the manufacturer's recommendations with particular attention to the reduction of vibration and noise transmission, as well as location allowing access for maintenance. Rotating machinery must be installed on a longitudinal or vertical axis, unless otherwise approved by TCMS. The Contractor must present an installation drawing to the Inspection Authority before commencing the work.

3.2 Piping

3.2.1 General installation

3.2.1.1 Before beginning work, the Contractor must present to the Inspection Authority and the Technical Authority installation diagrams or drawings for approval. They must be sufficiently detailed in order to obtain regulatory approval. Piping must be installed so as to avoid interfering with:

a) passage through doors;

b) hatches and scuttles;

c) openings covered by removable plates or work areas;

d) in frequently used walkways, the minimum overhead clearance must be 2 metres;

e) operation of machinery, equipment, controls and with routine maintenance;

f) the vessel's structure;

g) routes designated for removal of equipment or removable structural parts of the vessel designed to access equipment, removal or for maintenance of the equipment.

3.2.1.2 Piping must be installed in a location where there is no risk of damage, if not possible, the Contractor must provide protection for piping to the Inspection Authority's satisfaction. Piping runs must be as direct as possible and utilize the minimum amount of fittings in order to minimize friction flow.

3.2.1.3 Piping must be removable when close to mechanical, electrical or hydraulic systems which require periodic maintenance or refitting. Isolating valves must be provided and installed to facilitate removal of piping, so as to minimize the effects on operation as much as possible.

3.2.1.4 When high or low points are inevitable in the routing, vents, purge drains or other means acceptable to the Inspection Authority must be installed to guarantee adequate operation of the system.

3.2.1.5 Pump suction piping must also be as short as possible, of sufficient diameter, and arranged so as to avoid forming bends to prevent air pockets. Tail pipe connections must be 0.5 times the inside diameter of the pipe above the bottom of the tank, at the deepest point.

3.2.1.6 Bulkheads and decks must be pierced close to boundaries of compartments. Cutting bulkhead stiffeners, deck beams, plating butts and seams is not permitted unless otherwise indicated. Approval must be obtained from TCMS prior to piercing.

3.2.1.7 Piping must not be led though inner bottom tanks and voids, except as necessary to serve the tanks themselves, or to avoid penetrating fuel tanks, potable water tanks and ballast tanks by piping less desirable therein than in the inner bottom tanks and voids. Piping that operates under pressure must not pass through void spaces, cofferdams or other normally non-vented spaces.

3.2.1.8 Piping must not pass through the following spaces, unless needed to serve them:

- Chain lockers;
- Wiring trunks and enclosures;

3.2.1.9 Where piping crossing through fuel oil or diesel fuel tanks is authorized by TCMS for different fluids, the thickness of the piping must be schedule 80 and joints must welded.

3.2.1.10 Supports must be designed and located to safely support the weight of the piping, its operating or test fluid (whichever is heavier), its insulation or lagging (where applicable), in accordance with the operating conditions of Section 2.1 of this

Specification. Supports must also withstand the loads imposed by expansion and contraction of the piping and working of the vessel.

3.2.1.11 The number of supports installed, the type selected, and their location must prevent rubbing against any other components or excessive vibration of the piping under all operating conditions. The supports must not exert stress or transfer loads to the piping.

3.2.1.12 Rigid anchor points must be designed so that the noise and vibration of piping components and excessive heat from high temperature systems are not transferred through the anchor to surrounding areas.

3.2.1.13 Changes in direction of the piping must be done through elbows and offsets where space does not permit straight sections.

3.2.1.14 The use of miter joints is authorized only on pipes such as air purge vents and overflows, when their use would not cause unacceptable pressure drop or turbulence in the fluid flow. Branch connections must be located to minimize turbulent flow and the type used (crosses, single and double-sweep tees, Y and lateral fittings) must be suitable for the required flow characteristics.

3.2.1.15 Direct reading thermometers, pressure gauges or vacuum gauges must be installed in locations where they can be easily read and are protected from damage. All pressure gauges and vacuum gauges must be supplied and installed with an isolating valve.

3.2.1.16 Connections of dissimilar metals that could cause galvanic corrosion are not authorized unless otherwise accepted by the Inspection Authority or TCMS. In this case, the Contractor must control galvanic corrosion by connecting a relatively small portion of the cathodic material to a large portion of anodic material, or by separating different kinds of metal by a short piece of very heavy galvanized steel pipe (waste piece). This device must only be installed when indicated. Raised face flanges must not be used against bronze or other relatively low strength composition valves, fittings or flanges. Voltage between pipe sections must not exceed 0,4 volts.

3.2.1.17 Where pipes pass through holes in the non-watertight structures, provision must be made to keep the pipes from bearing on the structure.

3.2.2 Material Selection

3.2.2.1 Figure 3-1 specifies those materials that are acceptable for use in specific piping systems. Figures 3-2 to 3-8 specify materials for various piping systems and components.

3.2.2.2 Piping systems and components must comply with this Specification except where the specified material is incompatible with materials remaining in the system. Alternate materials not listed will be permitted only when approved or recommended by the original equipment manufacturer and/or supplier of that equipment/component. In such situations, direction must be requested from the Technical Authority before proceeding further with the work.

3.2.2.3 Steel pipes used for raw water must be hot-dip galvanized. The Contractor must ensure that all hot-dip galvanisation is carried out after all fabrication, all in-place adjustments, all welding of fittings and components, and all pressure testing is completed. If this is not possible, the Contractor must obtain authorization from the Inspection Authority if it intends to use cold galvanizing and must stipulate the product and corresponding standard. Before hot-dip galvanizing of steel parts, they must be free of welding slag/by products. This can be accomplished through, hammering with a welder's hammer and acid cleaning.

Figure 3-1: Acceptable products in each piping system

Element or system	Figure corresponding to the material
Raw water systems	**References**
Fire Main, Sewage (Black Water), Ballast, AFFF, Bilge Suction (oil/water separation)	4t, 6b, 1a, 2a, 3a, 6a, 7a, 3fl, 4fl, 5fl, 11fl, 12fl, 1f, 2f, 3f, 4f, 19f, 20f, 21f, 1v, 2v, 3v, 5v, 6v, 7v, 8v, 22v, 5g (AFFF 11g only) (4b non-bilge areas)
Main and Auxiliary Circulating Systems	4t, 9v, 10v, 11v, 12v, 8f, 9f, 10f, 11f, 12f, 20f, 21f, 4fl, 5fl, 5g, 6g, 7g, 1b, 2b, 6b, 1a, 2a, 4a
Oil Fuel, Marine Diesel and Distillate	**References**
Filling and Transfer	4t, 1b, 6b, 6g, 7g, 1a, 5a, 6a, 4fl, 5fl, 8f, 9f, 10f, 9v, 10v, 19v
Inside Tanks	1b, 6b, 6g, 4fl, 8f, 9f
Fresh Water	**References**
Potable (including vents, overflows, sounding pipes, inside tank suctions), Sanitary (Grey water)	3t, 5g, 4b, 1a, 2a, 3a, 6a, 1fl, 2fl, 1f, 3f, 4f, 5f, 3fl, 1v, 2v, 3v, 5v, 6v, 7v, 8v (valve bodies can be used in accordance with standard ASTM B62, seals in accordance with standard ASTM B61)
Circulation (Engines)	5t, 5g, 2b, 6b, 1a, 2a, 3a, 6a, 3fl, 4fl, 5fl, 11fl, 12fl, 8f, 9f, 10f, 11f, 12f, 19f, 20f, 21f, 9v, 10v, 11v, 12v, 13v, 14v, 18v 19v, 20v
Lubricating Oil	**References**
General Service (150 PSIG side)	4t, 6g, 7g, 1b, 6b, 1a, 5a, 4fl, 12fl, 8f, 9f, 10f, 21f, 9v, 10v, 11v
Hydraulic Oil	8t, 9t, 1b, 1g, 1a, 6fl, 12fl, 13f, 14f, 15f, 21f, 22f, 14v
Steam (150 psig)	**References**

Element or system	Figure corresponding to the material
Feed water, Condensate	3t, 4t, 3g, 1b, 6b, 1a, 1fl, 2fl, 12fl, 1f, 2f, 4f, 5f, 21f, 1v, 2v, 3v, 4v, 6v (valve bodies may comply with standard ASTM B62, seals to standard ASTM B61)
Compressed Air	**References**
3,000 PSIG 150º F	1t, 2g, 1a, 17f, 16f, 21v
250 PSIG 150º F	5t, 3g, 1b, 6b, 1a, 4fl, 5fl, 8fl, 12fl, 8f, 9f, 10f, 11f, 12f, 21f, 4v, 6v, 9v, 11v, 12v, 13v
Deck Drains and Scuppers	**References**
All *"As Fitted"*	5t, 4b, 6b, 5g, 6g, 4fl, 8f, 9f

Figure 3-2: Material for Pipes and Tubes

	Description	Important	
1t	Tube – seamless (tube for pressures greater than 150 PSI)	ASTM B466-79	70-30 CU-NI
2t	Tube, seamless	ASTM B466-79, Alloy 706	90-10 CU-NI
3t	Tube, seamless	ANSI/ASTM B88-78	Copper
4t	Pipe, seamless	ANSI/ASTM A 53 GR A or B Sch 40	Steel
5t	Pipe, seamless	ANSI/ASTM A 53 GR A or B Sch 40	Carbon Steel
6t	Tube	ANSI/ASTM A376-79B	Stainless Steel, 316L
7t	Tube	ASTM B59-78	Low Carbon Steel
8t	Tube, seamless	ASTM A179	Hydraulic Quality carbon steel
9t	Pipe, seamless	ANSI/AASTM A376-79B AISI 316	Stainless Steel

Figure 3-3: Material for Valves

	Description	Important
1v	Globe, angled	ANSI/ASTM B 61-76
2v	Pressure Regulating	ANSI/ASTM B 61-76
3v	Pressure Relief	ANSI/ASTM B 61-76
4v	Y Type Filters	ANSI/ASTM B 61-76
5v	Diaphragm	ANSI/ASTM B 61-76
6v	SDNR and Lift Check	ANSI/ASTM B 61-76
7v	Butterfly	ANSI/ASTM B 61-76
8v	Gate Valve, flanged	ANSI/ASTM B 61-76
9v	Globe, angle and check valve	Steel
10v	Gate valve	Steel
11v	Relief	Steel
12v	Pressure Regulating	Steel
13v	Globe, angle, check, control bleeder, ball valve	Carbon steel
14v	Globe, gate, ball valve (fire resistant)	316 stainless steel
18v	Angled, relief	316 stainless steel
19v	Butterfly	Ductile cast iron or cast steel
20v	Assorted	AISI 304, 316/A51M, A 182 Teflon packing
21v	Assorted	Alloy 642
22v	Sprinkler Control Valves	ASTM B61

Figure 3-4: Material for fittings

	Description	Material
1f	Brazing	ANSI/ASTM B61 only (do not use standard ASTM B 150)
2f	Flange	ANSI/ASTM B61 only
3f	Threaded	ANSI/ASTM B61 (125 psi nominal)
4f	Unions	ANSI/ASTM B61 only
5f	Solder joint	Wrought copper ANSI B16.22
6f	Brazing bosses	ANSI/ASTM B61 only
7f	Refrigeration	Wrought copper ANSI B16.22
8f	Butt welding	ANSI/ASTM A234-WPB
9f	Socket welding	ANSI/ASTM A 105
10f	Welding bosses	ANSI/ASTM A 105
11f	Threaded	ANSI/ASTM A 105
12f	Union	ANSI/ASTM A 105
13f	Socket Weld	AISI 316L
14f	Butt welding	AISI 316L
15f	Flanges	AISI 316L
16f	Brazing	Bronze
17f	Union	Bronze
18f	Butt welding	90-10 CU-NI
19f	Flexible coupling for shouldered steel pipe	ductile iron for grooved end pipe
20f	Tube fittings	Stainless Steel (Swagelok)
21f	All compression fittings	316L or carbon steel

Figure 3-5: Material for flanges

	Description	Material
1fl	Brazing	ANSI/ASTM B61 only
2fl	Threaded	ANSI/ASTM B61 only
3fl	Composite	ANSI/ASTM B61 – brazing ring, with slip-on flange complying with ANSI/ASTM A181-77 GR1 and ANSI/ASTM A181-GR1
4fl	Welding neck, socket weld, slip-on	ANSI/ASTM A181-GR1
5fl	Extended welding neck	ANSI/ASTM A181-GR1
6fl	Welded	AISI 304L, 316L
8fl	Welding neck socket	ANSI/ASTM A105-GR-2
9fl	SAE 4 Bold split, solid	Carbon steel
10fl	Composite	Inner flange 90-10 CU-NI Outer flange carbon steel
11fl	Flexible coupling for shouldered steel pipe	ductile iron for grooved end pipe
12fl	Swagelok flanges	316L or carbon steel

Figure 3-6: Material for Gaskets

Figure 3-6:	**Description**	**Material**
1g	O-Ring	Buna N
2g	O-Ring	Buna N
3g	Full Face	CAF Non Graphite
4g	Full Face	CAF with graphite
5g	Full Face	Synthetic rubber, max. temp. 180º F
6g	Full Face	Buna N
7g	Flat Ring	Teflon
8g	Spiral Wound	Teflon impregnated
11g	Sheet	Ethylene propylene terpolymer (EPT)

Figure 3-7: Material for nuts and bolts

	Description	Material
1b	Bolts	ANSI/ASTM A193-79A
	Continuous Thread	GR B16
	Stud or Hex Head	ANSI/ASTM A193-79A
	Tap End	GR B16
	Nuts: Hex, HSF	ANSI/ASTM A194-79A GR4
2b	Bolts	Phosphor Bronze ASTM
	Continuous thread	ANSI/ASTM B139-79
	Stud or Hex Head	Alloy B1 or B2
	Tap End	
	Nuts: Hex, HSF	
4b	Bolts	Mild steel
	Stud or Hex Head	Hot dipped galvanized
	Nuts, Hex	
5b	Stud Bolts	
	Continuous Thread	
	Tap End	
	Nuts: Hex, HSF	
6b	Bolts: Hex Head	ASTM A-307 Cadmium plated
	Nuts: Hex Head	
7b	Bolts: Hex Head	ASTM A-320 Stainless Steel
	Nuts: Hex Head	

Figure 3-8: Material for miscellaneous components

	Description	Material
1a	Pipe Clips	Steel
2a	Orifice Plates	Monel
3a	Strainers	
	Plate type	ANSI/ASTM B 61-76
	Flat plate	ANSI/ASTM B 61-76
	Y-type	ANSI/ASTM B 61-76
	Basket type	ANSI/ASTM B 61-76
4a	Strainers	Steel
	Y-type	
	Basket type	
5a	Strainers	304 stainless steel
	Y-type	
6a	Closures for Sounding Pipes	Bronze
7a	Fire hose – supply manifold	Bronze

3.2.3 Fire Fighting systems

3.2.3.1 All piping for the sprinkler system and the CO_2 fixed fire extinguishing system must comply with TCMS regulations and they system manufacturer`s specifications.

3.2.4 Exhaust Piping

3.2.4.1 Exhaust piping must be fabricated from materials as indicated on the guidance drawings. Flanges must be forged steel 1,035 kPa, “Light Pattern”, in accordance with standard ASTM A181-59T. Expansion pieces must be free flexing with flange joints, one fixed and one free floating flange, internal stainless steel sleeves suitable for exhaust duty at the system's operating temperature).

3.2.5 Piping Fabrication

3.2.5.1 Flange faces must be perpendicular to the longitudinal axis of the pipe, tube or fitting to which they are attached. All components and assemblies of components must be thoroughly cleaned after fabrication and before installation on the vessel. Foreign matter such as dirt, grit and shavings, must be removed by methods and materials that are compatible with the fluids employed in the service aboard the vessel.

3.2.6 Bulkhead and Deck Pieces

3.2.6.1 Bulkhead and deck pieces must be steel marine standard three-flange, galvanized for seawater, black for hydrocarbons. Penetrations must be schedule 80 pipe. Penetrations for copper piping must be in bronze, with a nut on each side of the bulkhead or deck.

3.2.7 Joints and Connections

3.2.7.1 Brazed joints must be used in non-ferrous systems and welded joints in carbon steel or alloy systems. The number of joints must be minimized through the use of pipe bending.

3.2.7.2 For bend radii three times the diameter or less, only prefabricated bends must be used. For bends with larger radii, the Contractor must also use prefabricated piping, unless otherwise authorized by the Inspection Authority.

3.2.7.3 If the Contractor wishes to fabricate joints on board the vessel, it must obtain authorization from the Inspection Authority and the Technical Authority. It must comply with all pertinent CCG safety requirements.

3.2.7.4 Disassembly joints must be located so as to permit sufficient clearance to ensure proper assembly and maintenance. Joints located in locations inaccessible for maintenance must be welded or brazed. All flanged pipe joints must be connected using joint sealant appropriate for the intended service and approved by TCMS.

3.2.7.5 Throttle valves and valves with operate automatically or semi-automatically such as safety valves, relief valves and regulating valves must be flanged. If their nominal bore is less than 20mm (3/4"), they may have threaded connections.

3.2.8 Contact strips

3.2.8.1 All copper joints isolated by joining to other materials must be provided with contact strips securely fitted from flange to flange, in order to have a continuous circuit in pipelines.

3.2.9 Hydraulic Piping

3.2.9.1 Hydraulic piping must be phosphate etched, neutralized, flushed with oil and blown dry prior to installation.

3.3 Pumps

3.3.1 General

3.3.1.1 With exception to engine driven pumps, pumps must be supplied with electric motors suitable for the power supply specified on the single line diagram. Pump motors and starter characteristics must be as specified under section 4 of this Specification package.

3.3.1.2 Engine driven pumps must be engine manufacturer`s standard supply. Allowance must be made for specific installation requirements when specifying pump performance parameters.

3.3.1.3 Pump performance criteria must correspond to the requirements of the entire system or systems to which they are connected. Pumps must operate at their nominal capacity. Pumps installed on resilient mounts must have flexible suction and discharge connections that will accept deflections arising from thrust and shock loading.

3.3.1.4 Radial and thrust bearings must either be of the sliding surface or rolling contact type. The selection of thrust bearings must take into account the vessel's rolling and pitching which could cause axial thrust, even when the pumps are in hydraulic balance.

3.3.1.5 Wear rings must be fitted to the casing of all centrifugal pumps. Wear rings must be fitted to all impellers driven at a BHP of 10 or greater at rated output.

3.3.1.6 Pump glands must incorporate mechanical seals.

3.3.1.7 Pump casings must be provided with a vent connection at each discharge stage, as well as a casing drain connection.

3.3.1.8 Pumps operating in parallel must be capable of continuous steady operation.

3.3.1.9 The major rotating elements of all pumps with connected appendages must be dynamically balanced. Documented proof of this must be submitted to the Inspection Authority.

3.3.2 Centrifugal pumps

3.3.2.1 Centrifugal pumps, unless otherwise specified, must have the following characteristics:

- vertical in-line overhung;
- Radial split bronze casing;
- stainless steel shaft;
- mechanical shaft seal;
- aluminum bronze impeller;
- renewable wear rings;

- removable shaft spacers;
- bearings lubricated by the pumped fluid in plain bearing applications, or grease packed roller bearings.

3.3.2.2 Pumps must be fitted with the following accessories:

- discharge pressure gauge, liquid filled, with isolating valve;
- compound suction gauge, liquid filled, with isolating valve;
- drip tray;
- all applicable guards.

3.3.2.3 The design conception of the pump must allow the entire rotating assembly to be removed without disturbing the piping.

3.3.2.4 In cases where the discharge head can exceed the design pressure of any part of the connected piping system, pumps must be equipped with a pressure relief valve.

3.3.3 Positive Displacement Pumps

3.3.3.1 Unless otherwise specified, pumps must have the following characteristics:

- Positive, constant displacement, rotary screw;
- Nodular iron casing, maximum 18% elongation;
- steel power rotor;
- integrated adjustable relief valve;
- mechanical seal.

3.3.4

3.3.4.1 Pumps must be fitted with the following accessories:

- discharge pressure gauge, liquid filled, with isolating valve;
- compound suction gauge, liquid filled, with isolating valve;
- drip tray;
- all applicable guards.

3.4 Valves

3.4.1.1 All valve bodies must indicate the pressure rating, size, material, flow direction, rated temperature, application, name of manufacturer or trade mark cast or forged into the valve body or stamped in a non-stressed area. Valve handles must be located in a place where they can be easily operated.

3.4.1.2 Where a system can be supplied by more than one pump, check valves must be installed in the discharge side of each pump to prevent flow reversal.

3.4.1.3 Check valves and screw down non-return valves must be installed such that the disc opens with the flow and recloses by gravity or by means of springs. Check valves must be installed in locations where reverse flow could interfere with the proper operation of the system, or in locations where reverse flow could flood a space.

3.4.1.4 Globe and angle valves used for isolation must be fitted so that the system's pressure or vacuum is not exerted on the bonnet joint or stem packing when the valve is closed.

3.4.1.5 Manifolds must be used where ever possible.

3.4.1.6 Safety and relief valves and their piping must be fitted so that their discharges will not damage or endanger machinery, equipment or personnel.

3.4.1.7 Valves in branch lines must be mounted adjacent to the main supply line in order to maintain system integrity in the event of a line failure.

3.4.1.8 Butterfly valves or ball valves must not be used as hull isolation valves. Hull isolation valves must be in accordance with the CSA Machinery Regulations.

3.4.1.9 Position indicators are required on all valves for which stem rotation is greater than 360 degrees. Exceptions are specific valves where the position is obvious from operation of the system or from the position of the stem (unless required by TCMS).

3.4.1.10 Check valves must be installed where ever reverse flow could interfere with the proper operation of the system, or in locations where reverse flow could flood a space.

3.4.1.11 All automatically operating valves must be sized to meet capacity requirements. They must have the control sensitivity and adjustment necessary for all operating conditions. Where extreme sensitivity is required, pilot actuated or pneumatic control valves must be installed. Manually operated throttle valves and their operating mechanism must have the necessary sensitivity of control.

3.4.1.12 Relief valves must be installed to protect pressure vessels, heat exchangers, piping systems, machinery and equipment against damage caused by excessive pressure. Relief valves must have sufficient capacity to prevent a pressure increase greater than 10% above maximum allowable operating pressure of the system.

3.4.1.13 A strainer must be installed in inlet piping, and a pressure gauge in the outlet piping from each pressure reducing valve. A relief valve must be installed in the discharge piping, unless otherwise indicated. The strainer must be installed upstream of the pressure reducing valve and downstream of the bypass isolation valve. The pressure gauge and the relief valve must be fitted downstream of both the reducing valve and the bypass valve. Relief valves must be sized on the assumption that the pressure reducing valve could remain wide open. The outlet piping diameter must be increased to comply with the system's flow characteristics. A straight piece of piping, of a length recommended by the manufacturer of the pressure reducing valve must be installed at the largest end of a tapered fitting. A bypass must be installed around each reducing, unless indicated otherwise. The bypass valve must be a manually operated throttle valve that must not permit a greater flow than the reducing valve`s capacity.

3.4.1.14 Relief valves must not have a packed stem stuffing box. Relief valves discharging to pump suctions or vacuum piping must not be fitted with rubber or neoprene stem sealing sleeves. Enclosed spring design with tight covers must be used for the following services:

a) Discharge to a closed system or tank that subjects the valve outlet to a back pressure when the valve is closed;
b) discharge to a closed system or equipment that subjects the valve outlet to sub-atmospheric pressure when the valve is closed;
c) flammable or combustible liquids;
d) toxic or explosive gases.

3.4.1.15 All valves larger than 20mm (3/4 in.) must have flanged connections. All valves larger than 40mm (1-1/2 in.) must have a bolted bonnet, gland and screw type renewable seats.

3.4.1.16 Nameplates identifying the service must be installed on new or reconditioned valves, as shown in Section 2.9. Valves installed under the deck plates must be provided with hinged access covers. Nameplates must fixed to the deck plate.

3.5 Machinery Insulation

3.5.1 General

3.5.1.1 New, non-asbestos containing insulation, approved by a Classification Society, must be installed on all sections of piping, machinery and equipment, in places where the insulation has been removed and on newly installed equipment which must be insulated. The insulation must be installed by a company or qualified personnel with expertise in this field to the satisfaction of the CEW. One of them must be trained as a tinsmith. Valves and fittings must be insulated using the necessary material and thickness indicated on the original plans or according to the TCMS guidelines for adjacent piping. The Contractor must submit the complete lagging and insulation schedule to the TA and the IA for review 48 hours prior to ordering the material. Any insulation and lagging must meet the requirements of the Regulatory Body.

3.5.1.2 Piping and equipment whose design internal temperature is greater than 150°C must be insulated from their supports, or the supports insulated from the structures to which they are attached.

3.5.1.3 Piping hangars for piping with internal temperature below 5°C must be insulated from the steel structure to which they are attached. Piping exposed to weather must be properly insulated against freezing. This requirement does not apply to systems in which a fluid is normally flowing or when the exposed portion a system can be secured and drained to prevent freezing.

3.5.1.4 Where possible, insulating materials must be from one manufacturer.

3.5.2 Lagging

3.5.2.1 New, non-asbestos containing lagging, approved by a Classification Society, must be installed. Lagging (protective covering or coating over insulating materials) must be suitable for the temperature and location and must correspond to either of the following:

- Fibrous glass cloth, tape and thread, thermoplastic base translucent sealant for outside use.
- Aluminium mechanical protective guards, plain or hammered, secured with quick release fasteners.

3.5.2.2 Insulation of piping and/or equipment not exposed to weather must be covered with either a cloth or tape type lagging, when not of the pre-lagging type. Cloth type lagging must be secured by an adhesive or be sewn. Tape type lagging must be spirally wound with not less than a 10mm (3/8 in.) overlap and with the ends fastened to the insulation

and/or lagging by adhesive, stitching or stapling. Insulation and cements used for lagging purposes must comply with CGSB 51.9-92 and CAN/ULC-S102-M standards. Hyperlinks:

- **https://www.scc.ca/en/standardsdb/standards/13174**
- **http://www.scc.ca/en/standardsdb/standards/25791**

3.5.2.3 Insulation, insulation jackets, canvas, fiberglass mat, as well as wrapping and adhesives must be fire retardant with a maximum flame spread index of 25, and a maximum smoke development index of 100, when tested in accordance with CAN/ULC S102-M standard.

3.5.2.4 Insulation of piping or equipment exposed to weather or excessive moisture must be protected by application of a 6mm (1/4 in) thick, weather resistant type coating, secured in place prior to application of its. The presence of cracks or openings in the continuity of the completed coating lagging, especially at valves, flanges and fittings must be avoided in order to prevent the ingress of moisture, spray or water. For deck penetrations, insulation must be protected by 150 mm (6 in.) high steel kick guard, welded to the deck and covered with the same insulation coating.

3.5.2.5 In places where the insulation lagging could be easily damaged, a protective galvanized sheet metal lagging No. 2 USSG must be installed. Where the protective metal lagging is subject to frequent removal for machinery maintenance, it must be in plain or hammered aluminum, secured by quick release clips.

3.5.3 Securing Arrangements

3.5.3.1 All insulating materials must be secured to prevent settling and to allow rapid removal for equipment maintenance.

3.5.3.2 All high temperature piping system must be insulated using reusable prefabricated covers made of the following materials, from the pipe surface outwards:

1) Monel mesh;
2) Fiberglass mat, with density of about 32kg per m^3 (2 lb/ft^3), containing no chemical binder and resistant to operating temperatures of up to 450°C;
3) Foil-lined silicone-coated fiberglass lagging, secured to the insulation by stapling: all edges must be sealed.

3.5.3.3 Covers must be provided with stainless steel or Monel clips, secured by through hooks around which a securing wire can be wound for assembly and fastening purposes.

3.5.3.4 The insulation, with all joints tightly butted, must be secured to the pipe at ends with not less than two metal bands per section, minimum 20mm (3/4 in.) wide, with quick release clips.

3.5.3.5 In places where the pipe insulation abuts flanges or fittings, the ends of the insulation must be tapered to allow removal of bolts.

3.5.4 Insulation Thickness

3.5.4.1 The surface temperature of insulation must not exceed 150°F (65.6°C). The maximum temperatures must determine the thickness of insulation and must correspond to 10% overload of a respective machine or engine. Where the total required thickness of insulation is greater than one inch (25 mm), double layers must be used. The layers must be of equal thickness. All laps must be staggered and all end joints must be overlapped.

3.5.5 Insulation, Anti-condensation

3.5.5.1 Cold water piping and equipment, including sewage pipes, must be insulated using anti-condensation insulation. Anti-condensation insulation, other than elastomeric, foamed plastic type, must be covered with cloth lagging or tape lagging secured with adhesive to form a moisture proof finish. Anti-condensation insulation must be protected by lagging or a protective screening as required where there is a potential for damage.

Where piping or tubing passes through the galley or other high humidity spaces, the insulation must be double layered, with the outside of each layer being waterproofed.

3.5.6 Insulation, removable/reusable, covers or pads

3.5.6.1 Flanges, flange fittings, flexible joints, expansion pieces or any other components of machinery or piping likely to be disassembled for inspection and maintenance must be covered by removable or reusable covers or pads. They must be made of the same material as the main pipe insulation. Gaps between pads and fitted insulation must be filled with pieces of applicable felted material, tight enough to prevent air flow.

3.5.7 Ducting

3.5.7.1 All ducting must be insulated with a minimum two (2) inch (50 mm) thick vapor seal duct insulation with factory applied vapor barrier (Manson AK Flex™ or equivalent – See Annex K). The vapour barrier dam must be a product with fiberglass cloth. Two (2) layers of canvas mat wrap, 16 oz. weight, must be applied with insulation cement, as a final finish for all ducting. Alternative products may be used with the approval of the Technical Authority.

3.5.7.2 Air duct penetrations must be sealed with non-shrink/hardening silicone based caulking.

3.6 Machinery Space Outfit

3.6.1 General

3.6.1.1 The engine room must be provided with ladders, gratings and floor plates, provided at convenient levels to all items of the machinery for operation and routine maintenance.

3.6.2 Deck Plates

3.6.2.1 Deck plates must be non-skid embossed steel tread plate supported on steel bearers and secured by 13mm (1/2 in.) countersunk stainless steel screws at the sides. The plates must not be larger than 120cm (4 ft.) by 183mm (6 ft.). Smaller portable plates must be provided where ever frequent access is required. Portable hinged openings must be provided over valves, cocks and strainers, and identified with brass nameplates. Open contours must be closed with a vertical edge, except for access openings at the base of the machinery. Floor plate supports must be painted. Supports provided must be able to support machinery weights during refits (concentrated loads of 600 lbs).

3.6.3 Protective Guards

3.6.3.1 Protective guards must be fitted over all rotary drives accessible to personnel. They must be light weight and portable. Open guards must be made of expanded laminated metal; closed guards in steel or aluminum. Protective guards must allow visibility of drives and dissipation of heat. Access must be provided at the centers of shaft lines.

3.6.4 Sea Suction and Overboard Discharges

3.6.4.1 All new sea suctions and overboard discharges must be made of the steel plate as used for the hull and protected by means of sacrificial. All components must be covered with a complete hull coating system.

3.6.5 Sea Isolation Valves

3.6.5.1 Each seawater suction line must have a sea isolation valve fitted as close as possible to the seawater intake. Seawater suction valves must be approved by a Classification Society and made of cast steel with stainless steel trim.

3.6.5.2 The valves must be attached by means of bolts to a steel pad with blind tapped bolt holes which has been welded directly to the ship`s hull or sea chest. If a valve cannot be fitted directly to the hull or sea chest, extensions approved by TCMS must be installed between the valve and the steel pad. The extension piece must be as short as possible and must be connected only to the valve and the pad.

3.6.5.3 Sea isolation valves must be high lift globe type. High lift angle valves may be used if it is impossible to install straight globe valves. The minimum size of fasteners used on the sea side of isolation valves must be 19 mm (3/4 in.). Bolts must be made of phosphor bronze alloy; category B1 or B2 in accordance with standard ANSI/ASTM B139-79.

3.6.5.4 When a pump having direct sea suction, is located in a compartment remote from its sea isolating valve, another isolating valve must be located in the pump compartment.

3.7 Machinery Instrumentation

3.7.1 Pressure and Suction gauges

3.7.1.1 Unless otherwise indicated, only 4½ inch (115 mm) pressure gauges (or larger) must be used for instruments.

3.7.1.2 All pressure gauges for which the pressure exceeds 1,000 lb/in.^{2} (7,000 kPa) or those used with compressible fluids must be safety gauges with back blow outs.

3.7.1.3 All gauge lines must be equipped with a capped test tee. All gauges must be equipped with a needle type isolation valve. Pulsation dampers must be fitted to keep gauge pulsations below 5% of full scale. The pressure gauge reading must be at half or two-thirds of its range respectively for fluctuating or steady state working pressures.

3.7.1.4 All pumps must be equipped with a suction compound gauge and a discharge pressure gauge.

3.7.1.5 All refrigeration compressors must be provided with suction and discharge pressure gauges, and "Schroeder" valves must be fitted at the gauge lines to allow portable refrigeration gauge manifolds to be connected.

3.7.1.6 All measurements for new pressure gauges must be in imperial (lb/in.^{2}) and metric (kPa or bar) units. Dial faces must be white with black lettering, and the pointer must of the micrometer adjustable type. Gauge movements must be in stainless steel with stainless steel over-pressure and under-pressure stops. Bourdon tubes must be in bronze or stainless steel (316), with brass or stainless steel sockets (316). The accuracy of the pressure gauge must be ±0.5% of scale range, in accordance with standard ASME B40.1, Grade 2A. Pressure gauges must be filled with glycerine or silicone according to ambient temperature requirements or severity of vibration expected.

3.7.2 Thermometers

3.7.2.1 Unless otherwise indicated, all thermometers must be standard 229mm (9 in.) scale thermometers with a universal adjustable angle stem, a cast aluminum enclosure with cured polyester powder coating, clear window and removable brass thermos well. Thermometers must be fitted with an acrylic window to withstand temperatures to 149°C (300°F) or double plated safety glass for temperatures greater than 149°C (300°F).

3.7.2.2 All thermometers must be housed in 304 or 316 stainless steel thermos well to permit removal of the thermometer without interfering with operation of the equipment. The thermometer and thermos well must enter at least ½ the pipe diameter in the measured process. When thermometers are installed in insulated pipes, longer stem thermometers

with thermos wells with a removable extension collar must be used. The extension collar must be at least 50mm (2 in.) long.

3.7.2.3 Thermometers which measure air temperature must be fitted with a perforated guard stem and a mounting flange instead of a removable brass thermos well.

3.7.2.4 All thermometers must be filled with red alcohol. Range selection for thermometers must be such that the operating temperature of the measured process will fall approximately mid-scale. The scale face must be white with black numbering and must include graduations in degrees Fahrenheit and degrees Celsius. The accuracy of the thermometer must be ±1 scale division.

3.8 Equipment Bases

3.8.1 Steel bases must be fitted for all motors, machinery, pumps and for all new/relocated equipment. Base scantlings must be of adequate strength and thickness and must be approved by TCMS, where required. Additional stiffening must be fitted where required to distribute loads and reduce vibrations.

3.8.2 Drip trays/save-alls must be installed around any hydraulic system and pumps installed as outlined in this Specification package.

3.8.3 An insulator must be installed between ferrous and non-ferrous materials or equipment.

3.9 Anti-Vibration Mounts for Equipment

3.9.1 Anticipated motions of the vessel are described in Section 2.1 of this Specification package. Anti-vibration mounts must provide between 75% to 85% isolation of all equipment generated vibration to the hull structure.

3.9.2 Vibration mounts must be fitted with a shock-proof device with resilient stop to withstand up to 5g acceleration. Metal parts of the vibration mounts must be protected against corrosion with Fe/Zn 8C in accordance with standard ISO 2081 for the marine environment. The resilient mounts must be protected with a cover to prevent contamination of the damping elements.

3.10 Hull Structure

3.10.1 The structural integrity of the hull must be maintained and any questions about its integrity must be referred to TCMS for resolution.

3.10.2 All welding must be performed in accordance with the requirements CWB Welding Standard and/or the Classification Society Rules, whichever is more stringent.

3.10.3 For new structures and where permanent removal of fittings will result in the necessity of fitting insert plates in shell plating, watertight bulkheads and/or watertight decks, the following procedure must be followed:

a) the Contractor must prepare and submit a CWB engineer approved welding scheduled for approval by TCMS;
b) All insert on shell plating must be flush;
c) All underwater inserts must be subjected to a complete X-ray inspection after completion of the work;

d) New and existing tanks, as well as cofferdams and void spaces, where inserts have been fitted must hydrostatically tested to a head of water of 2.5 meters. These tests must be recorded and carried out in the presence of TCMS and the Inspection Authority;
e) The location of any new insert plates must be recorded on the vessel's Shell Expansion Drawing.

4.0 ELECTRONIC AND ELECTRICAL CHARACTERISTICS

4.1 General

4.1.1 The requirements specified in this section apply to all electrical work. Electrical modifications made to the vessel must comply with current regulations, in particular standards TP 127E and IEEE 45 with the approval by TCMS.

4.1.2 All electrical/electronic equipment, fittings and fixtures temporarily removed to allow the necessary clearance to perform work must be reinstalled in its original position, securely attached and all areas must be restored to their original condition.

4.1.3 Unless otherwise stated, equipment provided by the contractor must conform to the requirements of IP56 (IEC 60529) and Section 2.1 of this Specification package.

4.1.4 The Contractor must refer to Section 6 for documentation requirements relating to the electrical system.

4.1.5 Electrical conducting surfaces, heat transfer surfaces and ventilation screens must not be painted. Such areas must be protected from dirt and debris, including paint overspray though out the duration of the contract.

4.1.6 The Contractor must remove all electronic equipment from compartments in which hot work will be performed. If equipment cannot be removed, the Contractor must obtain the approval of the Technical Authority and must ensure that the equipment is protected from hot work by-products and damage.

4.2 New Electric Motors

4.2.1 If new electrical motors are to be installed, these motors must be of commercial marine quality and comply with all regulatory requirements. Motor enclosures for installations must comply with standard IEC 60529.

www.nema.org/Standards/.../ANSI-IEC-60529.pdf

4.2.2 All motor windings must be sealed with Class F insulating material, resistant to oil and water. Motors must operate in an ambient temperature of 50°C when installed inside machinery spaces and 40°C when installed on enclosed decks. For motors operating on an open deck, the low ambient temperature must be considered as -40°C. Temperature increases, as measured by a thermometer after an 8 hour heat test, must not exceed those stated in TCMS TP 127E, Class B.

4.2.3 All AC motors rated in excess of 0.37 kW (1/2 hp) must be squirrel cage induction motors, designed for continuous operation and able to achieve design parameters with 460 Volt, 60

Hz, 3 phase power supply, unless otherwise specified. Induction motors with a rated power less than or equal to 0.37 kW may be designed for operation on 120 Volts, single phase power supply. Before placing an order, the TA's approval must first be obtained.

4.2.4 Induction motors must be selected to ensure that each motor is not too large for the intended service, avoiding a low power factor inherent to under-loaded induction motors. Before placing an order, the TA's approval must first be obtained.

4.2.5 Motors of 0.18 kW (1/4 hp) or greater must be equipped with anti-friction bearings designed to withstand the imposed thrust and radial loads. Where motors are used with solid couplings, a thrust bearing must be fitted to the housing at the end of the shaft, and shaft endplay limited to the clearance in the bearing. Tandem ball bearings must not be used for axial thrust loads.

4.2.6 When anti-friction ball bearings are required for rotating electrical machinery, they must be pre-lubricated & sealed type, unless otherwise specified.

4.2.7 Before purchasing new motors, the Contractor must provide all technical specifications/data of the motors to the IA in order to confirm compatibility for the intended use.

4.3 Nameplates for electrical equipment

4.3.1 All electrical equipment must be fitted with nameplates and comply with the general instructions of Section 2.9.2. Each nameplate must identify the piece of equipment, the manufacturer's name, the type, the serial number, the model number, the rating and the date of manufacture.

4.3.2 All special precautions, maintenance or operating instructions must be listed on the nameplate or on a separate panel affixed to the equipment.

4.3.3 All electrical equipment that operates on dangerous voltages and the compartments where they are located must have a warning notice identifying the danger and must specify the system's maximum voltage.

4.3.4 Distribution panels (switchboards) must be fitted with nameplates containing the following information:

- Name of switchboard;
- Manufacturer;
- Serial number (if applicable);
- Date of manufacture.

4.3.5 Each circuit breaker must have a nameplate indicating the name and designation of the circuit and the setting of the breaker. The Contractor must correctly indicate the name and function of each instrument, switch, etc., on the switchboard, as well as indicated the full load value or normal operating value with a red line.

4.3.6 Distribution panels must be provided with nameplates indicating:

- The space, service, device or circuits controlled and the feeder designation.

4.3.7 Inside, switchboards, distribution panels, and motor controllers must have nameplates identifying bus bars and terminals. Bus bar must have phases identified by colour coding.

4.3.8 Electrical enclosures where several electrical or electronic equipment or devices are housed must have a unique identification code for each device, and each device must be labelled accordingly. Mechanical layout drawings of the enclosures must clearly show the layout and identification codes of the devices within the enclosure.

4.3.9 Terminal blocks and terminal wiring must be marked with the circuit designation and must be treated as devices within enclosures. Terminal blocks must be labeled consecutively and ascending order from left to right and from top to bottom.

4.3.10 Nameplate size and other characteristics must comply with Section 2.9.

4.4 Cables

4.4.1 All cables must comply with TP127E, be manufactured, tested and installed in accordance with the latest TCMS publication, IEEE and the Classification Society requirements.

4.4.2 The Contractor must produce a schematic or update the single line schematic showing all new electrical cables which must be installed and all existing cables which must be reused. For each cable, the following elements must be shown:

- Conductor size;
- Current rating;
- Estimated length;
- Identification number and name of manufacturer;
- Approximate weight;
- Voltage drop;
- Insulation level (voltage);
- Insulation type designation and maximum allowable temperature.

4.4.3 This schematic must be submitted to the Technical Authority for review and approval 2 working days before installing or removing any cables. The schematic may be submitted in sections as the detailed design develops.

4.4.4 New cables must not be spliced. Splicing in existing cables of 600 VAC or less, may be permitted with prior permission from TMCS providing splices are performed in accordance with TP 127E.

4.4.5 Coaxial cables for radio frequencies must not be spliced. In-line connectors must not be used in such cables, except to terminate the cable. All cable and wire terminations must be in accordance with TP 127E.

4.4.6 Where cables penetrate drip proof or watertight compartments, motors or other sheltered or sealed equipment, TCMS approved glands and/or strain relief devices must be used. Cables entering into sheltered compartments must be from the bottom or the side. Where cables penetrate the side of an enclosure, they must be routed downward of the compartment before running in an upward direction.

4.4.7 Cables must be concealed, except in machinery spaces, workshops and store rooms. The location of the cable runs, connection boxes, hangars/supports, concealed by paneling or linings, must be clearly indicated on the "As Fitted" drawings. Concealed connection boxes must indicate the circuit designation, stamped or painted on a part of the box that cannot be dismantled.

4.4.8 Adhesive or permanently printed plastic identification labels for individual cables and conductors can be used inside equipment cubicles and equipment racks.

4.4.9 All conductor identification markings and cable labels must be reflected in the "As Fitted" system drawings and must be as follows:

a) Cable tags must be printed with indelible ink and must not be handwritten;
b) Each cable must have an identifier unique to the installation;
c) Each cable tag must have the following information: unique cable designation and location of each end;
d) Conductor identification markings must be secured to the conductors to prevent them from becoming disassociated from the conductor when it is connected to a device.

4.4.10 Spare conductors within a cable must not be stripped back or shortened and must be tied back, and appropriately labelled as spare. Control cables and cables used for the alarm and monitoring system must contain a minimum of 10% spare conductors. Shielded control cables must have the shield bonded to ground at one end of the cable run only, preferably at the input signal end. The cable must not be grounded at both ends.

4.4.11 Low-loss coaxial cables of appropriate impedance must be used for coaxial antenna feeders.

4.5 Cable Separation

4.5.1 The Contractor must refer to Figure 4-1, indicating the physical separation which must be maintained between the various categories of cables. The separations do not apply to cables crossing at, or close to, right angles. Cables of all types must be kept well separated from antennas, antenna couplers and feed wires. Deviations must be approved by TCMS and the Technical Authority and all related documentation of approved deviations must be forwarded to the Inspection Authority.

4.5.2 Cables must be grouped according to their categories indicated in Figure 4-1 and must comply with the following instructions:

- Cables of groups A to E inclusive may be grouped with cables from the same group and share a common cable tray with the remaining groups;
- Grouping of cables of groups F to K inclusively is not authorized unless otherwise advised by the Inspection Authority. In this case, additional separation material must be provided and installed to the Inspection Authority's satisfaction;
- Cables of groups F to K must use separate cable trays wherever possible, unless otherwise advised by the Inspection Authority.

Figure 4-1: Recommended cable separation (in inches)

Cable group	Cable group classification	Recommended separation (in inches) between cable groups									
		A	B	C	D	E	F	G	H	J	K
A	Ship lighting and electrical power supply	–	4	2	2	4	12	18	18	18	18
B	Receiving antenna cables	4	–	4	2	2	12	18	18	18	18
C	Electrical control cables	2	4	–	2	4	12	18	18	18	18
D	TV and VHF antenna distribution cables	2	2	2	–	2	12	18	18	18	18
E	Telephone and audio distribution cables	4	2	4	2	–	12	18	18	18	18
F	Echo sounder transducer	12	12	12	12	12	–	18	18	18	18
G	Antenna/transmitter coupler feed cables	18	18	18	18	18	18	–	18	18	18
H	Coupler and antenna cables	18	18	18	18	18	18	18	–	18	18
J	VHF/UHF transceiver antenna cables	18	18	18	18	18	18	18	18	–	18
K	Radar transceiver co-axial/wave guide	18	18	18	18	18	18	18	18	18	–

4.6 Circuit breakers

4.6.1 Circuit breakers must be equipped with individually insulated, braced and protected connectors. Tripped indication must be clearly shown by the handle at a position between ON and OFF and/or a visual trip indicator.

4.6.2 All circuit breakers must be rated for their application taking into account voltage, current, trip value, and the number of poles.

4.6.3 Circuit breakers must be calibrated at 50°C.

4.6.4 Circuit breakers must be suitable for marine use, meeting the following criteria:

a) They must be provided with a moulded enclosure;
b) They must be designed for a nominal voltage of 600 VAC, 240 VAC or 120 VAC;
c) They must be quick closing and opening;
d) They must have overcurrent inverse-time characteristics;
e) They must have an overload device for each phase.

4.7 Bulkhead/Tabletop Mounting

4.7.1 Equipment mounted on bulkheads must be attached directly or indirectly to the ship's structure. Under no circumstances must any equipment be supported on lining panels or ceiling panels.

4.7.2 Mounting equipment on tables is acceptable, but the use of window sills must be avoided, unless approved by the TA. Standard manufacturers' mounting accessories must be used wherever possible. All mounted equipment must be oriented to best serve the operator.

4.7.3 Enclosures of all equipment mounted on bulkheads or tables must be grounded to the ship's metal structure.

5.0 DOCUMENTS

All documents provided by the Contractor must become the property of Canada. This also includes all electronic media. Electronic media must not be protected to prevent making additional copies for internal use. Unless otherwise indicated by the TA, all documents provided by the Contractor, as indicated in this section, must be submitted in both official languages (French and English) to the TA and the IA.

5.1 Drawings

5.1.1 General

5.1.1.1 The Contractor must provide all drawings & diagrams necessary for the design and execution of work on the new or modified systems, including drawings & technical manuals produced by the manufacturers or the subcontractors.

5.1.1.2 All new drawings must be submitted as individual files compatible with DWG format (AutoCAD Version 2013). The files must be provided to the TA on a USB key, clearly identified with the title and number of the project.

5.1.1.3 The drawings must provide a complete and detailed visualization of all new or modified systems (Electrical & mechanical). The drawings must include all the information so that a qualified technician can conduct a quick, complete and specific search in case of malfunction or for any other reasons.

5.1.1.4 Generally, the drawings must include or describe all of the following elements:

a) Detailed cover page and index;
b) Abbreviations and symbols used;
c) Identification and specification of equipment;
d) Location, physical representation and mechanical dimension;
e) Block diagrams, overview of the systems;
f) Electrical circuits: Controls, power, cables and wiring;
g) All other references or details required to understand the system

5.1.1.5 It is the responsibility of the Contractor to update or redraw all original vessel drawings affected by the modernization project. Changes made to the old drawings must be denoted in a different colour or style. If more than 50% of an original diagram is changed, the diagram must be redrawn in full, in DWG (AutoCAD) format. Although some original diagrams are kept in a series, this should not prevent all drawings from being homogenous in presentation, numbering and method of interpretation.

5.1.1.6 The Contractor must have an effective method to produce and update drawings throughout the work period. The Contractor must maintain an up-to-date list of drawings & revisions, and must provide this list to the TA at the monthly progress meeting. This list must include a column of all drawings sent to TCMS for approval.

5.1.1.7 The Contractor must provide the Inspection Authority and Technical Authority all drawings required by or generated by subcontractors.

5.1.1.8 A final version of the “As Fitted” drawings must be approved by the IA and TA, and provided at the end of the project. Individual files compatible with DWG (AutoCAD) files must not be electronically protected, and the CCG must be able to modify all elements as needed in any future changes.

5.1.2 Conceptual design drawings

5.1.2.1 The Canadian Coast Guard provides all technical reference drawings to the Contractor for reference purposes only. The Contractor must produce working drawings and ensure that all of these drawings receive relevant regulatory approval. The Contractor must note that the reference drawings provided are not all "As Fitted" drawings. The Contractor must physically verify each element affected, as well as all dimensions required for the work.

5.1.3 Working drawings

5.1.3.1 The Contractor must prepare the details of the project working drawings in accordance with the requirements of the regulatory agency. All changes must be included in the revisions of working drawings.

5.1.3.2 Working drawings must clearly indicate the materials or equipment being supplied, all construction details, precise dimensions, capacity, operating characteristics and performance. Each working drawing must include a unique identification number, and blocks of numbers must be used to identify the various elements of the specification items. When multiple working drawings are required, each drawing must indicate the total number of sheets within the series.

5.1.3.3 Each working drawing for non-catalogue items must be prepared specifically for this project. Working drawings and brochures for catalogue items must be clearly marked to show the items being supplied.

5.1.3.4 The Contractor must verify all working drawings and indicating:

a) The drawing's compliance with all specification requirements has been verified;
b) The equipment has been coordinated with the other equipment to which it is attached or connected;
c) All dimensions have been verified to ensure the correct installation of equipment within the available space.

5.1.4 Working drawings – Submission for Review by PWGSC and CCG for review

5.1.4.1 The Contractor must submit to the TA and IA by email with the CA cc'd, or other electronic means the working drawings, shop drawings and schedules required for the work. The TA may request up to three paper copies of these drawings. Drawings must be submitted at least 10 business days before the start of the work for the affected drawings. The IA and TA must verify specification compliance and, as needed, share their comments with the Contractor within five business days. The Contractor must make all necessary amendments and return and return the revised version of the drawing, with revision dates and revision numbers, to the TA, in the following two working days.

5.1.4.2 Reviewed drawings must not be modified in any way without written authorization from the Technical Authority. In the event of subsequent revisions to drawings already reviewed the entire drawing (all sheets, revised or not) must be resubmitted for review.

5.1.4.3 Space must be provided on the working drawings for review dates and signatures of the Inspection Authority and the Technical Authority.

5.1.4.4 Drawings submitted for review, unless otherwise specified, must be in the form of original drawings. Printed manufacturer's data sheets for standard components are acceptable as long as the pertinent characteristics are identified and relate to specified items.

5.1.5 Working drawings – Submission for TCMS approval

5.1.5.1 The Contractor must submit to TCMS copies, as necessary, of working drawings, ship drawings and/or layout drawings, schedules and calculations required for approval by TCMS.

5.1.5.2 The Contractor is responsible for ensuring that working drawings are approved by TCMS before beginning work on any section of these specifications that must be approved by TCMS.

5.1.5.3 Space must be provided on all working drawings for TCMS approval stamps. This space must be clear of all technical information and must not be on the back of any sheets.

5.1.5.4 The Contractor must communicate with the respective TCMS approval office to determine the quantities and types of materials required for approval purposes.

5.1.5.5 The Contractor must submit one copy of the original stamped drawing and three copies of all TCMS approved drawings to the Technical Authority.

5.1.5.6 The Contractor must provide the Technical Authority with a USB KEY containing all TCMS approved drawings in a PDF compatible format.

5.1.6 "As Fitted" drawings

5.1.6.1 Upon completion of work, the Contractor must transfer all mark-ups from the working drawings to a final revision of all vessel drawings affected by the project work. These drawings must become the "As fitted" drawings for the project work.

5.1.6.2 After acceptance of work, the Contractor must provide the following:

a) One copy on ANSI standard paper of the latest revision of each of the "As Fitted" drawings;
b) The latest revision of each "As Fitted" drawing, in AutoCAD 2013 DWG compatible format, containing a detailed, up-to-date, MS Excel compatible format list of the files for each USB KEY;

c) All drawings must become the property of the Government of Canada.

5.1.6.3 If no AutoCAD compatible drawing files are produced then scanned files (raster format) must be supplied to the Technical Authority in PDF compatible format.

5.1.6.4 The "As Fitted" drawings must be delivered within 15 days after completion of the sea trials.

5.1.7 Framed drawings

5.1.7.1 The following drawings, modified as "As Fitted" drawings, must be printed, framed and mounted on board the ship at the locations designated by the Technical Authority:

- 108H-23_25-1/2/3/4 General Arrangement Drawings, plan view of all decks and profile view; (Distributed between Boat deck, Upper deck (2) and Main deck)
- 07352-10 Lifesaving equipment location (Upper deck, Stbd Fwd)

5.2 Manuals and Registers

5.2.1 General

5.2.1.1 Instruction Manuals and Registers must be bound in a hardcover three-ring, D-ring binder with positive locking mechanisms capable of holding 8 1/2" by 11" sheets. Larger drawings and documents must be concertina folded to suit. The following information must be printed on the cover:

- CCGS Martha L. Black – Vessel Life Extension;
- Specification identification number an contract number;
- Identification of equipment or systems;
- equipment manufacturer;
- Revision number and date.

5.2.1.2 All sections of the manuals must be equipped with plastic tabbed indices. Major equipment components must be subdivided into separate sections in the manuals.

5.2.1.3 A main index must be provided at the beginning of each binder indicating all items included in each section.

5.2.1.4 A list of names, addresses and telephone numbers of contacts associated with equipment manufacturers must accompany the document for consultation after the completion of the project for maintenance and information data purposes.

5.2.1.5 A copy of the final and approved "As Fitted" drawings must be included in the maintenance manual.

5.2.1.6 The Contractor must provide the Technical Authority with two paper copies of all manuals and data sheets in English and in French (1 copy each) for the equipment components supplied by the Contractor prior to the completion of the contract.

5.2.1.7 The Contractor must submit two copies of all manuals and data sheets to the Technical Authority on individual USB KEYs in PDF compatible format, prior to the end of the work.

5.2.2 Operating manuals – "As Fitted"

5.2.2.1 The operating manuals must include the following:

a) A general description of the equipment's operating sequence in English and French;
b) A detailed equipment start-up procedure in English and French;
c) Schematic wiring diagram for the fitted equipment;
d) All pertinent equipment performance criteria;
e) When systems are accompanied by software or hardware, a user manual must include the following:
   - Full software documentation manual for the system, in digital format, such that Canada may revise the programs without recourse to the Contractor.
   - The minimum software documentation must include:
     i. System level diagrams describing the overall scheme of the software/hardware system;
f) The functional specifications describing in detail the functional capabilities of the system and of each software component;
g) The list of project-specific programs, including all comments describing the particularities of the code functions;
h) All listings, files, manuals and associated documentation material must be delivered to and become property of Canada.

5.2.2.2 The Contractor must supply the number of paper copies and electronic copies of the operating manuals as indicated in the section 6.2.1 above.

5.2.3 Maintenance manuals – "As Fitted"

5.2.3.1 These manuals must include the following:

1) The manufacturer's maintenance instructions for each piece of equipment requiring maintenance;
2) The instructions must include installation instructions, part numbers, parts lists, master drawings and exploded views with part identification for all mechanical, electrical, and electronic parts, name of suppliers;
3) A list summarizing each piece of equipment requiring lubrication, indicating the name of equipment item, location of all points of lubrication, type of lubrication recommended, and the frequency of lubrication;
4) Troubleshooting sections must be included for all equipment in the maintenance manual under a separate header.

5.2.3.2 The Contractor must supply the number of paper copies and electronic copies of the maintenance manuals as indicated in the section 6.2.1 above.

5.2.4 Tests/Trials and Inspections Registers

5.2.4.1 Tests, trials, calibration values, measurements, readings and inspections must be clearly presented in tabular form, with two hard copies provided to Canadian Coast Guard Technical Services: one to the Chief Engineer and one to the Technical Authority. This report must be submitted in PDF compatible format. It must be divided by specification number, with page numbers and dates. Tests, trials and inspections must be performed to the satisfaction of the CCG Inspection Authority and the Transport Canada inspector. This requirement must in no event abrogate the obligation to provide, in the shortest time possible, a hard copy of the measurements and test results to the Inspection Authority, to be assessed and evaluated in regards to the expectations towards the Contractor.

5.2.4.2 The Contractor must prepare a separate binder, laid out according to Section 6.2.1, to assemble all tests, trials and inspections. The binder must be indexed for each test, trial and inspection conducted.

5.2.4.3 The Contractor must maintain a complete and accurate register of all tests, trials and inspections conducted during the work. This must include tests, trials and inspections conducted at subcontractors' facilities. These registers must include all relevant documentation, test procedures, associated test sheets, including shop test data, trial and inspection data, as well as observation results.

5.2.4.4 The originals of tests, trials and inspections registers must be signed by TCMS, the Contractor and where applicable, the subcontractor and/or Field Service Representative who witnessed the tests.

5.2.4.5 Tests and inspections carried out for the specific purpose of satisfying the TCMS requirements for the Ship Inspection Reporting System (SIRS) update of the vessel must be recorded and signed on documents meeting the requirements of TCMS, to clearly indicate which piece of equipment or system with associated field number was tested and the results of tests performed. All copies of the documents must be dated and signed by the TCMS inspector present and by the Contractor.

5.2.5 Certificate Register

5.2.5.1 The Contractor must prepare a separate binder, arranged as per section 6.2.1 above, for the documentation of all Certificate records. The binder must be indexed for each element or piece of equipment for which Certificate records are available.

5.2.5.2 The Contractor must maintain a complete and accurate register of all certificate records for the work performed. Certificates records must be up-to-date and correspond to the type of equipment installed by the Contractor. When certificates of approval from a Classification Society are required, the Contractor must ensure that they are inserted within the Certificate register binder. When manufacturers provide equipment certificates in operating manuals, copies of these certificates must also be indexed in the Certificate register binder. The Contractor must also obtain and index all certificates issued by its subcontractors.

5.2.5.3 The Contractor must provide the number of paper copies and electronic copies of the tests, trials and inspection records as set out in section 6.2.1.

5.2.5.4 NOTE: Where original certificates are provided, especially TCMS certificates, one of the three paper copies submitted must be the original document.

5.3 Photographs and Images - General

5.3.1 Initial photographs and images

5.3.1.1 The Contractor must hire a professional photographer to take a minimum of a 1,000 different high-resolution, JPEG compatible format, digital images (8 megapixel minimum), a video, or a combination of both. Images must be stored on a USB KEY. The Inspection Authority and/or the Technical Authority must be present for all photographs taken. The entire ship must be photographed with sufficient detail to identify specific parts and/or components.

5.3.1.2 The Contractor must meet this requirement in conjunction with Section 1.10 of this Specification package and the conditions for custody of the ship in Appendix I of the contract.

5.3.1.3 The Contractor must provide two (2) copies of all initial digital images in JPEG format on individual USB KEYs to the Inspection Authority and the Technical Authority at the first progress meeting, after the delivery of the vessel to the Contractor's facilities.

5.3.2 Progress photographs/images

5.3.2.1 For each item of sections 10 to 20, the Contractor must provide the CGTA with high-resolution, digital, JPEG compatible format images (8 megapixel minimum), on USB KEY, of work progress. Photography must begin at the start of work on the ship, continue for the duration of the work and show the work when completed.

5.3.2.2 The Contractor must take sufficient photos during the work period in order to ensure that an adequate record of work progress is captured. The date on which the photograph was taken must be automatically recorded for all images.

5.3.2.3 At the monthly progress meetings, the Contractor must provide (2) copies of all progress photographs in JPEG compatible format on USB KEYs to the Inspection Authority and the Technical Authority.

6.0 TESTS, DOCK TRIALS AND SEA TRIALS

6.1 General Requirements

6.1.1 The Contractor must demonstrate that the completed work and equipment comply with the performance requirements described in this Specification package or those of the equipment suppliers. The Contractor must develop test and trial procedures, and must conduct all tests and trials required by this Specification package, by manufacturers or by regulatory bodies in order to obtain all appropriate certificates required for the ship. The Contractor must obtain, and supply to the CGTA, all necessary certificates for the vessel to ensure that the vessel is fully certified and seaworthy, for a vessel of its class, prior to the completion of the contract.

6.1.2 The Contractor must prepare the trials schedule showing dates, sequence, procedures and duration of each trial or set of trials. This schedule, including the proposed trial record sheets for all trials, must be submitted to the Technical Authority and the Inspection Authority for review and approval 20 business days prior to the start of any tests and trials.

6.1.3 The Contractor must coordinate the testing schedule with Transport Canada Marine Safety (TCMS) and Health Canada (HC) to ensure their participation, where applicable. The Contractor must ensure the availability of a Field Service Representative (FSR) or obtain written authorization from the manufacturer before initial start-up of the installed or modified equipment.

6.1.3.1 CCG has contracted the American Bureau of Shipping (ABS) with TCMS delegation to perform surveys and certification of work done on Canadian Coast Guard vessels, in agreement with the Canada Shipping Act, rules and regulations. All ABS invoices must be forwarded to CCG at the address specified in the contract. The Contractor will have the responsibility to schedule the ABS surveyor, to complete all mandatory requirements

6.1.4 The Inspection Authority must be present for all tests, as well as the TCMS, FSR or subcontractors, where applicable.

6.1.5 Tests must follow the recommended procedures described below. Any defects must be corrected to the satisfaction of the Inspection Authority, TCMS and the attending FSR on. Once defects are corrected, the tests and trials must be repeated to the satisfaction of the Inspection Authority, and where necessary TCMS.

6.1.6 Upon completion of each specification item, the Contractor must notify the IA and TCMS (as required) so they can inspect the work prior to final acceptance of each specification item or reassembly of equipment/components. Failure to notify the IA does not absolve the Contractor from its responsibility to provide the opportunity to inspect any completed item in accordance with regulatory and contract requirements.

6.1.7 Inspections completed by the Inspection Authority do not in any way, replace those inspections required by TCMS and/or HC.

6.1.8 Shop testing, dock and sea trials must be to the standards required by TCMS. Where TCMS has no requirements for shop test procedures, the Contractor must adhere to SNAME guidelines as referenced in section 1.4 of this Specification package. The minimum standard for all electrical dock and sea trial must comply with TCMS, TP127E and IEEE 45-2002. All electronic equipment static tests must be completed prior to seal trials, with only the operational tests to be carried out at sea.

6.1.9 Mechanical and piping systems must be tested in accordance with Section 7.2.

6.1.10 Hydrostatic testing of piping and components forming part of any system must be completed prior to any operational testing of the system. The Contractor must have on hand signed and witnessed test sheets showing the results of hydrostatic tests prior to the operational tests of a system. As a minimum, the Inspection Authority must be notified when any components are being hydrostatically tested.

6.1.11 The Contractor must provide the Technical Authority with a complete list of disturbed services and ship's that require functional and operational tests prior to the completion of each specification requirement. The Contractor must develop specific test procedures to test the operational and functional condition of each of the disturbed services and/or ship's systems. The Contractor must submit the list of disturbed services and ship's systems and the associated specific test procedures for review to the Inspection Authority and Technical Authority twenty (20) working days prior to the testing of these systems.

6.1.12 The Contractor must make reference to Section 5.2.4 with respect to documentation requirements for tests, trials and inspection registers.

6.2 Mechanical and Piping Systems

6.2.1 All piping systems and sub-assemblies fabricated by the Contractor must be hydrostatically tested to 1.5 times the system's working pressure and proven tight to the satisfaction of the Inspection Authority prior to installation onboard the ship.

6.2.2 Machinery and equipment must not be exposed to pressures higher than the maximum allowable operating pressure during system pressure tests. Valves at the components may be closed, or the connection blanked off to protect such components from excessive pressure. Where there any flanged joints in the piping between a tank isolating valve and the open end of the tail pipe, or where a tank isolating valve has not been installed, the flanged joint next to the open end of the tailpipe must be temporarily blanked off so the system may be pressure tested up to that point. Instruments, pressure switches and other components

that may be damaged by excessive pressure must be removed or otherwise protected during hydrostatic testing.

6.2.3 For tests, calibrated pressure gauges must be installed at the connections provided in the gauge piping for this purpose. During the tests, readings of installed gauges must be checked with the calibrated test gauges. Installed pressure gauges must be adjusted where necessary, to indicate the correct pressure. The Contractor must provide all calibration certificates for all instrumentation used for the testing of systems to the Inspection Authority and Technical Authority.

6.2.4 When the duration of a pressure test is not specified, the test pressure must be maintained for a sufficient length of time to permit a thorough examination of the system for leaks, to the satisfaction of the Inspection Authority.

6.2.5 Relief and safety valves and all other components installed to limit the operating pressure of a system must be removed, blanked, or bypassed where necessary, in order to build up the required pressure for the test. After a system has satisfactorily passed these tests, all components previously removed must be reinstalled and tested under pressure to ensure they are operating at their approved set pressures. Set pressures, as indicated on identification plates of these components must conform to the approved set pressures.

6.2.6 All components required for the safe operation of the system must be examined and adjusted during the operating tests to demonstrate that they comply with the requirements specified and approved for the system. Operating testing must demonstrate that the design and installation of the piping adequately meets the service requirements.

6.2.7 Components, such as spring clamps, must be adjusted where necessary. Flexible piping connections, slip joints, expansion joints and noise isolation pipe fittings must be checked for satisfactory operation while the system in which they are installed is being operated.

6.2.8 Where pumps or ejectors have suctions from tanks or compartments, the operating test must demonstrate the system's ability to remove the service liquid down to the level of the open end of the suction line.

6.2.9 Open systems such as vent lines, overflows and deck drains must be tested for unobstructed flow. This test must be conducted using a compressed air or water not exceeding 690 kPa (100 psi). Manual pump systems, portable drainage facilities and other various systems must undergo an operating test, as well as the specified pressure test. Pressure tests must precede operating testing.

6.2.10 All systems must undergo visual inspection and must be leak free during the specified tests.

6.2.11 All pressure and operating tests must be completed before system trials.

6.2.12 Where tanks have been opened for the purpose of conducting work, they must be cleared, cleaned and inspected by the Inspection Authority prior to being closed. Failure to notify the Inspection Authority does not absolve the Contractor of its responsibility of providing the opportunity to inspect any completed items.

6.2.13 Inspections completed by the Inspection Authority do not in any way, replace those inspections required by TCMS.

6.2.14 Upon completion of the inspection, new gaskets must be installed on all tank covers prior to closing. The Contractor is responsible for producing a register using an MS Excel spreadsheet, containing the signatures of those responsible for each inspection of each task to be inspected in the tanks. This register must include signature spaces for the Inspection Authority (CCG), TCMS inspector and the Contractor responsible representative attesting that all work and inspections have been completed.

6.2.15 Where work has been conducted in or on any structural part of a tank, that tank must be subjected to a hydrostatic pressure test at a water column height of 8 ft. (2.5 m). The hydrostatic pressure test must be witnessed by the Inspection Authority and TCMS. Hydrostatic pressure tests must be documented as per section 6.2 of this Specification package.

6.3 Ship Performance Sea Trials

6.3.1 In addition to dock trials commissioning tests of individual ship's systems specified with in this Specification package, the Contractor must perform a full set of sea trials in accordance with the "Guide for Sea Trials" as published by SNAME. The Contractor must develop all sea trial procedures and data sheets. The sea trial procedures with attached data sheets, must be submitted to the Inspection Authority and Technical Authority for review and approval 20 days before the start of sea trials.

6.3.2 After the refloating of the ship and once all the work in this Specification package has been completed, sea trials of a minimum of 8 hours must be performed. The Contractor must also provide an hourly rate, in its bid, permitting the price of these trials to be adjusted (up or down) in order to ensure they meet the regulation requirements of this Specification package.

6.3.3 The sea trials must be completed over the course of one day. The Contractor must provide four shipyard personnel, including one supervisor, for the duration of the trials in order to make all necessary adjustments.

6.3.4 Where necessary, the Contractor must organize and assume all docking costs associated with the sea trials. The Contractor must provide the necessary resources required for handling the ship's mooring lines and any tugs required for the ship's departure from and return to the dock.

7.0 BERTHING, MOORING, DRY-DOCKING AND REFLOATING

7.1 Berthing and Mooring

7.1.1 The Contractor must provide all materials and labour required to manoeuvre, dry-dock, and fit out a ship as identified in Section 1.2 this Specification package. Details of the berthing and mooring facilities must be included in the Bidder's proposal.

7.1.2 The Contractor must be responsible for docking and mooring of the ship for the duration of the contract period. The Government of Canada must have free access to the ship at all times.

7.1.3 The ship must be located at the Contractor's facilities for the duration of the works.

7.1.4 The depth of water must be sufficient to prevent the ship from touching bottom during any tidal or low water conditions. The Contractor must ensure that there is sufficient water under the keel to allow propulsion system testing during dock trials.

7.1.5 The Contractor must supply all mooring lines and labour required for docking/undocking, mooring, dock trials, refloating of the ship and casting off of the vessel. The Contractor may use the ship's mooring lines to tie up the vessel upon arrival, but must be immediately replace these and remove the vessel's lines to storage.

7.1.6 The Contractor must supply all material and labour required to dock and undock the vessel including any vessel movements, provisions for tugs, and line handling personnel.

7.1.7 The Contractor must supply and install a gangway fitted with a safety net in compliance with the Canada Labour Code for as long as the ship is docked at/in its facilities. The Contractor is responsible for the safety of the gangway.

7.2 General

7.2.1 Platforms

7.2.1.1 The Contractor must supply the labour and material for the erection of access platforms required to execute the work specified in this Specification package and any additional agreed upon work. Upon completion of the work, the platforms will be disassembled and removed from the ship. The Contractor must include the cost of these preparations in its bid.

7.2.2 Equipment

7.2.2.1 The Contractor's bid must include costs for transportation services, installation of gangways and ropes, cranage and removal and reinstallation of parts and equipment required for the work.

7.2.3 Hot Work

7.2.3.1 The Contractor must supply the appropriate type and quantity of fire extinguishers including fire watches, required for all hot work until these surfaces and walls have cooled (see section 2.2.2). The ship's fire extinguishers must not be used except in emergency situations. If the Contractor must use one of the ship's fire extinguishers, it must be refilled and verified by an authorized company. The Contractor must supply fire-retardant protection to protect cable trays, cables, equipment and structure against slag and any hot work by-products.

7.2.3.2 For each day that hot work is planned, the Contractor must submit a hot work permit to the Inspection Authority ensuring that safety measures have been identified and will be applied. If a permit is not available, the Contractor must alternatively submit a request to the Inspection Authority along with the safety measures planned. The Contractor must maintain the fire watch (firefighter) where the hot work took place for up to 30 minutes after stopping.

7.2.4 Access and Cumbersome Items

7.2.4.1 The Contractor must remove any piping, inspection hole covers, components and equipment where necessary, in order to perform the work and access work spaces. Upon completion of the work, the Contractor must reinstall the removed items with new gaskets, collars, hardware and anti-seize compound to be supplied by the contractor.

7.2.5 Temporary Lighting and Ventilation

7.2.5.1 The Contractor must supply, install and maintain any temporary lighting and ventilation as required to carry out the work in this Specification package. Upon completion of the work, the Contractor must remove these items.

7.2.6 Cleanliness

7.2.6.1 The Contractor must ensure that all spaces, compartments and areas of the ship, both interior and exterior, are returned to their original state (upon delivery of the ship). The cost of removing dust, debris and other materials must be included in the bid.

7.2.7 Certificates Issued by a Chemist

7.2.7.1 The Contractor must provide the Inspection Authority with certificates obtained from a marine chemist or other qualified person in accordance with TCMS Bulletin TP 3177E prior to conducting cleaning, painting or hot work in confined spaces or machinery compartments. These certificates must clearly indicate the type of work permitted and must be renewed in accordance with the regulations in effect. The Contractor must submit one copy to the Inspection Authority, must display one at the entrance of the affected work area.

7.2.8 Fixed Fire Detection and Extinguishing System (Sprinklers & CO_2)

7.2.8.1 Where work affects the ship's fire detection or extinguishing systems (sprinklers, CO_2), the Contractor must ensure that the ship and its occupants remain protected from any risk of fire. The Contractor may only remove or deactivate one section of these systems at a time, by installing replacement parts throughout the work or by any other means accepted by the IA.

7.2.9 Coatings

7.2.9.1 All types of coatings required must be applied in accordance with their manufacturer's instructions and specifications on surface preparation, ambient conditions, drying/curing time, time between each layer, thickness of layers and preparation of coatings.

7.2.10 Primer

7.2.10.1 Unless otherwise specified, any new or replaced steel surface or part must be covered with at least two coats, (2.0 mils dry), of paint compatible with the vessel’s existing coating system (See document titled: Hull, masts and superstructures coatings). Unless otherwise specified, the primer must be supplied by the Contractor and the work must be accepted immediately upon completion by the IA. It is prohibited to use paint containing lead. All welds must be de-burred and cleaned before applying any primer.

7.2.11 Tools

7.2.11.1 Unless otherwise specified, the Contractor must supply all required tools needed to perform the work, with exception for some specialized tools that will be lent to the Contractor by the Technical Authority. Any tools lent to the Contractor must be recorded and returned upon completion of the work.

7.2.12 Instructions

7.2.12.1 The overhaul and installation of all machinery and equipment specified herein must be carried out in accordance with the applicable manufacturer's instructions, drawings and specifications.

7.2.13 Workmanship

7.2.13.1 The Contractor must use qualified, certified and competent tradesmen and supervisors to ensure a high quality and standard of work in accordance with ship construction/building standards and to the satisfaction of the Inspection Authority.

7.2.14 Supervision

7.2.14.1 During all phases of the contract, the Contractor must supervise the work of its staff and subcontractors. Unless otherwise stipulated, personnel designated by the Inspection Authority will accompany the Contractor's employees at all times in accommodations and cabin spaces.

7.2.15 Smoking

7.2.15.1 The Public Service Smoking Policy forbids smoking aboard Government of Canada ships. The Contractor must inform and ensure its employees and subcontractors adhere to this policy.

7.2.16 Halocarbons Policy

7.2.16.1 A control policy for halocarbons used on CCG ships is in vigor. This policy is in Section 7.D.4 of the Fleet Safety and Security Manual. A copy is included in Appendix A on safety. The Contractor must ensure its employees and subcontractors respect this policy.

7.2.17 Disposal of Waste Oil and Hydrocarbons

7.2.17.1 The Contractor must dispose of all waste oil and hydrocarbons or assign the task to subcontractors holding the provincial licences required for disposal of petroleum products. Copies of these licences must be presented on request, and disposal of waste oil and hydrocarbons must be done in accordance with Canadian Coast Guard policy on handling of fuel, oil and waste oil, described in Chapter 7.C.1 of the Fleet Safety and Security Manual.

7.2.18 Waste Disposal

7.2.18.1 Disposal of waste generated by sandblasting and mechanical cleaning must be done by the Contractor while respecting provincial or municipal regulations, or by a

subcontractor holding a licence from provincial authorities for the disposal of such material. Copies of these licences must be presented on request.

7.2.19 Standards

7.2.19.1 All work in this Specification package or, otherwise authorized, carried out aboard must respect Part 2 of the Canada Labour Code, the provincial regulations in effect, Maritime Occupational Health and Safety Regulations and the provisions of the Canadian Coast Guard Fleet Safety and Security Manual while the ship is in the custody of the CCG.

7.2.20

7.3 Dry Docking

7.3.1 Reference : Docking plan

7.3.2 The ship will be delivered to the entrance of the shipyard. The Contractor is responsible for docking the ship at the wharf adjacent to the dry dock, including the installation and removal of a gangway (Contractor supplied), regardless of the ship's arrival and departure times. This also applies to any docking/undocking as required for sea trials.

7.3.3 The Contractor must supply all labor, materials, equipment and resources necessary for handling the ship's mooring lines and tug assistance as required to perform the docking and refloating of the vessel, as well as any other movements required throughout the duration of the contract period. The Contractor must be responsible for any associated fee.

7.3.4 The Contractor must note that the ship will require a period of 24 hours, both before after dry docking, to allow for ballasting and fuel transfer operations necessary to obtain the desired trim of the vessel for dry docking.

7.3.5 The Contractor must supply a plan of the dry dock with its proposal. The plan must comply with the conditions imposed by the contract. The plan must include the date and time of foreseen entry/exit from the dry dock, as well as the availability of the adjacent wharf.

7.3.6 The particulars of the ship can be found in Section 1.2 of this Specification package. The Contractor's bid package must include proof that the docking facility is certified to dry dock the ship.

7.3.7 The stability books are included in the Technical Data Package provided to bidders.

7.3.8 A docking plan is available upon request to the Technical Authority.

7.3.9 The Contractor must supply all labour, materials and facilities necessary for dry docking and refloating the ship as required to conduct the work described in this Specification package.

7.3.10 The blocking plan will be provided to the shipyard by the TA during the first contractual meeting or before the ship arrives at the shipyard.

7.3.11 The new blocking plan must indicate the location of all keel blocks in relation to the respective frames to serve as a reference for the next dry docking, permitting work to continue on the hull in the areas covered by blocks during this dry docking.

7.3.12 The new blocking plan must be submitted to the TA and the IA for approval before the Contractor prepares the dry dock.

7.3.13 Before the dry docking of the ship, the Contractor must arrange an inspection with the Inspection Authority to verifier the blocks and their alignment. A report of the alignment readings must be submitted to the Inspection Authority.

7.3.14 The Contractor must prepare the blocks and any shoring required to maintain the true alignment of the ship's hull and machinery throughout the dry-docking period. The Contractor must dock and undock the ship and plan sufficient lay days to carry out the work described in this document, with a sufficient margin to perform unexpected work.

7.3.15 The Contractor must include in its bid, the total number of lay days and the unit cost per lay day.

7.3.16 The Contractor is responsible for recording all tank soundings, draft, trim and list of the ship, and must perform the stability calculations required for the dry-docking. These calculations must be forwarded to the Technical Authority and Inspection Authority two (2) business days prior to dry docking the vessel.

7.3.17 The ship must be blocked taking into consideration all docking plugs, transducers, anodes and sea inlet grids are clear and accessible. Blocks supporting the keel and hull that prevent removal of the drain plugs from tanks will have to be moved.

7.3.18 The Contractor must not place blocks under the echo sounder transducer plates located between frames 138 and 140, port and starboard, nor under the Doppler sonar transducer plates located between frames 155 and 156.

7.3.19 There must be a minimum clearance of 1.3 m (4 ft.) under the keel.

7.3.20 In the event that hull fittings or foreseen work locations are covered, the Contractor must be responsible for all labour and equipment required for making alternative arrangements to drain tanks and/or move blocks to gain access to areas of specified work.

7.3.21 All misplaced blocks, not corresponding to the new blocking plan provided by the Contractor, must be moved at the Contractor`s expense.

7.3.22 If the CCG requires other blocks to be moved for other reasons, the Contractor must provide a unit price for additional block displacement.

7.3.23 The Contractor must supply and install gangways compliant with the Canada Labour Code as long as the ship is in dry dock. The ship must be equipped with two separate and independent accesses at all times. One gangway must be installed at the front of the ship on the port or starboard side and the other must be installed at the aft of the ship on the opposite side of the forward gangway. The gangways must be safe and structurally adapted for the passage of the ship’s crew and workers, in accordance with Section 2 of the Maritime Occupational Health and Safety Regulations. The gangways must be well lit at night. The gangways must be placed at both ends of the ship, in accordance with the Technical Authority's directives. The Contractor is responsible for the safety of the gangways.

7.3.24 Once the ship is properly resting on the blocks, the Contractor must immediately remove the ballast tank drain plugs and drain these tanks. The position of these plugs is indicated on the blocking plan.

7.3.25 The drain plugs must be clearly labelled as they are removed to insure they are reinstalled in their respective positions. Once the drain plugs have been removed, the Contractor must give them to the CCG Inspection Authority, who will be responsible for their storage.

7.3.26 The Contractor must install drain fittings to the various deck scuppers overboard drains if they interfere with the work in any way. The Contractor must indicate a unit price for the installation of five (5) temporary drains for deck scuppers and overboard drains.

7.3.27 The Contractor must be responsible for the safe transfer of the ship to the berth or mooring location where it will stay until the dry docking. During dry docking, radio contact must be maintained between the ship's Commanding Officer or Inspection Authority and the Contractor's docking master. If necessary, the Contractor must include in its bid towing and/or pilotage and icebreaking services. All costs for rope handling and for the certified docking master are the Contractor's responsibility. The Contractor must provide and install a ground cable between the vessel and the dock while it is docked, as per TCMS Ship Safety Bulletin 6/89.

7.3.28 The Contractor must notify the CCG of all movement or refloating of the ship not required by this Specification package, seven days prior to the start of the operations. The Contractor must supply the CCG and PWGSC authorities with a plan of its intentions. The Contractor will be responsible for all costs associated with these decisions.

7.3.29 Within four hours of dry docking, the bottom of the ship's hull must be pressure washed (5000 psi minimum) with fresh water to remove any marine life/vegetation allowing for a preliminary hull inspection.

7.4 Numbering

7.4.1 The contractor must supply the necessary material and labour to temporarily number the hull frames and bulkheads to facilitate the external hull inspection. The shipyard will be responsible for keeping the frames numbered throughout the entire dry docking period until the ship is refloated.

7.4.2 Frames must be numbered on each side of the ship, at five-frame intervals, in conformity with the ship's construction drawings. Each number must be accompanied by a line 60 cm in height, on each side of the hull at bilge-level.

7.5 Undocking

7.5.1 Before refloating the ship, the Contractor must obtain the drain plugs from the GCC IA and install them in their respective locations using white lead and twine. The Contractor must verify the water tight integrity of all tank drain plugs, including those that were not removed, by means of a vacuum box test. If the seal of a previously removed drain plug does not pass the vacuum box test, the Contractor must remove it and add more cement with twine and redo the test until proven watertight. The CCG IA must witness the tests.

7.5.2 Before refloating the ship, the Contractor must verify all grate fasteners for all sea chests, seawater intakes and hull openings to ensure that they are locked in place by welding.

7.5.3 Before undocking the ship, the Contractor must ensure that any protective covers and connections are removed. The Contractor must supply, install and remove, upon completion of work, all fittings and lugs required to perform the work indicated in this Specification package. Where the lugs and/or fittings are installed and removed, the welds must be ground flush with the hull. Any damaged or disturbed paint work must be performed in accordance with the instructions found in the paint section of these Specifications and of those of the paint manufacturer. Paint must be applied in accordance with the ship's colour and external marks diagram.

7.5.4 Before undocking the ship, the Contractor must ensure that all tanks are filled to obtain the same conditions as at docking. The Contractor is responsible for the safe refloating of the ship, taking into consideration any changes in stability resulting from the work carried out in these Specifications. The Contractor must perform the necessary stability calculations required to refloat the ship. These calculations must be submitted to the IA and TA for review, 48 hours prior to flooding the dry dock.

7.5.5 Prior to refloating the ship, the Contractor must clean the transducers using a mild soapy fresh water solution to eliminate any contaminants or fouling. The transducers must then be rinsed with fresh water to eliminate residual soap on their exterior surfaces.

7.5.6 The Contractor must ensure the safe undocking of the vessel and that no damage to the vessel will be incurred during the undocking process. The Contractor must have a sufficient number of personnel on board to respond in case of water ingress or other problems.

7.5.7 Prior to flooding the dry dock, the Contractor must ensure that all ship`s side, including valves, are properly closed using a checklist.

7.6 Deliverables

7.6.1 The Contractor must supply, before the end of the contract, a new docking plan, offsetting the blocks relative to the measurements indicated on the 2013 plan in order to permit sandblasting of the hull and application of paint in those areas where the ship rested on keel blocks in 2013.

7.6.2 Prior to the ship's departure, the Contractor must provide the CCG TA with the documentation required to obtain a certificate of seaworthiness from TCMS.

8.0 SERVICES

8.1 GENERAL

8.1.1 The following services for which unit prices must be submitted, must be provided to the ship while it is at the Contractor`s facilities. These prices must cover the entire work period. Unit prices for each service must also be submitted for adjustment purposes based on variations in the duration of services. Services identified with an asterisk (*) will be required both in dry dock and at the Contractor's wharf.

8.1.2 The Contractor must supply all equipment, tools and machinery required to perform the work as described in this Specification package. The Contractor cannot make execution of work conditional on provision of equipment or other machinery that is not already included in its firm price by the Government of Canada or by a subcontractor paid by the Government of Canada. Lifting equipment must be properly adapted and of sufficient capacity for its intended use. It must be accompanied by a valid certificate indicating its safe working load, or bare a permanent marking indicating its safe working load.

8.1.3 All welded supports or other mountings required in this section must be installed by welders certified by the Canadian Welding Bureau. Upon completion of the work, all supports and mountings used for the work described in this Specification package must be removed from the ship.

8.2 (*) TELEPHONE + HIGH-SPEED INTERNET LINES

8.2.1 Refer to section 1.6.1 of this Specification package.

8.3 (*) TEMPORARY PROTECTION OF DECKS AND BULKHEADS

8.3.1 In order to avoid accumulation of dirt in corridors and to protect floor coverings, the Contractor must supply and install rigid hardboards, at least 1/8 inch thick, on all deck surfaces and of the Main deck, Upper deck, Boat deck, Officers deck, Navigation deck, Bridge and the Control Room. The Contractor must also supply and install rigid hardboards in all entries, staircases, the Chief Engineer's, the Engineers offices, the Crew`s Dining Room, the laundry room deck and the rear main deck from the port propulsion room entrance to the steering gear compartment, inclusive. The total area to be covered is approximately 650 m^2. For adjustment purposes, the Contractor must provide a unit price per square metre (m^2).

8.3.2 The Contractor must supply and install 48 in. x 1/8 in. thick cardboard on the lower bulkheads of all deck corridors mentioned above. The total length will cover approximately 800m. The Contractor must ensure that the cardboard and rigid hardboards, remain in good condition for the duration of the contract. If the cardboard and rigid hardboards are damaged, they must be replaced at the Contractor's expense.

8.3.3 Installation of the deck and bulkhead coverings must be done as soon as the ship arrives at the shipyard facilities. The Contractor is responsible upon taking charge of the ship. Upon completion of the work, the Contractor must remove all cardboard and rigid hardboards and must remove any remaining adhesive residue on decks and bulkheads. <u>The use of multipurpose plastic film covers is prohibited.</u>

8.4 (*) ELECTRICAL POWER

8.4.1 The Contractor must supply two electrical power connections (600 VAC, three-phase, 300 amps/connection) for the duration of the contract (docked or in dry dock).

8.4.2 The Contractor must supply the material and labour to connect and disconnect as required, two electrical cables for shore power supply, each being 150 feet long with male plugs. These two cables must be connected in parallel onboard ship. Before powering the ship, the Contractor must ensure that power sources supplied have the same phase sequence at the source and on the ship. The nominal load of the ship is between 350 and 400 kilowatts. The ship will provide two, female plugs with two meter long extensions for connection to ship yard’s electrical system. These cables must not be shortened. The cables and connections must be Megger-tested before connection.

8.4.3 The Contractor must provide a unit price per kilowatt hour which the Contractor must use in its bid to determine a price for a block of 500 000 kilowatt hours. This unit price will also be used to adjust (up or down) the ship`s total consumption at the end of the contract period via a PWGSC 1379 form.

8.4.4

8.4.5 The Contractor must supply a kilowatt-hour meter and connect it to the ship's power source to track consumption. The Contractor must read the kilowatt-hour meter in the presence of the Technical Authority before connection and disconnection of the power supply to verify the electrical consumption. The meter must be read in the presence of the Technical Authority before and after any movement of the ship.

8.4.6 The power supply for which the price is indicated must only be used for the ship. In Annex J of the call for tenders, the Contractor must certify its commitment to providing the power defined in these specifications for the duration of the contract, regardless of the presence of the crew.

8.4.7 Upon completion of the work and disconnection of the shore power, the shore power adaptors/extensions must be disconnected from the cables and returned to the ship's Electrical Officer.

8.4.8 NOTE: If the Contractor powers the ship using a diesel generator installed on the wharf, it must be responsible for watch keepers and generator fuel.

8.5 HEATING

8.5.1 It is the Contractor's responsibility to ensure that heating and dehumidification are maintained for the duration of the contract. The Contractor is responsible for monitoring the environmental conditions onboard the ship to prevent damage from temperature variations. This must include protection from freezing of all piping systems containing liquids and protection against overheating in any spaces in which electronic equipment is susceptible to damage, such as the electronic equipment room, the wheelhouse and the engine control room. If the ship is shut down and unmanned, cooling water will not be necessary.

8.5.2 The Contractor must provide a steam supply or portable steam boiler for the duration of the work period. The steam supply must be equivalent to the vessel’s rated boiler capacity (7 bars and 2000 kg/h). (60 HP, High Pressure Boiler, 150 PSI MAWP and 940 Kg/hr is acceptable) The Contractor must isolate and blank each of the vessel’s boilers steam stop valves and must connect to the ship’s steam piping via the 80 mm pipe steam main piping, flange diam. : 200 mm, ANSI bolts circle : 160 mm (face to face DIN-3202, flanges DIN PN-25. Condensate requirements must be provided as determined by the Contractor’s steam system; the vessel’s condensate system may be utilized at the Contractor’s discretion. Exact pipe routing to be at the discretion of the shipyard, but take notice that the vessel’s weather-tight integrity must be maintained for the duration of the work period. Prior to sea trials, the Contractor must return the vessel and the steam system (using new fasteners and gaskets) to the pre-work condition.

8.6 FRESH WATER AND FIREMAIN SEAWATER SERVICES

8.6.1 The Contractor must supply all material and labour to install necessary connections and supply fresh water necessary to provide the services described hereunder throughout the entire dry docking period. The Contractor must disconnect connections upon completion of work.

8.6.2 The Contractor must supply and install a calibrated flow meter for each domestic water supply line connected to the ship for the duration of the contract. Flow meters must be sized for the service they are intended for. The flow meter calibration records must be presented to the Inspection Authority. All flow meters must be read by the Contractor at the beginning and at the end of the contract period, as well as before and after any vessel movements to or from the fit out wall or the dry dock, in the presence of the Inspection Authority. The following connections are required to service the vessel:

a) The Contractor must supply and install a 1½ inch hose certified for potable water. The water must come from a source that has recently been certified safe for human consumption by a health services authority from the local municipal or provincial government. The Contractor must supply a valid potable water certificate to the Inspection Authority before making the connection. Potable water must be supplied through a pressure regulator, complete with pressure gauge and isolation valve. Potable water pressure will be held to fifty (50) psi gauge. Water consumption is approximately 8 tons/day. The Contractor must fill both fresh water tanks before removing the fresh water service supply and before the vessel leaves the shipyard. Filling of two (2) potable water tanks (100 m^3).

b) The Contractor must supply a separate and continuous, uninterrupted non-potable water connection, which must pass through a pressure regulator and connected to the ship's fire main. The water supply must be connected immediately after the ship's entry into the dry dock. This water supply must be maintained at a pressure of 690 kPa (100 psi gauge) at all times and must be supplied by one 2.5 inch diameter hose. This installation must include an on-board pressure regulator equipped with a pressure gauge and isolating valve. The Contractor must communicate with the Inspection Authority to determine the exact locations for connecting to the ship. There must be no interruption of this supply while the ship is at the Contractor's facilities. It is the Contractor's responsibility to take all necessary precautions to ensure that lines do not freeze in cold weather. Water will be consumed as needed for firefighting and cleaning purposes. Daily consumption of non-potable water is estimated at 130 tons.

8.6.3 The Contractor must include in its bid, a written price quote per cubic meter consumption of potable water, non-potable water and sea water.

8.6.4 The Contractor must supply separate fresh water for cleaning, testing and rinsing tanks, in accordance with these specifications. The cost of water consumption for these items of this specification package must be assumed by the Contractor.

8.7 OVERBOARD DISCHARGE/DRAINAGE CONNECTIONS

8.7.1 The Contractor must supply all required materials and labour to attach temporary drainage hoses to the overboard discharges as listed below, such as to prevent water from running down the hull and disturbing uncured paint. The Contractor must also supply and install temporary drainage hoses to each of the overboard scuppers in such a manner as to prevent water from running down the hull. All drainage connections must be drained to suitable disposal facilities and/or drains. It is the Contractor's responsibility to ensure that lines do not freeze in cold weather. The Contractor must disconnect and remove all temporary connections upon completion of work.

OUTLETS	DIMENSIONS	LOCATION
Bilge After deck	2"	Port Fr. 9/10
Sewage and Gray water	3"	Stbd Fr. 19/20
Oily water	2"	Port Fr. 31/32
Submersible bilge Pp	3"	Port Fr. 38/39
Boiler Blow Down	1"	Stbd Fr. 72/73
Auxiliary & Emergency Generators	3"	Stbd Fr. 82/83
Fresh Water Generator	3"	Stbd Fr. 87/88
S.W. Cooling	10"	Port Fr. 94/96
Bilge and ballast	6"	Stbd Fr. 94/96
Fire & Washdeck	3"	Stbd Fr. 96/97
Bilge Forward deck	2"	Port Fr. 180/181

8.8 BLACK WATER AND GREY WATER

8.8.1 For black and grey water, the Contractor must supply portable tanks or tanks that can be pumped out; the Contractor must be responsible for disposing of this water. All related costs must be included in this item. The Contractor must provide a unit price per cubic meter. The estimated amount is 400 m³.

8.9 OILY BILGE WATER

8.9.1 The Contractor must indicate a price for the disposal of approximately 20,000 litres of oily bilge water from the ship's bilges. The Contractor must provide a unit price for each additional 1,000 litres regardless of the proportion. The price specified for this item must be adjusted upward/downward based on Contractor submitted of invoices. The quantity stated of this item must only apply to the ship's needs and not to the Contractor`s needs as required to complete any work described in this Specification package. The Contractor must provide the Inspection Authority with the name(s) of the company(ies) registered for pumping and disposal of waste oil, and receipts for the elimination of ship hydrocarbons for inclusion in the hydrocarbon service booklet.

8.10 (*) GARBAGE REMOVAL

8.10.1 The Contractor must supply one (1) garbage container of ten (10) cubic yard, placed on the flight deck beside the gangway for waste from the ship. This container must be emptied weekly.

8.11 CRANES AND SCAFFOLDING

8.11.1 Provide the services of a 5-tonne crane from the shipyard for the ship's general needs, including an operator and all personnel needed to ensure that these operations are carried out safely. The Contractor must provide a price for this service for one (1) hour per working day, giving an average of five (5) hours per week, for the duration of the contract. For adjustment (up or down) purposes, the Contractor must provide an hourly rate for this service. The Contractor must maintain a record of crane usage that must be signed weekly by the Inspection Authority.

8.11.2 For the duration of the work period, crane services must be provided by the shipyard for displacement of parts arising from the work described in this Specification package. This work must be in addition to the specific needs of the ship, and the costs must be included with each item of this Specification package.

8.11.2.1 During the entire dry dock, the Contractor must make a statement of all weights to be removed/added from/to the vessel, indicating the weight in kilograms, the frame location of the related weight, the deck level, as well as equipment identification that is replaced or removed.

8.11.3 The Contractor must provide a price for general services of a powered platform (cherry picker). The Contractor must provide a price for this service for one (1) hour per working day, giving an average of five (5) hours per week, for the duration of the works. For adjustment (up or down) purposes, the Contractor must provide an hourly rate for this service. The Contractor must maintain a record of use that must be signed weekly by the Inspection Authority.

8.11.4 The Contractor must supply all labour and materials needed to set up scaffolding, work platforms, shelters, nacelles or other lifting apparatus required to carry out the inspection of the ship's hull by the TCMS inspector or by the crew, as well as all work performed on the ship's hull. This includes, but not limited to, scaffolding and equipment to access propellers, rudder, rudder trunk, bow thruster and cathodic anodes to be replaced.

8.12 CLEAN UP

8.12.1 Upon termination of the work, the Contractor must remove any garbage, debris and unnecessary material created by the work and must return the vessel to a clean condition similar to that existing at the time of transfer from custody to delivery of the vessel to the hands of the contractor at the beginning of the refit period.

8.12.2 Upon completion of all work and final cleaning, the Contractor's Quality Assurance (QA) representative and the CCG TA must complete an inspection together of all compartments and spaces where work was performed by the Contractor. Any defect or damage noted during this visit must be recorded and compared with the digital images taken during the initial inspection (section 1.10).

8.12.3 The Contractor must repair any damage or defects resulting from the work carried out, at its own expense.

8.13 VESSEL SECURITY

8.13.1 The Contractor must ensure security of the ship while under his care, custody and control.

8.13.2 The Contractor must provide specialized security staff to carry out rounds all spaces, both interior and exterior, of the vessel. In addition to the requirements for hot work, the Contractor must conduct rounds every day at four-hour intervals. These rounds must include a visual inspection of every compartment. The security patroller must be trained and informed of how to immediately take appropriate action upon discovery of any risky or urgent situations for the ship.

8.13.3 When the ship is afloat, the Contractor must make arrangements to prevent damage to the ship due to wind, waves, tides, floods, fire and weather conditions. The Contractor must increase the frequency of security rounds in the event of bad weather conditions.

8.13.4 The Contractor must provide a logbook, to be submitted to the CGTA each Friday, at 13h00 and must be initialed by the security patroller upon the completion of each round.

8.13.5 The Contractor must implement an alert system to intervene in case of emergency, including personnel qualified to remedy these situations and prevent potential damage to the ship. Damage to the ship due to the Contractor's failure to meet these requirements must be repaired at the Contractor's expense.

8.14 VERMIN

8.14.1 The Contractor must protect the ship from infestation of rats or vermin for the duration of the contract period. The Contractor must exterminate all rats or vermin found on board the ship if they come onboard during the contract period.

9.0 ADDITIONAL WORK

9.1 GENERAL

9.1.1 Additional work must be performed and inspected to the complete satisfaction of the IA and TCMS, as required.

9.1.2 The Contractor's Quality Assurance Manager must implement an updated inspection plan and agree with the IA on the points to inspect before, during and after each additional work item.

9.1.3 The final inspection by the IA is essential for the acceptance of the work. The Contractor must take all necessary measures to provide the IA the opportunity to inspect the additional work.

9.1.4 Inspection of an item by the IA does not relieve the Contractor of the inspections required by TCMS.

9.2 NOT USED

9.3 ADDITIONAL WORK

9.3.1 All additional work not described herein but arising from this Specification package and inspections must be negotiated by the PWGSC representative using a 1379 form, and by means of a written specification.

9.3.2 This written description of the work required will be provided by the IA to allow PWGSC to obtain a firm price before the commencing the work.

9.3.3 Canada reserves the right to cancel, in part or in full, any item of this Specification package if, on the TCMS inspector's advice, it is no longer necessary to carry out an inspection due to the good condition of the componentSAFETY AND SECURITY EQUIPMENT

10.0 SAFETY AND SECURITY EQUIPMENT

10.1 LIFEBOAT AND DAVIT REPLACEMENT

(10B01A)

10.1.A Identification

A.1 The work consists of making the necessary modifications for the replacement of the lifeboat and its davit located on the boat deck, starboard side.

A.2 The new lifeboat and its davit will be supplied by Coast Guard.

A.3 The work will be monitored and inspected by the following organizations: TCSM and FO-CCG, until final acceptance of the work.

A.4 The Contractor must provide, except as otherwise specified in this Specification, the labor, technical assistance, tools, materials and all equipment required to perform the Work. It will also provide all the services required to dismantle, reassemble, transport and handle all equipment to be treated during the work, as well as the disposal of both solid and liquid debris. All these services and products must be taken into account and included in all items with reference to the technical specifications, such as: bow thruster, auxiliary Caterpillar engine, HVAC unit replacement, etc.

10.1.B Références

B.1 Laws and regulations applicable to this specification:

a) TRANSPORTS CANADA, 2001 law Canadian Marine merchant of Canada;

b) TRANSPORTS CANADA - CRC ch. 1436 – Lifesaving equipment rules- Last modification 17 June 2015. Annex IX;

c) DET NORSKE VERITAS AS, Rules for ships, Pt. 3, Ch. 1, Sec. 2 - Materials, January 2013;

d) TRANSPORTS CANADA, TP 127 Ship's electrical standard rules;

e) IACS n° 47 Shipbuilding and Repair Quality Standard;

f) ASTM Standards, Section One: Iron and Steel Products, volume 01.07 Ship and Marine Technology;

g) CWB mechanical/welding procedures and standards (or equivalent);

h) Dry paint measurement standard, SSPC- PA 2 (Nov.1982), Paint Application Specification nº.2;

i) CSA identification rules in work place;

j) Fisheries & Ocean Canada – Canadian Coast Guard, Paint and coating standards, 18-080-000-SG-003 revised June 2002;

k) CCG Fleet Federal Identity Program Guide, CCG-6016.

B.2 Reference documents

B.2.1 Owner's documents made available:

a) GARDE CÔTIÈRE CANADIENNE – Plan 108-H-23_25 – *General Arrangement* – 2011-09;

b) BURRARD YARROWS CORP - Plan H-2 - *Construction Sections* - Nov. 9/83;

c) BURRARD YARROWS CORP - Plan No. 108 / 5.55-H4410 *Insulation plan – Apr 84*;

d) BURRARD YARROWS CORP - Plan No. 1.08 5.55-H-4060 *Ceiling Plan Upper Deck* - 12.6.84;

e) BURRARD YARROWS CORP - Plan No. H-01-76 - *Unit 76 Boat Deck Fr. 53-84* – 4 Oct. 84;

f) BURRARD YARROWS CORP - Plan No. 1.08/5.55-H-0007 - *Upper Deck* - Date 3/84;

g) BURRARD YARROWS CORP - Plan No. 1.08/5.55-H-0008 - *Boat Deck Plating*, June 8/84;

h) BURRARD YARROWS CORP - Plan No. 10.8/5.55-H-0009 - *Officers & Bridge Deck, 6/84*;

i) GARDE CÔTIÈRE CANADIENNE – Plan 07283 – *Accès à la chaloupe de sauvetage tribord à installer* – 93/05/27;

j) PALFINGER – Plan 2710SC750B-01 - *General Arrangement Plan LBT 750T* – 2004-3-10;

k) SCHAT DAVITS – Plan D405539A – *General Arrangement of Davit Type CEA10400/4425* – 10.10.84;

l) PALFINGER – Plan I-1055-003 – *General Arrangement NPD 11300H with LBT 750 Starboard version* – 2013-10-21;

m) PALFINGER – Plan I-1055-2003 – *General Assembly NPD 11300H with LBT 750 Starboard* – 2015-12-08;

n) PALFINGER – Plan NS1246 – *Hydraulic Davit Single Line Diagram*- 2017-04-07;

o) UNKNOWN – Plan 80-40 SHT. 23 – *Duty: Liveboat Davit*;

p) PALFINGER – Operation and Maintenance Manual / NPD 6000H, NPD 7700H, NPD 1300H, NPD 14800H, NPD 18200H, 12-05-2017;

q) HARDING – Installation Manual / NPD 6000H, NPD 7700H, NPD 11300H, NPD 14800H, NPD 18200H, 21-07-2016.

r) DNV Z steel.pdf

B.2.2 These documents have not been verified by the Consultant. The Contractor must verify all relevant data prior to the beginning of the work and advise the Owner of any differences that may affect its quotation.

B.3 Drawings " as fitted"

The Contractor must take all the necessary readings and provide all the drawings of modified structures in this item, in "As fitted" version, compatible with PDF and CAD electronic version.

B.4 Pictures

B.4.1 Photo 1 : Ladder winch to relocate

B.4.2 Photo 2 : After leg of existing davit and landing barge davit hydraulic unit

B.4.3 Photo 3 : Landing barge davit hydraulic unit and deck penetration

B.4.4 Photo 4 : Railing to remove and deflectors to relocate

B.4.5 Photo 5 : Boarding stairs and access

10.1.C Delivery and taking charge of components

C.1 Upon reception of this item's components, the Contractor, with the CGTA, must check :

C.1.1 That the davit and its associated equipment have been received, complete and in good condition;

C.1.2 That the lifeboat and its associated equipment have been received, complete and in good condition;

C.2 After delivery to the Contractor, all components must be effectively stored and protected prior to installation. Any damage sustained during storage due to inadequate protection or improper handling is the sole responsibility of the Contractor and / or those acting on behalf of the Contractor

10.1.D Statement of work

D.1 Installation procedure

D.1.1 The Contractor must take note of the installation instructions of the equipment provided by the manufacturer and comply scrupulously. Any request for exemption from the installation instructions must be submitted to the Owner and the manufacturer, and a period of ten (10) working days will be applicable for the issuance of a response.

D.1.2 Before proceeding with the installation of the structural reinforcements shown in drawing No. 2686-18-500 Replacement of Lifeboat and Davit - Structural Reinforcements; as well as the guardrails shown in drawing 2686-18-001 Replacement of Lifeboat and Davit - Arrangement, Lighting and embarkation area, the Contractor will be required to dismantle certain items from cabins on the vessel.

D.1.3 The main compartments affected by the works are:

a) Main deck :

b) Local 123 : Cafeteria;

c) Upper deck :

d) Local 223 : Bedroom, senior engineer

e) Local 213 : C/Engineer office and bathroom;

f) Local 209 : Bedroom, C/Engineer;

g) Starboard inside walkway;

h) Engine room trunk

i) Boat deck :

j) Starboard section between frames 68 and 88;

k) Local 305: Officer's mess.

l) Officer's deck: Starboard section between frames 75 and 82.

D.2 Generals

D.2.1 All equipment in the work area to be dismantled must be stored in a dry and secure place. The elements listed below are the main equipment requiring intervention by the Contractor. This list is not exhaustive and any element that may interfere with the work or that may be damaged during the work must be moved or dismantled.

D.2.2 The Contractor must take care to note the location of each dismantled equipment and to identify each item for future relocation.

a) Furniture

i) All furniture moved or disassembled for the purposes of the work identified in this Specification must be stored in a dry, sheltered and secure condition.

b) Wall paneling

i) Wall panels of rooms affected by work or adjacent to a work area identified in this specification must be removed by dismantling the anchorages or protected to avoid any damage that may be caused by welding work.

c) Ceiling tiles

i) All ceiling coverings, including the tiles and supports, of rooms affected by the work or adjacent to a work area identified in this specification must be removed and stored for resettlement upon completion of the work.

D.2.3 Ventilation

a) Ventilation ducts located in the work area and preventing the installation of the equipment specified in this specification must be dismantled.

D.2.4 Cables and electrical wiring

a) All electrical cables and control cables located in the work areas that may be affected by them must be de-energized and wrapped outside the work area for reuse after the completion of the work.

b) Cableways located in the work area and preventing the installation of the equipment specified in this specification must be dismantled and the cables must be temporarily fixed so as not to interfere with the work. Cables that are too short to be moved must only be disconnected from the source or equipment and reconnected once the work is complete. No wire must be cut and connected.

D.2.5 Insulation

a) The insulation on the bulkheads and under the decks must be removed at the appropriate places to perform the welding work necessary for the structure reinforcement.

b) The insulation inside the engine room trunk must be dismantled at the places affected by the welding of the structural reinforcements.

D.2.6 Lightings, speakers, fire and smoke detectors

a) Lightings, speakers, fire and smoke detectors must be dismantled at the appropriate places to perform the necessary welding work on the structure.

D.3 REINSTALLATION AFTER WORK

D.3.1 The Contractor must reinstall all disassembled equipment if their condition allows it according to the criteria of the Owner. Items to be replaced must be of a type approved by TCMS and the Owner.

a) Furniture

i) The furniture will have to be reinstalled according to its original location. If furniture is damaged during disassembly, it must be replaced by new furniture equivalent to the Contractor's cost.

b) Wall paneling

i) All wall paneling will be reinstalled with existing anchors. If these have been damaged during the dismantling, they will be replaced by new equivalents at the expense of the Contractor.

c) Ceiling tiles

i) All ceiling coverings and their structure will be reinstalled at their respective locations.

D.3.2 Ventilation

a) All disassembled ventilation ducts will be reinstalled. The supports must be sufficient for this type of ship.

D.3.3 Cables and electric wires

a) If electrical cables are to be replaced, they will have to meet the requirements of the Marine TCMS, as described in TP 127 Electricity Standards for Marine ships. The maximum voltage tolerance on each of the cables must not be less than the nominal voltage of the circuit on which it is used.

D.3.4 Insulation

a) The disassembled insulation will be reinstalled if it is acceptable to the Owner, otherwise it will be replaced by a material equivalent to the existing one.

D.3.5 Lighting, speakers, fire and smoke detectors

a) Removed lighting, speakers, fire and smoke detectors will be reinstalled if their condition is deemed acceptable by the Owner, otherwise they will be replaced by equipment equivalent to existing ones.

D.4 LIFTING POINTS

D.4.1 Prior to using the lifting points or anchor points of the vessel, the Contractor must test and certify the lifting eyes in accordance with the requirements of the laws in force in the province where the work will be performed.

D.5 SURFACE PREPARATION FOR PAINT

D.5.1 All surfaces to be painted must be clean and degreased. All new structural parts will be blasted, the corners will be rounded by grinding, all according to the paint system supplier's recommendations.

D.6 PAINT

D.6.1 All areas affected by the work will be painted. One (1) primer application will be performed, followed by two (2) finishing applications. One (1) stripe of paint will be applied to all welds, curbs, access holes, etc., prior to the application of the primer, and prior to the application of the first coat of finish. The Contractor will be responsible for painting all areas affected by the work before reinstalling the insulation and the ceiling tiles and wall panel.

D.6.2 All paint applications will be performed according to the manufacturer's technical specifications.

D.7 WORK TO BE CARRIED OUT

D.7.1 The work to be done includes the dismantling and discarding of the existing davit and boat. Then the installation of the new davit and the boat, including the necessary structural reinforcements and the electrical connection of power and control.

a) For the details of the work to replace the davit, it will be necessary to refer to the following drawings:

2686-18-001 - Replacement of lifeboat and davit - general arrangement, lighting and embarkation area;
2686-18-500 - Replacement of lifeboat and davit - structural reinforcements.

D.7.2 PREPARATION

a) The Contractor must install temporary security railings while working on the upper and boat deck after the equipment dismantling.

D.8 DISMANTLING OF EXISTING EQUIPMENT

D.8.1 Upper deck

a) The accommodation ladder winch below the boat deck, at frame 78, must be relocated to the rear by approximately 800 mm to allow the reinforcement to be installed at the deck structure.

b) The Contractor must supply new cables and replace the winch cables (two drums). The new cables must be of the same diameter, material and capacity of the replaced cables and the Contractor must foresee an extra length, equal to the distance of the drums relocation, for each new cable and supply SWL certificates. Specifications of existing cables:

i) Number of cables to be replaced: Two (2)

ii) Existing cables length: 99 feet (30.2 m)

iii) Approximate cable length required: 101.7 feet (31 m) – To be validated by Contractor

iv) Cables diameter: ½ inch

v) Material: steel 6 x 36, galvanized, steel core (IWRC) regular straight stranding. One (1) E/M thimble end, one (1) free end.

vi) Capacity: 5000 pounds

c) The Contractor must replace three hoses from this system, detailed as such:

i) All hoses are fitted with Type JIC female hydraulic connectors, on both sides. Dash size -12 (5/8’’)

ii) Supply hose to the pump (Length: 31’’, including fittings). One side with 90° elbow and the other one straight.

iii) Discharge hose from pump (Length: 38’’, including fittings). One side with 90° elbow and the other one with 45°elbow.

iv) Discharge hose to tank (Length: 42’’, including fittings). One side with 90° elbow and the other one with 45°elbow.

d) The system operating pressure is 2000 psi and the hoses to be replaced are rated at 3125 psi.

e) The Contractor must manufacture and install a new seat for this winch, including the following work:

i) Perform measurement of actual seating and the vertical strengthening structure where the seating is welded.

ii) Extend the horizontal structure, supporting the seating strengthening structure, over a one metre distance (1 m).

iii) Supply and install a new seating and strengthening structure, both identical to the model.

iv) Weld in place the new strengthening structure and the new seating

v) Install the new drums on their seating.

f) Before proceeding with the work, the Contractor must submit to the owner for approval a plan illustrating the reinforcements and the new seating.

Photo 1: Accommodation ladder winch

g) The Contractor must install the new steel cables and connect the electric cables

D.8.2 Boat deck

a) The lifeboat currently installed on board will have to be removed, stored, prepare by the Contractor to be shipped with the davit.

b) The davit and all of its currently installed components will also need to be removed, and the Contractor will be required to package small components. The cables should be carefully removed and wrapped on a reel for shipping.

c) The two main sections of the davit arms must be prepared for sandblasting, in accordance with SSPC-SP-7 (Light Sandblasting) to remove any flaking paint and rust to produce the necessary surface profile to ensure good adhesion of the new coating on the existing material, according to section 2.8 “Painting” of the specification. Two coats of a primary coating compatible with the vessel’s existing coating system, 5 mils each and two coats of finishing coating compatible with the vessel’s existing coating system, 2 mils.

d) The Contractor will be required to secure the davit, components and lifeboat on a carrier flatbed platform and send it to the Canadian Coast Guard College, Sydney, Nova Scotia. Preparation, sandblasting, painting, handling and transportation costs to CCGC should be identified in the quote. Shipping address for the College is 1190 Westmount Rd., Westmount, Cap Breton, Nova Scotia, B1R 2J6.

e) The 4 fixing lugs will be cut to obtain a smooth deck, the holes created by the cut will have to be sealed with new steel by welding and the affected surfaces will have to be blasted before being repainted. Particular attention must be paid to the spaces below (rooms 223 and 209/213) to ensure that the insulation and electrical equipment are not damaged by the dismantling work.

Photo 2: After leg of existing davit and landing barge davit hydraulic unit

f) The penetrations in the boat deck (x7), in connection with the existing davit, will be removed and then plugged by inserted plates of a thickness equal to that of the deck. These are the penetrations for the existing davit limit switches (x2), the lifeboat power supply (x1), the engine power supply (x2) and the anti-condensation element, (x1) of the electric motor of the davit and the electrical cable of the electric box of the davit feed (x1).

g) The hydraulic unit of the barge davit will have to be moved towards the ship's side, by turning it 90 degrees at the front of the barge's railing. The two electrical cables, the penetrations, the electrical controller that is currently attached to the davit of the lifeboat and the hydraulic lines must also be relocated by the Contractor, to the satisfaction of the Owner. Deck penetrations in connection with the hydraulic unit of the barge must be replaced.

h) The Contractor must supply and install two new hydraulic tubing lines, 5/8" id x 50' total, of stainless steel with fitting, to replace the existing ones, reroute on deck, fix them on deck, the same way as the old ones, and cover them with a new bolted U shape steel protection. The Contractor must supply and install two new electric cables (1: P106-3 15 A, 120 V, 1 ph and 2: P-605-9 30A, 600V, 3 ph), 40' each, to replace the existing ones and reroute as well.

i) Piping and oil reservoir to be emptied, cleaned and filled with new hydraulic oil. The drained oil (Hydrex 22) must be disposed of by the Contractor.

ii) The Contractor must fill the tank with 150 liters of an oil equivalent to the drained oil.

iii) All materials, ss marine hydraulic tubing, hydraulic oil, electric cables, fitting, supports, steel to be Contractor supplied and installed.

i) The hand railings between the couples 70 and 90 must be removed. The deflectors, located between the railings and the plating, will have to be relocated on each side of the new davit. The position of the deflectors must be determined jointly with the Owner.

j) The current davit control panel, located in the ventilation room (# 328) at the boat deck, will need to be dismantled. All electrical power and control cables should be removed to the handling room (# 141) located on the main deck.

Photo 3: Landing barge davit hydraulic unit with deck penetrations

k) The hand railings at the lifeboat davit, next to the ship's side must be removed, and a temporary safety protection must be installed while installing the new equipment and railing.

Photo 4: Hand railings to remove and lifeboat deflectors to relocate

D.8.3 Officer's deck

a) The lifeboat access stairway located between the starboard frames 75 and 82 and allowing boarding of the current lifeboat must be removed. A temporary guardrail will be added to limit the risk of falls.

Photo 5: Boarding stairway

D.9 INSTALLATION

D.9.1 Davit and structural reinforcement

a) Structural reinforcements and deck inserted plates must be installed in accordance with Plan No. 2686-18-500 Replacement of Lifeboat and Davit - Structural Reinforcements.

b) Special attention will be paid by the Contractor to the fact that the davit must be installed in a horizontal plane parallel to the baseline on a deck equipped with a camber. Steel shims, whose final thickness must be determined on board, must be welded to the inserted plates.

i) New grade Z steel is required as per Navtech reference drawing NT-2686-18-DE500A as attached DNV-GL document, section E page 14 for grade Z steel, the new 6 inch thick steel shims will need machining to have the horizontal plane as mentioned in the above paragraphs.

c) The Contractor must provide the hydraulic oil required to fill the tank of the new davit. The type of oil used must comply with the requirements of the davit operations manual.

d) The mooring eyelets of the boat must also be supplied and installed on the boat deck by the Contractor.

e) Steel runners will be installed at the opening between the upper deck and the boat deck, above the stored accommodation ladder, see Photo 6, to ensure that the boat is launched without snagging in the opening. The position of these runners must be defined by the Contractor jointly with the Owner not to interfere with the operation of the ladder. Before proceeding with the work, the Contractor must submit to the owner for approval a plan illustrating the new runners. .

f) 

Photo 6: Runners location at the accommodation ladder

D.9.2 Electricity

a) An 8-3 power supply cable must be provided and routed to the base of the davit power box (HVAC room) from the P-605-7 circuit breaker to replace the existing cable. The davit must be powered by the MCC main bus network located in the handling room (Room 141) at the main deck. A new circuit breaker and current limiter of adequate capacity of the davit must also be provided and replaced by the Contractor in P-605-7 MCC starter drawer.

D.9.3 Guardrails

a) Guardrails will be installed in accordance with Plan # 2686-18-001, Replacement of Lifeboat and Davit - Arrangement, Lighting and Embarkation Area. The new guardrails will be manufactured with the same samplings and dimensions as the existing guardrails and, if possible, aligned with the existing structure of the accommodation.

b) Guardrails will be installed on the davit as shown on Plan 2686-18-001 Replacement lifeboat and davit - arrangement, lighting and embarkation area. The contractor must determine the method of fixing the guardrails on the davit in accordance with the recommendations of the manufacturer of the davit.

D.9.4 Boarding stairway

a) The stairway for embarkation in the lifeboat must be designed by the Contractor in accordance with the general dimensions illustrated in Plan 2686-18-001 Replacement of Lifeboat and Davit - Arrangement, Lighting and Embarkation Area. The Contractor must make a plan for the design and manufacture of the boarding stairs. The stairway plan must be submitted for approval to the Owner by the Contractor before the work begins.

b) A non-slip wire mesh of the same width as the boarding stairs must be installed on the top of the davit. The Contractor must determine the method of fixing the wire mesh on the davit in accordance with the recommendations of the manufacturer of the davit.

D.9.5 Emergency lightning and display

a) Emergency lighting fixture will be supplied by the Contractor and installed by the Contractor in accordance with Plan # 2686-18-001 Replacement of Lifeboat and Davit - Arrangement, Lighting and Embarkation Area. The three new outdoor lighting fixtures will be marine, RIGID Q wide beam or equivalent. Supports for the luminaires must be welded to the ship's bulkheads, no drilling of bulkheads or

decks must be permitted except for power supplies. High safety hot work precautions must be taken as usual (dismantling, insulation check and fire guard).

b) Sign must be put in place in accordance with the regulations defining the assembly and boarding areas.

D.9.6 Paint

a) Surfaces that have been worked and altered with the steel work will be cleaned, prepared and repainted in accordance with the Owner's requirements.

10.1.E Proof of performance

E.1 IMPORTANT NOTICE : The Contractor must supply the on-site services of a manufacturer's (Palfinger) accredited technician in order to perform the following tasks:

a) The FSR on-site presence for the Lifeboat and davit installation must include two (2) visits.

b) 1st visit, preliminary visit of two (2) full days on site, to confirm the exact position of the davit on the boat deck, overview preliminary installation, mechanical and electrical outcomes.

c) 2nd visit, final visit of five (5) days on site, for testing and commissioning the equipment.

d) Contractor must coordinate and schedule these visits.

e) Contractor must include two (2) complete travels both ways.

E.1.2 Verify the conformity of the davit installation;

E.1.3 Verify the conformity of the Electrical / electronic connections;

E.1.4 Conduct and supervise the full preliminary tests according to Palfinger standards;

E.1.5 Conduct and validate the static or dynamic tests, according to the requirements of the classification society or TCMS for obtaining complete certificates related to the use of the lifeboat, launching and its davit

E.2 Equipment users

E.2.1 The workers using the equipment must know the specific safe operation instructions and procedures for launching the lifeboat.

E.3 Inspection, maintenance and test

E.3.1 After installation, the equipment must be tested in accordance with the requirements of the representatives of TCMS and the CGTA.

E.4 Tests

E.4.1 Disassembled and reinstalled equipment, systems and cables, including the accommodation ladder and the barge davit, must be tested in the presence of the CGTA, all new wires must be supplied with certificates.

E.4.2 The new davit will have to be tested for operation. A test procedure must be prepared by the Contractor jointly with the manufacturer of the davit and lifeboat.

E.4.3 According to the davit installation manual, it is not required to perform a static load test of 2.2 times the SWL, this test being done at the factory by the manufacturer before delivery.

10.1.F Deliverables

F.1 The contractor must supply the Technical Authority an electronic copy, on a USB stick not protected by a password, in a compatible Microsoft Office Word 2003 or more recent format, a report detailing all undertaken works, defects, repairs performed and detailed results of all performed tests.

F.2 The following "As fitted" drawings

F.2.1 Drawing, new seating, accommodation ladder winch

F.2.2 Drawing ship side's runners

F.2.3 Drawing, lifeboat access, through officer deck and davit

F.3 The Contractor must supply the CGTA with a detailed QA report at the completion of the Work. This must include, but not limited to, inspection records, DFT readings, and condition monitoring data during coating application, etc.

10.2 FIRE FIGHTING SYSTEMS

(10E)

10.2.A Identification

A.1 Inspection and annual maintenance of shipboard firefighting system in accordance with Transport Canada Regulations.

10.2.B References

B.1 Available lists

a) Extinction fixe (Fix extinguishing systems including AFFF 3% foam containers)

b) Extincteurs portatifs (Portable extinguishers)

c) Système détection (Location of smoke and heat detectors)

B.2 Regulations

a) Canada Shipping Act and its regulations

B.3 General

a) The Contractor must include in its bid all known work in accordance with the lists provided as reference.

b) Labels showing the name of the Contractor, the date and the initials of the person performing the inspection must accompany each system.

10.2.C Statement of work

C.1 Fixed CO2 and FM200 fire extinguishing and smothering systems

C.1.1 Contractor must be an authorized distributor of Pyrene parts and services (Kidde) for CO^2 fixed systems and demonstrate that it has the necessary spare parts to carry out work on cylinders and CO^2 equipment.

C.1.2 The Contractor must check system for proper operation of timers, delayed release systems, visual indications, audible alarms and the ship's ventilation shut-downs. CO_2 cylinders must be disconnected to avoid accidental discharge of CO_2 gas.

Piping must be blown-through and proven free, using compressed air, nitrogen or other inert gas.

C.1.3 At the start of each day, the Contractor must have sufficient reserves of compressed gas to perform all tests and inspections for that day, to avoid delays. The Contractor must provide manpower to rearm system and perform trials at the same time. The Contractor must coordinate trial and inspection period with Chief Engineering Officer. The Contractor must disassemble all fixed cylinders in turn while ensuring operational continuity of the vessel's protection system.

C.1.4 The Contractor must demonstrate that all nozzles and conduits are free from obstruction. This may require dismantling and blanking of certain sections of piping to connect pressure cylinder for test. Each system must be reassembled and restored to its original configuration at the end of each day.

C.1.5 The Contractor must validate that all local and remote actuation devices, local, remote, manual and automatic triggers, time delays, and temperature rise actuators are operating correctly. Check that the wheelhouse alarm panel gives a correct indication.

C.1.6 The Contractor must assure, by way of a pressure test, that all hoses and flexible connections between bottles and distribution network are gas-tight.

C.1.7 The Contractor must check all bottles for liquid level. A label must be affixed to the cylinder indicating the level of its contents.

C.1.8 All systems must be identified, by the Contractor, with tags bearing the contractor’s name, date and initials of person performing inspection.

C.1.9 The Contractor must keep the firefighting equipment accessible and available in case of emergency. The Contractor must take adequate precautions when using hot work to perform inspection.

C.1.10 In every case, where a fixed firefighting cylinder is found defective, charged below its nominal capacity or requires hydrostatic testing, the Contractor must be remove the cylinder, empty it and fill it, then return to its original position and re-connect. Parts to be replaced must be supplied by the contractor and dealt with using the PWGSC 1379 form. The Contractor must identify the cylinders to be worked on as the following model:

a) Cylinder number xxx from compartment…….

b) Cylinder number xxx from compartment…….

C.1.11 The Contractor must provide a unit price for individual cylinder hydrostatic test:

a) Cylinder 100 pounds. CO^2, fwd hatch bank and aft motor room bank

b) Cylinder 113 pounds FM 200, after hatch

C.1.12 No fixed CO_2 cylinder must be tested hydrostatically except for those mentioned in C.1.10

C.2 Portable Fire Extinguishers

C.2.1 The Contractor must perform annual inspection of all portable fire extinguishers aboard the vessel according to list provided. Inspection must be performed aboard the vessel. Date and time must be coordinated with Chief Engineering Officer. Chief Engineering Officer must be advised if any extinguishers must leave the vessel.

C.2.2 The Contractor must remove each fire extinguisher from its wall support and inspect it for anomalies. The Contractor must check pressure gauges and date of most recent hydrostatic test.

C.2.3 The Contractor must check and weight the cartridges of all powder type fire extinguishers when fitted with it.

C.2.4 The Contractor must affix all extinguishers with tags bearing the contractor's name, date and initials of person performing inspection.

C.2.5 Contractor must repair and recharge all extinguishers found defective, below nominal charge and perform hydrostatic testing if required. The contractor must remove the extinguishers from the vessel, fill them up and install them in their original location. Parts to be replaced must be supplied by the contractor and dealt with using the PWGSC 1379 form.

C.2.6 The Contractor must provide a unit price for performing hydrostatic test on the following units:

a) ABC : 2.5, 5, 10, 15 and 20 lbs ;

b) CO^2 : 5, 10 and 15 lbs. ;

c) BC : 20 lbs.;

d) AFF 9.5 liters.

C.2.7 The Contractor must provide replacement CO_2 extinguishers during hydrostatic testing, in order to guarantee an adequate protection in absence of the ship's extinguishers

C.2.8 The Contractor must perform all hydrostatic tests and 6-year maintenance on portable extinguishing cylinders that will reach their expiry date within the next 12 months.

C.2.9 The Contractor must ensure that firefighting equipment remains available in case of emergency. The Contractor must take adequate precautionary measures during hot work to complete inspection.

C.2.10 When inspection is complete, (Date stamp), all extinguishers must have received necessary maintenance, and hydrostatic testing for them to be certified for 1 full year, until the next inspection, the following year.

C.3 Galley, Fixed Fire Extinguishing Pyrochem system.

C.3.1 Contractor must perform annual inspection of Galley Fixed Fire Extinguishing system..

C.3.2 Contractor must check ventilation shut-downs, visual alarms and fusible links for correct operation.

C.3.3 Contractor must check local, remote and automatic triggering devices.

C.3.4 Contractor must check cylinder for level of extinguishing agent and date of most recent hydrostatic test. The cylinder Pyrochem performed its last hydrostatic in September 2014.

C.3.5 If system cylinder needs to be removed for inspection, testing or refilling, the Contractor must replace it with a cylinder compatible with the system in place, until original cylinder can be re-installed. The cylinder will be removed from the vessel only if it needs to be refilled or hydrostatically tested. Parts to be replaced must be supplied by the Contractor and dealt with using the PWGSC 1379 form.

C.3.6 Upon completion, new tags bearing the contractor's name, date and initials of person performing inspection must be affixed to the system by the Contractor.

C.4 Flight Deck Fire Extinguishing System

C.4.1 The Contractor must perform annual inspection, maintenance and validation of operation of Flight Deck fire extinguishing systems: FireCombat, Minuteman and main foam system (3%).

C.4.2 Contractor must provide containers and draw a sample of AFFF Foam from the monitor system (Aero-Lite 3%), from the Minuteman system, and one from each lot of spare foam, as identified by the Chief Engineering Officer, so four (4) samples in all. Results from the analysis of these samples must be given to the CCG.

C.4.3 Contractor must assure that the powder from the FireCombat system has not been compacted due to the ship's vibrations. If compaction is noticed, contractor must advise Chief Engineering Officer.

10.2.D Proof of performance

D.1 Inspection

D.1.1 All work carried out must be to the satisfaction of the Chief Engineering Officer and he or a delegated officer must be present during inspections.

D.2 Trials

D.2.1 Equipment must be proven operational to the Chief Engineering Officer.

D.3 Certificates

D.3.1 Contractor must provide two paper copies along with the original certificate, to the Chief Engineering Officer. Electronic copies in PDF format must be sent to the Vessel Maintenance Manager. All deficiencies noted must be resolved, by the Contractor, before the end of the contract. Corrective actions and parts to be replaced must be supplied by the contractor and dealt with using the PWGSC 1379 form.

10.2.E Deliverables

E.1 Report

E.1.1 Contractor must provide a written report describing in detail all work performed the causes of noted deficiencies, corrective actions taken and parts replaced.

E.1.2 Contractor must provide the report in electronic format (.pdf compatible), to the Chief Engineer and to the CGTA.

E.1.3 Contractor must provide to the Chief Engineer and to the CGTA an hydrostatic test certificate of all fixed cylinders and portable fire extinguishers tested.

E.1.4 Contractor must provide to the Chief Engineer and to the CGTA a certificate of inspection of fixed cylinders and portable fire extinguishers.

E.1.5 Contractor must provide to the Chief Engineer and to the CGTA a certificate of inspection of the MINUTEMAN system and of the FireCombat system in the helicopter hangar.

E.1.6 Contractor must provide to the Chief Engineer and to the CGTA a certificate of analysis of the MINUTEMAN foam system, the Fire Combat system and spare containers. The inspection must be performed by the manufacturer or by a qualified laboratory.

10.3 ALARM AND MONITORING SYSTEMS UPGRADE

(10D)

10.3.A Part 1: PURPOSE

A.1 The Statement of Requirements is related to the installation of a marine alarm and monitoring system equipment - "Alarm and monitoring system (AMS)". CCG has recently acquired from an Original Equipment Manufacturer (OEM) authorized supplier all equipment necessary to upgrade the existing GE - Cimplicity MAX I original system. New equipment delivery, software, hardware, cables should occur within three 3 weeks after the vessel reach the Contractor facilities.

A.2 The Contractor must install the cables as described in 10.3.I and 10.3.J, and engage the services of an authorized supplier by GE-Cimplicity OEM (OEM) to complete all necessary connections. , preliminary verifications to commissioning, and the commissioning of the new AMS system updated and redundant.

a) To perform all tasks described in10.3 AMS upgrade, the OEM must be on site. The FSR on-site presence, is requested for full installation and commissioning tasks:

b) **1st task**, removal / installation period of twenty (**20) full days on site**, to remove existing equipment and cables, install all cables and connections, PC and LU equipment. Include two (**2) complete travels both ways.**

c) **2nd task**, preliminary test and commissioning period of twenty-eight (**28) full days on site**. Include three (**3) complete travels both ways.**

d) **3rd task**, dock trials period of six (**6) full days on site and sea trials period of two (2) full days on site**. Include two (2) complete travels both ways.

e) Contractor is to coordinate and schedule these periods.

A.3 In this specification, in order to lighten the text, the use of the term Contractor includes the Sub-Contractor, which must be authorized by the OEM as a specialist integrator of GE - Cimplicity equipment. The Contractor must confirm this item with a letter from the OEM prior to the engagement of a sub-contractor. The OEM contact for GE-Cimplicity Eastern Canada is :

a) Daniel Harnois. Sales Manager, Québec – Maritimes, Automation & Controls, GE Energy Connections, Cell: (514) 918-1898, Daniel.harnois@ge.com, www.geautomation.com.

10.3.B GENERAL REQUIREMENTS

B.1 The OEM upgraded AMS design must be fully approved by at least one recognized member of the International Association of Classification Societies (IACS) and the Delegated Statutory Inspection Program (DSIP). Since the original GE – Cimplicity MAX I AMS systems are IACS approved (Lloyd's and ABS), an upgrade with OEM equipment and service will be fully compliant to maintain the original certification.

B.2 Blank.

a) Before the end of the contract, the Contractor must supply to the CGTA, Engineer Stamped new or modified drawings approved by an OEM recognized organization.

b) The propose the OEM – AMS upgrade package must take into account the standards, rules and regulation of the following marine authorities:

i) International Maritime Organisation (IMO) regulations, resolutions and amendments, as far as compulsory for this vessel

ii) International Convention for the Safety of Life At Sea with amendments (SOLAS)

iii) International Regulations for Preventing Collisions at Sea 1972 (COLREGs)

iv) Règlement sur les machines de la marine marchande du Canada (No Canada Shipping Act 2001, SOR-90-264 Marine Machinery Regulations Sch VIII, remote control and monitoring system vessel category 2, voyage class Home trade 1 & 2)

v) DNV GL Det Norske Veritas, part 6 Chapter 3 2010

vi) Institute of Electrical & Electronic Engineers Standard No. 45 (IEEE-45)

vii) National Electrical Manufacturers Association (NEMA)

viii) Ship Electrical Standards (TP127e)

B.2.2 The subcontractor must be an OEM equipment and service recognized organization who has completed recently, in the past five years, alarm and monitoring systems installation projects for CCG or other marine organization with the same OEM

technology. An OEM – GE Cimplicity MAX II certification or letter of accreditation for the subcontractor will be required.

10.3.C OPERATIONAL REQUIREMENTS

C.1 The upgraded AMS will migrate from MAX I system to MAX II with fully redundant system with new safety feature. See below Appendix 1, which schematically shows the migration from MAX I to MAX II. With such architecture, the system will continue running normally even if losing a critical component such as: a computer, a PLC, I/O LSU and / or a communication bus.

C.2 The language used in all electric diagrams, instrumentation, manuals and nameplates will be only in English if the original to be modified is in English; all new ones must be in French and in English . The metric units (SI) will be used for instrumentation and identification of data. All electrical diagrams must be made using ANSI standards

10.3.D INSTALLATION OF EQUIPMENT AND CABLES

D.1 The expected delivery date to the Contractor of all equipment, accessories and installation cables to upgrade the AMS should occur within three 3 weeks after the vessel reach the Contractor facilities.

D.2 Following delivery to the Contractor, all components of the AMS must be effectively stored and protected prior to installation. Any damage sustained during storage due to inadequate protection or improper handling is the sole responsibility of the Contractor and / or those acting on behalf of the Contractor.

D.3 The delivery of the AMS includes all the necessary spare parts recommended, the special tools and cables required for installation to update the new AMS system. The equipment supplied and to be installed as well as the spare parts are listed in a minimum basic list attached in 10.3.I. Parts supplied.

10.3.E The Contractor must dismantle and dispose of the following equipment

E.1 One GE Fanuc PLC 90-30 with CPU350 in the control room;

E.2 Seven LU GE Fanuc FCS stations with Genius communication protocol, located in the engine room compartments;

E.3 Cables connecting the PLC to LU stations.

10.3.F The Contractor must fix and install the following equipment

F.1 Two Ge Rx3I PLC with CPU330 in the control room;

F.2 Seven GE Versamax LU stations with Profinet network communication protocol, distributed in the machine compartments, as per 10.3.J;

F.3 Two switch with Ethernet communication input, Phoenix 8 input;

F.4 New Belden 1300SB and Ethernet CAT5 cables connecting PLCs to LU stations, redundancy systems and Phoenix Ethernet switches connecting the new equipment described in 13.2C.4; access to existing cable tray and bulkhead glands remains the Contractor's responsibility, including dismantling / reassembling ceilings, walls, lighting and other obstructions that must be removed; List of equipment to be connected in 10.3.J;

F.5 Identifications: The cables must be identified with permanent metal markers at each end and on each side of an opening or bulkhead;

10.3.G COMMISSIONING REQUIREMENTS

G.1.1 The Contractor must label all connections, develop a verification plan for all connections, submit it to the CGTA for approval prior to energizing the equipment according to the OEM standard, and implement it;

G.1.2 The Contractor must develop a verification plan for all major equipment, submit it to the CGTA for approval prior to full energizing of the equipment to the OEM standard and implement it;

G.1.3 The Contractor must develop a verification plan for all sensor reading points, submit it to the CGTA for approval prior to full energizing of the equipment to the OEM standard and implement it;

G.1.4 The Contractor must develop a Dock Test Plan in accordance with the OEM Standard, submit it to the CGTA for approval and implement it; the tests must be to the satisfaction of the CCG and the IACS / TCMS inspector;

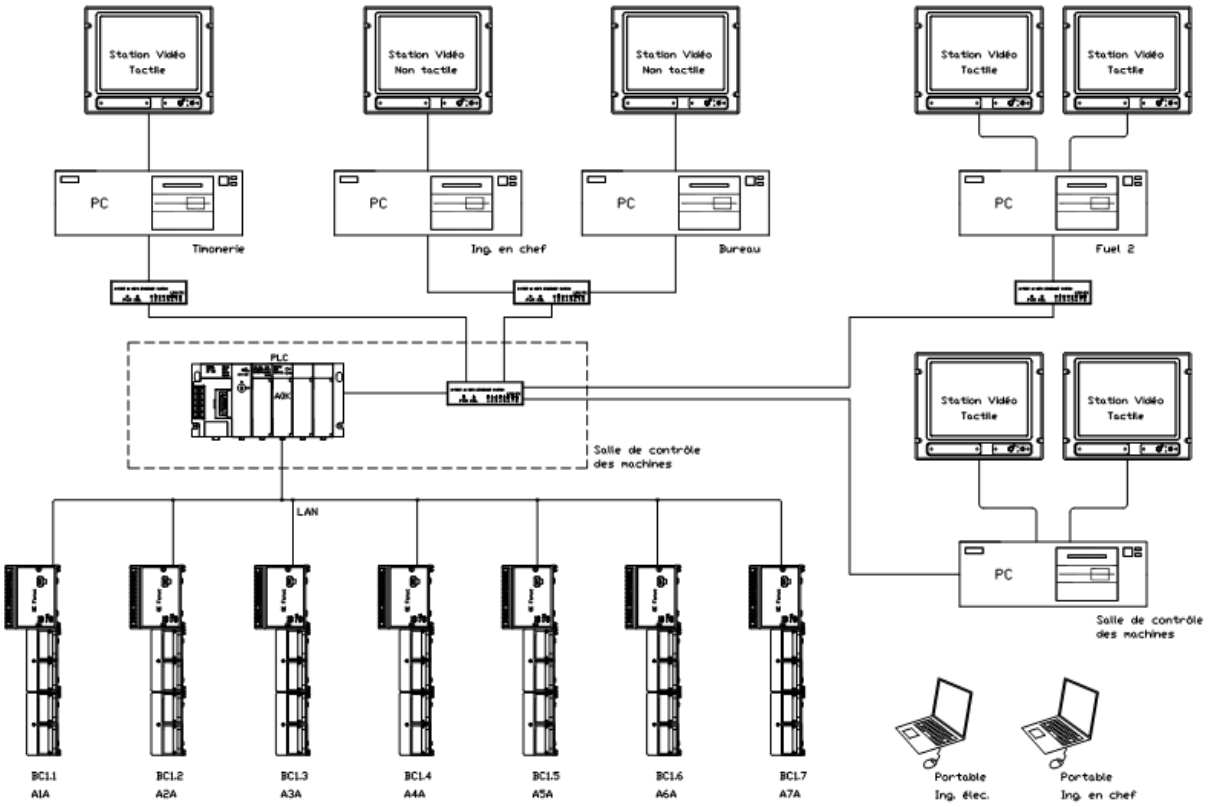
G.1.5 The Contractor must develop a Sea Trial Test Plan in accordance with the OEM Standard, submit it to the CGTA for approval and implement it; the tests must be to the satisfaction of the CCG and the IACS / TCMS inspector;

G.1.6 Before the end of the contract, the Contractor must provide all drawings, test reports and specifications, in both English and French, in both electronic and paper format. Electronic formats must be compatible with Microsoft, Adobe and AutoCAD.

G.1.7 Before the end of the contract, the Contractor must provide the ship with three (3) copies, in both electronic and paper format, of complete manuals describing the complete installation, dockside and sea trial tests result. The manuals must be completely legible and written in French. English manuals must also be included if available.

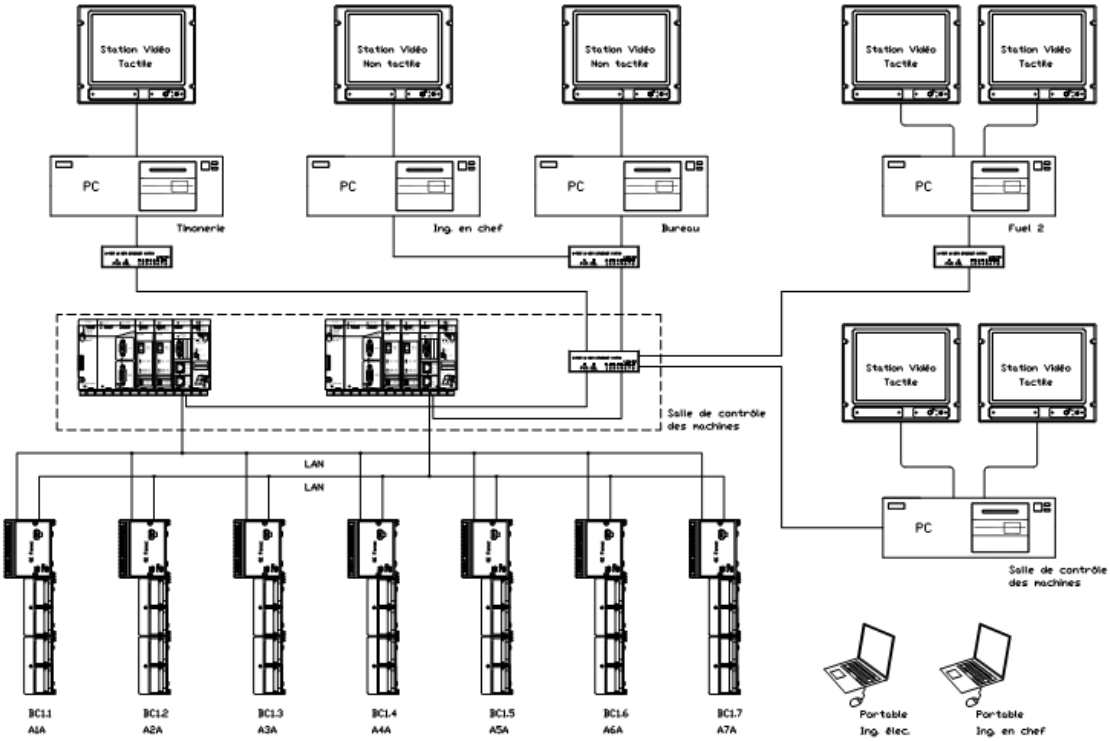
10.3.H ANNEX I

H.1 EXISTING ACHITECTURE – MAX I – NON REDUNDANCY



H.2 FINAL ARCHITECTURE – MAX II – REDUNDANCY

(Phoenix switch 8 port – not shown)



10.3.I ANNEX II

I.1 PARTS TO INSTALL – CABLES TO INSTALL

Hardware: Qty	
PLCs:	2
IC695CHS007CA, 7 Slot Universal Base	2
IC695PSD140, 24Vdc Power Supply 40w	2
IC695PNC001CA, Profinet Controller	2
IC695CPK330CA, CPU CPE330 + Energy Pack	2
IC695RMX128, Synchronisation Link	4

I/O modules:	
IC200PNS001CA, Versamax Profinet Coupler	7
IC200ALG240, 16 channels Analog Input Module (4-20ma)	17
IC200MDL640, 16 channels, Digital Input module	16
IC200MDL740, 16 channels, Digital Output Module	1

Others:	
2891929, Switch 8 port Phoenix Manage	2
Miscellaneous, LSU Internal components as: Terminals, fuses and fuse holder, back plate, cabling	LOT
Part number, Belden 1300SB, Profinet cable	600m
Ethernet cable CAT5	300m

10.3.J ANNEX III

J.1 LISTS OF EQUIPMENT TO BE WIRED

The existing cables will have to be removed between the 7 LU local stations and the PLC, and wired again in redundancy according to the scheme of the new architecture, the Phoenix switches are not shown in the diagram but must also be wired. Both PLCs must be interconnected by fiber optic cabling.

LU # 1 Cyclo-converter room, near the test cabinet;

LU # 2 Propulsion diesel room, in front of engine # 1 (Port engine)

LU # 3 Propulsion diesel room, in front of engine # 2 (Engine center)

LU # 4 Propulsion diesel room, in front of engine # 3 (Starboard engine)

LU # 5 Transformers Room, Cabinet C3

LU # 6 Control Room, Cabinet C1

LU # 7 Diesel Propulsion Room, Port Top Level (Frame 70)
The new bow thruster Warstila

The new Caterpillar C32 auxiliary unit

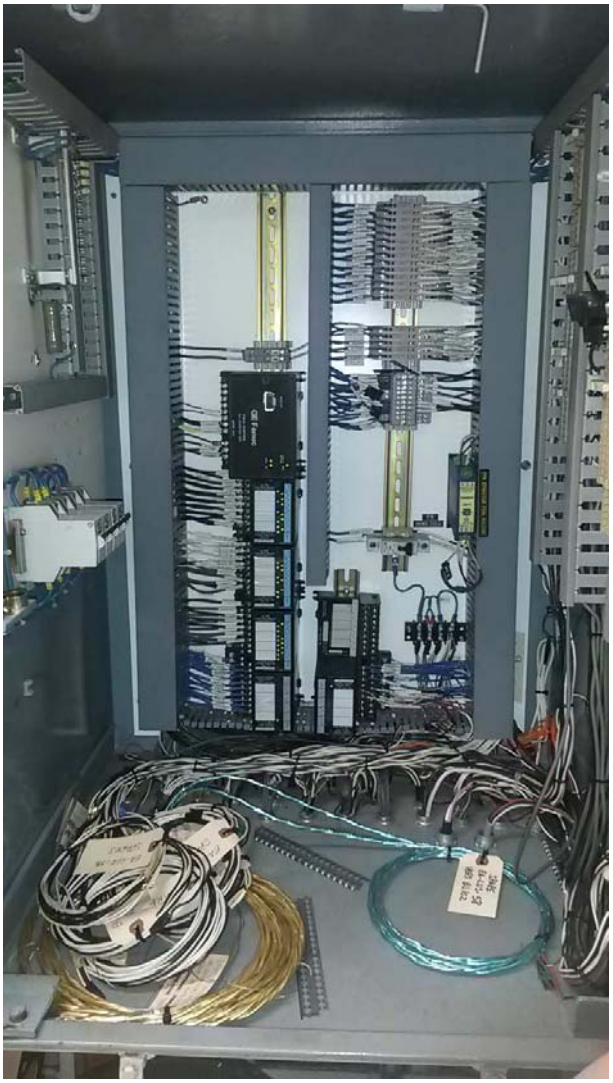
The new HVAC Bronswerk units

The new Clayton steam generators (2017 installation)

10.3.K ANNEX IV

PHOTOS

K.1 Station LU, station close and inside




ASEA

K.2 Cabinet C1 control room, close door and open

10.4 WEATHERTIGHT DOORS REPAIRS

(10F02B03)

10.4.A Identification

A.1 Three weathertight doors require partial inner plating replacement

10.4.B References

B.1 Pictures of weathertight doors to be repaired

B.1.1 Upper deck, starboard, forward

B.1.2 Upper deck, starboard, forward details

B.1.3 Upper deck, port, forward

B.1.4 Upper deck, port, forward details

B.1.5 Flight and Boat deck, port

B.1.6 Flight and Boat deck, port details.

10.4.C Statement of work

C.1 The Contractor must supply parts and manpower to perform the following work on each of the three weathertight doors :

C.1.1 Dismantle the lower half of the closing mechanism.

C.1.2 Cut and remove the doubler plate, in straight line, at fifteen (15’’) inches from the door’s bottom.

C.1.3 Supply and install new stainless steel, gr. 316, doubler plates, with the same thickness as the ones removed.

C.1.4 To cover the joint between the new and old plate, screw in a two inches (2’’) wide stainless steel flat bar that must cover the whole joint.

C.1.5 Reassemble the closing mechanism on each door.

10.4.D Proof of performance

D.1 Demonstrate to the CGTA the correct operation of the doors mechanism

10.4.E Deliverables – NOT USED

11.0 Hull and Related Structures

11.1 CLEANING AND PAINTING OF THE SHELL

(11A01)

11.1.A Identification

A.1 Clean the underwater hull surfaces in order to paint it with a coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings)

A.2 The product used for shell coating of Type 1100 Canadian Coast Guard vessels must have a high abrasion resistance and must be able to be applied on the hull of a Polar type Icebreaker. That coating must prevent the ice from sticking to the hull surface and have a very low friction factor.

11.1.B References

B.1 Drawing

B.1.1 108-H-001 Shell Expansion

B.1.2 07352S42 Shell expansion – Surface calculation

B.2 The coating product must also comply with the following requirements :

B.2.1 The product must have been used successfully on a Polar Icebreaker hull for at least three years;

B.2.2 The product must certified by Lloyd's Register as a high abrasion resistance coating;

B.2.3 The product must keep its efficiency at temperatures as low as minus 50 degrees C;

B.2.4 The product must be applied with an anticorrosion Epoxide coating with a minimum of 90% solid particles;

B.2.5 The product must be available in at least two colors, black and red;

B.2.6 The coating must be applied on a single step with 30 mils dry thickness.

B.2.7 Abrasion resistance : Taber (ASTM D4060[1], 1 kg, CS-17 wheel) : maximum weight loss of 50mg;

B.2.8 Adhesion factor : (ASTM D4541[2]): 1000 psi min;

B.2.9 Kinetic friction factor with ice less than 0.03 at speeds between 10 and 25 cm/s.

B.2.10 Underwater hull surface is 1950 m², detailed as such: underwater shell: 1288 m², ice belt: 618 m² and approximately 50 m² for the drift well. It includes all underwater from the keel up to the 7 metres load line including; rudder, ship's bow covering anchor pockets (a triangle leading to the aft upper edge of each pocket from frame 164 , rudder trunk, drift well and bossing are also included in the total surface area. It also includes the sea chests grates, the bow thruster tunnel and grates.

B.2.11 Part of the hull must be painted red (from the 7m load line to 4m load line. This area covers the complete perimeter of the vessel), while the remaining hull, including the hawseholes, the rudder and the rudder trunk, must be painted in black (only on bare metal).

B.3 Sand blasting requirement

B.3.1 Throughout the entire sandblasting period, the Contractor must air-tight cover all ship's openings and ventilation ducts with heavy duty plastic film to prevent sand from entering accommodations and engine room compartments.

11.1.C Statement of work

C.1 Hull surface preparation for coating application :

C.1.1 The Contractor must quote for a 570 m^2 (30%) damaged hull surface to be repaired.

a) Estimated proportion of the hull surface to be repaired: 70% of 570 m² which is about 400 m².

b) Estimated proportion of the ice belt surface to be repaired: 30% of 570 m² which is about 170 m².

C.1.2 The Contractor must first wash the hull with fresh water to get rid of salt and other debris from the surface to be painted.

C.1.3 The Contractor must sandblast all damaged surfaces to SSPC-SP10 (near white - Sa2-½ Swedish Standard SIS 055900) with abrasive providing minimum amplitude of 80 microns.

C.1.4 The Contractor must feather all edges to the existing intact vessel's existing coating (maximum length of 15 mm) to bare metal and blow clean with compressed air prior to the coating application.

C.1.5 The Contractor must ensure that all paint or steel surface profiles, where coating is to be applied, are swept with abrasives to a minimal roughness of 3 mils.

C.2 Application of red color coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings):

C.2.1 The Contractor must prepare for painting a surface of three (3) metres high, from the 7 meters mark up to the 4 metres mark of the load line for the entire perimeter of the vessel, including the stem to cover the hawseholes.

C.2.2 The Contractor must sandblast surfaces where the coating is still intact to the recommended roughness of the paint manufacturer in order to favour the required adhesion of the coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings). See C.1.5

C.2.3 The Contractor must supply and apply one or two coats of Coast Guard red (RAL 3000) color coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings) on the whole surface to obtain a film thickness of 0.020" on bare metal once the paint is dry. On the existing red vessel's existing coating system, application of a 0.010" film of red coating compatible with the vessel's existing coating system will be sufficient.

C.2.4 The Contractor must avoid any paint dripping and sagging. If paint dripping or sagging are observed, the Contractor must repair the areas at its own charge.

C.3 Application of black color coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings):

C.3.1 Below the 7 metres under the load line, the Contractor must treat only the damaged surfaces, as indicated in items C.1.3, C.1.4 and C.1.5.

C.3.2 The Contractor must perform an adequate abrasive sweep around the damaged surfaces in order to obtain a feathered joint between the new and old paint system.

C.3.3 The Contractor must supply and apply one or two coats of black color coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings) on all bare metal surfaces to obtain a dry film thickness of 0.020".

C.3.4 The Contractor must perform the same task as C.3.2 and C.3.3 with the sea chest grates.

C.3.5 The Contractor must avoid any paint dripping and sagging. If paint dripping or sagging are observed, the Contractor must repair the areas at its own charge.

C.4 Recommendations and additional requirements:

C.4.1 The Contractor must supply and install a temporary shelter covering the ship's hull entire area that is to be painted. See 0.

a) OPTION: This shelter must be ventilated and heated. No combustion gasses exhausted from the heaters are allowed in the shelter. The shelter is mandatory without consideration to the outside temperature or the climatic conditions. The shelter must withstand all possible bad weather and be waterproof with the vessel's hull. The Contractor must quote a separate price for the shelter, the heating system and the ventilation system.

C.4.2 The shelter must be dismantled only after the paint work is completed, and only after the recommended drying time is reached.

C.4.3 During the paint work on the hull, the Contractor must plug all the drain scuppers with perforated wooden plugs fitted with a pipe extension to avoid contact between the drained water and the painted hull.

C.4.4 The Contractor must cover all docking plugs for the fuel oil and ballast tanks, double-bottoms, sea chests and void spaces during the paint application and remove the coverage before the vessel is floated. The same protection measures must be taken by the Contractor for the echo sounder and Doppler transducers. The

Contractor must also protect the bow thruster openings and the Loch plate (frame 162).

a) Upon completion of work, the Contractor must verify, tighten and ensure water tightness of all drain plugs under the hull using the vacuum box method.

C.4.5 Besides the preceding items, the Contractor must protect all following equipment during the hull sand blasting and painting works and remove the protection after the completion of the work:

a) Bow thruster's propeller, foot and zinc anodes;

b) Both main propellers and the stern tubes exits ;

c) Rudder stock and bearings ;

d) All sea water suctions ;

e) All plugs for the lifting lugs fitted in the hull. If any paint is applied on these plugs, the Contractor must remove it using sand blasting.

C.4.6 After the rudder blasting and before applying the coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings) on the hull and rudder, the Contractor must renew the cement for about fifty (50) welded plugs of 150 mm X 50 mm X 40 mm deep. The Contractor must supply all material to fill in these holes.

C.4.7 The Contractor must take all necessary steps after blasting to minimize steel oxidation by applying coating compatible with the vessel's existing coating system. (See document named: Hull, masts and superstructures Coatings) as soon as possible and in accordance with the paint manufacturer. The Contractor must high pressure blow before the coating application.

C.4.8 It is imperative for the Contractor to define the hull surface that can be prepared in each period of time where the workers can work continuously while the application conditions are adequate.

C.4.9 The Contractor must perform the application of the coating compatible with the vessel's existing coating system (See document named: Hull, masts and superstructures Coatings) according to the paint manufacturer standards.

C.4.10 The Contractor must pick up and dispose of the blasting product used for the process and clean the area, including the rudder and rudder stock.

11.1.D Proof of performance

D.1 The Contractor must perform magnetic particle testing of the areas where the shelter's attachments were welded to the hull according to Transport Canada's requirements.

11.1.E Deliverables

E.1 The Contractor must supply a new docking plan showing the position of every block in regard with the frames of the vessel. This drawing will be used to assure a different block position for the next dry docking period in order to apply a coating compatible with the vessel's existing coating system (See document named: Hull, masts and superstructures Coatings) on the areas covered during the current dry docking period.

11.2 HULL PLATING ABOVE THE LOAD LINE

(11A01)

11.2.A Identification

A.1 Prepare and paint the ship's hull from the load line to the bulwarks and the accommodation ladders' storing areas. The Contractor must remove the accommodation ladders and install them once the paint job is completed. The Contractor must perform a working test before the CGTA after the accommodation ladders installation to make sure they are still operating correctly.

11.2.B References

B.1 Accommodation ladders

B.1.1 Type : Fixed Step Type Alum. Alloy

B.1.2 Fabricant: Tyne Gangway Co.

B.2 Fairleads drawings

B.2.1 Martha L. Black, fairleads and bollards, forward.pdf

B.2.2 Martha L. Black, fairleads and bollards, after.pdf

11.2.C Statement of work

C.1 The total surface of the hull above the load line is 953 m².

C.2 The Contractor must sand blast an estimated 15% of the hull surface to meet the SA2½, Swedish standard, SIS 055900, or SSPC-SP-10 (near white) commercial standard.

C.3 The Contractor must pick up and dispose of the blasting product used for the process and clean the area.

C.4 The Contractor must clean with a high pressure water jet (5000 psi) or sandblast and roughen and grind with mechanical tools the remaining surface.

C.5 The Contractor must blow, with high pressure, all surfaces before the coating application.

C.6 The Contractor must supply and apply one red priming coat of paint compatible with the vessel's existing coating system (See document named: Hull, masts and superstructures Coatings), .005" to .006" thick, on all bare metal areas, then, two coats of 2 mils DFT, red, Coast Guard, RAL 3000, of paint compatible with the vessel's existing coating system on the whole surface. The Contractor must apply the coating in a straight line along the load line. The Chief Engineer must be consulted by the Contractor and be on the site to validate that the coating line stops at the load line.

C.7 The Contractor must ensure that the application of red paint compatible with the vessel's existing coating system on top of the red color initial paint is not completed more than eight (8) hours after the preceding application on the hull.

C.8 Between the application of paint coatings, the Contractor must perform a soft sand blast on the surface to assure an adequate holding capacity of the following coating.

C.9 Recommendations and additional requirements:

C.9.1 During the paint work on the hull, the Contractor must plug all the drain scuppers with perforated wooden plugs fitted with a pipe extension to avoid contact between the drained water and the painted hull. These plugs must be maintained watertight for the whole length of the work

C.9.2 The Contractor must cover every porthole and window on the main and upper decks during the sand blasting and painting works. The Contractor must remove the covers once the work is completed.

C.9.3 The Contractor must sand blast or mechanically grind then paint the portholes surrounding accordingly with item C.6. The Contractor must very cautious not to damage the portholes' glass.

C.9.4 For the entire period of sand blasting work, the Contractor must cover, with a multipurpose plastic film, all accommodations' openings, including the ventilation ports to make sure that there will be no sand infiltration inside the accommodations and the engine room. Every equipment on the main, upper and boat decks (windlass, winches, cranes, davits, etc) must be protected the same way, by the Contractor. The Contractor must remove these protections once the sand blasting and painting works are completed. These openings must be examined and accepted by the CCG representative before starting sanding operations.

C.9.5 The Contractor must cover every fairlead (Closed and Port Colborne type), hawsehole and the six (6) Warping Rollers during the paint application on the hull then paint these equipments using black paint compatible with the vessel's existing coating system (See document named: Hull, masts and superstructures Coatings). The Contractor must demonstrate to the CGTA the adequate operation of the Port Colborne type fairleads and of the Warping Rollers.

C.9.6 The contractor is responsible of any sandblasting product entry in any of the ship's compartment/equipment and will assume any breakdown related to the lack of protection of the mentioned compartments/equipments

11.3 HULL PLATING WELDING JOINTS

(11A01)

11.3.A Identification

A.1 Find out which hull plating welding joints need to be re-welded in order to comply with TCMS requirements.

A.2 The extent of this task must be defined following the hull inspection that will take place immediately after the docking of the vessel.

A.3 Following the inspection, plate replacement work is also described in this specification.

A.4 Since welding work will be required (Bow thruster – generator replacement) and all the vessel holding tanks (ballast, fuel oil, void spaces) must be inspected, this is the best time to perform this work.

11.3.B References

B.1 Drawings

a) 108-H-001 Shell Expansion

11.3.C Statement of work

C.1 Preparation and inspection

C.1.1 The Contractor must provide sufficient staging or mobile scaffolding to access all seams and butts of the hull so that the surveyors may ascertain the condition of the welds.

C.1.2 The Contractor must first wash the hull with fresh water to get rid of salt and other debris from the surface.

C.1.3 Once the hull has been thoroughly cleaned, the Contractor must notify both the CCG Technical Authority and the Transport Canada Marine Ship Branch Surveyor so a visual survey of the entire hull and its associated welds can be done.

C.2 Welding

C.2.1 On both sides of the vessel, about 500 linear feet of welding joints (butt joints and seams) must be welded, by the Contractor, with an average of twelve (12) welding passes for a total of 6,000 linear feet of welding to perform.

C.2.2 The Contractor must perform these works only when the tanks in contact with the areas of the hull have been emptied, cleaned, degreased and certified for hot work and when all other elements in contact with the working zone have been removed.

C.2.3 The butt joints and seams to be repaired must be marked by the TCMS surveyor and must be sand blasted, by the Contractor, to remove the extra INERTA coating, salt deposits, dirt and grease.

C.2.4 The Contractor must gouge or rectify all the repaired welds to bring them to their original position.

C.2.5 The Contractor must grind smooth, prior to welding, any undercut edges of the weld and it's boundary plates.

C.2.6 The Contractor must remove all grits from the welds and gouging by vacuuming or air blowing.

C.2.7 The Contractor must erect a heavy duty plastic film shelter in the working areas to prevent rain, snow, ice, or their melted counterparts from rapidly quenching of the welds,

C.2.8 The Contractor must preheat the shell welds to 93°C (200°F) prior to welding.

C.2.9 The Contractor must perform the work so the new welds present an excess of about ¼ inch that will be grinded then sandblasted to SA 2 ½ standard to show a rounded and rough surface. The excess should look like a sheet metal joint made with an automatic welding machine.

C.2.10 The Contractor must quote for the price of gouging 500 linear feet of full width weld on the welded surface and for grinding 500 linear feet on the same surface. The Contractor must also quote for the price of gouging and grinding one foot of weld. The final cost of gouging and grinding will be adjusted on a PWGSC 1379 form.

C.2.11 The Contractor must quote for 6 000 linear feet of weld seam. The Contractor must also quote for one linear foot of weld seam in order to establish the accurate final cost that will be corrected on a PWGSC 1379 form. The Contractor will be provided with a shell expansion drawing of the hull of the vessel. The Contractor

must clearly show on this drawing, in prominent red lines for both port and starboard sides of the ship, the full extent of new shell welds done during this repair.

C.2.12 The CCG will provide Contractor with a "Shell Expansion" drawing of the hull of the vessel. The Contractor must clearly show on this drawing, in prominent red lines for both port and starboard sides of the ship, the full extent of new shell welds done during this repair.

C.3 Hull plating replacement (If required in A.3)

C.3.1 The contractor must move the blocks and adequately support the vessel for the entire duration of metal working on the hull.

C.3.2 The Contractor must torch cut all plates mentioned, taking care not to damage the frames, the beams or the floor timber that are not to be changed, and dispose of the plates.

C.3.3 The Contractor must grind the edges and frames ready to be welded to the new material.

C.3.4 Using the "Shell expansion" drawing, the Contractor must cut the plating sections identified following the Hull inspection.

C.3.5 The Contractor must transport, form, adjust and weld in place the plating sections to the frames, to the satisfaction of the TCMS surveyor and the CGTA. The Contractor must perform all welds following the arc welding full penetration back-step method so as to produce a welding excess of ¼ in. on the surface. The Contractor must grind the welding excess so as to obtain a rounded and smooth surface that will facilitate paint system adhesion.

C.4 Radiographic Inspection

C.4.1 The Contractor must bid on taking a minimum of twelve (12) radiographic films of the welds in question. The TCMS surveyor must determine locations where these films are to be taken. A unit price per film must be provided in the Contractors bid and this unit price is to include all staging and cranage that may be required.

C.4.2 For radiographic inspection, the Contractor must clean adequately the surfaces of welds and adjacent base material to allow accurate interpretation of the area of interest (weld zone). Discontinuities appearing on the radiographic film that

subsequently are determined to be surface discontinuities must be repaired by the Contractor and the location must be re-inspected by radiographic methods.

C.5 Completion of the work

C.5.1 On completion of all welding, the Contractor must apply, on newly welded seams, bare and disturbed areas and new hull plates, the same preparation and paint schedule(s) as required for the area of the hull that the welding has been done. (i.e. underwater hull, icebelt or topside).

C.5.2 Once all work has been carried out and the indicated tanks have been thoroughly cleaned, the Contractor must reinstall the manhole covers using new galvanized steel gaskets, nuts and washers.

C.5.3 The Contractor must put the docking plugs back in place and proceed with hydrostatic testing of each tank in the presence of the.

C.5.4 Once testing is completed, the Contractor must:

a) Drain and dry tanks;

b) Put back the docking plugs;

c) Test their water tightness using the vacuum box method, before the TCMS surveyor and the TA;

d) Install the manhole covers;

e) Ensure they are ready to be filled.

11.3.D Proof of performance

D.1 Inspections to be performed by the TCMS surveyor and the CGTA.

D.1.1 Hull plates inspection;

D.1.2 Inspection of all hull welds, both port and starboard.

D.2 Testing to be performed by the Contractor:

D.2.1 Radiographic films taken by a certified NDT Surveyor;

D.2.2 Hydrostatic testing of each tank, in presence of the TCMS surveyor and the TA;

D.2.3 Vacuum box testing of all docking plugs, in presence of the TCMS surveyor and the CGTA.

11.3.E Deliverables

E.1 The contractor must supply the Technical Authority:

E.1.1 An electronic copy, on a USB stick not protected by a password, in Microsoft Office Word 2003 or more recent format, a report detailing all undertaken works, defects, repairs performed and detailed results of all performed tests

E.1.2 Marked up Shell Expansion drawing showing areas of work.

E.1.3 Two (2) copies of all radiographic films taken.

E.1.4 One Quality Assurance (QA) report indicating that all areas as defined in this specification have been inspected by the Contractor's QA Department and all areas of defects established by this survey have been identified for remedial action.

E.1.5 One copy of NDT Surveyor's certification required.

11.4 CARGO HOLD DB TANK PLATE REPLACEMENT

(11A02)

11.4.A Identification

A.1 Replacements of a damaged plate in the cargo hold, starboard, between frames 145 and 146. This plate is part of the double bottom ballast tank # 2.

11.4.B References

B.1 Drawings

B.1.1 108-H-003 Tank Top & Double Bottom

B.2 Pictures

B.2.1 20180204_144956 Damaged plate position

B.2.2 20180204_145202 Dimensions of the damaged plate

11.4.C Statement of work

C.1 These works must not start before the double bottom ballst tank #2 is cleaned, ventilated and certified gas free and that a certificate is posted near the entrance to the tank and maintained until the end of the required work.

C.2 The contractor must supply parts and manpower to perform the following work:

C.2.1 Cut the plate in a square form of sixteen inches(16’’) a side in order to remove all damaged plating.

C.2.2 Clean the edges of the square hole.

C.2.3 Manufacture and weld in place a steel insert, of the same grade and thickness of the removed plate, similar to the hole’s dimensions.

C.2.4 Weld the insert with full penetration.

C.2.5 A liquid penetrant test must be performed and the result submitted to the TCMS surveyor.

C.2.6 Perform an hydrostatic test and apply one coat of primer on the welding, the new plate and the bare metal areas in the surroundings.

11.4.D Proof of performance

D.1 During the hydrostatic test of the #2 double bottom tank, the plate welds must be presented to the TCMS surveyor.

11.4.E Deliverables

E.1 The Contractor must supply the CCG Technical Authority a report, detailing the results of the liquid penetrant tests and yhe air pressure or hydrostatic test, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.

11.5 CHAIN LOCKER

(11A07C)

11.5.A Identification

A.1 Remove the anchor chains from both chain lockers; clean the chain lockers for a TCMS surveyor's five year inspection. Afterward, the Contractor must paint the chain lockers and return the chains into their respective chain locker.

A.2 This work is mandatory to allow the TCMS surveyor to acknowledge the chain lockers' condition in regard with the vessel's Division 3 list.

11.5.B References

B.1.1 Not used

11.5.C Statement of work

C.1 The Contractor must operate the vessel's windlass in order to lower in the dock the Port side anchor and anchor chain then the Starboard side anchor and anchor chain. The Contractor must request the Chief Engineer's advice before starting the windlass.

C.2 While the chains have been removed from the chain lockers, the Contractor must remove the perforated floor plates from both chain lockers.

C.3 Access to the chain lockers is from two vertical manholes located in the Boatswain store.

C.4 The Contractor must hydro-blast clean, scrape and brush with a steel brush to purge the lockers of all loose scale, paint, dirt and rust both chain lockers, including portable perforated deck plates, manhole covers and strum boxes. The Contractor must remove and dispose of all the mud and dirt in its own facilities.

C.5 The Contractor must bid on removing, transporting and the disposal of approximately two (2) cubic meters of mud and associated debris.

C.6 The Contractor must have a sample of the mud analyzed, at a provincial Government approved environment laboratory, as to its contaminant level content. Should the sample's contaminants contents exceeds acceptable Provincial environmental standards, the Contractor must advise the CCG Technical Authority.

C.7 If special handling and disposal is required for the Contractor, the cost must be negotiated using the PWGSC 1379 form.

C.8 The Contractor must wipe dry both lockers prior to submit them to the CGTA and TCMS surveyor's inspection.

C.9 The Contractor must clean both dry wells and their drain pipes and prove the system to be functional and in good working condition by performing, before the CGTA and the TCMS surveyor, a pumping trial using the bilge pump.

C.10 The Contractor must take twenty (20) ultrasonics shots inside the chain lockers and supply the staging and the required tools. The Contractor must contact the CCG Technical Authority for the location of these shots. The Contractor must neatly and accurately record these thickness readings on a Contractor's supplied drawing which must denote location of each shot with reference to the ship's framing and the expected plate thickness. Four (4) copies of this drawing must be provided to the CCG Technical Authority.

C.11 The approximate area of both chain lockers is 1400 ft^2, which means 700 ft^2 for each locker

C.12 On the CCGS Martha L. Black, the Contractor must paint all bare interior surfaces, including the centre line division plate, portable deck plates and manhole covers with one coat of primer. Once primer has been applied to the bare areas, the Contractor must apply, on all interior surfaces of each chain locker, including the manhole cover(s), two (2) separate coats of paint compatible with the vessel's existing coating system (See document named: Hull, masts and superstructures Coatings). Each coat is to achieve a DFT of 0.005".

C.13 On completion of painting, the Contractor must install, in their respective location, the portable deck plates and manhole cover(s) using new neoprene gaskets, studs and nuts.

C.14 The Contractor must then rinse with a high pressure water jet (minimum of 5000 psi), raise and stow both port and starboard chains into the chain locker to the satisfaction of the Chief Engineer and the TCMS Surveyor.

C.15 The Contractor must touch-up the paint on the hull, the hawse holes when reassembled to their initial position.

11.5.D Proof of performance

D.1 Inspection

D.1.1 The following inspections must be verified by the Technical Authority and the TCMS surveyor.

a) • Inspection of the chain locker after cleaning,

b) • Inspection of bitter end connection,

c) • Inspection of drains and strum boxes.

D.2 Testing

D.2.1 The following tests are to be performed by the Contractor before the Technical Authority and the TCMS surveyor:

a) Prove functionality of drain pipes and strum box suctions,

b) Measurement of paint thickness.

11.5.E Deliverables

E.1 The Contractor must provide four (4) copies of the lab report regarding the mud sample taken during the disposal process, to the CCG Technical Authority.

E.2 The Contractor must supply to the CCG Technical Authority a report, detailing the work undertaken, defects, repairs made and measurements and readings taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.

E.3 The Contractor must provide, to the TA, a Quality Assurance (QA) report indicating that all parts of the chain locker have been inspected by the Contractor's QA Department for correct installation and fit.

11.6 SEARCHLIGHTS REPLACEMENT

(11E06)

11.6.A Identification

A.1 Perform replacement of two (2) forward searchlights and one (1) after searchlight by new ones, supplied by Coast Guard.

11.6.B References

B.1 Drawings

B.1.1 108-H-23_25_1 General Arrangement – Profile & end views

B.1.2 108-H-23_25_2 General Arrangement Upper Deck, Boat Dk, Officers Dk, Wheelhouse floor and top

B.1.1 C06-55-101-01 rev 1 Ajout d'une antenne satellite au mât arrière (for dimensions only)

B.1.2 CL35 DIM'S Both searchlights dimensions including foundation

B.2 Pictures

B.2.1 IMG_2212 Searchlight to be removed, starboard forward, with base

B.2.2 IMG_2215 Searchlight starboard forward, side view

B.2.3 IMG_2216 Searchlight starboard forward, base

B.3 Manuals

B.3.1 Installation Manual CL35

B.4 Specifications – Searchlights to remove

B.4.1 Deck above wheelhouse

a) Carlyle & Finch – Xenon Single Fixture (Motorized) – 2 off

B.4.2 After Mast

a) Carlyle & Finch – Redundant – A 19'' 1500 Watt – 1 off

B.5 Specifications – New searchlights to be installed

B.5.1 Deck above wheelhouse

a) Colorlight CL38-11 – 2 off

B.5.2 After Mast

a) Colorlight CL35-11 – 1 off

11.6.C Statement of work

C.1 Deck above wheelhouse – Searchlights CL38-11

C.1.1 Electrical supply will be disconnected and locked by the vessel's crew.

C.1.2 The Contractor must supply parts and manpower to perform the following work:

a) Dismantle both existing searchlights including their dampening square base. Deliver both searchlights to the CGTA and scrap both dampening square bases.

b) Remove the tiles from the wheelhouse ceiling to uncover the work areas.

c) Manufacture a square, steel foundation plate (340 mm x 340 mm, 10 mm thick) following CL35 DIM'S drawing to drill holes. NOTE that CL35 and CL38 searchlight foundation plates are the same size.

d) Modify the remaining structure so the foundation plate is elevated higher than the bulwark, which means about sixteen inches (16'') and the searchlight main axis is moved outboard and forward, respectively ten inches (10'') and eight inches (8''). This structural modification will improve the lighting area covered by the searchlights close to the vessel hull.

e) To strengthen the modified structures, two (2) stiffeners (angle bar) must be welded on the longitudinal bulwark and two (2) more on the forward transverse bulwark.

f) Weld the new foundation plates on the modified structures..

g) Sand blast the modified structures and the bare metal areas and perform Liquid Penetrant tests on all new welding passes.

h) If any failure is detected, the Contractor must, at its own expense, correct all defects and perform more Liquid Penetrant tests until all welds are accepted by the CGTA.

C.1.3 As soon as the welds are approved, the Contractor must apply two coats of primer on new structures and on the bare metal areas.

C.1.4 The Contractor must, after the mandatory curing delay, apply two coats of white (RAL 9003) paint, supplied by Coast Guard..

C.1.5 The Contractor must install both searchlights on their bases.

C.1.6 The Contractor must feed the control cables, supplied by Coast Guard, from both searchlights to both wheelhouse wing consoles. The cables will be connected by the crew.

C.1.7 At the end of the work, the Contractor must close the ceiling tiles and clean the work areas.

C.2 After Mast – Searchlight CL35-11

C.2.1 Electrical supply will be disconnected and locked by the vessel's crew.

C.2.2 The Contractor must supply parts and manpower to perform the following work:

a) Dismantle the after mast searchlight including the dampening square base and deliver them to the CGTA. The actual structure will not be modified.

b) Manufacture a square, steel foundation plate (340 mm x 340 mm, 10 mm thick) following CL35 DIM'S drawing to drill holes.

c) Weld the new steel foundation plate on the structure.

d) The Contractor must sand blast the modified structures and any surrounding bare metal areas then perform Liquid Penetrant tests on all new welds.

C.2.3 If any welds need to be repaired, the Contractor must do so, at his own expense, then perform new Liquid Penetrant test until all welds are satisfactory.

C.2.4 The Contractor must apply two coats of primer on new structures and on bare metal areas then two coats of finishing paint (beige/ buff, RAL Design 070 7040), supplied by Coast Guard.

C.2.5 The Contractor must install the searchlight and its damper assembly on its foundation following Installation manual instructions.

C.2.6 The Contractor must feed the control cables, supplied by Coast Guard, from both searchlights to both wheelhouse wing consoles. The cables will be connected by the crew.

11.6.D Proof of performance

D.1 All Liquid Penetrant testing must be performed in presence of the CGTA.

11.6.E Deliverables

E.1 The Contractor must supply to the CCG Technical Authority a report, detailing the work undertaken, defects, repairs made and measurements and readings taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.

E.2 The Contractor must provide, to the TA, a Quality Assurance (QA) report indicating that all new structures and the searchlights' installations were inspected by the Contractor's QA Department for correct installation and fit.

11.7 MAGNETIC COMPASS KINGPOST REPLACEMENT AND INSULATION

(11F02)

11.7.A Identification

A.1 Perform replacement and insulation of the kingpost between the magntic compass and the wheelhouse.

11.7.B References

B.1 Pictures

B.1.1 Kingpost and platform

B.1.2 Kingpost

B.1.3 Kingpost base

B.1.4 IMG_2217 Upper kingpost near compass platform, looking to port

B.1.5 IMG_2219 Upper kingpost, cables, port side

B.1.6 IMG_2220 Upper kingpost, cables, port side toward forward

B.2 Kingpost dimensions (to be validated by Contractor)

B.2.1 Length : 4 feet

B.2.2 Diameter : 6 inches

11.7.C Statement of work

C.1 Before the work is started, the crew will remove the inner cylinder of the kingpost.

C.2 The Contractor must remove the magnetic compass from its base and tie it to a handrail, far enough to prevent it to be damaged.

C.3 The Contractor must protect the helmsman chair and the wheelhouse central console using a polythene film covering the entire console, including the helm. The polythene film must be fixed in place, making sure not to damage the console.

C.4 The Contractor must install a tarpaulin covering the work area for further protecting the console during cutting and welding work..

C.5 The Contractor must protect or move the cables situated near the kingpost, near the platform, and put them back in place once the work is completed.

C.6 The Contractor must perform the following tasks :

C.6.1 Remove the kingpost, cutting it at its base and at the platform,

C.6.2 Clean the area surrounding the removed kingpost.

C.6.3 Manufacture and weld in place a ten inches (10'' by ½'' thick) diameter doubler plate around the hole on the deck.

C.6.4 Supply and weld in place a new kingpost with the same wall thickness (Standard steel pipe, schedule 40) and the same inside diameter (6 in.) as the one removed in order to allow the inner cylinder to fit in.

C.7 When the welding is complete and the welds are at the ambient temperature, a water tightness test must be performed by the Contractor, in presence of the chief engineer and the CGTA, using a high pressure water jet, at least 5000 psi, on all kingpost welds. Another Coast Guard representative will be watching, in the wheelhouse for any water keak.

C.8 If there is a leak, the Contractor must, at his own expense, repair the deficient welds and perform another water tightness test, as stated in C.7

C.9 The Contractor must clean up all debris fallen in the wheelhouse and remove the tarpaulin and the polythene film.

C.10 Whenever the kingpost welds tightness have been confirmed, the Contractor must apply two coats of primer, 5 mils DFT.

C.11 The Contractor must insulate the kingpost to an A60 level, using his choice of insulation. The insulation must be covered by a protecting sheet metal, sealed at the ends and at the joint.

C.12 The Contractor must apply two coats of primer on the protecting sheet.

11.7.D Proof of performance

D.1 The water tightness test must be performed in presence of the CGTA and the chief engineer.

11.7.E Deliverables

E.1 At the beginning of the sea trials, the Contractor must supply the services of a specialist and perform manoeuvers for calibration of the magnetic compass and its certification.

E.2 Before the end of the contract, the Contractor must supply to the CCG Technical Authority a report, detailing the work undertaken, defects, repairs made and measurements and readings taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password

11.8 BALLAST WATER TANKS AND COFFERDAMS – CLEANING, INSPECTION AND PAINTING

(11G)

11.8.A Identification

A.1 Opening and cleaning of ballast water tanks and cofferdams for inspection and, if required, repairs and painting.

A.2 Perform hydrostatic pressure test on each tank and cofferdam for certification.

11.8.B References

B.1 Drawings

B.1.1 108-H-0026 Capacity plan

B.2 Tanks and cofferdams

DESCRIPTION -TK	LOCATION - FR.	CAPACITY (Metric tons)	AREA (m^2)	% Loose paint
Forepeak	Fore frame to 175	103.4	771.7	40
Aft peak	Frames 1 - 13	112	416.9	40
Double bottom after (#3) Port	54-70	43.5 Oily water	329.6	40
Double bottom after (#4) Stbd	54-70	43.4	329.6	40
Double bottom #2 Port	126-152	49.9	405.5	40
Double bottom #2 Stbd	126-152	49.9	405.5	40
FWD Wing Port	163-175	43.4	342.2	40
FWD Wing Stbd	163-175	43.4	342.2	40
AFT Wing Port	152-163	51.4	385.1	40
AFT Wing Stbd	152-163	51.4	385.1	40

DESCRIPTION – VOID SPACE	LOCATION - FR.	VOLUME (m^3)	AREA (m^2)	% Loose paint
VOID #1 Port Outboard	117-126	40	228.2	20
VOID #1 Stbd Outboard	117-126	40	228.2	20
VOID #2 Port Outboard	106-117	55	285.0	20
VOID #2 Stbd Outboard	106-117	55	285.0	20
VOID Double bottom Port	102-106	30	59.7	20
VOID Double bottom Stbd	102-106	38	71.7	20
VOID #3 Port Outboard	54-70	70	188.9	20
VOID #3 Stbd Outboard	54-70	70	188.9	20
VOID #4 Port Outboard	30-54	150	279.8	20
VOID #4 Stbd Outboard	30-54	150	279.8	20
VOID #5 Port Outboard	13-30	200	285.8	20
VOID #5 Stbd Outboard	13-30	200	285.8	20
VOID Aft	11-13	Not available	60	20
Cofferdam, Helicopter Fuel Tank	5-13	Not available	120	20
Port Echo Sounder Compartment	126-130	Not available	15	100
Stbd Echo Sounder Compartment	126-130	Not available	15	100
Fore Center Piping Tunnel	102-163	Not available	210	25
Aft Center Piping Tunnel	51-94	Not available	140	25
Port lateral double bottom VOID	53-54	Not available	25	20
Stbd Cofferdam for centreboard trunk transducer	123-126	Not available	30	25

11.8.C Statement of work

C.1 Preparation, cleaning and inspection

C.1.1 The Contractor must note that the tanks of this specification are used as water ballast tanks. The ship's crew, prior to docking the vessel, must empty these tanks to the minimal required level in order to achieve the desired trim.

C.1.2 Once the vessel has been safely docked, the Contractor must remove the docking plugs for the designated tanks in order to drain them.

C.1.3 The Contractor must give the docking plugs to the Chief Engineer for safekeeping.

C.1.4 Contractor must bid on draining and disposing of approximately five (5) tons of water and debris from each of the ballast tank noted and one (1) ton of water and debris from each void space.

C.1.5 The Contractor must open all manhole covers and ventilate the tanks. The contractor must post a certificate, prepared by a certified chemist, near the entrance of each tank specifying a safe entry and a permission to perform all required work during the whole duration of the work period.

C.1.6 The Contractor must scale, sand blast, to remove all rust and whatever paint that is not in contact with the plate, then clean each of the tanks and void spaces noted in this specification. The Contractor must hydro-blast the ballast and cofferdams, using high-pressure water (7500 psi minimum), hand clean them, removing all traces of rust and dirt, and dry them prior to inspection.

C.1.7 The evaluation of the expected surfaces to be treated is indicated in table B.2.

C.1.8 Once cleaned, each of the tanks and voids must be surveyed by the TCMS Surveyor and the CCG Technical Authority. The Contractor must notify the TCMS Surveyor and the CGTA when the work is ready for inspection.

C.1.9 The cost associated with all remedial work, required by the TCMS Surveyor and the CGTA, after their inspections, will be negotiated using PWGSC 1379 form.

C.2 Painting

C.2.1 The Contractor must assure the cleanliness of the tanks before painting them.

C.2.2 In each tank, on completion of the survey and any remedial action completed, such as those planned in item 11.4, the Contractor must supply all coating material and accessories to:

a) Apply one (1) coat of paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), .0015" inch. thick on bare metal.

b) Apply one (1) coat of paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), .012" inch thick only on areas painted on C.2.2 a).

C.2.3 In each void, on completion of the survey and any remedial action completed, the Contractor must supply all coating material and accessories to:

a) Apply one (1) coat of paint compatible with the vessel's existing coating system, .0015" inch thick on bare metal.

b) Apply one (1) coat of white paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), .012" inch thick only on areas painted on C.2.3 a.

C.3 Closing, testing and certification

C.3.1 The Chief Engineer must inspect the tanks and in order to validate the quality of the paint application between each coat of paint and prior to the final closing of the manhole covers.

C.3.2 On completion of all work, the Contractor must:

a) Install all docking plugs

b) Install the manhole covers using new gaskets, washers and nuts that he must supply. The new gaskets must be of the same material and thickness as those currently fitted.

c) Apply an Anti-seize compound to all threaded components.

C.3.3 The Contractor must perform a pressure test (hydrostatic or air pressure), on each tank and cofferdam, in presence of a TCMS surveyor and the CGTA.

C.3.4 Once the hydrostatic or air pressure test are completed, the Contractor must remove the docking plugs in order to drain the tanks (if necessary).

C.3.5 The Contractor must re-install the docking plugs, supplying and installing new joints, and perform a vacuum test in the presence of the Chief Engineer.

11.8.D Proof of performance

D.1 Inspections by TCMS and the CGTA must show that all surfaces from each tak and cofferdam are in good condition and completely coated with an adequate product.

D.2 Hydrostatic or air pressure tests must prove that all tanks and cofferdams are watertight.

11.8.E Deliverables

E.1 The contractor must supply the Technical Authority an electronic copy, on a USB stick not protected by a password, in a compatible Microsoft Office Word 2003 or more recent format, a report detailing all undertaken works, defects, repairs performed and detailed results of all performed tests.

E.2 The Contractor must supply the CGTA with a detailed QA report at the completion of the Work. This must include, but not limited to, inspection records, DFT readings, and condition monitoring data during coating application, etc.

11.9 WELDING WORKS IN CARGO HOLD

(11J09)

11.9.A Identification

A.1 Replace and/or install many fixed and floating rings in cargo hold. To do so, the Contractor must supply a welding sequence in order to certify the ring strength to five thousand pounds (5000 lbs), once welded in place.

A.2 Straighten or replace a pillar in the cargo hold.

A.3 Straighten or replace a "U" shaped channel bar in cargo hold.

11.9.B References

B.1 Drawings

B.1.1 108-H-003 Tank Top & Double Bottom

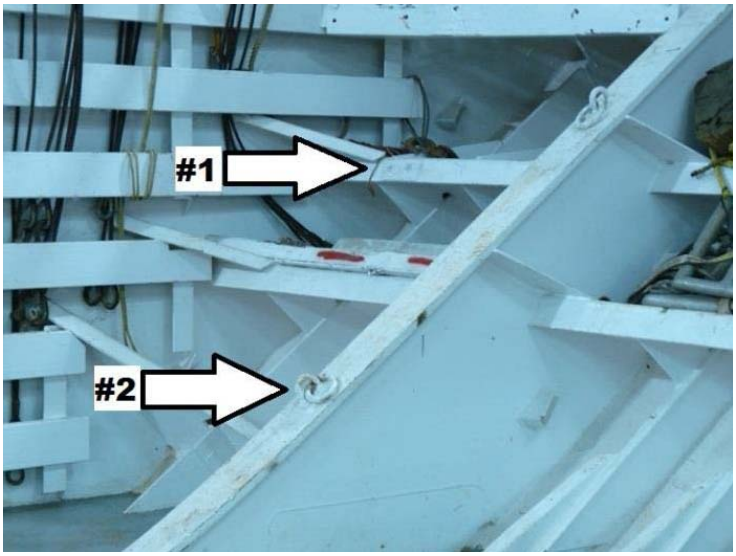
B.2 Sketch of 5000 lbs capacity ring sets, supplied by Coast Guard and to be welded in place by Contractor.

B.2.1 C0100433-10_APB Floating ring in fixed ring

11.9.C Statement of work

C.1 The Contractor must perform the following work for each numbered item:

C.1.1 Item No. 1: Starboard side, forward: Remove existing plate and the shackle, weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #1, pictured in C.1.1.a)

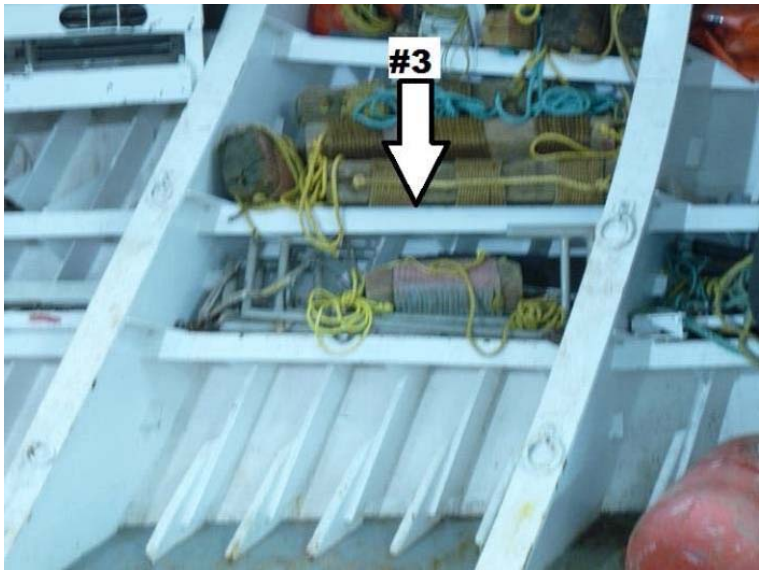


a)

C.1.2 Item No. 2 Starboard side, forward: Remove a distorted floating ring and its plate and weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #2, pictured in C.1.2.a))

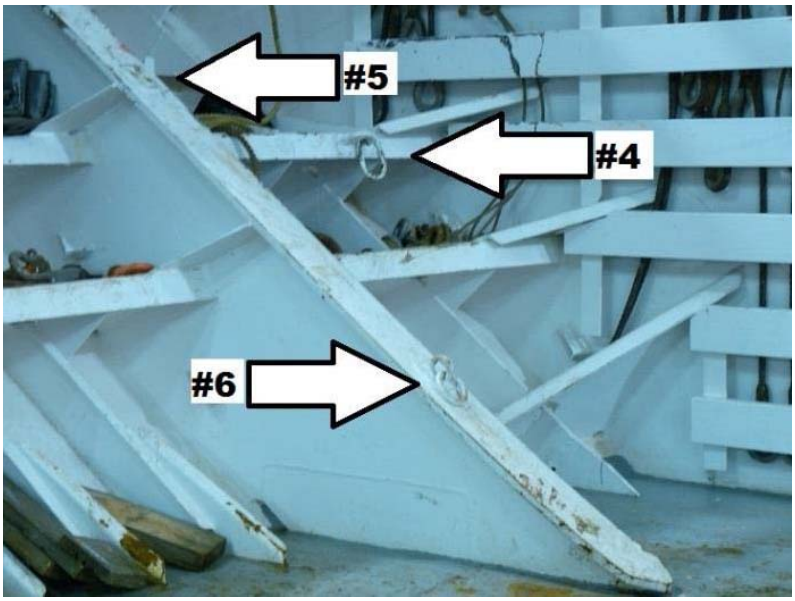
a)

C.1.3 Item No. 3 Starboard side, forward: Weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #3)

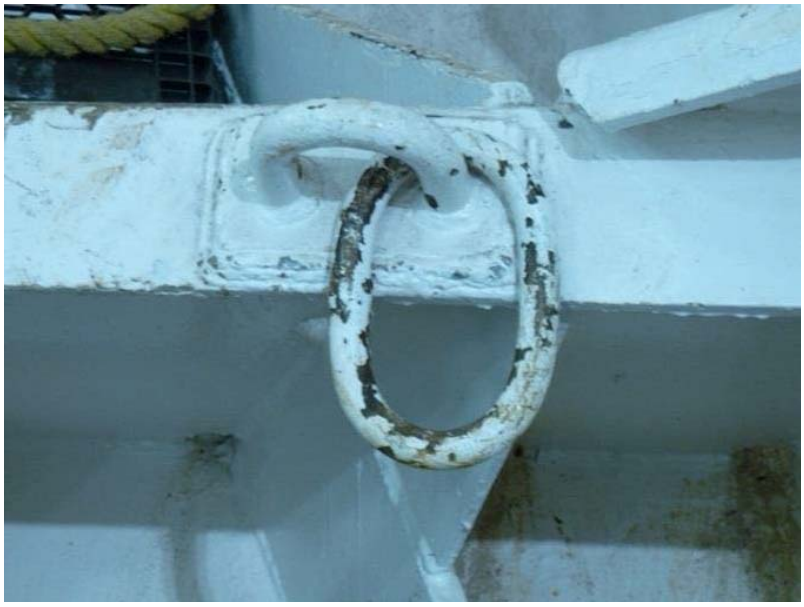


a)

C.1.4 Item No. 4 Port side, forward: Remove a distorted floating ring and its plate and weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #4, pictured in C.1.4.b)



a)

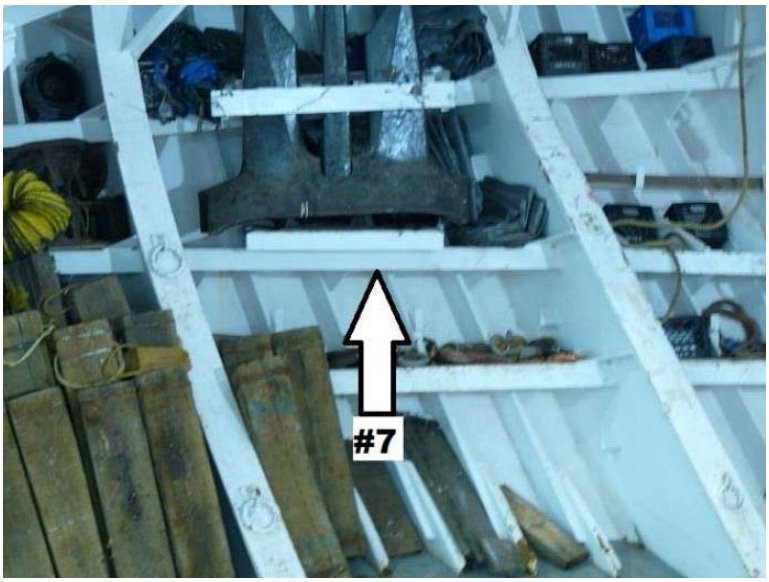
b) 

C.1.5 Item No. 5 Port side, forward: Remove a plate and the shackle, weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #5, pictured in C.1.4 a)

C.1.6 Item No. 6 Port side, forward: Remove a distorted floating ring and its plate and weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #6, pictured in C.1.6 a)

a) 

C.1.7 Item No. 7 Port side, forward: Weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #7)

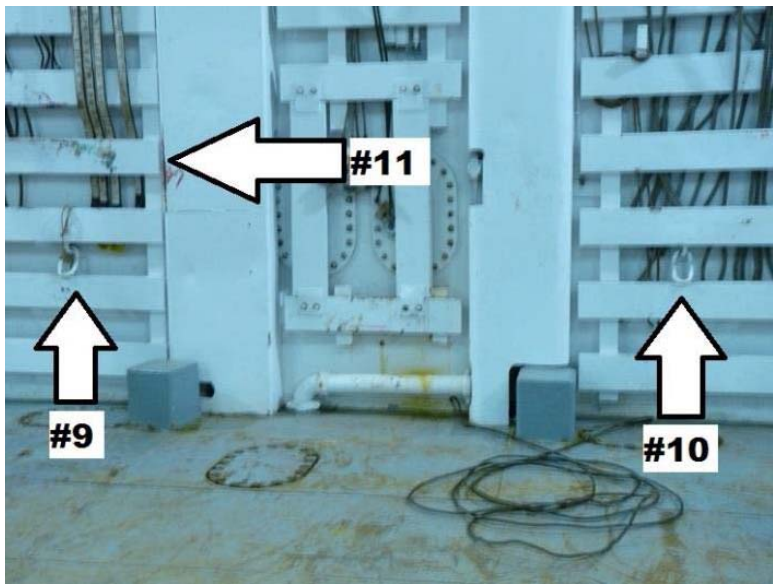
a) 

C.1.8 Item No. 8 Port side, aft: Remove a distorted floating ring and its plate and weld in place a fixed and floating ring set supplied by Coast Guard. (Arrow #8, pictured in C.1.8 b) - NOTA: The Contractor must move or cover with fire proof blankets the steel cable reels making sure not to damage them.

a) 

b) 

C.1.9 Items No. 9 et 10, Forward bulkhead: Remove two distorted floating rings and their plate and weld in place fixed and floating ring sets supplied by Coast Guard. (Arrows #9 & #10, pictured in C.1.9 b) and c). TAKE NOTE that these plates are welded on a fuel tank after bulkhead and the Contractor must wait until this tank is cleaned and certified gas free before performing this work.

a) 

b) 

c) 

C.1.10 Item No. 11, Forward bulkhead : Straighten or replace a channel bar (Arrow #11, pictured in C.1.10 a)

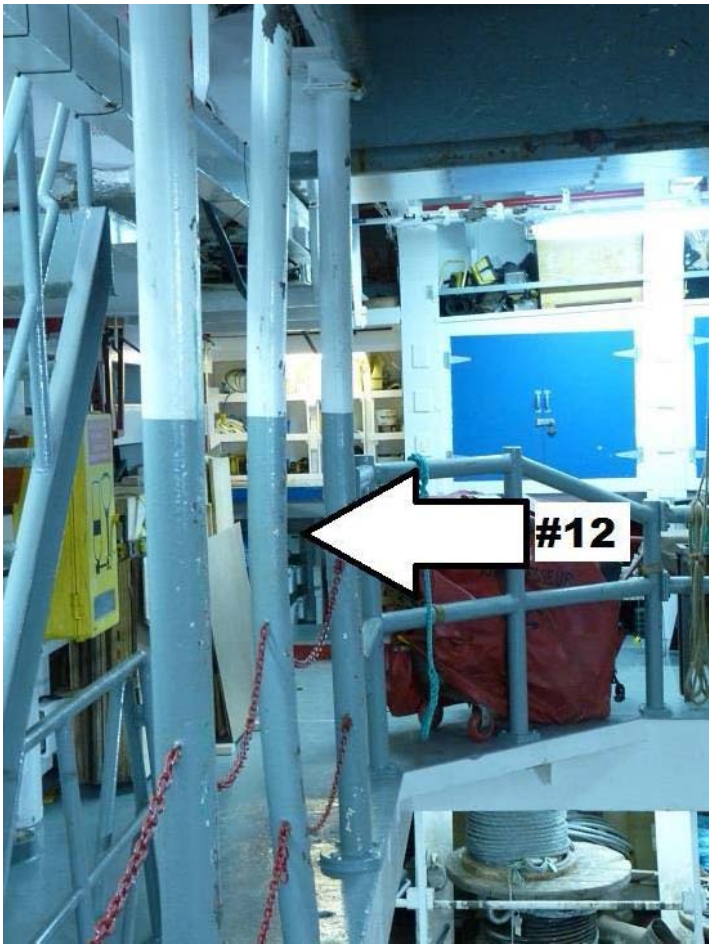
a) 

b) Channel bar dimensions (to be verified by Contractor):

i) Length : 49’’

ii) 8’’ x 2¼’’ x ¼’’

C.1.11 After tween deck : Straighten or replace a pillar (Arrow #12, pictured in C.1.11 a)

a) 

b) Pillar dimensions (to be verified by Contractor):

i) Height : 104’’

ii) Diameter : 4½’’

iii) Round base : Diameter 10’’, Thickness 1½’’, 4 holes, truncated (appr.) 1’’

iv) Top base : Square, 8’’ sides , Thickness ½’’, 4 holes

C.1.12 Once each fixed or floating ring is installed, it must be submitted to a One ton tension equivalent test by the Contractor in order to check to welds sturdiness.

C.1.13 The Contractor must prepare and sand blast all areas to be welded.

C.1.14 After rings approval, the Contractor must apply two coats of primer on all bare metal surfaces.

11.9.D Proof of performance

D.1 Each fixed and each floating ring must undergo a One ton equivalent tension test in presence of the CGTA.

11.9.E Deliverables

E.1 The contractor must supply the Technical Authority an electronic copy, on a USB stick not protected by a password, in Microsoft Office Word 2003 or more recent format, a report detailing all readings taken during testing.

NOT USED

11.10 NOT USED

11.11 FREEBOARD, DRAUGHT AND VESSEL'S IDENTITY MARKINGS

(11L02)

11.11.A Identification

A.1 Renew the hull and freeboard markings after painting the hull.

11.11.B References

B.1 CCG/6016 Federal Identity Program Guide

B.1.1 Drawing # 07352-SF Symbolisation fédérale:

B.2 The Contractor must supply all the paint to be applied, according to the manufacturer's specifications, for all black and white markings. All paint must be compatible with the various hull coatings.

B.3 Colours and type of paint to be supplied and used:

B.3.1 White: RAL9003

B.3.2 Black: RAL9004

11.11.C Statement of work

C.1 The Contractor must paint the load line, draught marks, forward and aft, port and starboard, letters, with two (2) coats of white paint compatible with the hull coating. There are two (2) sets of draft marks on each side of the ships bow and on each side of the stern.

C.2 The Contractor must ensure that all paint used for the markings is applied in two (2) coats and is compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings).

C.3 List of numbering/lettering to be performed by the Contractor:

a) **Vessel's name** on both sides, forward and aft; port of registry;

b) On both sides, inscriptions "**Coast Guard**" and " **Garde Côtière**", and the diagonal stripes and black lines along the stripes;

c) The "**Danger**" inscription with the **propellor** and **bow thruster symbols**, on both sides;

d) The **Canadian flag** with the "**Canada, Pêches et Océans, Fisheries and Oceans**" inscriptions, on both sides of the vessel.

C.4 The Contractor must stop painting of the diagonal stripes and their black lines, as stated in C.3b)) just above the ice belt.

11.11.D Proof of performance

D.1 Free board discs must be examined by the Ship safety and remade by welding if required. This work will be considered an extra and negotiated using **PWGSC** 1379 Form.

11.11.E Deliverables

E.1 **The contractor must supply the Technical Authority an electronic copy, on a USB stick not protected by a password, in Microsoft Office Word 2003 or more recent format, a report detailing all undertaken works, defects, repairs performed, measurements and readings taken.**

11.12 STRAINERS, SEA BOXES AND SEA BAYS

(11M)

11.12.A Identification

A.1 Opening of grates and manholes to give access to the sea boxes and the manholes for the sea bays.

A.2 Supply and installation of zinc anodes in the sea boxes.

A.3 Painting of designated areas in the sea boxes and seabays.

11.12.B References

B.1 Drawings and required anodes

a) 71-20-01 Arrg't seabay & seachests

i) 28 anodes, 23 lb each, Type Z19 or equivalent

b) 71-20-02 Arrgt Sea Chest Sterntube Lubricating

i) One anode, 32 lb, Type B4 or equivalent

c) 71-20-03 Arrangement Aft Sea Chest

i) One anode, 20 lb, Type P4B2 or equivalent

B.2 Location of sea chests and sea bays

B.2.1 List of external and internal sea chests

a) The following table shows the location of the sea chests that must be opened for cleaning and inspection by the CCG CGTA.

Description	Frames	Surface m²
External Sea chest, Submersible pump, Motor Room Port	51-53	16.8
External Sea chest, Stern Tube pump, Motor Room Center	37-39	1.2

External Lower Sea chest, Generator Room, Port	96-106	88.4
External Lower Sea chest, Generator Room, Stbd	96-106	88.4
External Upper Sea chest, Generator Room, Port	96-106	107.1
External Upper Sea chest, Generator Room, Stbd	96-106	107.1
External Sea chest, Évaporato, Generator Room, Stbd	102-106	21.5
Internal Sea chest, Generator Room, Center	96-102	227.6

11.12.C Statement of work

C.1 Sea Strainers

C.1.1 The Contractor must open the port and starboard (2) sea strainers. This will involve disconnecting the sea strainer vents & drains. Each strainer surface is about 6 m².

C.1.2 The Contractor must remove and sand blast the sea strainer grates to remove any marine growth or corrosion.

C.1.3 The Contractor must mechanically clean to bare clean surfaces the strainer boxes and, when dry, submit it to the Technical Authority for inspection. Any defects found must be brought to his attention for remedial action.

C.1.4 The Contractor must apply two coats of paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), of differing colours (.005" DFT each) to the interior surfaces of each strainer box as well as to the underside of each strainer cover.

C.1.5 The Contractor must, after the painting is completed submit it to the Technical Authority for inspection

C.1.6 After inspection, the Contractor must reinstall the strainers and the covers, using new gaskets, and secure the assembly into place. The Contractor must apply anti-seize compound on all fasteners.

C.1.7 The Contractor must reconnect the vents and drain piping and verify that they are working properly.

C.1.8 The Contractor must provide a quote for the additional costs to have the strainers hot galvanised after cleaning.

C.2 Seaboxes

C.2.1 The Contractor must remove the manhole covers of all the sea chests and the access grates (on the hull) to the stern tube pump sea chest.

C.2.2 The Contractor must clean the internal surfaces, including the access grates and the piping between sea chests and sea bays, Port and Starboard, using high-pressure water jets with a minimum pressure of 5,000 psig, or a sand blasting process, in order to remove all loose paint.

C.2.3 The Contractor must carry ashore an estimated 10 cubic meters of waste mud. The Contractor must provide a unit price for each exceeding cubic meter to evacuate. The final cost will be adjusted using PWGSC 1379 form. The Contractor must move all debris ashore and dispose of it at the end of each day.

C.2.4 The Contractor must inform the Technical Authority and the attending TCMS Surveyor when the seaboxes are opened up, so they can inspect them.

C.2.5 The Contractor must mechanically ream all access grates' holes to their original diameter.

C.2.6 The Contractor must supply and install) zinq anodes according to drawings specified in B.1. The anodes must be bolted down. The Contractor must supply stainless steel bolts that must be welded for the anodes installation.

C.2.7 The Contractor must sand blast clean any bared areas and remove all dirt in preparation for painting.

C.2.8 The Seaboxes must be inspected by the Technical Authority, before any painting starts.

C.2.9 After inspection, the Contractor must paint, with two (2) separate coats of paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), 0.005" à 0.006" for each coat, color grey, on all internal surfaces of the evaporator seabox only. The other sea chests must not be painted.

C.2.10 The Contractor must advise the Technical Authority so he (she) can witness each coat application.

C.2.11 The Contractor must provide a unit cost per square foot (or square metre) for each coat of paint application on bared areas and the surfaces described in C.2.9.

C.2.12 The Contractor must close the seaboxes' access grates, with corrosion proof new bolts, tack welded.

C.2.13 The Contractor must close all manhole covers, supply and install new gaskets (0,6 mm thick), and galvanized steel bolts, studs, washers and nuts.

11.12.D Proof of performance

D.1 The following inspections must be verified by the Technical Authority and the TCMS Surveyor:

D.1.1 Sea strainer grids and strainer boxes,

D.1.2 Inspection of internal surfaces of sea chests and sea bays after cleaning.

D.2 The following inspections must be verified by Technical Authority:

D.2.1 Closing up strainer covers and manhole covers.

D.2.2 Paint application on internal surfaces of evaporator sea chest and strainers..

D.2.3 Visual inspection of protection anodes.

D.3 Testing; a Hydrostatic test on the internal sea chest.

11.12.E Deliverables

E.1 The contractor must supply the Technical Authority an electronic copy, on a USB stick not protected by a password, in Microsoft Office Word 2003 or more recent format, a report detailing all undertaken works, defects, repairs performed, measurements and readings taken.

12.0 propulsion and maneuvering

12.1 STARBOARD THRUST BEARING

(12D04A)

12.1.A Identification

A.1 Remove thrust bearing cover for an internal inspection by TCMS.

12.1.B References

B.1 Specifications :

B.1.1 Bearing No : 91257 / 3

B.1.2 Fore & Aft clearance: 1.0 mm

B.1.3 Journal clearance : 0.5 mm

B.1.4 Serial No : 505-0236-2466-200

B.2 Pictures

B.2.1 IMG_2284

B.2.2 IMG_2285

B.2.3 IMG_2290

B.2.4 IMG_2291

B.2.5 IMG_2292

B.2.6 IMG_2293

B.3 Drawings

B.3.1 49519/7M Michell Marine Thrust Block

12.1.C Statement of work

C.1 Set-up

C.1.1 In order to gain access to the thrust bearings, the Contractor must remove some equipment located above the bearing on 17' flat deck. These equipment could include:

a) Hand rails;

b) Floor sections;

c) Piping;

C.1.2 The Contractor must, when visiting the ship, check carefully the working spaces in order to ascertain if it will be easier for him to displace or dismantle some of the equipment or any other equipment or structure mentioned in C.1.1.

C.1.3 The Contractor must rebuild and replace these equipment and structures after the completion of works and include the related cost in the original bid. This cost must not be considered as extra works.

C.2 Dismantling

C.2.1 The Contractor must open for inspection by TCMS the main thrust bearing which is located in the motor room.

a) Prior to work, the Contractor must take and record the thrust clearances and, once the shaft is uncoupled, the forward and after main bearings clearances.

b) The Contractor must measure the bushing drop, usin Mitchell micrometer.

C.2.2 The Contractor must drain completely the lubricating oil from both main thrust bearings. The Contractor must dispose of this oil with respect to the environment.

a) The Contractor must make sure to isolate both thrust bearings from the bearing lubrication system i.e. the holding tank and the pump.

b) The Contractor must clean the intake oil filter.

C.2.3 Work sequence is as follows in order to effectuate survey:

a) Uncouple and remove all piping connected to top cover;

b) Uncouple and remove all external electric instrumentation on top cover, four (4) hydraulic units for the thrust meter and four (4) wires for the thermocouple on each bearing;

c) Remove "End Closures" on covers;

d) Slacken two turns the "Journal Shell" holding screw;

e) Remove all bolts that connect both top and bottom casings and eliminate all other interference;

f) Install cover gudgeons guide;

g) Raise the top cover 1/16" maximum. Maintain parallelism between the couplings and the covers. Use the jacking screws for this purpose.

h) Open the upper section of the "Journal Shell" and their respective seat located in the top cover by tapping the holding screw and removing the top cover screws.

i) Raise the top cover slowly using a jacking screw until it can be visually determined that the upper sections of the shell bearing remain on the shaft.

j) Raise top cover, taking care not to damage any internal parts, unbolt the forward upper pad support and proceed with inspection of internal parts, mainly the six (6) forward pads, the six (6) reverse pads on each thrust bearings and the base ring assembly. When reassembling thrust bearings, ensure that forward pads are not inversed with reverse pads.

k) The Contractor must measure the axial clearance with a depth gauge before removing the pads.

C.3 Inspection

C.3.1 The Contractor must clean and take measurements of all pads before submitting them to the TCMS surveyor and the CGTA inspection.

C.3.2 If some pads are required to be replaced, they will be supplied by CCG.

C.4 Reassembly

C.4.1 After the survey, the Contractor must reassemble the thrust bearing in reverse order of the sequence described above.

C.4.2 There is one (1) oil cooler tube bundle per bearing. The Contractor must :

a) Disconnect water cooling piping, remove each bundle from bearing;

b) Clean inside the tubing and proceed with a water pressure test at 50 P.S.I. Test to be conducted in the presence the Chief Engineer.

c) Clean all inside parts of the thrust bearing, including sumps, removing remaining oil and dirt, then reinstall the cooler with new bolts, nuts and gaskets.

C.4.3 Once work is completed, the Contractor must:

a) Filter oil supplied by the vessel to 15 microns; the maximum quantity of oil to filter is 615 liters;

b) Refill thrust bearing sump with this oil ;

c) Reassemble the bearings and all dismantled elements, in reverse order of the sequence described above, supplying and using new gaskets;

12.1.D Proof of performance

D.1.1 The Contractor must ensure that the TCMS surveyor and the CGTA are present for the pads and bearings inspection.

D.1.2 The Contractor must submit to the TCMS surveyor and the CGTA the bearings clearances and the pads measurements as soon as they are available.

12.1.E Deliverables

E.1.1 Before the end of the contract, the Contractor must give to the CGTA a comprehensive report detailing the work undertaken, measurements and readings taken and the results of hydrostatic trials performed on the heat exchangers, in a Microsoft Office Word 2003 or more recent format, on an USB stick, not protected by a password.

12.2 PROPULSION SHAFTING BRAKES

(12D05B)

12.2.A Identification

A.1 Perform the five year inspection of the shaft brakes for the Marine Safety surveyor.

12.2.B References

B.1 Maker

B.1.1 Prime Mover Controls

B.2 Type

B.2.1 Caliper

B.2.2 Air-to-Set, Spring-to-release

B.2.3 Two (2) pairs of caliper per Shaft

B.3 Required Air pressure

B.3.1 Seven (7) Bar

B.4 Discs

B.4.1 Diameter : 1321 mm

B.4.2 Thickness : 40 mm

B.4.3 Two (2) halves

B.5 Pictures

B.5.1 IMG_2287

B.5.2 IMG_2288

B.5.3 IMG_2289

B.5.4 IMG_2294

B.5.5 IMG_2295

12.2.C Statement of work

C.1 The Contractor must perform the following work:

C.1.1 Remove the pads

C.1.2 Clean the pads and the discs, using a dirt and grease remover.

C.1.3 Apply heat to the pads, with a torch in order to fry them up thoroughly

C.1.4 Install the pads and dics and proceed with a trial.

12.2.D Proof of performance

D.1 The Contractor must submit all the dismantled and cleaned parts to the Maritime Safety surveyor.

D.2 The Contractor must perform a working trial in presence of the Maritime Safety surveyor.

12.2.E Deliverables

E.1 Before the end of the contract, the Contractor must give to the CGTA a comprehensive report detailing the work undertaken, defects, repairs made and measurements and readings taken in a Microsoft Office Word 2003 or more recent format, on an USB stick, not protected by a password.

12.3 BELLOW ASSY ON STBD TAIL SHAFT'S MECHANICAL SEAL.

(12F06)

12.3.A Identification

A.1 Perform verification of alignment of the bellow assembly on starboard tail shaft mechanical seal.

A.2 If a replacement is required, the new bellow assembly will be supplied by Coast Guard.

12.3.B References

B.1 Drawing

B.1.1 H71756 GA OF 560 MOD 559.97 TYPE MD SEAL

B.2 Pictures

B.2.1 IMG_2296

B.2.2 IMG_2297

12.3.C Statement of work

C.1 The Contractor must supply the services of a Wartsila certified FSR to supervise the following work, to be performed by the Contractor :

a) The Crane/Wartsila OEM FSR on-site presence, is requested for full installation and commissioning tasks.

b) 1st task, removal / installation period of 2 full days on site, to check and remove existing inflatable seal.

c) 2nd task, replace the inflatable seal with proper method heat vulcanization with glue (FSR supply, tools and glue), check and replace bellow assembly, compression and alignment, period of 3 full days on site.

d) Contractor is to coordinate and schedule these periods.

C.1.2 Apply a 5 bar air pressure on the inflatable seal.

C.1.3 Check for any air leak on the bellow assembly.

C.1.4 Drain the air and isolate cooling water and compressed air connections.

C.1.5 Remove the Main clamp ring assembly and the bellow assembly.

C.1.6 Clean the bellow contact surfaces and submit it to the CGTA.

C.1.7 Apply again a 5 bar air pressure on the inflatable seal to make sure that it touches the tailshaft evenly and on the entire circumference.

C.1.8 Check and adjust alignment of all components and inspected the bellow assembly.

C.1.9 Reinstall the same bellow assembly or, if a bellow replacement is required by the CGTA, a new bellow assembly, Coast Guard supplied, and the clamp ring assembly.

C.1.10 Supply compressed air and perform another pressure test on the bellow, applying a 5 bar pressure on the inflatable seal. The test must be performed in presence of the CGTA.

C.1.11 Reconnect cooling water and compressed air systems.

12.3.D Proof of performance

D.1 Trials

D.1.1 Inside dry dock trials :

a) On each test to be performed by the Contractor on the inflatable seal and the bellow assembly, The 5 bar initial pressure must hold. A pressure drop of approximately 0.7 bar over 30 minutes is allowed (ex. tailshaft diameter of 510 mm).

b) On the test where the bellow assembly won't be installed, it will be possible to see the inflatable seal and to make sure that it touches the tailshaft evenly and on the entire circumference.

D.1.2 Sea trials:

a) Once the ship is afloat, the Contractor must test the inflatable seal with the sea water pressure.

b) The Contractor must assure the whole system alignment.

c) The Contactor must check the system alignment to make sure that there is no hot spots during the whole sea trial period.

12.3.E Deliverables

E.1 Before the end of the contract, the Contractor must give to the CGTA a comprehensive report detailing the work undertaken, defects, repairs made and measurements and readings taken in a Microsoft Office Word 2003 or more recent format, on an USB stick, not protected by a password.

12.4 BOW TRUSTER REPLACEMENT

(12H02)

12.4.A SCOPE:

A.1 The intent of this specification item is for Contractor to remove the exiting bow thruster unit and install a new, Canada supplied, electrically driven Wartsila FT 175H-D transverse tunnel thruster.

A.2 IMPORTANT NOTICE: The Contractor must provide, at all installation, start up and sea trials, a qualified technician, certified by the builder (Wartsila), to supervise installation of the system, start-up and sea trials. This technician will be identified in this item as: WCT (Wartsila Certified Technician).

a) The FSR on-site presence, is requested for full installation supervision and commissioning tasks.

b) The FSR must be on-site, 4 full working weekdays, at every week, based on the 70 calendar days dry dock schedule. Thus the FSR must be on-site 40 full days, with travel every week, when work schedule permits.

c) For quote purpose, include 5 complete travel both ways.

d) Contractor is to coordinate and schedule these visits

12.4.B THRUSTER INSTALLATION

B.1 A new electrically driven Wartsila FT 175H-D transverse tunnel thruster must be installed in the bow area and will replace the existing thruster unit at its present location. After removal of the existing thruster unit, the new bow thruster must be

install within the existing tunnel and modifications made to the top portion of the tunnel and supporting structure above to suit installation of the new unit.

B.2 This specification is intended to be read in conjunction with Wartsila IPI Doc ID DBAE477645. If Inconsistencies between these documents occur, Wartsila IPI DBAE477645 must take precedence.Refer to Wartsila IPI Doc ID DBAE477645 for all welding, processes, Quality, Materials, Tolerences, Heat Treatment, and Filler Materials

B.3 A new GSM stainless wear ring must be installed within the existing tunnel.

B.4 A new set of “bolt on” ice grids must be fabricated and installed at both ends of the tunnel. Contractor must arrange for the services of the WCT to supervise the installation and commissioning of the new thruster. The installation must meet all relevant TCMSS rules and regulations and conform to the installation instructions and drawings supplied by Wartsila.

B.5 The WCT must be on site for mounting and alignment, electric installation, commissioning, and mechanical (Operational) commissioning. The WCT must be on site for dock and sea trials..

B.6 The Contractor is responsible for the correct function of all equipment upon completion of the installation. Contractor must perform all work with guidance from the WCT.

B.7 Contractor must perform all removals and install all new equipment, including all wiring from source to delivery point, all associated cabling needed for the interconnection between consoles and all associated cabling needed for the connection of the consoles to the Variable Frequency Drive (VFD) in the forecastle, between the VFD and the main motor, etc as explained in references documents DAAF358732 Project electrical drawings et DBAE224517-Design specification BT.

B.8 Contractor responsible for supplying and installing cabling to Wheelhouse/Control Room for Visual Tag System (VTS)

12.4.C MARTHA L BLACK EXISTING BOW THRUSTER SYSTEM-ULSTEIN 900TT

C.1 The existing thruster unit consists of:

C.1.1 One 1200 rpm 600 kW wound rotor motor

C.1.2 Motor/Starter control cabinet

C.1.3 Resistor banks for speed control

C.1.4 Thruster unit, propeller shaft, seals, coupling, propeller, and gear housing

C.1.5 Control system including 2 remote controls from the wheelhouse and local control at motor starter panel

C.1.6 Thruster tunnel, 1600 mm inner diameter and 1800 mm long

12.4.D TECHNICAL DESCRIPTION:

D.1 GENERAL

D.1.1 Contractor must provide the services of a WCT to supervise the bow thruster installation and commissioning.

D.1.2 Contractor must include in their bid price the cost to supply all equipment, enclosures, ventilation, staging, chain falls, cranage, slings, and shackles necessary to perform the work. All lifting equipment must be appropriate for the expected duties and be accompanied by current certification indicating or be permanently marked as to being of a safe working load for the expected duties.

D.1.3 Contractor must electrically and mechanically isolate the existing bow thruster to allow the removal of the components. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as a minimum per the DFO/5737 Fleet Safety Manual, 7.B.5- LOCKOUT AND TAGOUT. Contractor must install/remove locks and tags accordingly during the scope of work. Ship's Electrical Officer will assist the contractor in identifying the location to perform the lockouts, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the ship's Electrical Officer must be in attendance when all locks/tags are removed.

D.1.4 Hot work will not commence until the 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 a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the space and a copy of each certificate must be posted in a conspicuous location in close proximity to the manhole cover for each space. Spaces must be tested each day that personnel are required entry in the space. All precautions must 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 must include providing various applicable extinguishers and extinguishing mediums as necessary. This must also include any necessary preparations and cleaning in the vicinity of the work area to obtain a gas-free permit. As a minimum, Contractor must 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 – HOT WORK for these spaces.

D.1.5 Contractor must ventilate all tanks/spaces to the outside atmosphere, and provide mechanical ventilation to all areas. The tanks must be gas freed, and certified gas free as required. The tanks must be safe for personnel to enter and safe for hot work. A

copy of the certificates must be forwarded to the Chief Engineer prior to any personnel commencing work in the tanks and a copy of the certificate must be posted in a conspicuous area near the entrance to the each tank. Please note Coast Guard Safety Annex 7.B.3 (Entry into Enclosed Spaces).

12.4.E BOW THRUSTER REMOVAL

E.1 It is not the intention of this specification to detail all minor items requiring removal to carry out the required work. Any additional removals and replacement of or relocation of existing equipment or items not affected by the work, but necessary for either access or protection of items from damage, must be included by Contractor in the scope of work.

E.2 Contractor must seal all openings in watertight or fire rated decks and bulkheads, including bolt holes, caused by removal of steel structure, cables and piping not being reused. Openings must be sealed with welded plate inserts, as per marine good practice and approve by TC/MS on watertight bulkheads and decks.

E.3 All work must be approved by CGTA and follow TCMSS regulations.

12.4.F Refer to Drawings:

F.1 18004-400-A-001 BT removal and installation plan movement

F.2 Contractor must erect the necessary staging to access the bow thruster tunnel guards. The guards on both sides of the tunnel must be cleanly cut away.

F.3 Contractor must remove all existing bow thruster components. These include, but are not limited to:

a) Bow Thruster Unit (propeller, pod and ice grids)

b) Stainless Liner in Tunnel

c) Bow Thruster Motor

d) Bow Thruster Motor Control Cabinet and Seating

e) BT winch room local control cabinet

f) BT wheelhouse wing controls

g) Resistor Bank and seating

h) Oil Header Tank and seats, oil piping and supports

i) Various Cabling not intended for reuse

F.4 Contractor must remove the drain plugs and remove approximately 300 liters of oil from the thruster unit. The oil must be drained and collected by Contractor for disposal as per local environmental requirements. Copies of invoices detailing disposal of the oil are to be given to the CGTA.

F.5 Contractor must disconnect and remove the thruster pod and propeller, thruster motor, resistor bank and seating, control cabinet and seating, oil header tank, mounts and associated piping, and any cabling associated with the existing thruster. Refer to Allswater Drawing for further guidance on the removal of the larger sized items within the Winch Room, Thruster Compartment and Thruster Tunnel areas.

F.6 Contractor must remove the stainless steel ring from the tunnel and grind smooth the welds on inside of tunnel.

F.7 The existing tunnel is to remain in place.

F.8 Contractor must label all cables before disconnecting.

F.9 The intent is to reuse the main switchboard supply feeder cables to the thruster drive motor starter cabinet. Once these cables are disconnected it is the responsibility of Contractor to protect them and stow them in a safe place. All other power and control cables, where practicable are to be removed, new cables supply and install by the shipyard. A separate description is included.

F.10 Contractor must determine if there are any interference items that need to be addressed during the removal and installation process. Items which are electrically energized must be electrically isolated at their supply breakers with the concurrence of the CGTA. All interference items must be stowed safely by Contractor. Pipes must be blanked off with suitable flanges and gaskets, or pipe caps of the correct size. Any items that are not removed and subsequently damaged during the removal or installation process must be repaired at Contractor’s expense.

F.11 Within the Winch Room and Bow Thruster Compartment areas there are various items requiring temporary removal or relocation to facilitate removal of the existing thruster

unit components and to allow installation of the new bow thruster components. These include, but are not limited to the following.

12.4.G WINCH ROOM - FORECASTLE

G.1 The supply air fan and ducting on the starboard side from the bulkhead at Frame 161 to the flanged connection at approximately Frame 168, just aft of the existing motor control cabinet must be temporarily relocated. This includes the branch ducting running to port towards the Bow Thruster Compartment.

G.2 The communication system (phone, speaker), lighting equipment, fire extinguishing system (pull station, bell, piping etc) and fire detection system if needed must be remove temporarily, store and replace after work.

G.3 The vertical post and hand rail located at the forward starboard corner of the motor tunnel and attached to the existing motor control cabinet must be temporarily relocated.

G.4 There are miscellaneous panels and cabling attached to the aft side of the existing motor control cabinet that are not involved with the operation of the existing bow thruster that must be temporarily removed or relocated. Upon completion of the installation of the new control cabinet these items must be secured back in the same fashion to the new motor control cabinet.

12.4.H BOW THRUSTER COMPARTMENT: (FRAMES 163-169)

H.1 Contractor must un-dog the bow thruster compartment hatch, open and secure to the upright position. The Contractor must ensure that the bow thruster motor will clear the hatch during removal and installation stages. If not, the Contractor must unbolt, remove and store the hatch along with the bolts. Install a temporary protection over the opening.

H.2 The following items must be temporarily removed or relocated:

H.2.1 Remove and store vertical air ducting on forward bulkhead of the Bow Thruster Compartment.

H.2.2 Remove and store bilge, ballast, fuel oil, steam and condensate piping lines in the compartment which may interfere with the removal or installation of the Thruster Motor. The pipes must be marked prior to removal to aid with re-installation. In addition the Contractor must temporary blank all pipes.

H.2.3 Remove and store the various small pipes running along the starboard and forward bulkhead. The pipes must be marked prior to removal to aid with re-installation. In addition the Contractor must temporary blank all pipes.

H.2.4 Remove and store all lights, sirens, bells, and other small miscellaneous items located on the compartment bulkheads which may interfere with the removal and installation of the thruster motor. The Contractor must supply and set up temporary lighting to continue on with the work.

H.2.5 Electrical junction boxes mounted on the starboard bulkhead.

H.2.6 Remove and store all miscellaneous brackets and interference items IWO the clear opening.

H.2.7 Remove and store, the access ladder, ladder lugs along the bulkhead if needed, the two (2) landing gratings along with the landing support structures IWO the clear opening.

H.2.8 The Contractor must disconnect the electrical power and instrumental cabling from the fiberglass electrical connection box and the steel electrical outlet box located on the starboard side of the hatch coaming. The Contractor must ensure all cabling is marked prior to being disconnected to aid with re-installation. The Contractor must then remove and store the fiberglass electrical outlet box and the electrical connection box. The welded steel electrical box should be removed due to the small clearance, but at the Contractor discretion.

H.3 Once the components are removed from the vessel, Contractor must dispose of the equipment in accordance with safety and environmental rules.

H.4 Areas where seats and mounts have been removed, the steel must be ground smooth.

H.5 After all removals of existing equipment and new mounts installed, Contractor must blast the bulkheads, deck and all areas of disturbed paint in the bow thruster compartment (motor tunnel) to SSPC-SP6 standard. The new motor mount must be protected and not blasted.

H.6 Existing paint must be feathered back smooth. Various equipment such as and not limited to; phones, electrical outlets, wiring, heater, bilge manifold (and valves) must all be protected from the blasting. Contractor must prevent any ingress of blast media to the winch compartment i.e., the blasting area must be sealed off. Contractor must supply and apply one stripe and one complete coat of paint compatible with the

vessel's existing coating system to all prepared steel. A stripe and one complete topcoat of vessel's existing coating system must be applied after sufficient curing time is allowed for the previous coats and following all manufacturers recommendations to the entire motor tunnel.

12.4.I BOW THRUSTER INSTALLATION

I.1 Contractor must install the new bow thruster. It is the responsibility of Contractor to complete modifications or repairs to machinery seats and foundations to provide correct fit, alignment, and oil/water tightness.

I.2 Detailed disassembly steps are located in Wartsila Document No. DBAE477645 IPI (Installation Planning Instruction) 2 and must be used for each step of the specification where applicable.

12.4.J Guidance Documents

Allswater Drawing No. 18004-400-S-001, New seating Arrangement

Allswater Drawing No. 18004-400-S-002, Penetration Infill Arrangement

Allswater Drawing No. 18004-400-A-001, Movement Plan

Allswater Drawing No. 18004-400-S-004, Tunnel Grid Installation Detail

Wartsila Document No. DBAE477645 IPI (Installation Planning Instruction)

J.1 Contractor must install, arrange, test and commission all electrical installations necessary to provide a fully functioning tunnel thruster system. This must include all cabling, cableways, safety interlocks, protection and the necessary deck and bulkhead penetrations for the cables. The intent is to reuse the existing supply feeder cables to the existing thruster drive motor starter cabinet.

J.2 Contractor with CGTA present must test the existing supply and motor power feeds insulation to ground, prior to commence of removals. A second test must be performed just before the existing power feeds are connected to the new motor VFD and the motor itself.

J.3 Contractor must make modifications to the thruster gearbox housing before it is installed, in order to bolt the support plate on. The support plates will need to be machined to size, bolted on the thruster and welded in place once the thruster is in position. Refer to Wärtsilä guidance drawings DAAF 344905 and DAAF344924. Contractor must supply an Engineered Welding plan to CGTA and WCT for approval, to prevent distortion of the support ring.

J.4 All electrical equipment required by Contractor must be marine rated, comply with TP 127E, IEEE 45, and be current production makes and models.

J.5 Contractor must supply and install any cabling not identified as being supplied by the CGTA, as per attached cables list file. All new and used cables to be installed or modified requiring new terminals or lugs, as well Roxtec cable glands, should be supplied and installed by the Contractor.

J.6 All new Power and Control cables supplied by Contractor must be 0.6/1kv 110c of a low smoke zero halogen (LSZH) designation unless otherwise identified in the wiring specification. Where identified by CCG, new cable must also be braided / armoured.

J.7 All glands utilized to secure motor supply cables must be of a metal construction, fiber or composite glands will not be acceptable.

J.8 Contractor is required to provide estimated cable lengths of all new conductors to comply with requirements for fault current calculations.

J.9 Routing of the cables will be identified by CGTA in conjunction with Contractor installing the cable.

J.10 Cable installation must be in compliance with TP127, IEEE45 and Class requirements.

J.11 The new bow thruster motor must be megger base on IEEE43-2000 and TP 127 requirements (500VDC for a 60 second duration). Contractor must provide a calibration certificate. The calibration must be no older than 1 year from the date of this testing being completed. The temperature of the equipment being tested must be recorded and the megger readings must be corrected to 40 C as per IEEE43-2000. Contractor must inform the CGTA of any Megger readings below the limits as set down by TP127.

J.12 A Polarization Index (PI) must be completed on the bow thruster motor based on IEEE43- 2000. Contractor must provide a calibration certificate. The calibration must be no older than 1 year from the date of testing being completed. The temperature of

the equipment being tested must be recorded and the readings must be corrected to 40 C as per IEEE43- 2000. The PI test must consist of a 10 minute test duration with the first reading being recorded 15 seconds into the test and then recorded at 1 minute increments up to 10 minutes max. Contractor must inform the CGTA of any readings outside the limits of this test as set down by IEEE43-2000.

J.13 Approved drawings must be presented to CGTA and TCMSS for review prior to commencement of the structural work.

J.14 Existing cable trays are to be utilized where possible. In locations where new (intermediate) trays are required, these must be supplied and installed by Contractor.

J.15 Cables for communication, monitoring and signal cables must be mounted at a safe distance from power cables in order to prevent interference signal. Special attention in this respect must be given to the cable installation in the Engine Room, the Wheelhouse, and Bow Thruster compartment.

J.16 Cables in the accommodation area must be concealed in the ceiling and behind bulkhead panels in wire ways.

J.17 All power circuits must have over-current and short circuit protection as set out by TCMSS. The protection must be an automatic circuit breaker type and are to meet the short circuit level and the selectivity requirements for the location.

J.18 Contractor must supply, arrange and install all necessary wiring, wire tray terminals, junction boxes, and cable transits necessary for all connections to the Alarm and Monitoring System.

J.19 Contractor must supply and install communication cables required to connect the alarm and monitoring points from the new thruster system to the existing GE Cimplicity (ATS) alarm and monitoring system via a CAT 7 Ethernet cable. Two CAT 7 Ethernet cables must be supplied. One must be fitted from the Winch Compartment to the Motor Control Room (MCR) which will be connected to the ATS system. The second CAT and Ethernet cable must be fitted from the Winch Compartment to one of the wing control consoles fitted in the Wheelhouse (for future use).

J.20 CCG supplied a new OEM support for the GE Cimplity AMS alarm and monitoring system. The contractor must hire an OEM certified sub-contractor in order to incorporate the new Wartsila thruster alarm functions. A dedicated specification is included in 10.3.

J.21 Contractor must make connections to system electrical power, but not install specialized equipment within the cabinets or make connections of control or signal wiring, or other specialized connections unless directed to by the WCT and under its supervision/guidance.

J.22 The following values must be incorporated into the GE Cimplicity AMS:

J.22.1 Main Voltage (Into Drive)
J.22.2 Bow Thruster motor run indication
J.22.3 Torque Demand %
J.22.4 Motor Speed
J.22.5 Motor temperature
J.22.6 Motor voltage
J.22.7 Motor Current
J.22.8 Motor KVA
J.22.9 Control Lever Reference
J.22.10 Station in Control
J.22.11 Drive Temperature
J.22.12 Hydraulic tank low level alarm
J.22.13 Oil temperature indication of lubricating oil
J.22.14 System main oil pressure indication and low pressure alarm
J.22.15 Motor overload alarm and auto stop.

J.23 Contractor must arrange to have the WCT on site for the test program, set-to-work, test and trial all equipment including attendance at dock and sea trials.

J.24 Contractor must develop a welding schedule for the modifications required for the structure to facilitate the installation of the bow thruster and components. The welding schedule must be approved by TCMSS prior to commencement of any structural work.

J.25 Detailed installation and assembly steps are located in Ref. Wartsila Document No. DBAE477645 IPI, section 7.1 & 7.3 and must be used for each step of the specification where applicable.

J.26 The Contractor must align and weld (as per the procedures outlined in ref Wartsila Document No. DBAE477645 IPI) the new Stainless Steel ring into place as per ref. Allswater Drawing No. 18004-400-S-001, New seating Arrangement. The Contractor must inject the adhesive into the stainless steel ring as per ref Wartsila Document No. DBAE477645 IPI.

J.27 The Contractor must prepare and align the new adapter ring and top plate and weld it in place as per ref. Allswater Drawing No. 18004-400-S-001.

J.28 All steel must be provided as indicated on the drawings and supplied with Lloyds Class certification and copies of mill certificates.

J.29 Contractor is responsible for installing the cathodic protection system which consists of anode supports and aluminum anodes. Refer to Wärtsilä drawing # DAAW008946 for guidance.

J.30 Contractor must install the hydraulic oil system, along with the header tank and starter cabinet as per manufacturer's instructions and drawings provided.

J.31 Contractor must install all hydraulic piping and interconnections required between the hydraulic pumps, motors, reservoirs and controller in accordance with the thruster manufacturer's requirements.

J.32 Contractor must manufacture and install 2 grid designed by the thruster manufacturer to prevent the ingress of ice or other debris into the tunnel. Contractor must perform the necessary work required to the hull to mount the two new grids. Refer to Wartsila drawing #264- 001 for guidance.

J.33 Contractor must properly prepare, prime, and paint all new modified pipe sections, disturbed pipe sections, pipe clamps, mounts and any disturbed or new steel. All areas that have been affected by this work must be mechanically cleaned to SSPC-SP-11 Standards and must be given 2 coats of primer paint,. Coatings must be applied to yield 2-3 mils (ASTM D1640) DFT per coat and 2 top coats of fire Retardant white or grey (depending on location), Paint. See section 2,8 of this specification for painting specifications.

J.34 Surface preparation and coatings of the tunnel and hull grid plates must be completed as per section 11.1 Cleaning and Painting of the shell.

12.4.K MODIFICATIONS AND ADDITIONS TO STRUCTURE IN WAY OF THE NEW THRUSTER UNIT (REFER TO WARTSILA AND Allswater DRAWINGS)

K.1 The existing electrical motor distance ring must be temporarily removed, machined and drilled as per Wartsila instructions and reinstalled at its present location.

K.2 The two transverse web plate stiffeners located forward of Frame 165, and aft of Frame 167 which connect the top portion of the existing tunnel to the underside of the motor flat must be cut back to suit installation of the new thruster and will also provide access to the coupling and shaft.

K.3 New frame reinforcements must be installed in way of the modified transverse plate stiffeners. In addition the web plate stiffener at this location must be modified to suit the new installation as well.

K.4 The existing tunnel opening at top must be increased in size to suit the larger diameter thruster unit trunk plate and tunnel trunking. The size must be decided in consultation with CGTA and the WCT.

K.5 Pipe penetrations must be installed in the forward port corner of the thruster motor deck to provide passage for three oil lines connecting the oil pump and lubrication manifold within the bow thruster compartment to the thruster and the header tank located in the Winch Room.

K.6 The exact locations will be determined by the WCT and the CGTA. The oil lines must be installed in such a way to provide as much access as possible to the thruster shaft, coupling and mounting bolts.

12.4.L LUBRICATING OIL HEADER TANK AND PUMP SET (REFER TO WARTSILA DRAWINGS)

L.1 A new oil pump set must be mounted in the aft port corner of the Bow Thruster compartment on the port side and secured in place with bolted connections to welded angle bars at the Bulkhead.

L.2 The lubrication oil manifold must be located within the Bow Thruster Compartment on the aft bulkhead over the existing valve manifold at the motor flat level. The unit must be secured in place with bolted connections to welded angle bars. The electric pump starter, and pump, must be wire from the VFD control cabinet, and the starter box install next to the pump unit.

L.3 The Bow Thruster Compartment sounding tube, 2 inch line, must be modified in order to mount the lubrication oil manifold. Exact location will be determined with CGTA at time of install.

L.4 The new angle bar supports must be drilled to suit the bolting pattern of the oil pump set and oil manifold, the units must be secured in place using CFM stainless steel fasteners.

L.5 A new 35 liter oil header tank must be installed on the center/starboard of the Forecastle-Winch Room and secured in place as close to the deck head as possible while still maintaining the minimum required free access space. Overhead access for refill will be needed from the above deck, a watertight deck plug or service access must be install. The tank must be secured using angle bar welded to the existing deck head structure or bulkhead, the exact location will be determined by the WCT and the CGTA.

L.6 Contractor must supply and install new 42mm x 2mm seamless stainless steel tubing from the thruster unit to the motor deck level, and from the motor deck level to the pump, manifold and header tank.

L.7 The lines will also connect with the oil header tank located on the center/ starboard side of the Winch Room.

L.8 New 18mm x 2mm seamless stainless steel tubing must be used to connect the oil pump set and the lubrication manifold.

L.9 All oil piping must be degreased, pickled, neutralized, and blown dry prior to installation.

L.10 All hydraulic piping must be hydrostatically tested to 1.5 times the working pressure of the system, prior to system operation. The working pressure is 5 Bar, the test pressure must be 7.5 Bar for 1 hour. This test must be witnessed by CGTA.

L.11 Oil will be Contractor supplied, approximately 405 litres of Petro-Canada, Enduratex EP 100 is required.

L.12 Contractor must provide and install enough hangers and supports to properly secure the tubing. Contractor to note these components are in an area of high shock loads and vibration, so the number of supports must be increased accordingly. The hangers must prevent any undue stress from being exerted on the tubing and lubrication unit. New chafing material must be fitted to each clamping surface.

L.13 Contractor is responsible to supply and install the interconnecting communication wiring.

12.4.M MOTOR CONTROL CABINET in Winch room/Forecastle compartment (REFER TO WARTSILA AND Allswater DRAWINGS)

M.1.1 A new motor control cabinet, variable frequency drive (VFD) will be installed in the Winch Room in the same general location as the existing control cabinet. Contractor must fabricate and install the new structural seats. Due to the height size of the new cabinet the new seating must be constructed using short angle bar sections welded to the Winch Room deck.

M.1.2 The Contractor must also install a new local control panel at the same location as the old one, to the right of the winch room compartment access door. The new local control panel are approximately 30 in. x 30 in. x 12 in.

M.1.3 The scope of work to complete the owner's requirements includes the following tasks:

M.2 General:

M.2.1 Removal of all interference items required to complete the work item.

M.2.2 Forward forecastle bulkhead access opening located on starboard side in way of the existing louvers.

M.2.3 Removal of inboard and outboard louvers exterior louvers, hinged exterior covers and interior plenums.

M.2.4 Removal of the resistor bank, the main Reliance motor control cabinet, the local control panel and attached accessories.

M.2.5 Fabrication and installation of a new VFD equipment seat.

M.2.6 Installation of VFD cabinet, 5 sections all in one unit of 3 meters wide.

M.2.7 Installation of new insert plates in way of removed louvers and access opening.

M.2.8 Installation of a deck cable tray with protective cover.

M.2.9 Reconfiguration of an existing deck head fitted cable tray. Relocation/reinstallation of miscellaneous interference items to facilitate install of VFD components.

12.4.N Materials:

N.1 The Contractor must use new Lloyd's Grade 'A' or better for all plating and sections. Any proposal for material substitution must be made in writing and must be approved by the Owner prior to fabrication.

N.2 The Contractor must ensure that all steel plate and sections are clean and free of scale. All surfaces must be coated with a weld-able primer prior to fabrication. Material certificates for all steel must be provided.

N.3 The summary of scantlings and plate thickness of steel in way of access openings are as follows:

N.4 Forecastle bulkhead plating at Fr. No. 167 - 6.4mm (1/4")

N.5 Forecastle bulkhead stiffening - L4"x3"x1/4" O.A

N.6 VFD Cabinet Assembly Seat Frame - L4'' x 8''x 3/8'' O.A

N.7 VFD Cabinet Assembly Seat frame cut-out rim - 1/4'' x 2'' F.B

N.8 Deck Fitted Cable Tray Guard - 3/16'' Diamond Thread Plate

12.4.O Welding:

O.1 All welding must be as per original specification. The existing welding scheme is as follows:

O.2 Bulkhead plate seam welds - Full penetration

O.3 Bulkhead stiffener welds -As per original. (3/16'' Staggered intermittent Welds, 3-12). Rejoined stiffeners to be full penetration butt welding.

O.4 VFD Seat frame fabrication welds - 1/4" fillet welds

O.5 VFD Seat frame to deck- (1/4'' Staggered intermittent Fillet welds, 3-12)

O.6 Full penetration welds to be subject to 100% ultrasonic thickness testing. All remaining welds subject to 100% MPI. Technician to be certified to a mini-mum of Level II under CAN/CGSB 48.9712 - latest edition.

12.4.P Coatings, Paint Work and insulation:

P.1 Insulation support is to weld to the bulkhead, and other damage area during dismantling, in preparation to receive new insulation pads, vapor barrier and protection equivalent to the existing system, after the paint application.

P.2 The contractor will be responsible to prepare and coat the new and the heat affected steel in way of access openings in bulkhead and deck plating. The Contractor is to supply all coatings which are to be in accordance with the ships painting system.

P.3 The Contractor must ensure that the steel preparation follows the coating manufacturer's recommendations for application.

P.4 Prior to recoating the affected steel, the Contractor must ensure that all edges have been feathered by means of power tooling.

P.5 The Contractor must provide all WHIMIS data sheets for all chemicals, coating, solvents, etc. which are being used during the course of the specification item. All containers of such are to be removed from the work site at the end of each work day.

P.6 All areas that have been affected by this work must be mechanically cleaned to SSPC-SP- 11 Standards and given 2 coats of primer paint, Grey . Coatings must be applied to yield 2-3 mils (ASTM D1640) DFT per coat and 2 top coats of fire Retardant white or grey (depending on location) paint. The paint must be compatblie with the vessel’s coating system.

P.7 Contractor is responsible for supplying and installing all the interconnecting cabling needed for the motor, VFD and hydraulic/lubricating pump unit. Ref. Wartsila DAAF358732 Project electrical drawings

12.4.Q WHEELHOUSE WING CONTROL boxes (REFER TO WARTSILA AND Allswater DRAWINGS)

Q.1 Contractor must install the 2 wing control boxes in the Wheelhouse. They have to be at the same place as the actual ones, next to the forward sliding windows. The Wartsila boxes must be adapted or replaced for these locations.

Q.2 Contractor is responsible for connecting and installing all the interconnecting communication wiring, power feeds and control panels for the Wheelhouse controls located next to the forward sliding windows.

Q.3 The Request/Accept control changeover must be configured so that either station can take control from the active station at any time, but the station taking control must have the control lever in a neutral/off position to be able to take control.

12.4.R REFERENCES:

R.1 GUIDANCE DRAWINGS, DOCUMENTS AND FILES / NAMEPLATE DATA

R.1.1 All drawings that are not in AutoCAD DWG format must be converted to AutoCAD DWG format by Contractor, updated and verified by independent third party consultant hired by Contractor. A final as fitted version adapted to the ML Black, must updated for each drawing concerned with the BT replacement.

R.1.2 Final approval/review must be performed by CGTA.

DRAWINGS # PLAN	DRAWING NAME / NOM DU PLAN
108-H-001	Shell Expansion
108-H-002	Framing expansion
108-H-002_1	Construction section fore body
108-H-002_3	Constructions sections - bulkheads
108-H-003	Tank top and double bottom
108-H-003_1	Profile and decks – profile E.R. flat, tank top
108-H-003_2	Profile and decks – main deck and above
108-H-004	Engine room flats
108-H-005	Main deck
108-H-006	Main watertight bulkheads below main deck
108-H-0022	Docking plan
108-H23_25_1	General Arrg't Profile End Views 1 of 3
108-H23_25_2	General Arrg't Upper & Boat Deck Bridge 2 of 3
108-H23_25_3	General Arrg't Main Deck ER Tank Top 3 of 3
108-H-0026	Capacity plan
108-H-0029	Lines plan - fore
108-H-2730	Hatches, hold & stores aft.
108-H-4410	Insulation plan
7317G-207-01	Bow ice knife unit & lines plan, German & Milne Guide dwg.
07352S11	Tunnel surface (Calcul de surface intérieure du tunnel)
54-10-01 MLB	Bow thruster arrangement
62-20-01_01 MLB	Bow thruster ventilation
67-10-05_03 MLB	Bow thruster bilge arrangement
67-10-06_01 MLB	Bow thruster ballast arrangement oms
86-05 MLB	Wire way deck plan ER flat
SC5668	Ulstein/Reliance Outline 600 kW Motor
D8101810	Ulstein 900TT Lower Unit Assembly
D8101777H	Ulstein General Arrangement 900TT Bow Thruster
80-56	BT control system block diagram
80-57_01	BT system elementary wiring diagram
8102482	BT lubrication schematic
SC1812-W22	52-6 BT AC schematic
DAAF356703	Arrangement of Transverse Thruster
DAAF322383	Assembly of the propeller gearbox, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-30

DAAF332626	Flexible Coupling, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-44
DAAF359943	Block Diagram Hydraulic System, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 Block Diagram Hydraulic System
DAAK113254	Lubrication Pump Set, of the prop gearbox, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 9-14
DAAK113255	Lubrication Pump Set Hydraulic Diagram, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 9-13
DAAK113256	Lubrication System Manifold, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 9-15
DAAK015657	Dimension Sheet Header Tank (35 dm3), part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 9-16
DAAF323637	E-motor drawing, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 11-2
DAAF322758-SH001	Tunnel assembly, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-16
DAAF322758-SH002	Tunnel assembly, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-17
DAAF370697	Side Grids Arrangement, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-29
DAAW008946	Anodes plan. part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-87
	Cable list review 2 – Based on previous installation
DAAF326774	Steel plate 1, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-24
DAAF327425	Steel plate 2, part of IPI_DBAE477645_PAAF589818_TT_Black_a1 page 7-25
DAAF344924	Installation Drawing Support Plate, part of IPI_DBAE477645_PAAF589818_TT_Black_a1
DAAF357836_1	VFD Outline Dimensions, also part of SNL16066M4 Martha L Black VFD&Controls
DAAF357836_2	VFD Outline Dimensions, also part of SNL16066M4 Martha L Black VFD&Controls
DAAF357836_3	VFD Outline Dimensions, also part of SNL16066M4 Martha L Black VFD&Controls
Doc# PAAF589818 ID# DBAE477645	ML Black - Installation and Planning Instructions (IPI) – Transverse Thruster System manual
Doc# DBAE524860	Installation and Planning Instructions (IPI) –Electrical and Controls Manual ref

Doc# PAAF643909 ID# DBAE628418	ML Black - Operating and Maintenance Manual
ID# DBAE235806	System Integration Plan
DAAF357837	Controls station – local and wheelhouse - revC
DAAF362960	Project electrical drawings_ SNL16066M4 Martha L Black VFD&Controls O&MM
DAAF362961	Cable plan_rev--
DBAE224517	Lipstronic Unic Controls
DBAE224529	Modbuslist AMS
	Allswater engineering drawings
18004-400-A-001	BT removal and installation plan movement
18004-400-S-001	BT structural arrangement
18004-400-S-002	BT welding details
18004-400-S-004	Tunnels grids details
18005-400-A-001	Forecastle electric equipment arrangment
18005-400-S-001	Bulkhead opening and louvers
18005-400-S-002	Penetration welding
18005-400-S-004	VFD, hydraulic tank and hydraulic HPU, foundations
	Bill of material – Wartsila
PAAF589190	BOM- Bow Thruster controls
PAAF589818-A	BOM report_Headlines
PAAF577088	Panel Forecastle - BOM
PAAF434841	Panel WHP - BOM
PAAF434842	Panel WHS - BOM
DAAF362962	VFD cabinet - BOM
DBAE492010	E-drive commissioning protocol
	Field service acceptance protocol
	TT commissioning protocol
	Transverse Thruster acceptance protocol V03

12.4.S STANDARDS AND REGULATIONS

CSA W47.1-03 & 09, Certification of Companies for Fusion Welding of Steel
CSA W59-03 & 08, Welded Steel Construction (Metal Arc Welding)
CSA 17, Canada Shipping Act - Tackle Regulations
CSA 2001- 28, Canada Shipping Act - Hull Construction Regulations

CSA 2001- 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
TP 127E, Transport Canada Marine Safety – Ship Electrical Standards
IEEE STD 45 – Recommended Practice for Shipboard Electrical Installations
IEC 60092-504-electrical Installations in Ships – Part 504: Special Features –Control and Instrumentation
IEC 60533 – Electrical and Electronic Installations in Ships – Electromagnetic compatibility
IACS No. 47 Shipbuilding and Repair Quality Standard (1996) Part B – Repair Quality Standard for Existing Ships
Lloyd's Rules & Regulations for the Classification of Ships (Or other Classification similar Rules & Regulations such as Germanischer Lloyd)
Society for Protective Coasting (SSPC) Standards , SP1 – Solvent cleaning
Society for Protective Coasting (SSPC) Standards , SP2 – Hand tool cleaning
Society for Protective Coasting (SSPC) Standards , SP3 – Power tool cleaning

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

12.4.T OWNER / GOVERNMENT SUPPLIED MATERIAL (GSM)

T.1 Bow Thruster, Wartsila model FT175H-D, consisting of propeller, pod with right angle drive and support plate.

T.2 Stainless wear ring to be installed within the existing tunnel.

T.3 Thruster Drive Motor – Asynchronous Marelli Motor B5M 400LB4.

T.4 Variable Frequency Drive -Vacon NXP/Frequency Converter.

T.5 Hydraulic System – pump set, filters, 35 liter header tank, and starter cabinet.

T.6 Two Wheelhouse Wing Control Stations, to be adapted to the P & S sliding window position.

12.4.U CONTRACTOR SUPPLIED MATERIAL (CSM)

U.1 There are structural guidance drawings provided for material requirements.

U.2 All new steel plates and shapes must be minimum Lloyds Grade A or equivalent unless noted. The steel necessary to plate over any openings in the shell must have the same steel grade as the surrounding plating.

U.3 Contractor must supply all wiring unless otherwise stated for the installation of the new bow thruster unit. The existing main feeder cables from the main switchboard BT breaker are to be re-connect to the VFD cabinet, all other power cables, control cables, communications, AMS and data cables are to be contractor supplied, and install according to Wartsila DAAF358732 Project electrical drawings. A guide list of required cables and approximate length to be confirm by the Contractor is attached as « Cable list review 2 ». .Existing cables not re-use to be disconnected, and remove from the cable tray were needed and feasible.

U.4 There is a cable plan provided in the Installation and Planning Manual. Contractor must be responsible for determining lengths required.

12.4.V Proof of performance

V.1 Inspection

V.1.1 All work to be completed to satisfaction of the Chief Engineer, TC/MS and WCT, as applicable.

V.1.2 Visual inspection of all welding 100%.

V.1.3 Welds 10% MPI testing completed by approved testing personnel.

V.1.4 The Contractor is responsible for all air quality testing to ensure hot work and entry is permitted.

V.1.5 The Contractor must issue and post hot work permits and must maintain a fire watch.

V.1.6 Area where work was carried out to be inspected to ensure all debris (piping, etc.) has been removed.

V.2 TESTING

V.2.1 Contractor must arrange and be responsible for the operational and load testing of the bow thruster after final installation. The operational and load tests must be performed in accordance with TCMSS requirements.

V.2.2 TCMSS and CGTA must witness the tests and Contractor must prove that the bow thruster functions as per the performance requirements set out in these specifications.

V.2.3 Contractor must provide for the services the WCT during the commissioning and testing of the bow thruster system.

V.3 DOCK TRIALS

V.3.1 Contractor must develop procedures to prove that all aspects of the thruster installation and associated equipment are satisfactory. These test procedures must be submitted to the CGTA and the TCMS prior to any system testing.

V.3.2 Functional tests must include the operation of all control systems and safety devices.

V.3.3 Tests must include but not limited to the following:

a) Operational function of variable frequency drive and loading of ship's power supply.

b) Operation of load limiting devices.

c) Operation of all controls and interlocks associated with the bow thruster, including electrical, electronic, hydraulic, and support equipment required for the safe operation of the bow thruster.

d) Operation of the alarms and monitoring functions.

e) Contractor must arrange to have a total harmonic distortion test on the bow thruster system. This will be verified during the commissioning by a power quality test.

f) Contractor must arrange to have a complete set of vibration readings taken while the new bow thruster motor is trialed. The machine temperature must be logged into the test report. Vibration readings must be taken at the Drive End and Non-Drive end of the bow thruster motor. Measurements must be taken in 3 planes, vertical, horizontal and axial. The readings must be printed out in a Velocity Spectrum format.

g) Contractor must test all power and motor feeds insulation to ground and record readings with CGTA present. In addition, motor winding resistance readings must be taken along with the motor winding temperature before any testing of the motor and after the dock trials of the motor.

V.4 SEA TRIALS

V.4.1 Bow Thruster trials must include as a minimum the following:

V.4.2 With the vessel stopped in the water and heading into the wind, the bow thruster unit must be used to turn the vessel through 360 degrees both to port and to starboard. The weather and sea state conditions must be recorded.

V.4.3 As a minimum, the following data must be recorded during the trial:

a) Time and date of the test and base heading

b) Time to rotate vessel through 360 degree (port and starboard)

c) Compass headings to nearest degree every 10 seconds

d) Depth of water and sea conditions

e) Wind speed and direction

f) Trial draft

g) The current and voltage readings on the bow thruster motor at full thrust, and the time to respond from zero to full thrust in both the port and starboard directions.

h) Temperature of bow thruster components including motor and VFD unit.

i) Ambient temperature in the Bow Thruster Compartment

V.4.4 The bow thruster must also be demonstrated capable of manoeuvring the vessel while underway. The following test listed must be recorded as installation tombstone date for future reference for CGTA;

V.4.5 Trial # 1 – Vessel proceeding at a speed of 3, 4, 5, and 6 knots with rudder amidships, apply thruster to achieve course deviations to 20 degree to port and starboard.

V.4.6 Trial # 2 – Vessel proceeding astern at a speed of 3 knots, apply the thruster to achieve course deviation to 20 degrees to port and starboard.

a) The following data must be recorded each time;

i) Time to achieve course heading, degree of over swing.

V.5 Any defects must be repaired by Contractor.

V.6 Contractor must test all power and motor feeds insulation to ground and record readings with CGTA present. Test must be performed prior to and after sea trials. In addition, motor winding resistance readings must be taken along with the motor winding temperature prior to the sea trial testing of the motor and after the sea trials of the motor.

12.4.W Certification

W.1 Welders must be CWB Certified

W.2 Chemist must be Certified according to Maritime Occupational Health and Safety Regulations / SOR/2010-120

W.3 Technicians for NDT testing must be certified. Full penetration welds to be subject to 100% ultrasonic thickness testing. All remaining welds subject to 100% MPI. Technician to be certified to a mini-mum of Level II under CAN/CGSB 48.9712 - latest edition.

12.4.X DELIVERABLES: REPORTS, DRAWINGS, AND MANUALS

X.1 Contractor must update all "As Fitted" drawings affected by the installation of the bow thruster, AutoCad DWG format. Final versions for the drawings must be delivered to the CGTA and the TCMS. Copies of all TCMSS approved drawings must be delivered to the CGTA prior to completion of the contract.

X.2 Contractor must provide two hardcopy copies and two electronic copies of the drawings on CD ROM or USB format.

X.3 All drawings must be standard ANSI paper size and must be in, at minimum, AutoCAD 2008 DWG format, and conform to the CCG National CAD Standard [MECTS-#2860606- v1-National_CAD_Standards.

X.4 Contractor must prepare a separate binder for the documentation of all Tests, Trials and Inspection Records performed pertaining to the installation of the bow thruster. The binder must be indexed for each test, trial and inspection performed.

X.5 Contractor must maintain a complete and accurate record of all tests, trials and inspections conducted during the execution of the work. This must include those tests, trials and inspections performed at sub-Contractors facilities. The records must include all relevant documentation, test procedures, associated test sheets, including shop test data, and test, trial and inspection data and observation results.

X.6 All original records of the test, trial and inspections must be signed by TCMS, Contractor and where necessary by the sub-Contractor and WCT who witnessed the tests.

13.0 SHIP'S SERVICE ELECTRICAL POWER GENERATION

13.1 INSTALLATION C-32

(13B02)

13.1.A Scope of work

A.1 Perform the replacement of the Caterpillar Auxiliary Generator Set (model 3508) with another similar group (Caterpillar C32) supplied by Coast Guard.

13.1.B General notes

B.1 All work specified in this specification and all repairs, inspections and replacements must be completed to the satisfaction of the Coast Guard Technical Authority (CGTA), or his representative. Upon completion of each item of this specification, the CGTA must be notified so that he may inspect the work before the final closure of the work. The failure of the Contractor to notify the CGTA does not absolve him of the responsibility to provide the CGTA with the opportunity to inspect any item in this specification. Inspection by CGTA cannot replace an inspection required by Transport Canada (TCMS) or Class Society.

B.2 Any quote item that involves the use of heat to perform the work requires the contractor to notify the C/E at the beginning and end of the work. The contractor will be responsible for setting up and maintaining a competent and well-equipped firefighting team for one full hour after completion of hot work. This team will be able to monitor all surfaces involved, and will be able to intervene if necessary. The contractor will

supply fire extinguishers and the fire crew during work and until the room is cooled. Ship extinguishers must not be used except for an emergency. The Contractor will be required to comply with the Coast Guard Hot Work Policy, which will be provided to the Contractor at the beginning of the work. The contractor will be responsible for applying this policy to its staff, including subcontractors.

B.3 The Contractor must include in its bid the costs of transportation, scaffolding, rigging, slings, craning, removal and installation of parts and equipment required for the performance of the specifications.

B.4 All piping, manholes, parts and / or equipment that will need to be disassembled to perform the work will be put back in place at the end of the work, using new gaskets, bolts, nuts, brackets, collars, as requested and assembled before. All of these items will be inspected by the C/E and the contractor.

B.5 The Contractor will ensure that all spaces, compartments and cabins of the vessel, both inside and outside, are left in the same condition as at the beginning of the work. The price for the removal and disposal of any material will be included in the price of each item of this specification.

B.6 The Contractor must provide the C/E with any marine chemistry certificate to enter a tank or confined space, in accordance with CGSSB7P3177, before cleaning, painting, or hot work begins in these tanks or engine rooms. Certificates will clearly specify the type of work to be performed and will be renewed as needed.

B.7 When the Contractor performs work that involves a fire extinguishing or fire detection system, he must ensure that the disarming of such a system leaves the ship and / or personnel with adequate protection against fire at all times. This can be accomplished by removing or disarming only a portion of the system, by replacing it with temporary parts during the performance of the work or by any other means accepted by the C/E.

B.8 Unless otherwise specified, all steel replaced and / or repaired must be prepared and painted with 2 coats of Marine Metal Primer as used on Canadian Coast Guard vessels as soon as possible.

B.9 All materials will be provided by the contractor. If a specified part or material cannot be provided, the replacement material will be approved by the C/E.

B.10 The Contractor will be responsible for contacting TCMS when items are ready for inspection.

B.11 The Public Service of Canada Act respecting the use of cigarettes will be in force on the ship. The Contractor must notify his staff and ensure that he respects it at all times.

B.12 The Contractor will employ qualified, certified and competent workers and supervisors to ensure a level of workmanship meeting industry standards (reference section 2 art.15, 16; sections 3.2 and 3.3), all to the satisfaction of the C/E.

B.13 The repair and installation of any machinery or equipment specified in this specification must be in accordance with the manufacturer's instructions, drawings and specifications.

B.14 The Contractor will provide adequate temporary shelter for any equipment or spaces affected by this work. The Contractor must take appropriate precautions to properly protect any machinery, equipment, appliances, food or other items that may be damaged by exposure, movement of material, rain / snow, sand or sand dust paint, welding, aerial particles from sanding sand, solder or paint. Any damage will be the responsibility of the Contractor.

B.15 The Contractor must ensure that any welding is performed by a Canadian Welding Bureau (CWB) certified welder in accordance with Canadian Standards Association (CSA) standards. :

B.16 CSA W47.1 – Certification for Companies for Fusion Welding of Steel Structures (Minimum division level 2.0); and

B.17 CSA W47.2 – M1987 (R2003), Certification for Companies for Fusion Welding of Aluminium (Minimum division level 2.1).

B.18 Any installation or replacement of electrical equipment must be carried out according to the most up-to-date editions of the following marine standards: :

a) TP127 – Ship Safety Electrical Standards

b) IEEE 45 – Recommended Practice for Electrical Installation on Shipboard

c) All materials supplied and work performed by the Contractor must meet the following conditions of service:

i) Outside temperature from -40 to +35 degrés C;

ii) Wind speed up to 50 knots;

iii)Water temperature from -2 to +30 degrés C;

iv) Shock loading up to 2.5g horizontal, 1.5g vertical

13.1.C References

C.1 Reference drawings and sketches

- DWG No. 108 H-001 Shell expansion
- DWG No. 108 H-002 Framing expansion
- DWG No. 108 H-4410 Insulation plan
- DWG No. 50-00-02 Machinery elevation arrg.
- DWG No. 50-00-01 sh 02 Machinery arrg. flat level
- DWG No. 51-00-01 Aux gen holding down bolt
- DWG No. 56-00-01 Lifting gear
- DWG No. 108-H-23_25 General Arrangement
- DWG No. 108 H-004 Engine room flat
- DWG No. 108 H-005 Main deck arrg.
- DWG No. 108 H-01-35 Unit 35 main deck fr. 80-106
- DWG No. H-2-1 Construction section forward
- DWG No. H-2-2 Construction section after
- DWG No. H-3 pages 1 to 3, profiles and decks
- Caterpillar 3508 various Cat dwg.
- Caterpillar C32 various Cat dwg.
- Burrard Yarrows Industries Ltd. DWG No.H-01-73, Upper deck frame 53-84 unit 73. Plan View and Elevations

C.2 Standards

- Fleet Safety and Security Manual (DFO/5737)
- IACS No. 47 - Shipbuilding and Repair Quality Standard
- CSA W59-08 (R2008) - Welded Steel Construction
- CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel
- Society for Protective Coatings (SSPC) Standards

C.3 Laws and Regulations

C.3.1 Canada Shipping Act 2001 – Hull Construction Regulations

C.3.2 Maritime Occupational Health & Safety Regulations

13.1.D Work overview

D.1 **The ship will be in dry dock during this phase of the work. All dismantling, steel, electrical, reassembly, start-up and testing work will be performed by the Contractor. The Contractor must supply the services of a Technician certified to work on Caterpillar products (TCC) for the new Caterpillar Auxiliary Power Generator installation, the final inspection of the installation of the new generator set, as well as all mechanical and mechanical tests as required by the manufacturer, as well as all tests to satisfy the Transport Canada Marine Safety surveyor.**

a) The FSR on-site presence, two (2) visits.

b) 1st visit, preliminary visit of 2 full days on site, to confirm the exact position of the diesel engine on deck, overview preliminary installation, mechanical and electrical / electronic outcomes.

c) 2nd visit, final visit of 5 days on site, to tests and commissioning the equipment.

d) Contractor is to coordinate and schedule these visits.

e) Contractor must include, in its quota, two (2) complete travel both ways

D.2 **Before starting the dismantling work on the current generator set and the installation of the new generating set, a series of actions must be taken by the Contractor to prepare the vessel for the smooth running of the works.**

13.1.E Work preparation in engine room

E.1 The generator is located on the mezzanine of the lower deck of the engine room, starboard, between frames 83 and 94. The contractor must make an opening in the starboard plating between frames 82 and 95, to allow extraction of engine in place, and the insertion of the new generator group. See drawing C18-05-110-01 Opening plan in the plating for all the details of cuts.

E.2 It will be necessary :

E.2.1 Remove the thermal insulation and protective mesh on the ship's side up to 300 mm beyond the section of plating to be removed. See Dwg No. 108 H-4410 Insulation Plan. See photos no.1 and 2.

Photo no. 1 : starboard side, Caterpillar tools and parts

E.2.2 *Photo no. 2 : thermal insulation and protective mesh to remove*

E.2.3 Remove the fluorescent fixture, from the ceiling above the diesel engine, to approximately frame 82. Turn off the power to this fluorescent lamp before beginning work. See *photo no.3*.

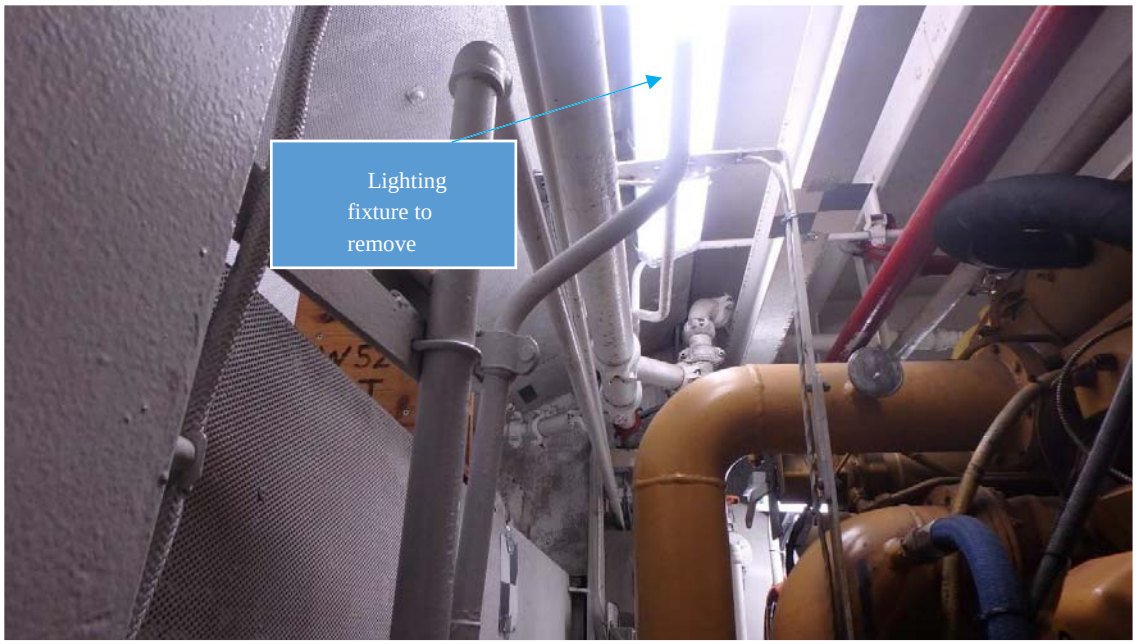


Photo no. 3 : Lighting fixture to remove; in order to remove/install Caterpillar engines

E.2.4 Installation of lifting frames, supports and / or rails to move the generator. The method must be chosen by the Contractor.

13.1.F Work preparation to dismantle existing diesel engine and alternator

F.1 The Caterpillar 3508 Auxiliary Power Generator should be prepared before it can be moved to allow it to exit through the opening in the starboard opening. The necessary preparations will have to be carried out on the diesel and also on the alternator and its controls.

F.2 Alternator and controls

F.2.1 Electrically safety isolated:

a) The generator, by opening the main circuit breaker (P-0607) connecting it to the buss bar,

b) All circuit breakers for auxiliary engine systems, such as pre-lubrication oil pump, KIM Hotstart, alarm and control panel power supply, alternator anti-condensation heating elements, ASEA Power Management System, etc

c) Alternator : 600V/3ph/60Hz@ 500Kw

F.2.2 Once the generator is electrically isolated, the contractor will proceed and / or coordinate the dismantling / disconnection of the wiring connecting the alternator to the bus bar, the stop signs of emergency, pre-lubrication and engine pre-reheat pump (Kim Hotstart), cylinder temperature indicator panel, and all connections between the diesel engine and the gauge and pressure gauge panel, located on the inner starboard guardrail .

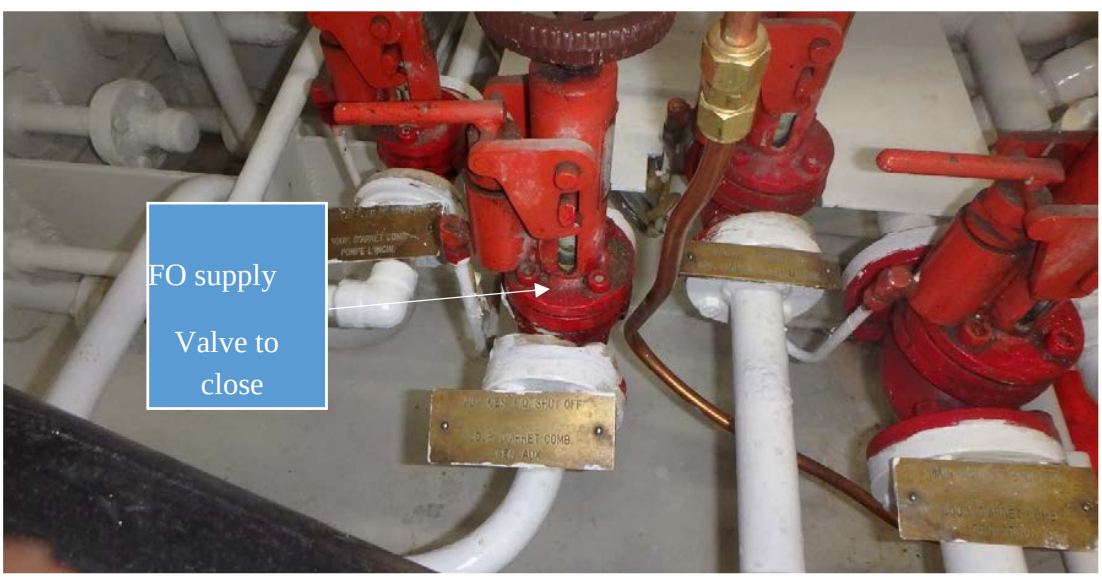
F.3 Diesel engine

F.3.1 Mecanically isolate after draining liquids (FO, oils and water) and dispose accordingly to provincial regulations:

F.3.2 F.O. :

a) By closing the auxiliary diesel fuel supply valve, located near the daily tank, at the rear of the frame 70, on the same deck as the auxiliary diesel. See picture no.4.

Photo no. 4 : Day tank FO quick closing valve to auxiliairy diesel engine, to shut and lock



b) By closing the fuel return valve, as well as the bypass valve, located near the starboard shell, at the frame 95, between the engine and the shell plating. See picture no.5.

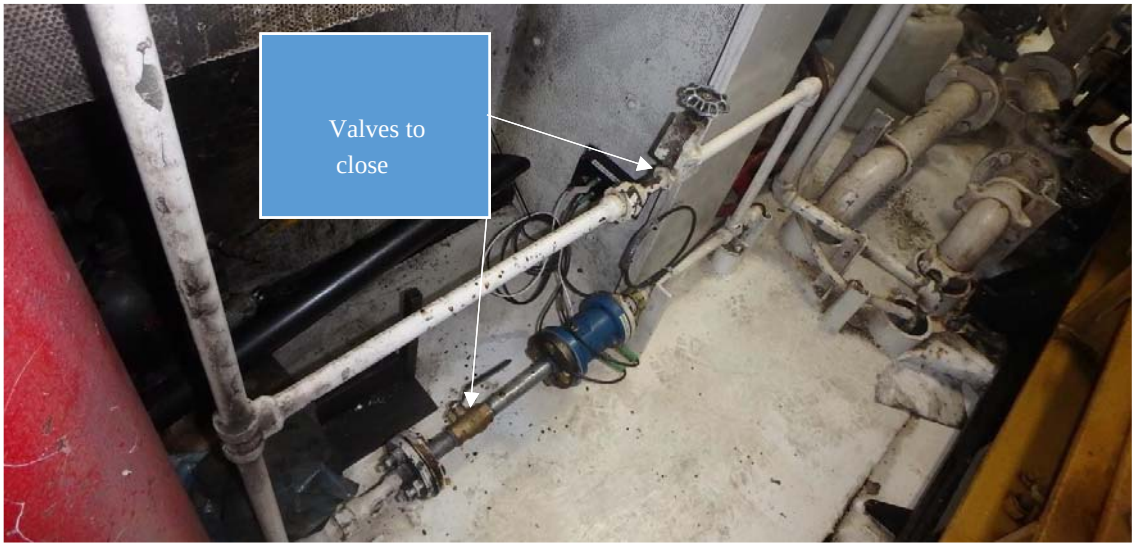


Photo no. 5 : Fuel return valves, near the starboard shell side

F.3.3 Lubricating oil :

a) Once the lubricating oil has been removed from the crankcase, disconnect the lubricating oil hose from the crankcase. See photo no.6 and photo no.7.

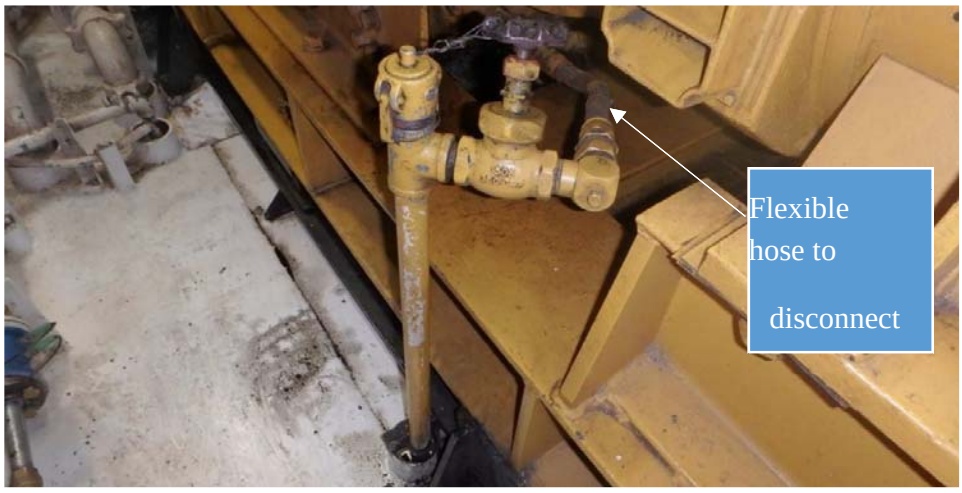


Photo no. 6 : Crankcase drain piping connection and hose

Photo no. 7 : Hose to disconnect

F.3.4 Starting air :

a) by closing the valve at the inlet of the pressure reduction station, at the rear of the engine, frame 81. See photo no.8.

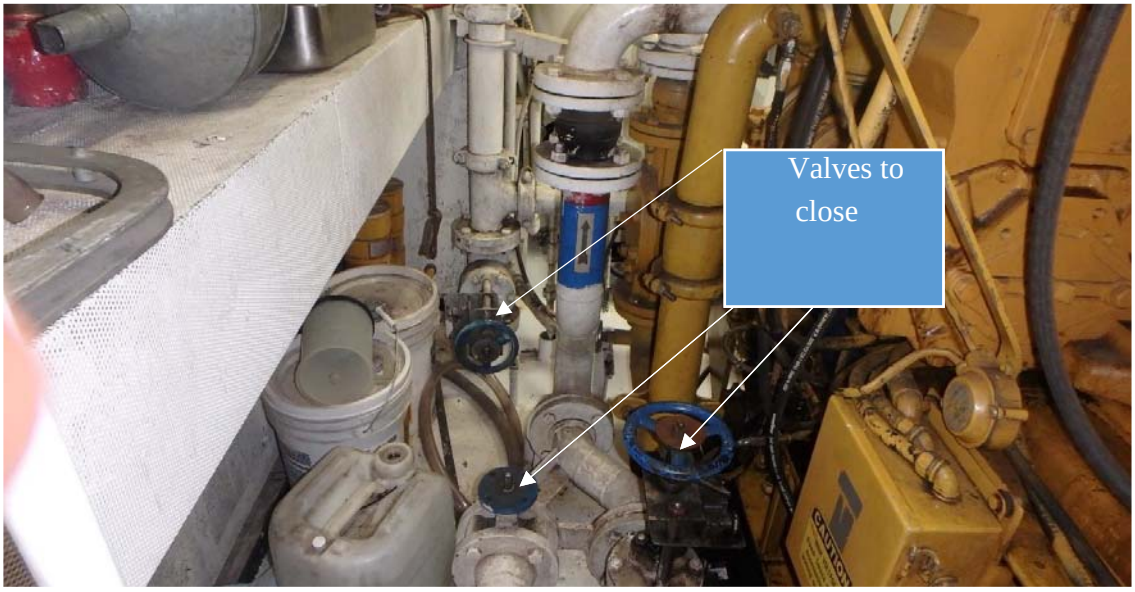
Photo no. 8 : Isolation valve, before the air starting pressure reducing station

F.3.5 Diesel engine cooling water,heat exchanger:

a) Central cooling system, fresh water :

i) Close valves at the engine inlet, next to the ship's side. See *photo no.9*.

Photo no. 9 : Central cooling system inlet valves, cooling water engine inlet



ii) Close return valve to the central cooling system, frame 83, at the mezzanine deck level. See *photo no.10.*

Photo no. 10 : return valve to the central cooling system

F.3.6 Emergency sea water:

a) Close the seawater inlet valve if the emergency system is connected. Normally in regular mode, there is a blind flange installed on this pipe and the valve would be closed. See pictures no.9 and no.11. Make sure that the pump supplying the seawater is taken out of service before starting work.

Photo no. 11 : emergency cooling seawater inlet. Notice blind flange.

b) Close the overboard discharge valves at sea, one above and one below the mezzanine deck, near the starboard ship's side. *See photo no.12 and photo no.13.*

Photo no. 12 : Overboard discharge valve, , cooling sea water (emergency)

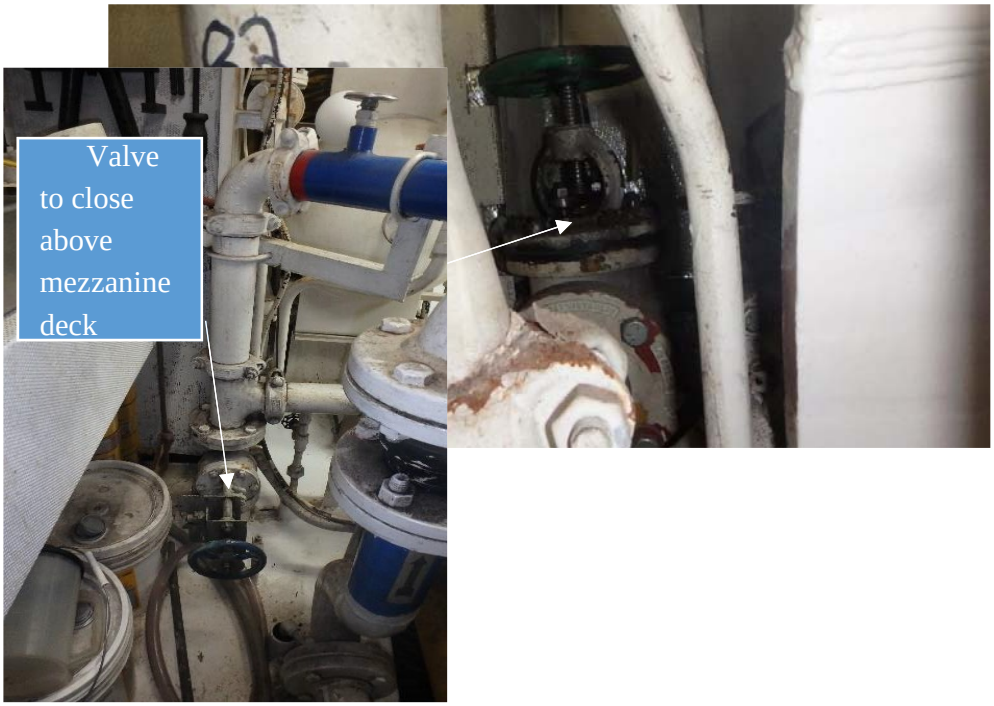


Photo no. 13 : Seawater outlet, engine front at mezzanine deck

13.1.G Piping removal

G.1 Several pipes of different systems will have to be dismantled to allow the removal of the current generator, and the introduction of the new generator.

G.2 The vast majority of these pipes will need to be modified to allow reconnection to the new Caterpillar C32 generator set. All changes will be shown on Plan C18-05-160-02 Drawing systems to be modified.

G.3 On the other hand, some pipes will be dismantled and replaced without modification, since they are obstruction only during the operations of handling of the generators groups, without more, but can be reinstalled at the same place without modifications.

a) Supply and install temporary blind flanges /caps if needed or if piping will be in service while in drydock, mitigation measure must be taken to ensure the least impact.

b) Always reinstall after work, with new gaskets flange or Victaulic (Flexible coupling for shouldered steel pipe) seals (contractor supplied).

G.4 Piping modifications

G.4.1 The pipes to be modified are mainly the pipes that are currently connected to the CAT 3508 engine, which will have to be modified to connect to the new CAT C32 engine.

G.4.2 All the pipes that will be dismantled for modifications or for temporary removal during the works must be drained / emptied, degassed, cleaned, modified, tested (1.5 x Working Pressure) and replaced at the end of the work. They will also have to be isolated from the systems to which they are connected.

G.4.3 The contractor must supply and install between the vessel piping and the engine piping all new flexible connectors, either flange flexible connectors above 1”ID, or hoses below 1”ID.

G.5 Diesel oil (or Fuel oil)

a) It should be noted that the main supply valves for the day tank and the return of fuel to the tank have previously been closed in F.3.

G.5.2 Diesel oil supply

a) Supply piping I.D. is 25mm.

b) Dismantle:

i) Bypass valve and attached piping;

ii) Supply piping to engine is threaded; disconnect at the engine.

c) See photo no. 14 and no.15.

d) See sheet 3 of drawing C18-05-160-02 for details of reinstalling the diesel oil supply piping on the new diesel engine

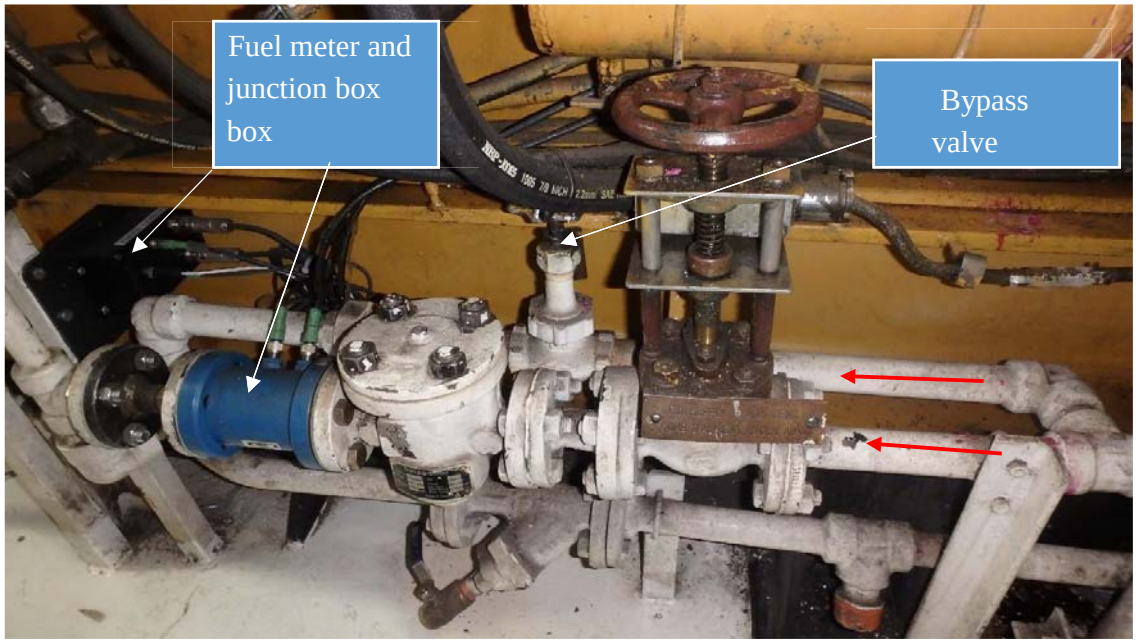


Photo no. 14 : diesel oil supply to engine CAT 3508

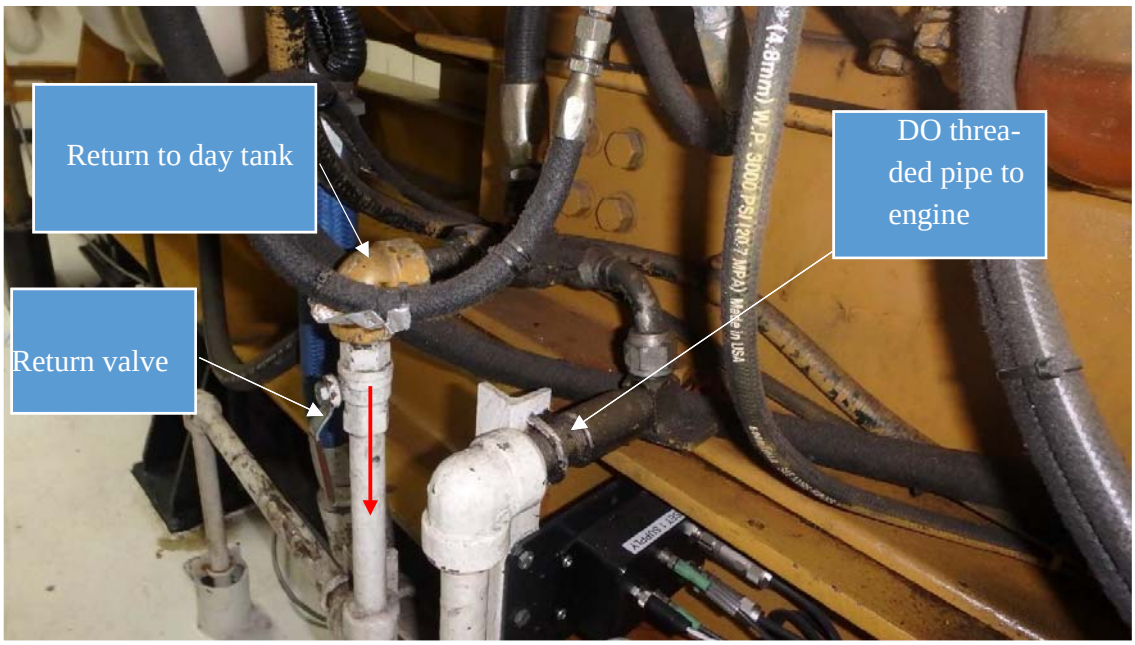


Photo no. 15 : diesel oil return from engine CAT 3508

G.5.3 Diesel oil return

a) Return piping I.D. is 13mm.

b) Disconnect piping at the engine.

c) See *photo no.15*.

d) See sheet 1 du plan *C18-05-160-02* for details of reinstalling the diesel oil return piping on the new diesel engine.

G.5.4 Cooling water

a) The cooling water for the auxiliary diesel is supplied via a central cooling system. This water is soft and processed. It is used for cooling most systems on the ship. The water supply to the auxiliary diesel circulation pump must be isolated. It will therefore be necessary, under the supervision of the Chief Engineer of the ship, to close on the system the following valves:

i) Suction and discharge of the main circulation pumps to the system (4 valves);

ii) Suction and discharge of auxiliary circulation pumps to the system (4 valves);

iii) Suction and discharge of fresh water circulation pumps to diesel propulsion engines (6 valves);

iv) Suction and discharge of circulation pumps for air compressors (4 valves);

v) Inlet and outlet valves for heat exchangers no.1 and no.2 (4 valves);

vi) Valve at the outlet of the expansion tank.

b) Despite the fact that the system is isolated, residual water will remain in the piping. The contractor must ensure that the system is properly drained before undertaking major dismantling work.

G.5.5 Central cooling system supply

a) The auxiliary diesel engine cooling pipe line arrives from the central cooling system's auxiliary fresh water circulation pumps on the port side at double bottom tank top level. The 75mm line goes up to the lower deck (mezzanine), close to frame 88, next to the starboard side. An engine cooling water inlet valve is currently in place. The contractor must:

i) Remove from the flange X all the 75mm piping that connects to the fresh water circulation pump, via a flange on the pump, from the heat exchanger on the engine to the discharge line to the central system

ii) From flange X, make a new pipe up to the cooling water circulation pump of the new motor suction. See sheet 2 of plan C18-05-160-02 for details. It should be noted that the cooling water inlet line of the central system and the emergency system will be slightly modified, to point some 30 degrees towards the ship’s side.

iii) Dismantle and modify pipe from the heat exchanger of the old engine, to allow it to connect to the pump's new engine output connection.

iv) Fabricate and install a new piping from the cooling water pump outlet of the new motor to the modified pipe on the return to the central system.

v) See *photos no.16 & 17*.

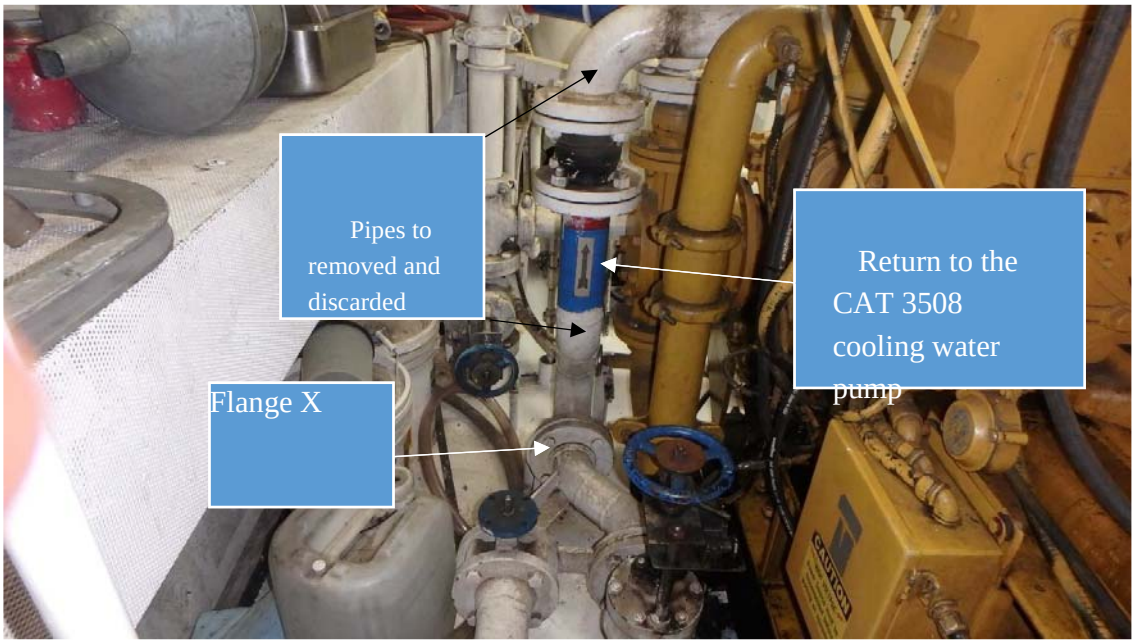


Photo no. 16 : cooling water inlet piping, looking after, with starboard ship side on left

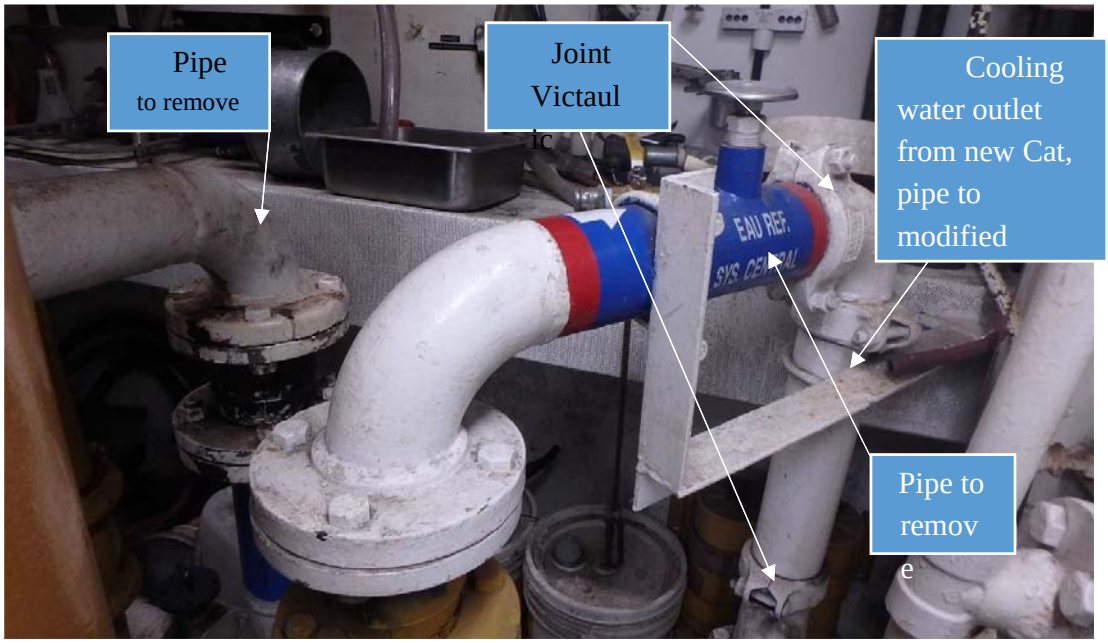


Photo no. 17 : Cooling water pump piping outlet view, engine heat exchanger outlet

G.5.6 Central cooling return from engine

a) The cooling water return line to the central system is located near the current diesel engine at frame 83. A 75mm shutoff valve isolates the system. No modification will be necessary on the return. See *photo no.18*.

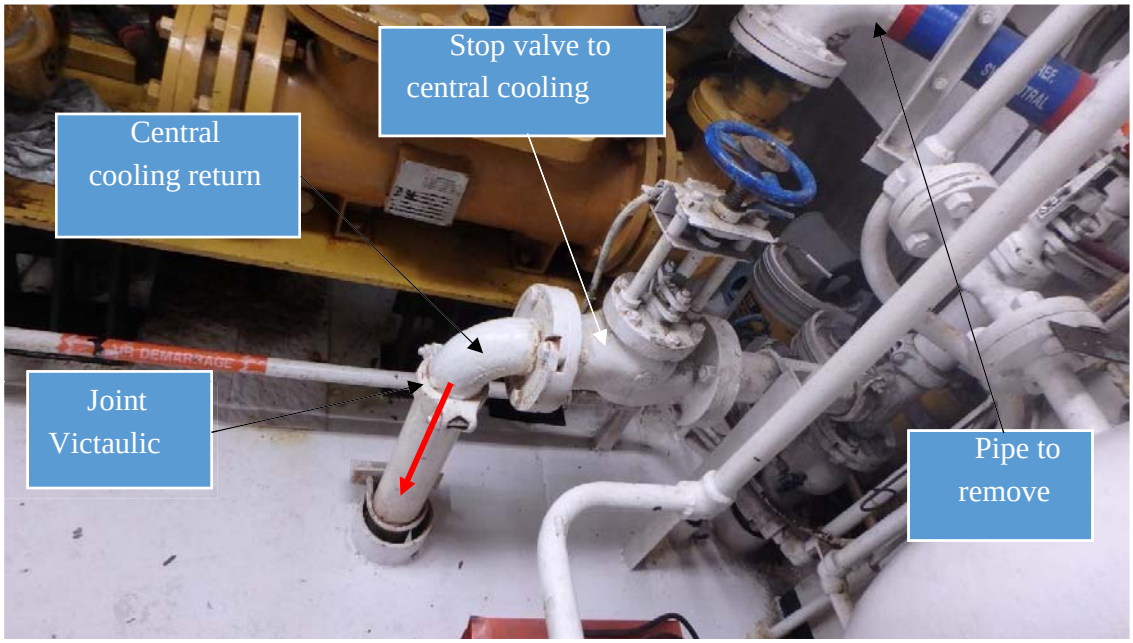


Photo no. 18 : Forward engine view, with central cooling return pipe

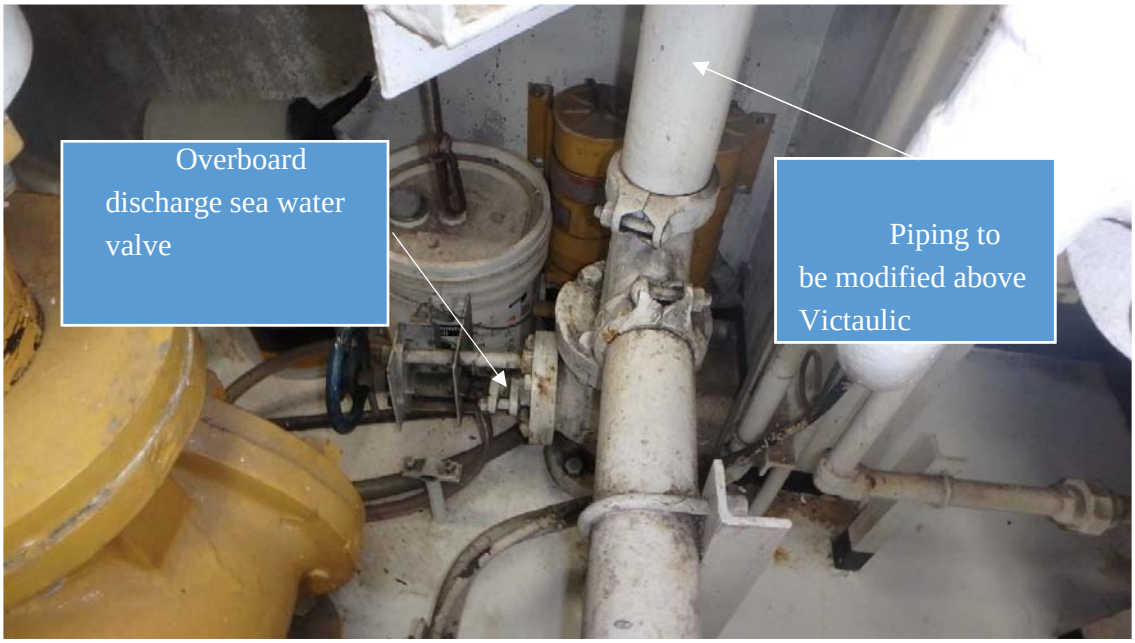


Photo no. 19 : Overboard discharge valve, with piping to remove

G.5.7 Emergency cooling water (seawater)

a) The 75mm emergency cooling water line (seawater) rises to the lower deck (mezzanine), close to frame 88, close to the starboard ship's side. A seawater cooling water inlet valve to the engine is currently in place. This valve is coupled with a blind flange, which prevents seawater from being accidentally circulated in the engine cooling system, unless there is an emergency. The contractor must:

i) Modify the seawater supply to the system, as described on plan C18-05-160-02, Drawing systems to be modified. It should be noted that the cooling water inlet line of the central system and the emergency system will be modified, and re oriented approximately 30 degrees toward the ship's side.

G.5.8 Starting air

a) The starting air supply pipe to the diesel engine arrives at the engine with a pressure of 10.3 bar; this pressure is reduced to 6.2 bar via a reduction valve. It will be necessary to:

i) Remove the air inlet pipe, from the threaded union after the reduction valve, under the compressed air bottle, near the starboard ship's side, 25mm pipe. *See photo no.21;*

ii) Then remove the flexible hose to the engine, See *photo no.22*.

iii) Fabricate new piping after the new engine installation. See sheet 3 drawing *C18-05-160-02* for details.

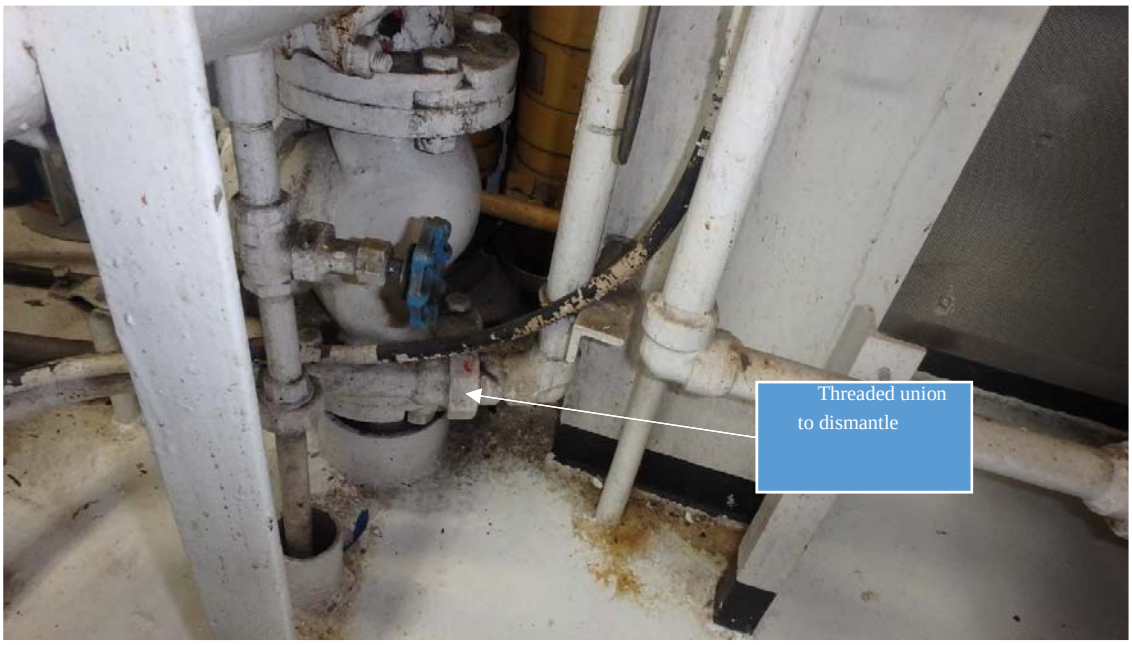


Photo no. 20 :threaded union, close to ship's side,

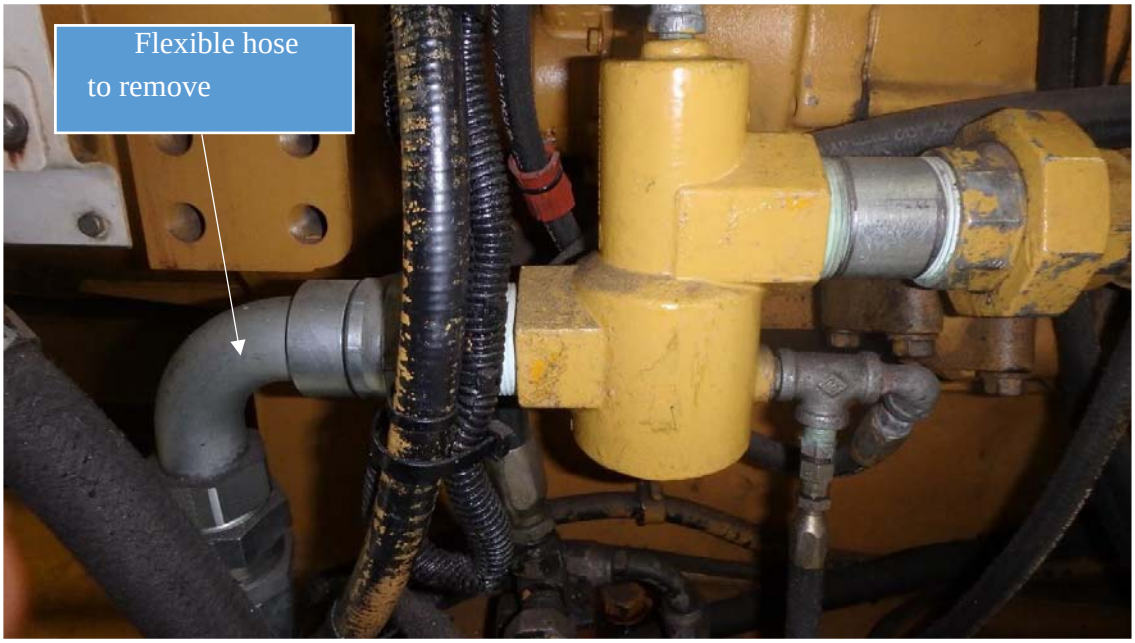


Photo no. 21 : starting air connection to diesel engine

G.5.9 Lubricating oil

a) The Contractor must drain the auxiliary generator lub oil tank (See drawing 50-00-01 sht 2 of 2, #201), and dispose of approximately 500 liter of Duron SHP 10w30 oil.

b) The Contractor must open the manhole cover, clean and dry up the tank

c) The lubricating oil line is used to empty / drain the diesel engine via the drain pipe *(see photo no.22)*. The 25 mm line will need to be removed to allow the old engine to come out and enter the new one. It will also be necessary to supply and replace the hose connected to this drain *(see photo no.22)*.

d) The contractor can dismantle this pipe by unscrewing the vertical elbow pipe under the mezzanine deck. See photo no.23.

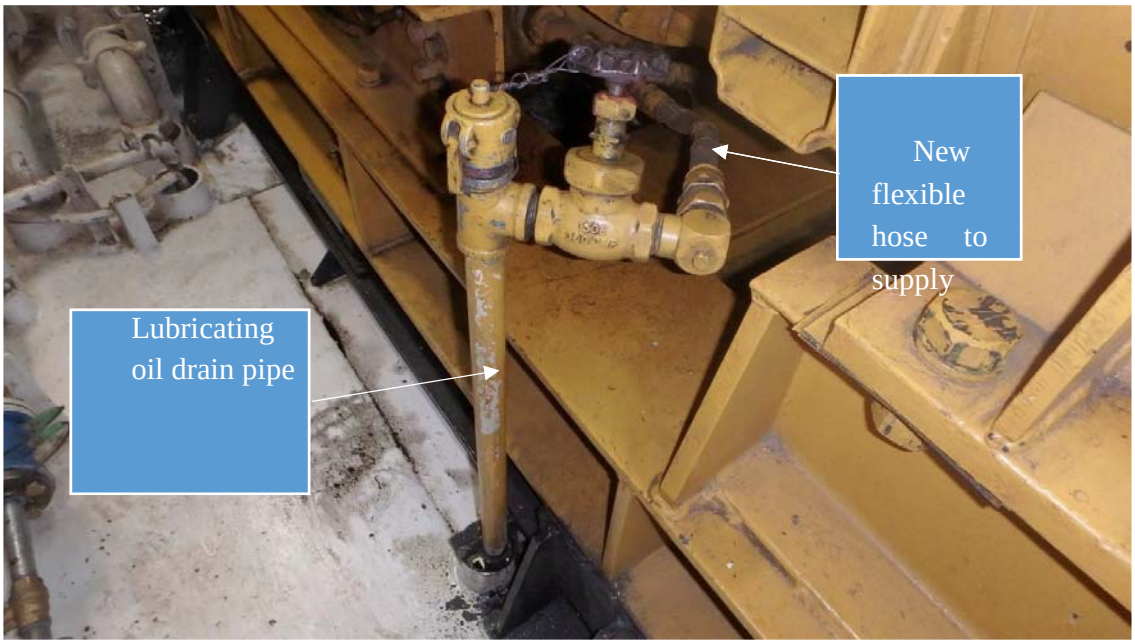


Photo no. 22 : oil crankcase drain hose, between engine and ship's side

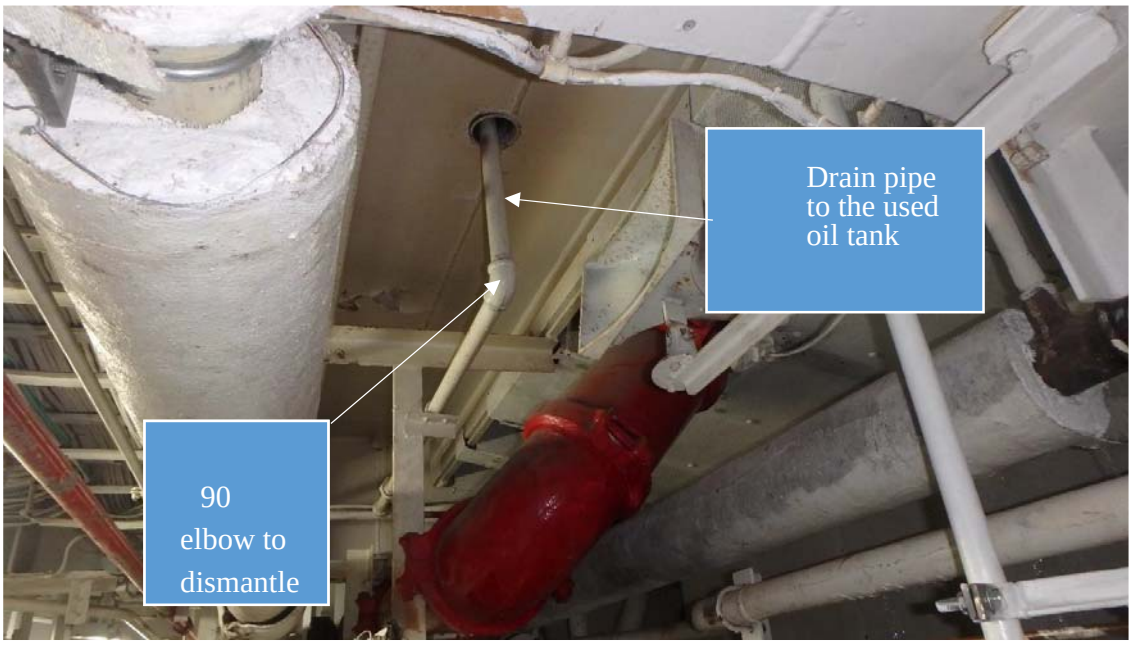


Photo no. 23 : piping from engine oil crankcase to used oil tank

G.5.10 Exhaust piping

a) The exhaust line must be dismantled from the engine up to the pipe reducer 250 to 200mm located in the highest part of the piping, port of the engine. A new exhaust line section must be supplied, manufactured and added following the installation of the generator set. See sheet 3 of drawing C18-05-160-02 for details. The photo no. 24 represents the current exhaust pipe.

b) The insulation and gaskets (contractor supply) of the new exhaust pipe will be similar to the material used on the existing pipes.

Photo no. 24 : existing exhaust pipe

G.6 Pipes to be removed and reinstalled

G.6.1 Foam pipe (Fire Monitor)

a) The 200 mm I.D. piping rising vertically from the engine room double bottom, next to the starboard ship's side at frame 88 must be removed as follow :

i) Dismantle the piping up to the Victaulic (Flexible coupling for shouldered steel pipe)next to the ceiling above the mezzanine deck. See photo no.25.

ii) Dismantle the piping up to the Victaulic (Flexible coupling for shouldered steel pipe) under the mezzanine deck. See *photo no.26.*

iii)The main foam pump breaker must be opened and locked.

iv)Once the new engine is in place, the piping can be reinstalled with new gaskets and Victaulic (Flexible coupling for shouldered steel pipe) seals, contractor supplied.

Photo no. 25 : 200mm pipe for foam monitor, starboard ship's side, looking toward aft.

Photo no. 26; 200mm pipe, under mezzanine deck

G.6.2 Fire main

a) Remove the 2.5 inches fire main pipe, at frame 93,with hose and hose rack. Reinstall at same place after steel work. Foam pump breaker must be locked open during engine replacement.

b) Fire main piping must be pressurized while in drydock, mitigation measures must be taken to ensure the least impact.

c) See *photo no.27*.

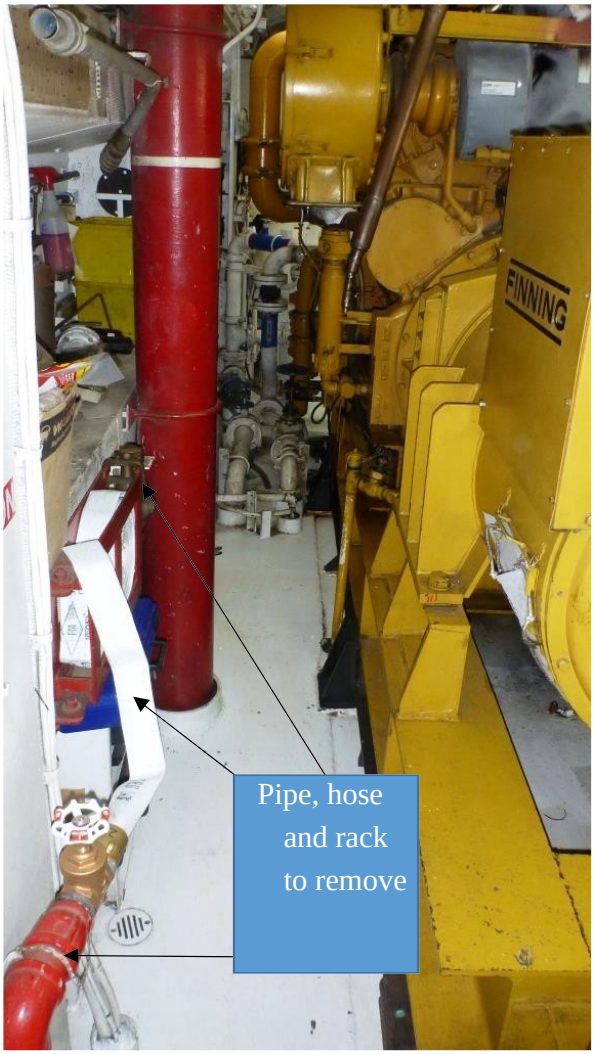


Photo no. 27 : Piping + fire hose

G.6.3 Gray water

a) After making sure the system is drained and secure, dismantle the 75mm gray water line at frame 97 near the bulkhead at the Victaulic (Flexible coupling for shouldered steel pipe) joint.

i) Dismantle the other end of the same pipe, at frame 81 (Victaulic and reducer).

ii) Also disconnect the piping. toward to the main deck

iii) Reinstall at the same place after the work.

iv) Gray water piping will be in use while in drydock, mitigation measure must be taken to ensure the least impact.

v) See photo no. 28-29-30.

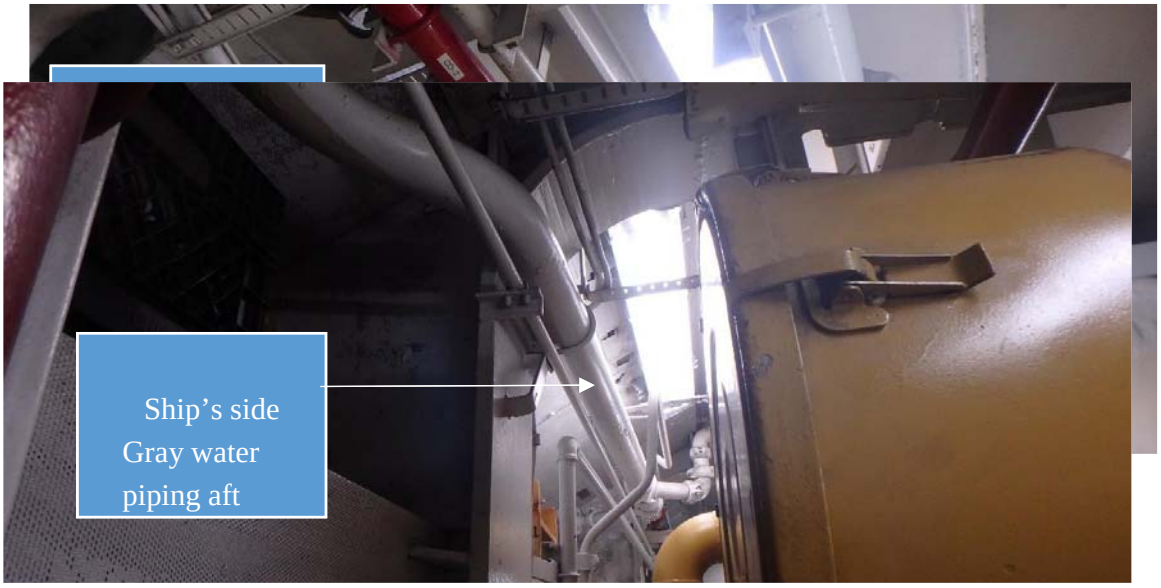


Photo no. 28 : View under the main deck, looking aft.

Photo no. 29 : Ship's side Gray water piping looking aft

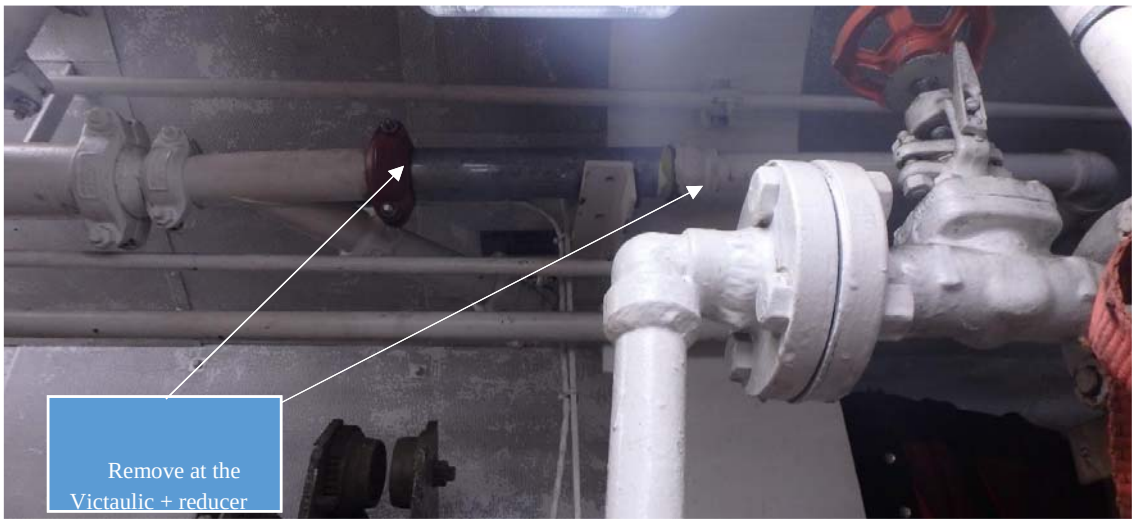


Photo no. 30 : at frame 81, gray water piping to be removed/reinstall

G.6.4 CO2

a) Before dismantling, ensure system is isolated and locked

b) Dismantle 63mm CO2 piping flange, at frame 95, next to the bulkhead. See *photo no.31*.

c) Dismantle the other end flange, at frame 81 (flange). See *photo no. 32*.

d) Reinstall at same position with new gaskets (contractor supply) after work.

Photo no. 31 : CO2 flange to dismantle, next to bulkhead at frame 97

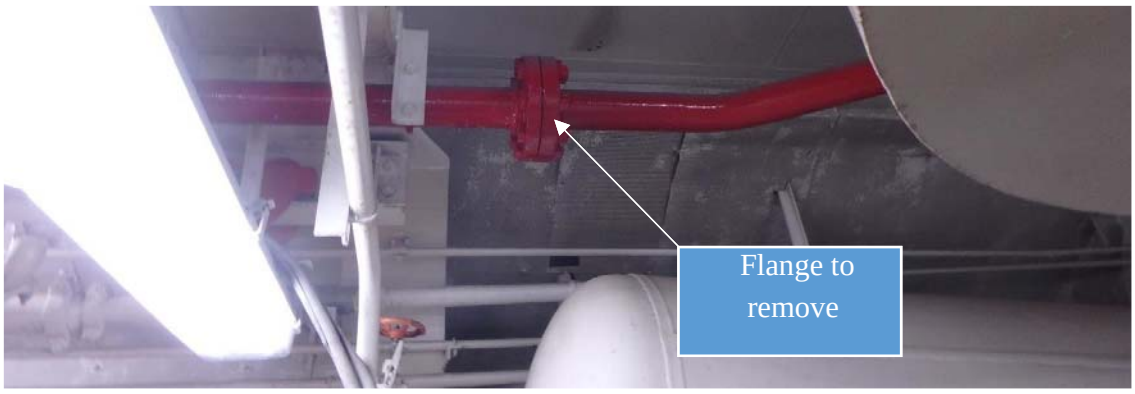


Photo no. 32 : tuyau CO2, à déboulonner à la bride, couple 81

G.6.5 Lubrication oil tank, filling piping

a) Remove lub oil filling pipe, at frame 97, at the flange next to the bulkhead. See *photo no.33.*

b) Dismantle the other flange end of the same pipe, at frame 81, above the lubricating oil tank See *photo no. 34.*

c) Reinstall at the same place after the work, with new gaskets (contractor supply).

Photo no. 33 : flange to dismantle at frame 97 next to bulkhead

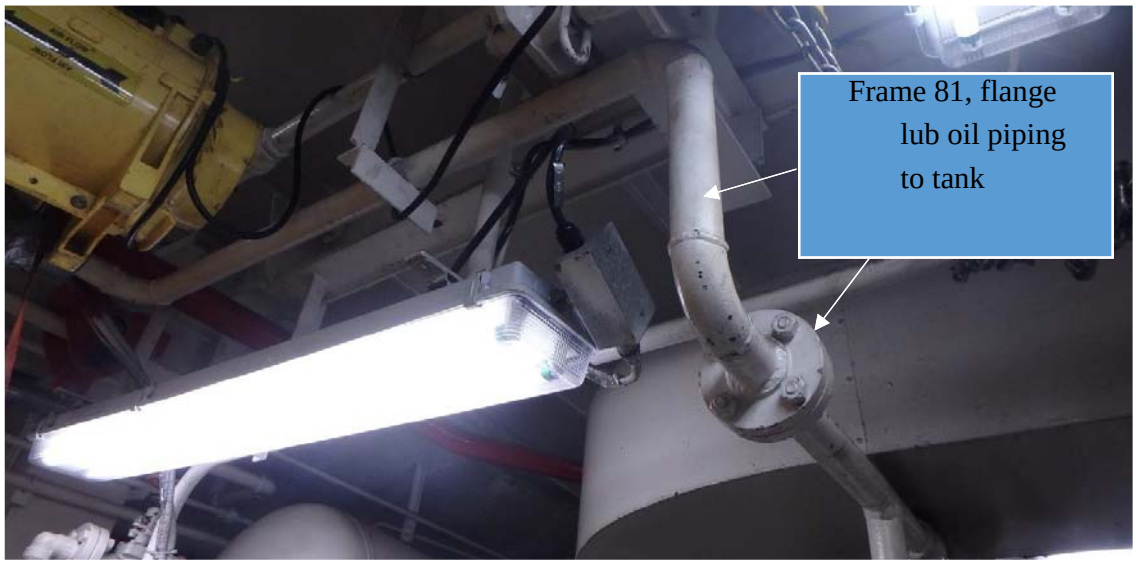


Photo no. 34 : frame 81, flange and pipe to dismantle

d) The Contractor must supply a new gasket and install the manhole on the auxiliary generator lub oil tank.

e) After all piping is completed and tested, the Contractor must supply 820 liters of new oil, equivalent to the drained oil, and fill the tank.

G.6.6 Cooling water, seawater and fresh water supply

a) These 2 pipes must be dismantled and removed in order to extract the old engine and install the new one.

b) Disassemble at the flanges connecting to the "Y". See photo no.35.

c) Keep the "Y" with a blind flange for reuse after the new engine has been inserted.

d) Dismantle under the mezzanine floor, the 2 seawater and cooling water pipes, at the Victaulic (Flexible coupling for shouldered steel pipe) connections indicated in photo no.37.

e) Keep and reinstall valves with new gaskets (contractor supply) at the new pipes.

f) Fabricate the 2 new pipe sections to fit a new orientation and connection between the Cat C32 to the existing "Y" at the end of the work.

g) Central cooling piping will be in service while in drydock, mitigation measure must be taken to ensure the least impact.

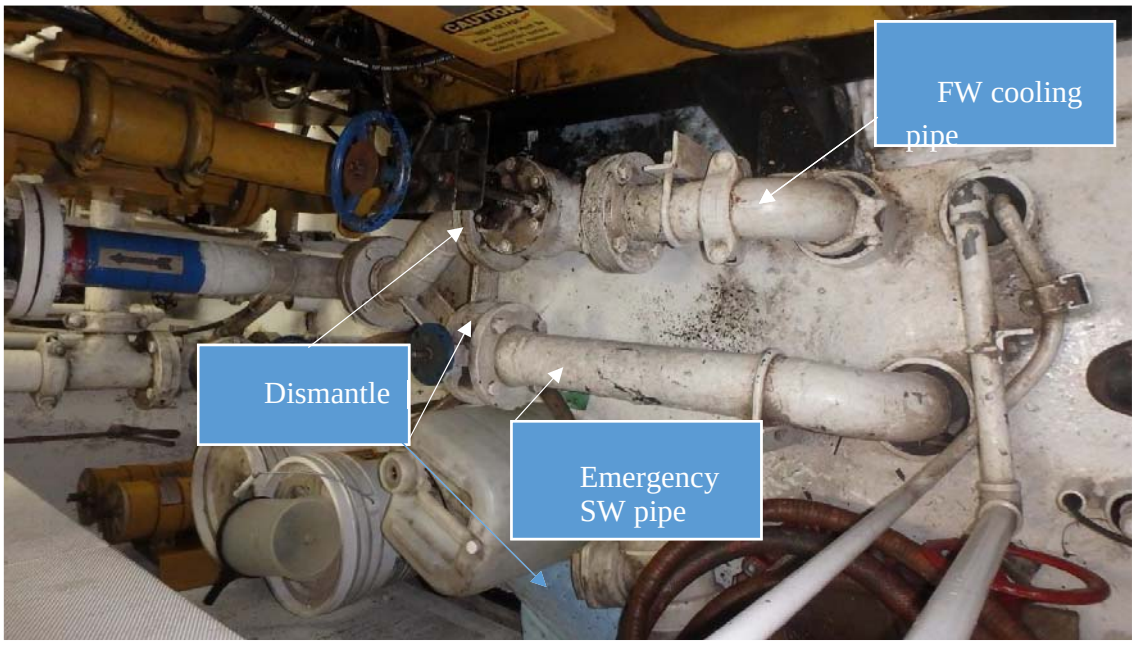


Photo no. 35: FW and SW piping, between engine and ship's side, at mezzanine deck, looking aft.

G.6.7 Flushing water and fresh water

a) Both 1-1/4 et ¾ inch pipes must be dismantled, first, under the mezzanine deck (see *photo no.37);*

b) Also looking forward of vessel past frame 81, dismantle at the first elbow or union. See *photo no.38.*

c) Supply and install temporary blind flanges or caps if needed for piping will be in service while in drydock, mitigation measure must be taken by the Contractor to ensure the least impact.

d) Reinstall both pipes after work, with new gaskets (contractor supply).

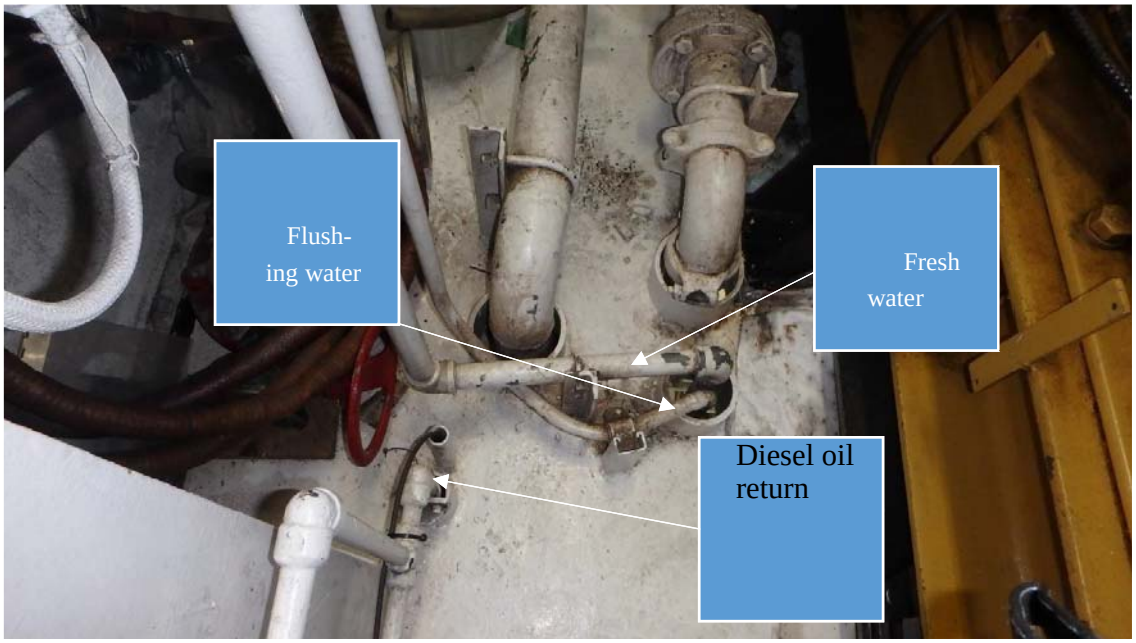
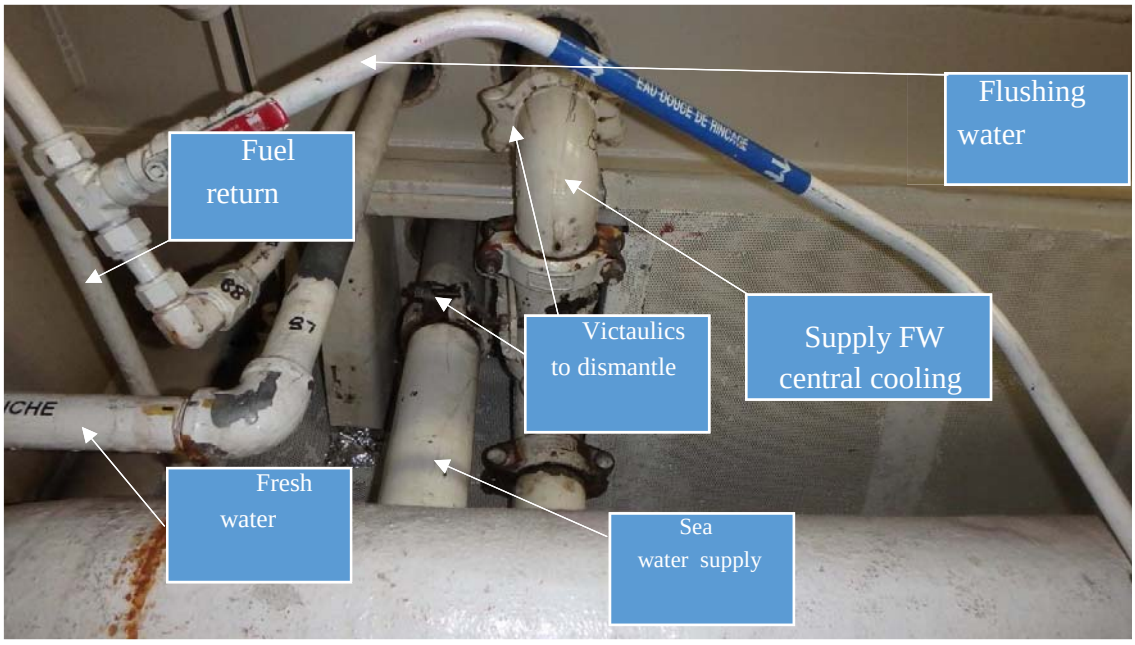


Photo no. 36 : mezzanine deck, between engine and starboard ship's side

Photo no. 37 : under mezzanine deck, 5 pipes to dismantle to remove the engine group



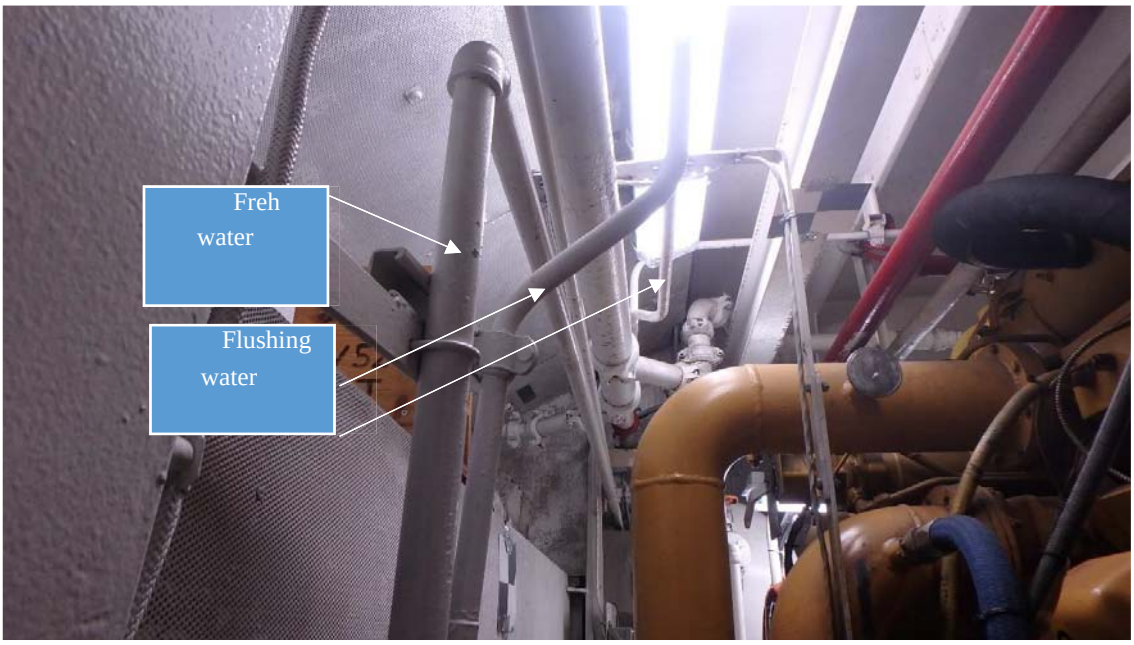


Photo no. 38 : at ship's side fresh and flushing water pipes to remove

G.6.8 Diesel oil return

a) Remove the diesel oil return piping from engine, including :

i) Flowmeter;

ii) Bypass and return valves;

iii) All piping at the mezzanine deck, up to frame 80, going toward the day tank;

iv) See photos no.39 & no.40

b) Supply and install temporary blind flanges or caps if needed or piping will be in service while in drydock, mitigation measure must be taken to ensure the least impact.

c) Reinstall after work, with new gaskets (contractor supply).

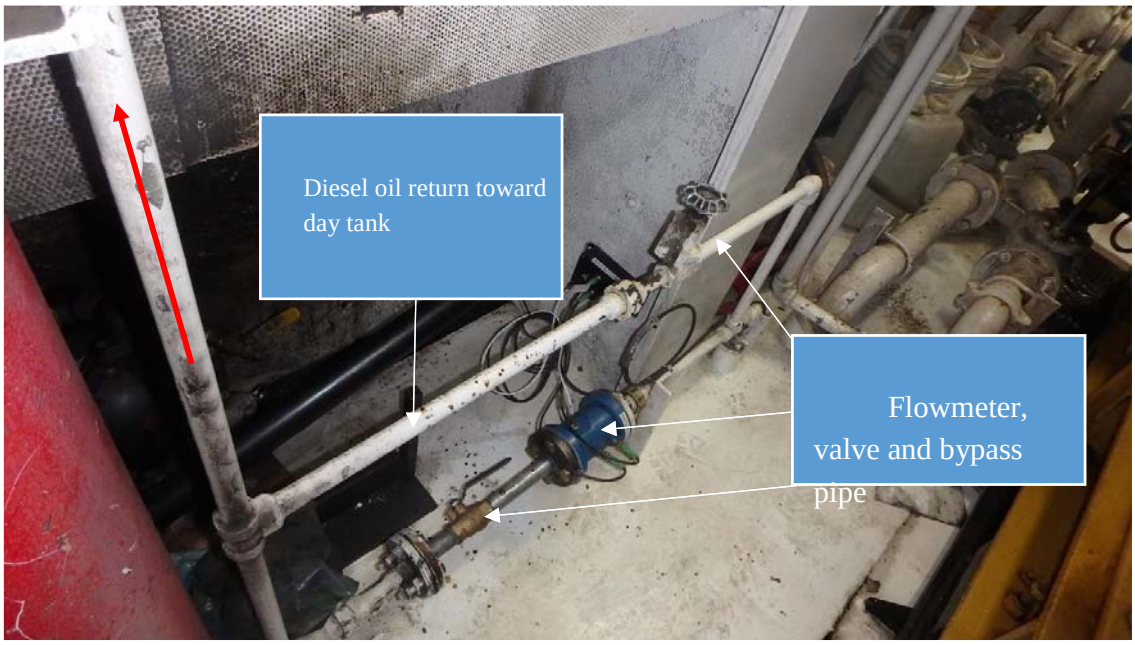


Photo no. 39 : diesel oil return pipe to day tank, starboard ship's side

Photo no. 40 : return diesel oil piping at day tank from engine

G.6.9 4.3.3 Electrical disconnection

a) The alternator will have been electrically isolated; the contractor will proceed and / or coordinate the dismantling / disconnection of the wiring connecting the alternator to the switchboard, the emergency stop panels, the pre-lubrication pump and the engine warm-up system (Kim Hotstart), the cylinder temperature indicator panel, and all connections between the diesel engine and the gauge and pressure gauge panel, located on the inner starboard guardrail.

13.1.H Steel work

a) Before removing the old generator and introducing the new one, several steel works will have to be completed. When all the preparations for the entry and installation of the new generator have been completed, and this group has been put in position, the other steel works (eg closure of the shell, etc.) can be completed.

H.1.2 Shell opening

a) Once the piping is dismantled and the plating section devoid of insulation, an opening will be made by cutting an opening as described in drawing C18-05-110-01.

b) The sections of 10 frames, 2 stringers and a porch will remain integral with the section of shell ship's side removed.

H.1.3 Engine maintenance lifting beams

a) Two longitudinal lifting beams with a capacity of 1000 kg are currently in place above the diesel engine. These beams can stay in place. They will not interfere with the replacement maneuvers of the generating set and may be used to maintain the new engine. If proven not adequately located, a new set of lifting beam, with same lifting capacity must be installed with the TCC recommendations.

H.1.4 Auxiliary generator seating

a) Following the removal of the CAT 3508 generator set, the angle bar frame that served as the seat will be cut off the deck and removed, deck surface will be smoothened.

b) Six (6) cuts will be made for the insertion of thicker plates in line with the supports of the new generator set as shown on the drawing C18-05-160-01.

c) Also note that the deck collar of the electrical cables connected to the generator must be moved.

d) The end-to-end inserts weld with the existing bridge plate will be full penetration and the existing structural members welded by continuous dual corner threads under the new steel inserts.

e) On the top of the deck, the weld beads that will be overlapped by the bolting plates will be smoothened to the deck's edge.

f) The bolting plates will be welded to the deck only after the new generator set C32 has been put in place and any obstructions will be resolved.

g) A 2” flat steel bar will be vertically full welded onto the deck all around the engine/alternator skid deck seating, to retain any liquid into this basin.

h) Once the work is complete, the floor will be thoroughly cleaned and mechanically brushed, followed by 2 coats of steel primer and a coat of white paint supplied by the ship.

H.1.5 Shell opening closure

a) The shell panel will be replaced once the new generator set is installed. All will be welded according to procedures and preparations approved for full penetration joints for grade EH36 steel. Contractor must prepare a complete welding procedure, approved by a certified professional engineer and presented to the on-site regulating authorities (TCMS or alternative authority).

b) The interior and exterior paint will be retouched around the welded joints.

c) Finally, the insulation and the protective plate will be reinstalled, using new material to replace the previously removed insulation and protective plate.

13.1.I Extraction/removal of 3508 engine

a) Previously, the engine and generator will have been isolated and disconnected. This work will be done by the Contractor, who will have to establish the best way to get the old engine and alternator out. It should be noted that the Contractor will have to dismantle the following equipment from the old engine before removing it from the vessel:

i) KIM Hotstart pre-heating system

ii) Pre-lubrification pump. See *photo no.41*.

b) These systems are not supplied with the new engine, and will need to be recovered and reinstalled on the new engine.

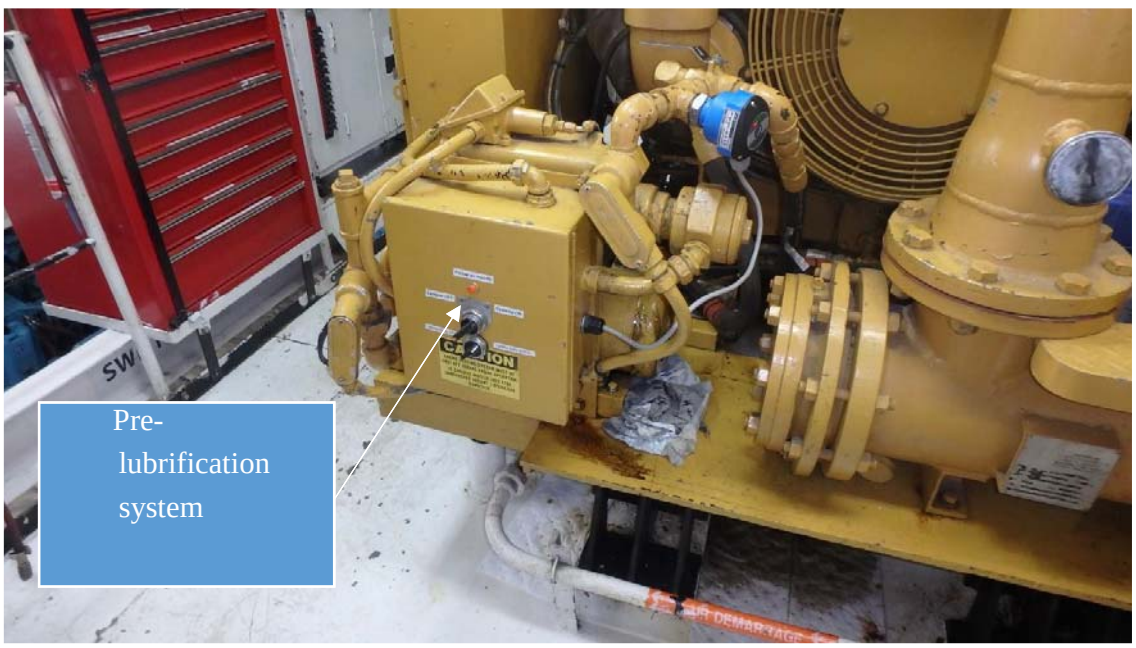


Photo no. 41 : Pre-lubrification system to dismantle and retain

c) The engine and alternator will be taken out through the opening made in the shell, described in H.1.2. The old engine set 3508 and accessories will be disposed of by the Contractor. The following 3 panels will be dismantled and discarded:

i) Cylinder exhaust temperatures panel (near compressed air tanks). See photo no.43:

ii) Pressure and temperature of water, oil and engine fuel panel (on the inner rail). See photo no.42:• Emergency engine stop panel, located on the engine, interior to the rear of the vessel. See picture no.44:

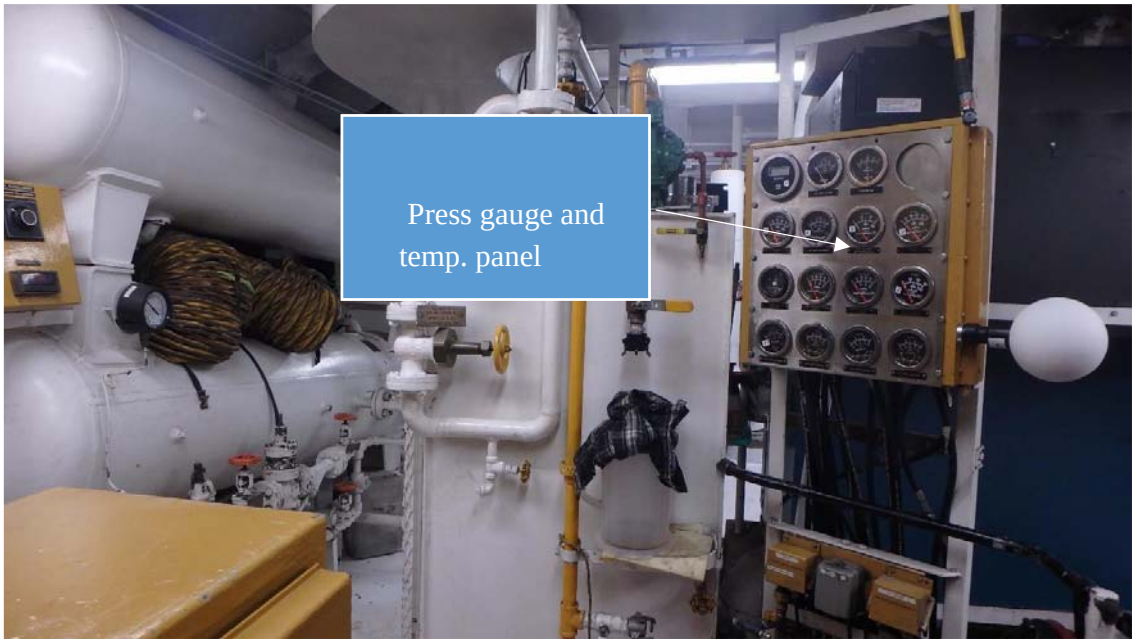


Photo no. 42 : pressure and temperature gauge panel, at the guardrail

Photo no. 43 : Exhaust gaz temperature panel

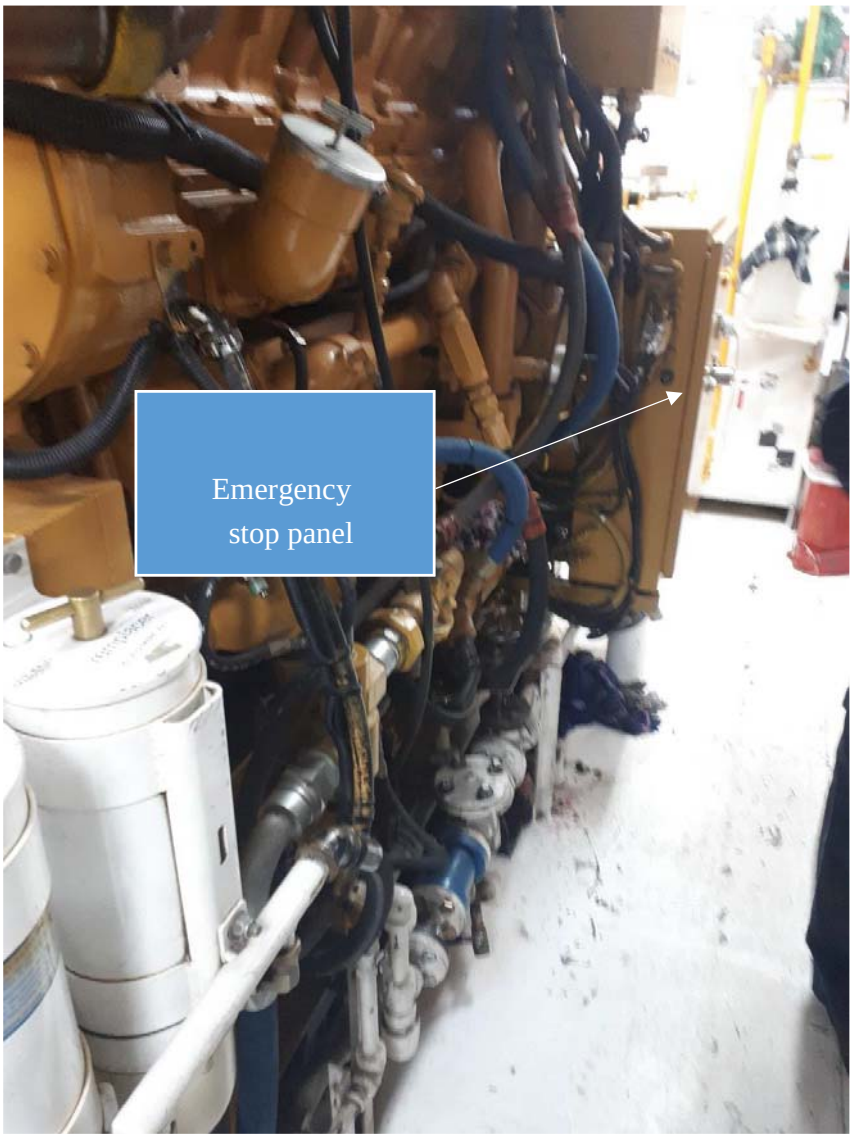


Photo no. 44 : emergency stop panel, at the engine inboard side

I.1.2 The following parts and systems can be removed from the engine, to facilitate the engine removal through the opening made in H.1.2. See *photo no.45*

i) Winslow filters on the top of the engine:

ii) Connection boxes for exhaust temperature pyrometers, on the top of the engine:

iii)Heat exchanger and piping

iv) Turbos and air inlet filter box

v) See *photo no.45.*

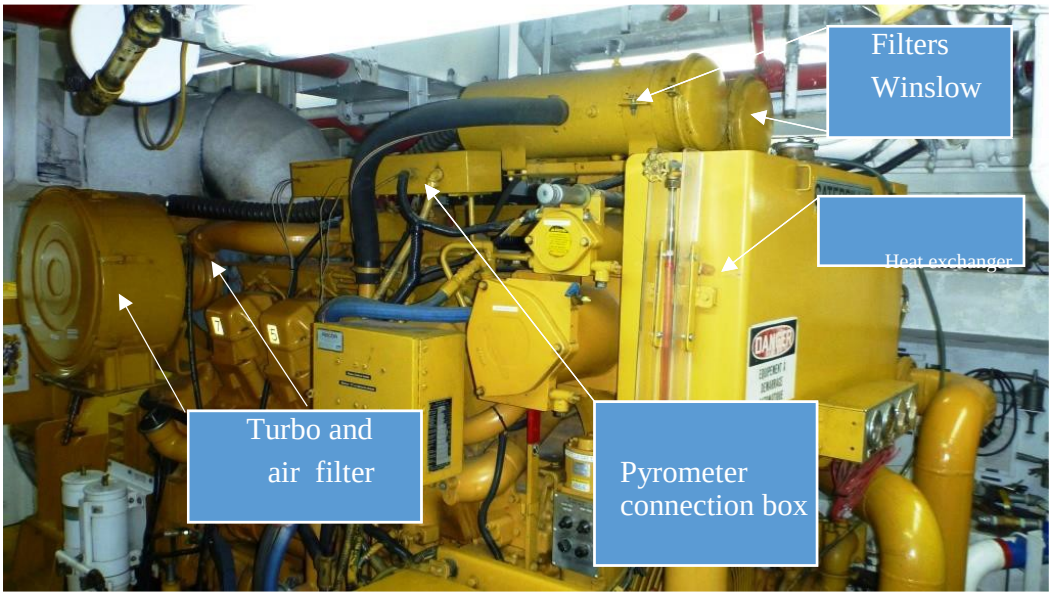


Photo no. 45 : equipment to be remove prior to engine removal

13.1.J Insertion/entrance Caterpillar C32

J.1 This work will be done by the Contractor, who will have to establish the best way to introduce the new Caterpillar C32 engine and alternator, with the TCC recommendations.

J.2 The engine will be introduced through the opening made in the shell, described in H.1.2.

J.3 The 2 systems removed from the engine, which will be recovered as indicated at 13.1.I, will be reinstalled on the new engine, based on TCC recommendations, and the Coast Guard representative. Drawing C18-05-160-02 the systems to be modified clearly indicates the layout of the new pipes to be fabricated and installed.

13.1.K Reconnections

K.1 Once the new engine is in place on its new seating, all piping and mechanical systems will be completed, as indicated on drawing C18-05-160-02 System to be modified.

K.2 These reconnections will be verified by the TCC to ensure they comply with the C32 installation instructions.

K.3 Also, all new power and control electrical connections will be made, as prescribed by Caterpillar. This work will be performed by the Contractor. The CGTA will have to approve everything before proceeding to the light and load tests of the engine. The HMI control panel attached to the group must be removed and moved to the location of the old pressure and temperature gauge panel near the handrail. A steel angle bar support must be manufactured and installed. A 10 m harness extension cable will be provided by the CCG. The cable must be installed and properly protected.

K.4 The Contractor must perform the electrical power and controls reconnections. The Contractor will have to produce plans and specifications to allow the electrical installation of the new motor and alternator. The Contractor will work closely with the TCC.

13.1.L Tests and trials

L.1 Upon completion of the insertion and installation of the new engine, the Contractor must start the engine / alternator assembly, according to the test protocol in place by Caterpillar. The Class and / or TCMS Inspector must also be present for certain tests, at their discretion. The final word will be left to the Coast Guard Technical Authority, with respect to Coast Guard satisfaction with the work performed in this specification.

13.2 INTEGRATION C-32

(13B01)

13.2.A Purpose

A.1 The Statement of Requirements is related to the installation, implementation and integration of a Woodward marine control system for three Alco 251 main engines and one Caterpillar C 32 auxiliary/emergency engine. CCG has recently acquired from an Original Equipment Manufacturer (OEM) authorized supplier all equipment (including all cables) necessary to replace the existing Dego Gena – Asea original system.

A.2 The Contractor or the OEM Woodward integrator, must supply and install the cables with terminals as showed in the design architecture Annex (13.2.F), and engage the services of an authorized installer/integrator by Woodward (OEM) to complete all necessary connections, preliminary verifications to commissioning, and the commissioning of the new control system updated.

A.3 In this specification, in order to lighten the text, the use of the term Contractor includes the Sub-Contractor, which must be authorized by the OEM as a specialist integrator of Woodward equipment. The Contractor must confirm this item with a letter from the OEM prior to the engagement of a sub-contractor.

a) The FSR on-site presence, is requested for full installation and commissioning tasks.

b) 1st task, removal / installation period of twenty (20) full days on site with three (3) FSR (3 x 20 days), to remove existing equipment and cables, install all cables and connections, hardware and software new equipment. Include two (2) complete travel both ways for the three (3) FSR.

c) 2nd task, preliminary test and commissioning period of ten (10) full days on site with three (3) FSR (3 x 10 days). Include one (1) complete travel both ways for the three (3) FSR.

d) 3rd task, dock trials period of three (3) full days on site and sea trials period of two (2) full days on site with three (3) FSR (3 x 5 days). Include one (1) complete travel both ways for the three (3) FSR.

e) Contractor is to coordinate and schedule these periods.

13.2.B Part 2: GENERAL REQUIREMENTS

B.1 The OEM replacement design must be fully approved by at least one recognized member of the International Association of Classification Societies (IACS) and the Delegated Statutory Inspection Program (DSIP). Since the original Dego Gena – ABB original system are IACS approved (Lloyd's), an upgrade with OEM equipment and service will be fully compliant to maintain the original certification.

B.2 The new Woodward system must be supported by a service and parts facility located in Canada that is capable of providing qualified technicians for on-site support at major CCG bases within 24 hours of a request by CCG. The Contractor or his subcontractor will be responsible for this service, upon request.

B.3 Contractor must include all engineering, construction, and Classification Society certification costs (whenever requested) for the Woodward marine control system.

B.3.1 Contractor must have Engineered Stamped new or modified drawings approved by an OEM recognized organization to reflect the replacement installation as fitted onboard the vessel.

B.3.2 The propose Woodward marine control system package must take into account the standards, rules and regulation of the following marine authorities:

a) International Maritime Organisation (IMO) regulations, resolutions and amendments, as far as compulsory for this vessel

b) International Convention for the Safety of Life At Sea with amendments (SOLAS)

c) International Regulations for Preventing Collisions at Sea 1972 (COLREGs)

d) Règlement sur les machines de la marine marchande du Canada (No Canada Shipping Act 2001, SOR-90-264 Marine Machinery Regulations Sch VIII, remote control and monitoring system vessel category 2, voyage class Home trade 1 & 2)

e) DNV GL Det Norske Veritas, part 6 Chapter 3 2010

f) Institute of Electrical & Electronic Engineers Standard No. 45 (IEEE-45)

g) National Electrical Manufacturers Association (NEMA)

h) Ship Electrical Standards (TP127e)

B.4 The subcontractor must be an OEM equipment and service recognized organization who have been accomplished recently, in the past five years, alarm and monitoring systems installation projects for CCG or other marine organization with the same OEM technology. An OEM – Woodward marine control system certification or letter of accreditation for the subcontractor will be required.

13.2.C OPERATIONAL REQUIREMENTS

C.1 The upgraded controls system will migrate from a gena-dego ABB system to a fully Woodward system with new safety feature. See below Annex 1 (F.1), which schematically shows the new Woodward equipment design architecture. With such architecture, the system will gain reliability, speed, and flexibility of operation and be ready for upcoming major milestone, such as cyclo-converter replacement with ABB new equipment in 2019 and new Wartsila engine package in 2020.

a) The scope of this work DOES NOT include any work related to the three (3) Alco main engines, such as switchboard related equipment like AVR, main CB, alternator to bus cables, PTs,CTs, and instrument protection. Most of these equipment and cables have been recently renewed. The power cables between the alternator and the bus will be reused, will probably be shortened by a few feet and the contractor will have to provide new terminals to connect the power cables at the alternator. In Section 13.2.F.2 and 3 the Contractor (and Woodward Service Subcontractor) is requested to integrate the GSM, ie *t*he installation of the control / communication / data cables between the various new Woodward equipment, refer 13.2.A.2.

C.2 The upgraded Woodward system must be capable of achieving its full working capability alongside or at sea, even when the ship is heeled to either port or starboard, and trimmed either forward or aft. The maximum static angle of heel or trim must be within the range of 4 to 8 degrees.

C.3 The language used in all electric diagrams, instrumentation, manuals and nameplates will be only in English if the original to be modified is in English; all new must be in French and English . The metric units (SI) will be used for instrumentation and identification of data. All electrical diagrams will be made using ANSI standards.

C.4 The upgraded Woodward system must be adapted to the vessel newly replaced equipment such as, ship service generator Cat C32, DSL propulsion breakers protection, Wartsila bow thruster unit, and equipment to be replaced in 2018/2019 such as, ABB propulsion system. In 2020, the vessel will undergo a complete main propulsion re-motorization diesel/alternator with the new Wartsila engines package, as the one being installed on CCGS Ann Harvey in early 2018. Provision should be made with the Woodward system to be compliant with this coming diesel/alternator replacement.

13.2.D INSTALLATION OF EQUIPMENT AND CABLES

D.1 The Contractor will have received by 20th July 2018 all equipment, accessories and installation cables to upgrade the engines control system.

D.2 Each piece of equipment has been proven functional and accepted by CCG during the factory acceptance audit before being delivered to the Contractor.

D.3 Following delivery to the Contractor, all components of the control system must be effectively stored and protected prior to installation. Any damage sustained during storage due to inadequate protection or improper handling is the sole responsibility of the Contractor and / or those acting on behalf of the Contractor.

D.4 The delivery of the Woodward system includes all the necessary spare parts recommended, the special tools and cables required for installation to update the system. The equipment supplied and to be installed as well as the spare parts are listed in a minimum basic list attached in Annex II Parts to install (F.2).

D.5 The Contractor must dismantle and dispose of the following equipment

D.5.1 All 4 Gena modules in cubicule C2, in the control room;

D.5.2 All 4 Dego modules in cubicule C2, in the control room;

D.5.3 Cables connecting Gena, Dego, their attachment and related power supply;

D.6 The Contractor must fix and install the following equipment, with adapted front and back plate (Contractor supply)

D.6.1 Four new Woodward 3500XT P2 Easygen in cubicule C2, in the control room;

D.6.2 Three new Woodward 733 digital governor control in cubicule C2, in the control room;

D.6.3 Switch with Ethernet communication input, and Phoenix hub as per design;

D.6.4 New Belden and Ethernet cables connecting Woodward control equipment to engines, and other connections as per design architecture. Phoenix Ethernet switches and hubs connecting the new equipment described in C.4; access to existing cable tray and bulkhead glands remains the Contractor's responsibility, including dismantling / reassembling ceilings, walls, lighting and other obstructions that must be removed;

D.6.5 Identifications: The cables must be identified with permanent metal markers at each end and on each side of an opening or bulkhead;

13.2.E COMMISSIONING REQUIREMENTS

E.1 The Contractor must develop a verification plan for all connections and submit it to the CGTA for approval prior to energizing the equipment according to the OEM standard, and implement it;

E.2 The Contractor must develop a verification plan for all major equipment and submit it to the CGTA for approval prior to full energizing of the equipment to the OEM standard and implement it;

E.3 The Contractor must develop a Dock Test Plan in accordance with the OEM Standard, submit it to the CGTA for approval and implement it; the tests must be to the satisfaction of the CCG and the IACS / TCMS inspector;

E.4 The Contractor must develop a Sea Trial Test Plan in accordance with the OEM Standard, submit it to the CGTA for approval and implement it; the tests must be to the satisfaction of the CCG and the IACS / TCMS inspector;

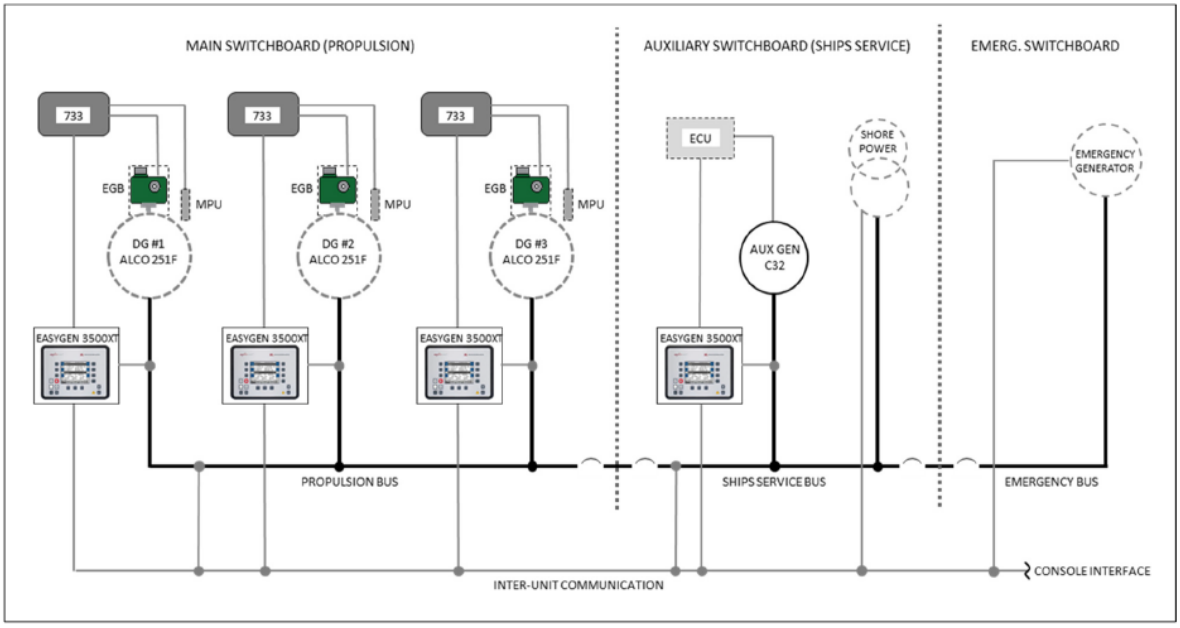
E.5 Before the end of the contract, the Contractor must provide all drawings, test reports and specifications, in both English and French, in both electronic and paper format. Electronic formats must be compatible with Microsoft, Adobe and AutoCAD.

E.6 Before the end of the contract, the Contractor must provide the ship with three (3) copies, in both electronic and paper format, of complete manuals describing the complete installation, dockside and sea trial tests result. The manuals must be completely legible and written in French. English manuals should also be included if available.

13.2.F ANNEXES

F.1 ANNEX I

FINAL ARCHITECTURE – Woodward Control System



F.2 ANNEX II

PARTS TO INSTALL – CABLES TO INSTALL

Hardware:	Qty:
Woodward controls	
3500XT P2 Easygen power management control part no. 8440-2088	4
733 digital governor part no. 8237-177	3
Engine Control Software (GAP) part no. 789-2437-5814	3

Ancillary Equipment & Components :	
Transformer upgrade kit (600-120) part no. 987-006-064TV2	1 kit
24-volt relays (4-Pole) part no. 987-X14A-9C	1 lot

Others:	
Terminal Blocks & Accessories part no. MIS-5965-S01	1 lot
Cable and Wire for sensor control, ethernet, and Can-bus	1 lot

F.3 ANNEX III

LISTS OF EQUIPMENT TO BE WIRED

The existing cables will have to be removed between the existing equipment and the C2 cubicule, and wired again in redundancy according to the scheme of the new architecture, the Phoenix switches are not shown in the diagram but must also be wired.

Woodward 3500XT P2 / 733 to Main engine 1 (Port engine)

Woodward 3500XT P2 / 733 to Main engine 2 (Center engine)

Woodward 3500XT P2 / 733 to Main engine 3 (Starboard engine)

Woodward 3500XT P2 to Caterpillar C32 digital control unit

Provision to be made for new cyclo-converter ABB, installation 2019

Provision to be made for new 3 Wartsila engine, installation 2020

F.4 ANNEX IV

PHOTOS

Cabinet C2 control room, close door and open

14.0 ELECTRICAL POWER DISTRIBUTION

14.1 NOT USED

15.0 AUXILIARY SYSTEMS

15.1 FUEL OIL, HELICOPTER FUEL AND OILY WATER TANKS

(15F)

15.1.A Identification

A.1 Open and prepare the fuel oil, helicopter fuel and all miscellaneous tanks described in B.2, for inspection by a TCMS surveyor in order to certify the tanks for TCMS.

A.2 If any emergency repairs must be carried, their cost will be negotiated using PWGSC 1379 form.

15.1.B References

B.1 Drawings

B.1.1 108-H-0026 Capacity Plan

B.1.2 108-H-022 Docking Plan

B.1.1 108-H-013 Tank Testing Plan

B.2 List of tanks included in this item :

B.2.1 All tanks with an asterisk (*) are fitted with docking plugs

Tanks	Frames	Capacity (m^3)	Surface (m^2)
* Fuel tank No 1 port	163-175	55.4	268.3
* Fuel tank No 2 starboard	163-175	55.4	268.3
* Fuel tank No 3 port	152-163	117.7	386.0
* Fuel tank No 4 starboard	152-163	111.7	386.0
* Fuel tank No 5 port	106-121	118.6	409.7

* Fuel tank No 6 starboard	106-121	118.6	409.7
* Double bottom No 7 port	106-126	51.8	354.2
* Double bottom No 8 starboard	110-126	41.5	282.2
* Double bottom No 9 port	70-96	79.7	533.0
* Double bottom No 10 starboard	70-96	79.7	533.0
* Overflow tank	106-110	8.5	78.7
Fuel drain tank	94-96	1.9	25.5
Oily water tank	55-64	1.6	Non disp.
Port used oil tank	30-37	6.5	60.0
Starboard oily water tank	30-37	6.5	60.0
Helicopter fuel tank	5-11	22.8	56.0
* Lower Flume tank	117-126	116.3	492.5
* Upper Flume tank	117-126	118.3	516.5
Renovated oil tank	54-57	13.8	118.5
Day tank	64-70	27.8	147.2
Settling tank	57-64	32.5	161.5
Emergency generator tank	67-69	1.9	13.8

B.3 Types of fuel stored in tanks

B.3.1 The fuel oil tanks contained:

a) Arctic type diesel; and/or

b) Marine type 3GP 11D; and/or

c) Arctic type 3GP 11C; and/or

d) Marine diesel;

e) As ISO8217: 2005 (F) international standard.

B.3.2 The helicopter fuel tank contained Jet A1 fuel.

15.1.C Statement of work

C.1 Emptying and draining the tanks :

C.1.1 Before starting the works prescribed by this specification, the amount of fuel was reduced to a minimum by the ship's crew and distributed as to facilitate the works.

C.1.2 The Contractor must bid to pump and store ashore and then pump on board the vessel back one hundred (100 m^3) cubic metres of diesel fuel. Storage facilities, Contractor supplied, must be clean, uncontaminated and, prior to transferring of any fuel oil to these facilities, inspected by the CCG Technical Authority to his satisfaction. This fuel transfer operation must be the responsibility of the Contractor. The Contractor must also submit a unit price for pumping, store ashore and pump back an amount of five (5 m^3) cubic metres of fuel oil. Final cost will be adjusted using PWGSC 1379 form.

a) The fuel drained from the Helicopter fuel tank must not be stored by the Contractor. It must be disposed of by the Contractor. The estimated quantity of residual fuel from this tank is five (5) m^3.

C.1.3 During the course of this transfer, the Contractor must empty all tanks to the bottom of their suctions. Contractor must consult with the CCG Technical Authority as to the sequence of transferring of fuel off the vessel whilst the vessel is sitting on the blocks.

C.1.4 The Contractor must remove the docking plugs and drain remaining fuel and residues from the tanks. The Contractor must bid on the removal and disposal of

approximately fifteen (15 m³) cubic metres of fuel residue and dirt which can be expected to be found in the tanks indicated in 15.1.B. For tanks not fitted with docking plugs, the contractor must use a portable pump to complete the draining procedure. The Contractor must dispose of this remaining residue ashore in accordance with the provincial environmental regulations. The Contractor must also submit a unit price for removal and disposal of an amount of one (1 m³) cubic metre of fuel residue and dirt. Final cost will be adjusted using PWGSC 1379 form.

C.1.5 There will still be some fuel in the day tank and possibly in the settling tanks. The Contractor must plan, in its specification, a fuel transfer by the ship's crew. Details must be discussed with the Chief Engineer.

C.2 Opening and cleaning of tanks

C.2.1 The Contractor must dismantle any equipment restraining access to the manholes and reassemble them once work is completed.

C.2.2 The Contractor must open the manhole covers of the tanks according to the schedule specified by the CGTA.

C.2.3 The contractor must empty, clean of all deposits, and ventilate the helicopter fuel tank, fuel tanks and oily water tanks for a sufficient period of time to ensure that tanks are free of noxious and explosive gases.

C.2.4 Before any work or inspection can be performed in the tanks, the Contractor must obtain a certificate from a chemist to certify that tanks are gas free, safe to work inside and that hot work can be performed inside. Copies of the certificates are to be posted in a visible location, near the manholes, and another copy for each tank must be given to the Chief Engineer. The Contractor must keep those certificates valid for the entire period where a tank is open.

C.2.5 The Contractor must steam clean all the other tanks and dispose of all dirt and debris.

C.2.6 Upon completion of steam cleaning, the Contractor must ensure that each tank is gas freed, suitable for entry and for further inspection and required works.

C.2.7 The Contractor must ensure that all limber holes in each tank are free and clear and he is to inspect for obstructions at the bottom of all sounding pipes and tank suctions.

C.3 Tanks inspection

C.3.1 All the tanks must be submitted to a TCMS surveyor for certification and by the CGTA. It must be the Contractor responsibility to inform the TCMS surveyor and the CGTA when the above mentioned tanks are ready for inspection.

C.3.2 Following the inspections, all defects noted by the surveyors or the Contractor must be repaired by the Contractor.

C.3.3 If any repairs are required for the Contractor, their cost must be negotiated using PWGSC 1309 form.

C.4 Tanks testing

C.4.1 Once the inspections completed, the Contractor must install the docking plugs.

C.4.2 The Contractor must close the manhole covers, supplying and using new gaskets, nuts and washers. The material for the manhole covers gaskets must be suitable for petroleum products. The Contractor must check all manhole cover studs and renew any defective stud.

C.4.3 The Contractor must perform hydrostatic or compressed air tests on all tanks, in presence and to the satisfaction of a TCMS surveyor. For bidding purposes, the contractor must include in his bid the unit cost for each additional test that might be required.

C.4.4 If hydrostatic tests are performed, once they are completed, the Contractor must:

a) remove the docking plugs,

b) drain the tanks,

c) open the manhole covers,

d) obtain a chemist certification allowing for safe entrance,

e) wipe dry the tanks,

f) close the manhole covers,

g) install the docking plugs

h) perform vacuum box tests in the presence of the Chief Engineer

C.4.5 The Contractor must plug all air vents and overflow piping before performing the hydrostatic or compressed air tests on the tanks and free the air vents and overflow piping after testing. The following tanks overflow are in the settling tank :

a) Emergency Generator Fuel Oil tank;

b) Fuel oil Day tank;

C.4.6 The settling tank overflow leaks into the overflow tank

C.4.7 If compressed air tests are performed on the tanks, the Contractor must plug all piping, supply, vents, overflow, etc.

C.4.8 All the tanks must be inspected by the Chief Engineer before the Contractor closes them.

C.5 Extra work, flume tanks

15.1.D Proof of performance

D.1 Inspections

D.1.1 The following inspections are required to be verified by the CCG Technical Authority and the TCMS surveyor:

a) Inspection of each fuel oil tank after cleaning,

b) Final inspection of all tanks prior to their being "closed-up".

D.2 Testing

D.2.1 The Contractor must perform the following test on each fuel oil tank:

a) Hydrostatic or air pressure test.

D.2.2 The Contractor must also perform the following tests:

a) Vacuum box tests on each docking plug

15.1.E Deliverables

E.1 **The Contractor must supply the CCG Technical Authority a report, detailing the work undertaken, defects, repairs made and measurements and readings taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.**

E.2 **Contractor must also provide a copy TCMS Division 3 survey credit to the CCG Technical Authority.**

E.3 **The Contractor must provide a Quality Assurance (QA) reports indicating that all areas, as defined in this specification, have been inspected by the Contractor's QA Department and all areas of defects established by this survey have been identified for remedial action.**

15.2 LUB. OIL TANK CLEANING AND INSPECTION

(15R)

15.2.A Identification

A.1 Perform emptying, cleaning and inspection of the Lubrication Oil Storage tank.

15.2.B References

B.1 Drawings

B.1.1 108-H-0026 Capacity plan

B.2 Tank Specification

B.2.1 Frames: 97 to 106

B.2.2 Volume: 18,5 cubic metres

15.2.C Statement of work

C.1.1 Before starting the works prescribed by this specification, the amount of lubricating oil was reduced to a minimum by the ship's crew.

C.1.2 The Contractor must bid to pump and store ashore and then pump on board the vessel back ten (10 m^3) cubic metres of lubricating oil. Storage facilities, Contractor supplied, must be clean, uncontaminated and, prior to transferring of any lubricating oil to these facilities, inspected by the CCG Technical Authority to his satisfaction. This lubricating oil transfer operation must be the responsibility of the Contractor. The Contractor must also submit a unit price for pumping, store ashore and pump back an amount of one (1 m^3) cubic metre of lubricating oil. Final cost will be adjusted using PWGSC 1379 form.

C.1.3 During the course of this transfer, the Contractor must empty the tank to the bottom of its suction.

C.1.4 The Contractor must open the manhole giving access to the tank and dump the remaining oil using a portable pump then ventilate the tank.

C.1.5 Before any work or inspection can be performed in the tanks, the Contractor must obtain a certificate from a chemist to certify that the tank is gas free, safe to work

inside and that hot work can be performed inside. Copy of the certificate must be posted in a visible location, near the manhole, and another copy must be given to the Chief Engineer. The Contractor must keep the certificate valid for the entire period where a tank is open.

C.1.6 The Contractor must wipe dry the tank floor and bulkheads in order to allow inspection by the TCMS surveyor.

C.1.7 Following the inspection, all defects noted by the surveyor or the Contractor must be repaired by the Contractor.

C.1.8 If any repairs are required for the Contractor, their cost must be negotiated using PWGSC 1309 form.

C.1.9 The Contractor must close the manhole cover, supplying and using new gaskets, nuts and washers. The material for the manhole covers gaskets must be is suitable for petroleum products. The Contractor must check all manhole cover studs and renew any defective stud.

C.1.10 The Contractor must perform a compressed air tests on the tank, in presence and to the satisfaction of a TCMS surveyor. For bidding purposes, the contractor must include in his bid the unit cost for each additional test that might be required.

15.2.D Proof of performance

D.1 Inspections

D.1.1 The following inspections are required to be verified by the CCG Technical Authority and the TCMS surveyor:

a) Inspection of the lubricating oil tank after cleaning,

b) Final inspection of the tank prior to closing.

D.2 Testing

D.2.1 The Contractor must perform the following test on the lubricating oil tank:

a) Air pressure test.

15.2.E Deliverables

E.1 The Contractor must supply the CCG Technical Authority a report, detailing the work undertaken, defects, repairs made and measurements and readings

taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.

E.2 Contractor must also provide a copy TCMS Division 3 survey credit to the CCG Technical Authority.

15.3 MAINTENANCE OF SCUBA AIR COMPRESSOR

(15J04)

15.3.A Identification

A.1 Supply material and labour to perform inspection, annual maintenance and certification of the breathing air compressor, used to fill the breathable air bottles.

15.3.B References

B.1 Manufacturer: JORDAIR, model K100-3EH

B.1.1 Manufactured: 1996

B.1.2 Pressure: 5000 PSI

B.1.3 SCFM: 5.8

B.1.4 Filling station: MAKO

B.1.5 Outside air suction

B.2 Air analysis Standard

B.2.1 CAN/CSA-Z180.1-00

15.3.C Statement of work

C.1 The Contractor must supply parts, oil and man power to perform the following task:

C.2 Replace the oil and the oil filter, both compatible with the compressor. The oil will be supplied by the Contractor.

C.3 Change the air filter cartridges.

C.4 Check that the purges are working properly.

C.5 Adjust the system for an available pressure of 2900 psi.

C.6 Supply two (2) spares filter cartridges and one (1) spare separator element compatible with the compressor. For this work, use the cartridges, oil and filter already aboard the vessel. The new cartridges will be delivered to the vessel and kept as spares.

15.3.D Proof of performance

D.1 Trials

D.1.1 The Contractor must fill up a breathable air bottle showing the compressor is working correctly.

D.1.2 When the maintenance is complete, the Contractor must supply parts and manpower and perform an air analysis test according to Z180 standard. All cost related to the analyses process, including those for certification must be included in the bid.

15.3.E Deliverables

E.1.1 The Contractor must send the air analysis report and the certificate to the vessel upon reception.

E.1.2 The Contractor must supply, to the CGTA, a detailed maintenance report describing all verification, lubrication, adjustment and calibration works including the parts replaced.

15.4 NOT USED

15.5 FUEL OIL TRANSFER PUMPS REPLACEMENT

(15F)

15.5.A Identification

A.1 Perform replacement of existing fuel oil transfer pumps assembly (pump and electric motor) by new Coast Guard supplied pumps.

A.2 Modify the existing bed and install the new pumps.

A.3 Modify the supply and return lines in order to join the existing piping system.

15.5.B References

B.1 Pictures

B.1.1	IMG_2275	General view, looking outboard
B.1.2	IMG_2276	Supply piping (75 mm) and isolation valves, pump #1 strainer
B.1.3	IMG_2277	#1 pump and motor
B.1.4	IMG_2278	General view, looking forward, discharge piping (75 mm)
B.1.5	IMG_2279	#2 pump and motor
B.1.6	IMG_2280	Supply piping (75 mm) and isolation valves, pump #2 strainer
B.1.7	IMG_2281	Piping between strainer and pump #2
B.1.8	IMG_2283	Pump #2, supply and discharge

B.2 Drawing

B.2.1	74-00-01	Fuel Oil Transfer System

B.3 Installation manual and new pumps specification

B.3.1 T1456FR V.9-3 POMPE ROTAN Types GP – HD – PD – CD – CC - ED

B.3.2 DESMI Pump – Model HD81EM-1U3B2

15.5.C Statement of work

C.1 The Contractor must supply parts and manpower to perform the following tasks:

C.1.1 Close and padlock the fuel supply and discharge valves.

C.1.2 Drain the pumps, strainers and piping in the isolated section and dispose of the drained fuel.

C.1.3 Dismantle piping between the strainers, the pumps and the isolating valves.

C.1.4 Disconnect both motor supplies. Prior to that, the crew will have isolated and padlocked the electrical supply to the motors.

C.1.5 Remove and dispose of the pumps and motors to be replaced.

C.1.6 Using the new pumps as a template, modify the pumps bed, install the new pumps connect and align them to the motors. Alignment and rotation trials must be witnessed by the chief engineer.

C.1.7 Manufacture and install new piping sections between the strainers and the pumps intake and between the pumps discharges to the related valves. Piping used must comply with specification included in the drawing.

15.5.D Proof of performance

D.1 Trials

D.1.1 Before being installed in the essel, all new piping sections must be coupled together and shop tested to a 225 psi minimal pressure, for a one hour period, in presence of the chief engineer.

D.1.2 When installation is complete and the fuel tanks available, a pumping trial must be performed with each pump to make sure all new piping is without leaks. These trials must be performed in the presence of the TCMS surveyor and the CGTA.

15.5.E Deliverables

E.1.1 The Contractor must supply the CCG Technical Authority a report, detailing the work undertaken, defects, repairs made and measurements and readings taken, in Microsoft Office Word 2003 format on an USB stick, not protected by a password.

E.1.2 Contractor must also provide a copy TCMS Division 3 survey credit to the CCG Technical Authority.

Spec Item:	Scope of work	TCMS Field #:
AUXILIARY SYSTEMS		(15F)
FUEL OIL TRANSFER PUMPS REPLACEMENT		

15.6 DIESEL, GAS AND JET A-1 HOSE CERTIFICATION

(15F)

15.6.A Identification

A.1 IMPORTANT NOTE: WORKS REQUIRED FOR THIS ITEM MUST BE PERFORMED BETWEEN SEPTEMBER 1ST AND 15TH 2018.

A.2 Perform verification and hydrostatic pressure test, according to RMA IP-11-4 standard, on seven (7) fuel hoses used for transferring diesel oil, gas and Jet A-1 fuel.

15.6.B References

B.1 List and specifications of hoses

B.1.1 Two (2) diesel oil transfer hoses, Make : PERAFLEX, 3 in. dia., 50 feet long, serial #: Q-055 and Q-056 (to be tested at 300 PSI).

B.1.2 One (1) Jet A-1 transfer hose, 1½ in. dia., 85 feet long (make sure not to leave any water traces in this hose) # 1217-3 (Q-054) (to be tested at 300 PSI).

B.1.3 One (1) gas transfer hose, ¾ in. dia., 50 feet long, # 2751 (Q-053) (to be tested at 225 PSI).

B.1.4 One (1) diesel oil hose, 1 1/2" dia., 60 feet long, # 87025 (Q-052) (to be tested at 225 PSI).

B.1.5 Two (2) Goodyear Petroliom hoses, ¾" dia., 50 feet long, # (Q-051 et Q-050) (to be tested at 225 PSI).

15.6.C Statement of work

C.1 The Contractor must supply material, tools and manpower to perform verification and hydrostatic pressure test on the seven (7) fuel hoses described in B.1, according to RMA IP-11-4 standard.

C.2 The Contractor must dispose of all the water used for testing and of the oil traces present in the hoses to be tested according to oily water disposal regulations. The cost of the disposal must be included in the original specification.

15.6.D Proof of performance

15.6.E Deliverables

E.1 The Contractor must provide the CGTA with one original copy of the certificate for each hose test..

16.0 DOMESTIC SYSTEMS

16.1 CLEANING, PAINTING AND DISINFECTION OF POTABLE WATER AND BOILER FEED TANKS

(16B02)

16.1.A Identification

A.1 Cleaning, painting, testing and disinfection of potable water tanks. The boiler feed tanks must also be cleaned, painted and tested.

A.2 The preparation and coating work of the potable water tanks must start early in the maintenance period to allow sufficient time for curing.

A.3 A Transport Canada surveyor must be present for the hydrostatic or pressurized air test performed on the three (3) tanks.

16.1.B References

B.1 Drawing

B.1.1 108-H-0026 Capacity Pan

B.2 Documentation

B.2.1 EKME/MCGE#3280255v15 CCG Technical Bulletin Bulletin 2015-01 Potable water tank epoxy based surface coatings update, lessons learned and recommendations.

B.2.2 Fleet Safety Manual 7.A.12 –POTABLE WATER QUALITY Version 4-1: 2015-12-04

B.3 Pictures

B.3.1 FW tank Port suction

B.3.2 FW tank Stbd suction

B.3.3 Inside Port piping

B.4 List of concerned tanks:

Tank	Frames	Volume (m^3)	Surface (m^2)

Port potable water	30-41	51.3	224.0
Starboard potable water	30-41	50	222.7
Feed water	7-13	16.1	

16.1.C Statement of work

C.1 Preparation, cleaning and painting

C.1.1 The Contractor must remove the manhole covers, finish emptying the tanks with portable pumps then ventilate the tanks. A certified chemist must post a certificate attesting that each tank is gas free and safe to work inside.

C.1.2 The Contractor must replace two (2) piping sections of fresh water supply lines on port and starboard tanks. Piping sections to be replaced are situated between the isolating valves and inside of each fresh water tank. (See pictures). To perform this task, the Contractor must:

a) Cut around the flange on each tank bulkhead

b) Uncouple the bolted flange on each isolating valve.

c) Clean the steel area around the carved out section

d) Manufacture a new piping section for each tank. Each piping section must be:

i) Made of galvanized (6 mils) seamless steel, ASTM 53 or equivalent after fabrication

ii) Schedule 40

iii)Built with new flanges with the same dimensions of the retrieved ones.

e) The Contractor must manufacture and weld in place an insert of a larger diameter than the flange cut on each tank and weld the new piping section on each tank.

C.1.3 The interior of the tanks is coated with white epoxy.

C.1.4 The Contractor must clean the inside of the three (3) tanks with high pressure (10,000 psi) water jet system.

C.1.5 The Contractor must remove all debris then wash and wipe dry the tanks.

C.1.6 The Contractor must plan on using mechanical tools to remove any loosened paint left after the water jet cleaning.

C.1.7 The Contractor must bid on removing and disposing of approximately of two hundred (200) litres of water and debris.

C.1.8 The Contractor must have all three (3) tanks inspected by a TCMS surveyor.

C.1.9 The Contractor must maintain a minimal temperature of 10°C in the tanks to be painted and on all their bulkheads.

C.1.10 CCG estimates that 25% of the total surface is bare metal. The Contractor must supply and apply, on these areas, two coats of a 100% solids epoxy paint, free of Volatile Organic Compound (VOC) and certified as a "Protective (Barrier) Material" for use on drinking water tanks, as indicated in Standard 61 of the National Sanitation Foundation (NSF) "Drinking Water System Components Program" and the American National Standards Institute (ANSI).

a) The white epoxy coating described in the preceding paragraph must be applied using paint brushes or paint rollers until required paint thickness is achieved.

b) Instead of the suggested paint, the Contractor may use an equivalent solid epoxy based paint that meets the standard 61 of NSF and ANSI and the application requirements of the manufacturer.

C.1.11 The Contractor must use all new equipment for the application of the coating including pumps, hoses, spray guns, brushes, etc. This is important to ensure that thinners or solvents are not inadvertently introduced by equipment previously used and then cleaned and contaminated with thinners or solvents. The re-use of pumps but not hoses may be permitted provided that the Contractor demonstrates draining plus sufficient flushing of the equipment with a product NSF 61 certified for use in potable water tanks and absent of any solvents. The Contractor must not use the product used for flushing on potable water tanks.

C.1.12 When submitting his bid the Contractor must provide the PWGSC Contracting Authority with the following.

a) Proposed paint coating being offered,

b) Manufacturer of the coating,

c) Proof that the paint meets the requirements specified in C.1.10

d) Manufacturer's working procedures sheets,

e) Product data sheets; and Material Safety Data (MSD) sheets.

f) The bid on having an independent certified NACE International (NACE) inspector with a minimum certification of Coating Inspector Program Level 2, who must:

i) Verify the work as specified, throughout the process;

ii) Provide advice and feedback directly to the CCG Technical Authority;

iii) Certify, in a written report to the CCG Technical Authority, that the Contractor has followed correct application procedures considering the environmental conditions.

C.1.13 The Contractor must be responsible for ensuring that the paint manufacturers application recommendations are strictly adhered to, especially in regard to the following:

a) Preparation of surfaces,

b) Paint temperature and substrate temperature during coating process;

c) Curing conditions (including temperature, humidity, dew point, ventilation and cure time),

d) Shelf life of paint, and

e) Compatibility with tank materials.

C.1.14 On completion of the surface preparation and prior to the first application of the paint schedule, the Contractor's Quality Assurance representative must provide a written statement certifying that the surface preparation has been completed in accordance with the manufacturer's instructions. Any deviations to those instructions must be noted in the certified statement.

C.1.15 The Contractor must be responsible for monitoring the following parameters during the application and curing period of the paint schedule:

a) Ambient air temperature of each tank and this must be constantly monitored during the application and curing period using an electronic data recorder. The Contractor must record temperatures hourly and submit printouts to the CGTA.

b) Before work is started, space temperature and relative humidity level in each tank.

c) Wet and dry bulb temperatures of each tank and temperatures of the surfaces being painted. The Contractor must measure and record these values every four hours during the coating process.

C.1.16 The Contractor must note that the paint application must not take place when the surface temperature is less than three (3) degrees C above the dew point.

C.1.17 The Contractor must ensure that anyone entering the tanks for any reason after the tanks have been cleaned, during or after the tank coating process must wear suitable clean, new, non-contaminating protective clothing, including booties/boot covers on their feet so as not to contaminate the tanks.

C.1.18 Once the coating is dry, The Contractor must rinse each tank, using fresh water.

C.1.19 Afterwards, the CGTA must inspect each tank.

C.1.20 Finally, the Contractor must install the manhole covers with new gaskets. Gaskets and anti-seizing compound used to install the manhole covers must be NSF 61 certified.

C.2 Overhaul of tanks' suction and discharge Valves

C.2.1 The Contractor must remove all suction and discharge valves on each tank and transport them to its shop for overhaul.

C.2.2 The Contractor must perform the following tasks:

a) Remove all valve bonnets;

b) Dismantle valves, clean and lap disks in with compound to ensure a good seat;

c) Clean all valve stems, examine them for wastage and then ring out;

d) Report to the Technical Authority any valve discs, seats and/or valve stems that require machining or replacement so remedial actions can be performed;

Inspect all contiguous piping and studs for wastage.

C.2.3 On completion of all cleaning and overhaul, the Contractor must lay out all parts for inspection and survey by the TCMS surveyor.

C.2.4 After successful completion of survey and/or repairs, the Contractor must reassemble all valves to a working order, using new gaskets and valve stem packing and then reinstall them in their respective positions using new gaskets. Gaskets used for the re-assembly of the valves must be NSF 61 certified.

C.2.5 The Contractor must supply and coat all moving parts and fasteners with an anti-seizing compound. This anti-seizing compound must be NSF 61 certified

C.2.6 The Contractor must perform the final closing up of all valves under the surveillance of the CCG Technical Authority. Following inspection, the Contractor must reassemble all valves in the closed position.

C.3 Sterilization and commissioning of potable water tanks

C.3.1 The Contractor must disinfect each fresh water tank tank in accordance with the CCG Fleet Safety manual (FSM) Potable Water Quality contained in section 7.A.12 prior to filling for testing.

C.3.2 The Contractor must superchlorinate each tank with bleach to a level of 50 mg/L (50 ppm) of free chlorine.

a) The Contractor must prepare a Sodium hypochlorite solution, using the following ratios:

i) One (1) litre per cubic meter of water, equivalent to 68.5 litres by potable water tank, when using 5 % bleach OR

ii) Thirty-five (35) liquid ounces per cubic meter of water, equivalent to 15 imperial gallons by potable water tank, when using 5 % bleach OR

iii) Four (4) decilitres per cubic meter of water, equivalent to 28.5 litres by potable water tank, when using 12 % bleach OR

iv) Fifteen (15) liquid ounces per cubic meter of water, equivalent to 6.5 imperial gallons by potable water tank, when using 12 % bleach

b) The Contractor must turn on all taps fed from these tanks to supply superchlorinated water to all pipes.

c) The Contractor must allow the superchlorinated water to sit in the tanks for a minimum of twenty-four (24) hours before flushing it.

d) The Contractor must bypass any charcoal filtration to ensure chlorinated water is in all parts of the system.

C.3.3 The Contractor must use this interval to perform the hydrostatic test on the potable water tanks and the feed water tanks, in presence and to the satisfaction of the CGTA and the Transport Canada surveyor. The Contractor must perform the following tasks:

a) Fill feed water tank with fresh water.

b) Perform hydrostatic tests, on all three (3) tanks, with fresh water to the top of their vent pipes. The Contractor must close de distribution valves from the potable water tanks to perform the hydrostatic tests and open the valves after their completion.

C.3.4 Afterwards, the Contractor must drain only the potable water tanks and rinse them, at least twice, until their chlorine concentration is less than 4 p.p.m.

C.3.5 The contractor must supply all required chemicals and equipment to dispose of all water used to treat the fresh water tanks in accordance with paragraphs 3.5 c), d), e), f) and g) of the CCG Fleet Safety manual (FSM) “Potable Water Quality”, contained in section 7.A.12.

16.1.D Proof of performance

D.1 Inspections

D.1.1 The following inspections are required to be verified by the Contractor's Quality and the CCG Technical Authority.

a) Inspection of each water tank after cleaning and surface preparation.

b) Monitoring of ambient temperatures and dew points before and during paint application.

c) Monitoring of surface temperatures before and during paint application.

d) Final inspection of all tanks prior to them being "closed-up".

D.2 Water quality analysis

D.2.1 The contractor must arrange for testing of potable water tank and distribution system in accordance with the following procedure for each tank:

a) The Contractor must fill the tanks with potable water to approximately fifty percent of their working volume.

b) The Contractor must collect one blank water sample from the freshwater supply line used to fill the tanks.

c) The Contractor must collect two water samples from each tank.

d) The Contractor must collect two (2) water samples from the distribution system from the following places:

i) First outlet chosen by the Chief Engineer

ii) Second outlet at the termination of the longest run of pipe

D.2.2 The Contractor must ship expeditiously the water samples listed above to an independent, accredited laboratory for testing water quality. The water samples must be tested using the 28 parameters described in the fleet safety manual, paragraph 3.6F of the section 7.A.12 – POTABLE WATER QUALITY, as well as other identified chemicals of concern based on the Coating manufacturer MSD sheets.

D.2.3 The Contractor must also have the water samples analyzed for two more chemicals concentration:

α) Bisphenol A Maximum concentration, NSF : 0,1 mg/l.

b) Epichlorohydrin Maximum concentration, OMS : 0,4 µg/l.

D.2.4 At least 72 hours after the first samples were taken, to ensure that the contaminants did not leach out in the tanks remaining stagnant water, the Contractor must collect two water samples from each tank and ship them for analysis as specified in D.2.2 and D.2.3.

D.2.5 Reports, from the independent, accredited laboratory for testing water quality, must be provided to the vessel and the CGTA within two (2) weeks. All parameters must be within the Health Canada Guidelines for Canadian Drinking water Quality.

16.1.E Deliverables

E.1 The contractor must supply, to the TA, the original water test reports proving evidence of acceptable tank water quality from the laboratory prior to acceptance of the refit work. A copy of the report will be posted on the vessel by the ship's crew.

E.2 **Before the end of the contract, the Contractor must give to the CGTA a comprehensive report detailing the work undertaken, defects, repairs made and measurements and readings taken, in a Microsoft Office Word 2003 or more recent format on an USB stick, not protected by a password.**

E.3 **The Contractor must also provide a copy TCMS Division 3 survey credit to the CCG Technical Authority.**

E.4 **The Contractor must supply the written report from the NACE inspector prior to acceptance of the vessel by Coast Guard.**

16.2 HVAC PLANTS REPLACEMENT

(16F04A01)

16.2.A Scope of work

A.1 Perform the replacement of the two main ventilation units by two similar groups, supplied by Coast Guard.

16.2.B General notes

B.1 All work specified in this specification and all repairs, inspections and replacements will be completed to the satisfaction of the Coast Guard Technical Authority (CGTA) or his representative. Upon completion of each item of this specification, the CGTA will be notified so that he may inspect the work before the final closure of the work. The failure of the Contractor to notify the CGTA does not absolve him of the responsibility to provide him with the opportunity to inspect any item in this specification. Inspection by CGTA cannot replace an inspection required by Transport Canada (TC).

B.2 Any specification item that involves the use of heat to perform the work requires the contractor to notify the C/E at the beginning and end of the work. The contractor will be responsible for setting up and maintaining a competent and well-equipped fire-fighting team during and up to one (1) hour after completion of hot work. This team will be able to monitor all surfaces involved, and will be able to intervene if necessary. The contractor will supply fire extinguishers and the fire crew during work and until the room is cooled. Ship extinguishers will not be used except for an emergency. The Contractor will be required to comply with the Coast Guard Hot Work Policy, which will be provided to the Contractor at the beginning of the work. The contractor will be responsible for applying this policy to its staff, including subcontractors.

B.3 The Contractor must include in its bid the costs of transportation, scaffolding, rigging, slings, craning, removal and installation of parts and equipment required for the performance of the specifications.

B.4 All hoses, manholes, parts and / or equipment that will need to be disassembled to perform the work will be put back in place at the end of the work, using new fittings,

gaskets, bolts, nuts, brackets, collars, as required and assembled before. All of these items will be inspected by the C/E and the Contractor.

B.5 The Contractor will ensure that all spaces, compartments and cabins of the vessel, both inside and outside, are left in the same condition as at the beginning of the work. The price for the removal and disposal of any material will be included in the price of each item of this specification.

B.6 The Contractor must provide the C/E with any marine chemistry certificate to enter a tank or confined space, in accordance with CGSSB7P3177, before cleaning, painting, or hot work begins in these tanks or engine rooms. Certificates will clearly specify the type of work to be performed and will be renewed as needed.

B.7 When the Contractor performs work that involves a fire extinguishing or warning system, he must ensure that the disarming of such a system leaves the ship and / or personnel with adequate protection against fire at all times. This can be accomplished by removing or disarming only a portion of the system, by replacing it with temporary parts during the performance of the work or by any other means accepted by the C/E.

B.8 Unless otherwise specified, all steel replaced and / or repaired must be painted with 2 coats of Marine Metal Primer as used on Canadian Coast Guard vessels as soon as possible.

B.9 All materials will be provided by the contractor. If a specified part or material cannot be provided, the replacement material will be approved by the C/E.

B.10 The Contractor will be responsible for contacting TCMS when items are ready for inspection.

B.11 The Public Service of Canada Act respecting the use of cigarettes will be in force on the ship. The Contractor must notify his staff and ensure that he respects it at all times.

B.12 The Contractor will employ qualified, certified and competent workers and supervisors to ensure a level of workmanship meeting industry standards (reference section 2 art.15, 16; sections 3.2 and 3.3), all to the satisfaction of the C/E.

B.13 The repair and installation of any machinery or equipment specified in this specification must be in accordance with the manufacturer's instructions, drawings and specifications.

B.14 The Contractor will provide adequate temporary shelter for any equipment or spaces affected by this work. The Contractor must take appropriate precautions to properly

protect any machinery, equipment, appliances, food or other items that may be damaged by exposure, movement of material, rain / snow, sand or sand dust paint, welding, aerial particles from sanding sand, solder or paint. Any damage will be the responsibility of the Contractor.

B.15 The Contractor must ensure that any welding is performed by a Canadian Welding Bureau (CWB) certified welder in accordance with Canadian Standards Association (CSA) standards. :

B.16 CSA W47.1 – Certification for Companies for Fusion Welding of Steel Structures (Minimum division level 2.0); et

B.17 CSA W47.2 – M1987 (R2003), Certification for Companies for Fusion Welding of Aluminium (Minimum division level 2.1).

B.18 Any installation or replacement of electrical equipment must be carried out according to the most up-to-date editions of the following marine standards: :

a) TP127 – Ship Safety Electrical Standards

b) IEEE 45 – Recommended Practice for Electrical Installation on Shipboard

c) All materials supplied and work performed by the Contractor must meet the following conditions of service:

i) Outside temperature from -40 to +35 degrés C;

ii) Wind speed up to 50 knots;

iii) Water temperature from de -2 to +30 degrés C;

iv) Shock loading up to 2.5g horizontal, 1.5g vertical

16.2.C References

C.1 Reference drawings and sketches

C.1.1 Canadian Coast Guard drawings:

a) Burrard Yarrows Industries Ltd. DWG No.H-01-72, Upper deck frame 20-52 unit Plan View and Elevations.

b) Burrard Yarrows Industries Ltd. DWG No.H-01-73, Upper deck frame 53-84 unit Plan View and Elevations.

c) Burrard Yarrows Industries Ltd. DWG No.H-01-75, Boat deck frame 20-52 unit 75. Plan View and Elevations.

d) Burrard Yarrows Industries Ltd. DWG No.H-01-76, Boat deck frame 53-84 unit 76. Plan View and Elevations.

e) Burrard Yarrows Industries Ltd. DWG No.H-0009, Officer's & Bridge decks. Plan View and Elevations.

C.1.2 Bronswerk drawing and sketch:

a) Bronswerk portside HVAC Unit, DWG No. 4316-S030-024-01, Rev A.

b) Bronswerk starboard HVAC Unit, DWG No. 4316-S030-024-02, Rev A.

c) Bronswerk droplet eliminator, J6050 00-00, Rev C.

d) Bronswerk AC CDU Field Connections diagram (4 sheets), 4316-320-101_1V0 1 (1).pdf

e) Plan électrique - electrical plan - HVAC Bronswerk.pdf

f) AC CDU/AHU STARTER PANEL 4316-S320-102.

C.1.3 Concept Naval drawing and sketch:

a) Concept Naval, plan d'installation des unités HVAC, C18-03-160-01, Rev 0.

b) Concept Naval, plan de modification des systèmes, C18-03-160-03, Rev 0.

C.2 Standards

a) Fleet Safety and Security Manual (DFO/5737)

b) IACS No. 47 - Shipbuilding and Repair Quality Standard

c) CSA W59-08 (R2008) - Welded Steel Construction

d) CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel

e) Society for Protective Coatings (SSPC) Standards

C.3 Laws and Regulations

a) Canada Shipping Act 2001 – Hull Construction Regulations

b) Maritime Occupational Health & Safety Regulations

C.1 Bronswerk manufacturer's reference

Bronswerk Group
Sajid Rashid,
Project Engineer
sajid.rashid@bronswerkgroup.com tél:
450.659.6571x 249

16.2.D Work overview

D.1 The ventilation units are located in the room A/C units (room 328) on the boat deck, between the frames 47 and 65. The Contractor must make an opening in the port and starboard bulkheads between the frames 47 and 53, to allow the extraction of both units in place and the entry of new units. See drawing C18-03-160-01 HVAC Unit Installation Plan, for all details of cuts and welds, and plan C18-03-160-03 System Modification Plan for modifications to affected circuits.

16.2.E Work preparation

E.1 First, the Contractor must ensure that all refrigerant gas (HCFC-22) is removed from the units with CCG having previously removed the gas. However the oil of the two compressors is still in the crankcase bases, remove oil from both units and dispose of it in accordance with applicable environmental standards. Then, it will be imperative to electrically isolate the two HVAC units. To do this, the following breakers must be opened and locked:

- P 615-1 port humidifier
- P-615-2 starboard humidifier
- P-615-3 compressor A/C No. 1 accommodation
- P-615-4 compressor A/C No. 2 accommodation

E.2 It is important to note that the compressor circuit breakers feed the compressor and the fan of each unit respectively.

Figure 1 : Humidifier breaker

Figure 2: Compressor breaker

16.2.F Before making the temporary openings in the bulkhead, the plenums connecting the current ventilation units to the fresh air suction louvers must be dismantled.

16.2.G In order to cut the bulkheads at deck level, ceiling tiles and insulation must be removed under the boat deck, engineer's office (room 226), port and starboard gangways and cabins (room 228 and 229) Electrical Engineer Officer and Second Engineer. The protective plates and the insulation of the bulkheads in the ventilation room (room 328) must also be dismantled.

Figure 3: Engineer's office

16.2.H The port and starboard ventilation ducts of the exhaust air return must be dismantled at the screw connection. Sections including fire dampers will be retained.

Figure 4: Starboard exhaust return air duct

Figure 5: Port exhaust return air duct

16.2.I Starboard side, the fire main pipe at about frame 53, going to the upper deck must be isolated, dismantled and blanked at the Victaulic (Flexible coupling for shouldered steel pipe) connexion.

Figure 6: Fire main pipe to dismantle

I.1 Also on starboard side, both (2) central cooling pipes are to be isolated, dismantled at frame 55 up to the HVAC units and blanked at the Victaulics (Flexible couplings for shouldered steel pipe) beside frame 55.

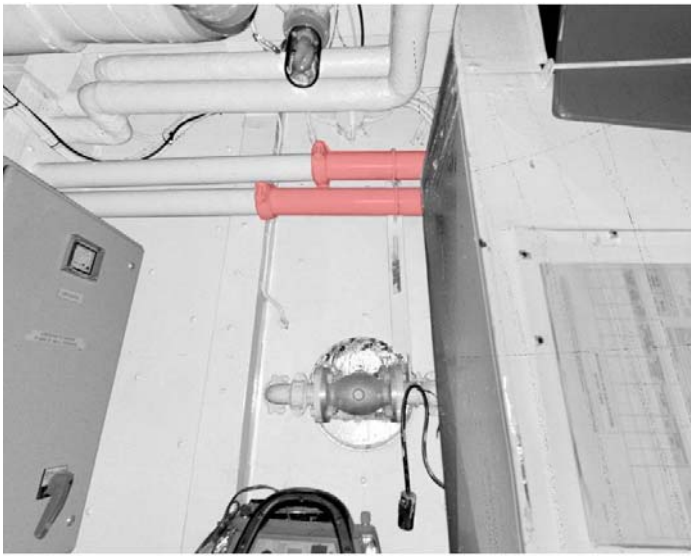


Figure 7 : Central cooling pipes to be dismantle

I.2 In front of the bulkhead 47, on the ventilation ducts going down to the upper deck, a junction box for the searchlight of the rear mast must be moved. The cables have enough length to move the box on the bulkhead 47. Note: Searchlight renewal included in this period.

Figure 8: Junction box to relocate

I.3 On the port passageway, the access stairs to the officer's deck must be dismantled while the work is being done. The staircase being bolted, the only modification will be on the starboard rail which is welded to the louvre, to be removable after.

Figure 9: Port staircase to be dismantle

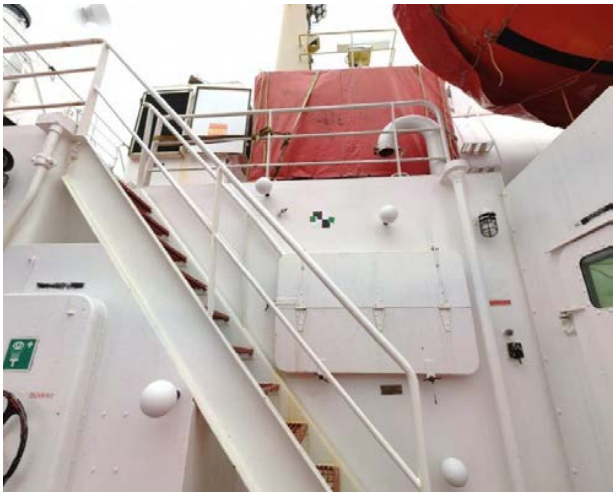


Figure 10: Handrail to be made removable

I.4 Port water drain and pipe to be temporarily removed. It will be reinstalled once the temporary opening is closed.

Figure 11: Port water drain and pipe to remove

I.5 Since it is not connected to the system, the foam water pipe must be removed and replaced with the steel bulkhead.

Figure 12: Foam pipe to replace

I.6 Port lighting and support to be removed temporarily

Figure 13: Lamp to dismantle

I.7 Starboard side, water drain and pipe to be removed temporarily.

Figure 14: Starboard drain and pipe

I.8 Also on starboard, the rear storage support arm of the gangway will also be removed and reassembled once the temporary opening is closed.

Figure 15: Gangway support to be removed

16.2.J Temporary access opening

J.1 Once the previously described steps have been completed, temporary openings can be made. The bulkheads will be cut as shown on plan C18-03-160-01 HVAC installation plan.

J.2 On starboard, a 2200x2545mm cut will be made between frames 47 and 53, 250mm from the officers' deck to the boat deck. The horizontal stiffeners bordering the cut of the current louvres will be entirely removed. The wall studs will be kept at a height of 220mm from the Officer’s deck. As a result, gussets welded to the deck will not have to be removed and hot work will have no effect on the officers' deck.

J.3 On the port side, with the proximity of the outboard engine cabinet, the cutout will be slightly smaller, 1800x2545mm. In the same way as on starboard, the horizontal stiffeners will be entirely removed and the vertical ones will be cut to 220mm of the officer’s deck to keep the gussets.

16.2.K HVAC units removal

K.1 The current units are welded to the deck by some weld seams. These must be cut to allow the two units to come out.

K.2 Each unit must be disconnected from the cooling water system. The fresh water inlet and return pipes are equipped with a drain to allow their emptying before disassembly.

Figure 16: Central cooling connexions

K.3 Steam and condensate piping, must be disconnected from the units. For this, the insulation cushions must be removed. The pipes will be dismantled until the first set of flanges for condensate return and to the thermostatic valve and the bypass valve for steam distribution.

Figure 17: Port side steam connexion

K.4 Humidifiers must be removed from each unit to allow them to be attached to the new ones. The freshwater supply piping for these items must be disconnected.

Figure 18: Humidifier and feed water pipe

K.5 Interconnection plenums between the port and starboard units, both for exhaust return air and for distribution, must be dismantled. The support of the plenums can remain in place to facilitate reassembly.

K.6 All electrical power and control cables must be identified, disconnected and isolated on both units. Cables that are not reused must be removed.

K.7 The choice of removal handling is left to the Contractor. The consequent dimensions of the temporary openings will allow easy handling. The Contractor is to dispose of all removed and not reused equipment.

16.2.L New HVAC unit installation and pipe connections

L.1 Once the old HVAC units are removed, the deck must be sand blasted to remove existing paint and rust. The deck will be painted before entering the new units. A weld recovery on the weld zones will be expected. An unpainted edge of 250mm will be reserved for the welding of the temporary opening.

L.2 The new units can then be moved to the room and positioned as in *C18-03-160-01 HVAC Installation Plan*. The Contractor must supply a custom made lifting spreader to move the units onto the ship's boat deck.

L.3 Like the previous units, the new ones will be welded on the deck.

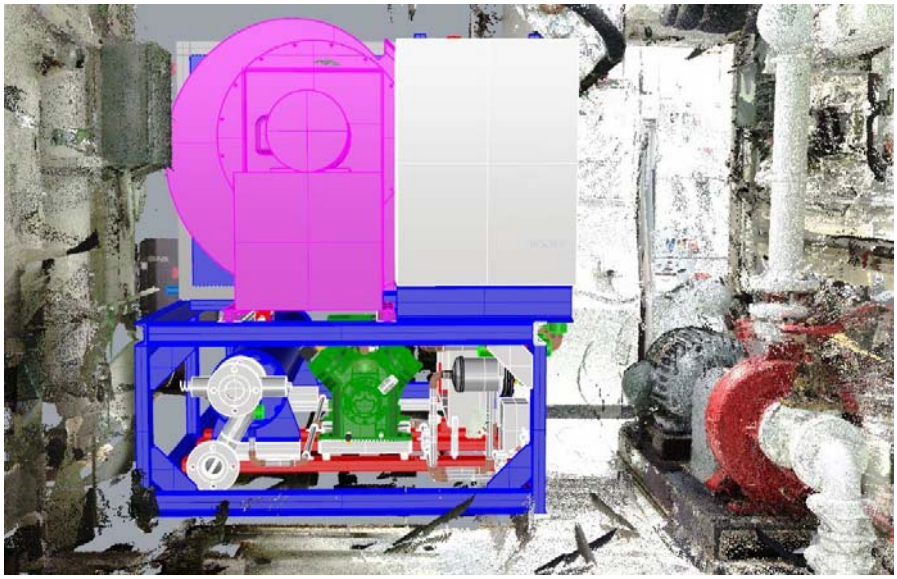


Figure 19: Port view of new HVAC unit

L.4 The steam system will be reconnected to each new unit as before. The thermostatic valve at the steam inlet in the unit will be replaced by a valve supplied by CCG.

L.5 The dimensions will be taken on site, the current piping is adjacent to the connections of the new units. These two new valves will be provided by CCG along with the HVAC units.

L.6 The cooling water system will be replaced along its entire length from the Victaulics (Flexible couplings for shouldered steel pipe) connections along the starboard bulkhead to approximately 55. New 2 ½ "butterfly valves will be used to connect the arrival. Contractor to supply piping and valves. The old 2" return valves must be reused as on plan C18-03-160-03 System Modification Plan.

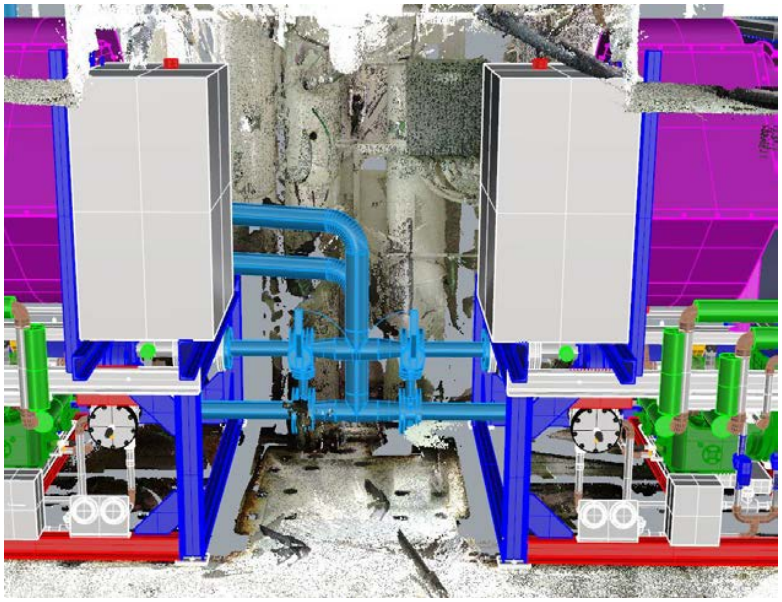


Figure 20: Cooling water connexion

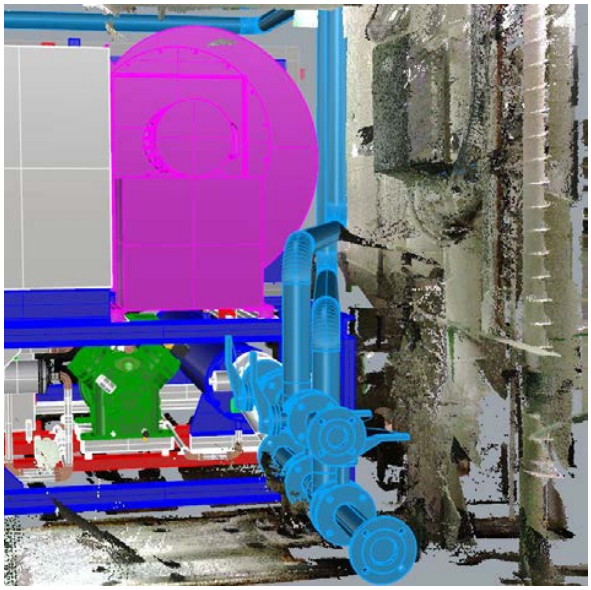


Figure 21: Cooling pipe view

L.7 In the same way as the existing system, a drain of the cooling water pipes to the deck drain must be added. Contractor to supply all new drain material.

L.8 Existing plenums will be replaced identically. The connections for the return air, the fresh air inlet, the accommodation air supply and by-pass are placed in the same places as on the old units. However, transition pieces of adaptation will have to be supplied and added between existing ducts and new HVAC units. These changes are shown on plan C18-03-160-03 *Plan de modification des systèmes*/System Modification Plan.

Figure 22: Cooling pipes drain connexion

L.9 Make sure that all connections to the ventilation ducts are leak-proof once the complete system is in place.

L.10 Existing humidifiers will be fixed to their assigned positions (see Bronswerk drawings) on new HVAC units and reconnected to freshwater supply and the steam output to the unit.

L.11 The last step of reconnection will be electricity.

a) Provide, fabricate and install a support structure according to Brunswork's plan no.4316-SCII-012 Panel positioning sketch, and attach the 4 panels to the structure;

b) Cables between circuit breakers P-615-1 and 2) and humidifiers must be reconnected;

c) For the connection of HVAC units, new cables must be supplied between the MCC circuit breakers (P615-3 and 4) located in front of the room, along the bulkhead 65 and the starter panels / HMI (20"x30"x12"each) to be fixed along the front bulkhead of the room;

d) New cables must be supplied between the starter panels / HMI and the control panels (20"x40"x12") which will have to be fixed above the transformer at the forward end of the room;

e) New cables must be supplied between the control panels to each of the junction boxes on each HVAC unit;

i) Provide, install and connect cables, supports and terminals for inter-connecting the above equipment: mentioned in above section b), c), d) and e) according to Bronswerk dwg. No. 4316-S320-102 pages 1 to 5.

ii) All temporarily dismantled items must be put back in place before the temporary access is closed.

2. *Figure 23: Four new panels to be fitted in the foward space*

16.2.M Temporary access closure and finishes

M.1 Once the units are reconnected to all their systems, the temporary openings will be closed by new plates that will be prepared before the final junction. They will be stiffened by new stiffeners, painted and insulated keeping a reserve of 250mm around the edge for welding. Plan C18-03-160-01 HVAC Unit Installation Plan illustrates temporary opening panels. An end-to-end weld will be performed to join the new panel to the sheet of the existing partition. At the deck, a double corner weld will be adequate.

M.2 A new fresh air louver GSM will be installed on each new bulkhead section. The louver will be recessed as per drawing *C18-03-160-01 Plan d'installation des unités HVAC.*

a) New louvers, provided by the CCG, to install on the bulkheads will have a flange to be bolted. The yard will supply and install studs on the bulkhead, provide gaskets and nuts to bolt the assembly to the new bulkhead. This will facilitate the interior assembly of the transition duct between the units and the louvre for the fresh air ducting.

M.3 Once the openings have been welded, a plenum duct will be made between the louvers and the fresh air intake of the HVAC units.

M.4 Repairs of paints and insulation must then be made on areas that have been reserved for welding. New insulation pads and ceiling tiles below the boat deck must also be put back in place.

M.5 The new plenum between the HVAC unit and the louvre must also be insulated.

16.2.N HVAC unit trials and commissioning

N.1 The inspection of the work will be done by a representative of the manufacturer of the ventilation units. He will be responsible for the proper operation and start-up of the installations. He will also train the crew to use the new HVAC units.

a) The FSR on-site presence, two (2) visits.

b) 1st visit, preliminary visit of two (2) full days on site, to confirm the exact position of the units on deck, louvers position in bulkhead, overview preliminary installation, mechanical and electrical / electronic outcomes.

c) 2nd visit, final visit of five (5) days on site, for testing and commissioning the equipment.

d) Contractor is to coordinate and schedule these visits. Include two (2) complete travel both ways.

N.2 Certified technician on site

N.2.1 The Contractor must ensure the presence of an independent technician, certified to work on Bronswerk products (TCB) at the site, at the beginning of the installation work for a sufficient period to ensure:

a) That the HVAC units and their associated equipment have been received, complete and in good condition;

b) That this equipment is now under the responsibility of the Contractor;

c) That the proposed installation meets the manufacturer's standards as assessed by the TCB .

N.2.2 The Contractor must ensure the presence of the TCB, on site, at the end of the installation work for a sufficient period in order to ensure the proper conduct of:

a) The conformity of the HVAC installation;

b) Electrical / electronic checks;

c) Leak, pressure, and vacuum tests must be performed on the refrigeration system. Followed by a nitrogen purge then fill the refrigerant system with a full charge of R407C (50 lbs/unit, total 100 lbs), refrigerant and oil to be Contractor supplied plus 20% refrigerant extra quantity as spare, left on board. Tools, equipment and consumable to be supplied either by the Contractor in this quote.

d) Preliminary and full tests according to Bronswerk standards;

16.3 GALLEY HOOD CLEANING

(16G03D01)

16.3.A Identification

A.1 Provide the material, tools and labour to clean the kitchen hood conduit from the outside outlet to the galley.

16.3.B References

B.1 Not used.

16.3.C Statement of work

C.1 The Contractor must clean and degrease the conduit of the kitchen extraction hood exhaust fan located to the upper deck starboard side.

C.2 The Contractor must open and close the access panels after cleaning

C.3 The Contractor must also clean the galley hood and its components.

C.4 The Contractor must clean the underside of the cooking plates.

C.5 The Contractor must deliver kitchen in the same state of cleanliness as they were before the works to remove all traces of the work.

16.3.D Proof of performance

D.1 The work must be performed to the satisfaction of the Chief Engineer or his/her representative.

16.3.E Deliverables

E.1 The Contractor must provide a full report which details the work.

16.4 DOMESTIC REFRIGERATION

(16K02)

16.4.A Identification

A.1 Supply the material, equipment and labour in order to perform the annual inspection and maintenance of domestic refrigeration system.

16.4.B References

B.1 Specific regulations

B.1.1 Technicians performing work must hold a valid CRHA card and indicate the number on the report; provide a copy of the card to the Coast Guard representative.

B.2 Regulations

i) Canada Shipping act and regulations

ii) Federal Halocarbon regulations, 2003

iii) Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems, Environment Canada

B.3 Domestic refrigeration compressor model

B.3.1 Two (2) Carrier compressors Model 5F30-C654,

B.3.2 These systems operate with R-134.

16.4.C Statement of work

C.1 The Contractor must provide parts and labor to perform the following tasks :

C.1.1 Inspect the mechanical joints and replace if necessary. Provide a quote for this item (parts and labor) ;

C.1.2 Renew the lubricating oil and the dryers;

C.1.3 Open, clean and inspect compressor crankcase;

C.1.4 Check and adjust the unloader ;

C.1.5 Adjust the start and stop signals, cutout and thermostatic valve;

C.1.6 Perform compressor transfer (rotation) on the domestic refrigeration system

C.1.7 Supply and replace door seals (Half moon shape) of all the refrigerated rooms of the domestic system (5 doors)

C.1.8 Perform complete inspection of systems.

C.1.9 Perform refrigerant leak test. All piping must be checked for leaks, including piping in ceiling, on main deck. Check system for gas tightness. Contractor must preserve ceiling tiles from damage, during removal, storage and reinstallation. Systems presently have no known leaks.

C.1.10 Clean and inspect evaporator units and defrosting systems. Four (4) rooms and one lobby.

C.1.11 Check evaporator drains, heating cables and drains. Ensure drains are free. Repair insulation upon completion.

C.1.12 Refrigerant, if required must be supplied by the contractor and dealt with using PWGSC 1379 form. Contractor must quote price for 13,6 kg bottle.

C.1.13 Contractor must check and adjust all operating parameters.

C.1.14 If additional work is necessary, a list accompanied by a bid must be provided to the Coast Guard representative before beginning work.

C.1.15 The on-line compressor will be serviced first and brought back on-line while the second one will be maintained. At the end of the maintenance of the second compressor, it will be brought on-line and the first one stopped. This way, the back-up compressor, at the beginning of the process, will be on-line at the end.

16.4.D Proof of performance

D.1 Inspection

D.1.1 All work must be to the satisfaction of the Chief Engineer.

D.2 Trials

D.2.1 The Chief Engineer or his delegate must be present to witness trials.

D.3 Certification

D.3.1 Provide original, individual certificates for each system, identifying the firm performing the inspection, certificate number, name and signature of technician. Contractor must provide the certificate originals to the Chief Engineer and also electronic format (.pdf compatible), to the Chief Engineer and to the Vessel Maintenance Manager.

16.4.E Deliverables

E.1 Rapport

E.1.1 Contractor must provide a written report describing in detail all work performed the causes of noted deficiencies, corrective actions taken and parts replaced.

E.1.2 Contractor must provide the report in electronic format (.pdf compatible), to the Chief Engineer and to the Vessel Maintenance.

17.0 DECK EQUIPMENT/ SHIP SUPPORT SYSTEMS

17.1 WINDLASS, MOORING WINCHES AND FAIRLEADS

(17A02D)

17.1.A Identification

A.1 Perform major/five year maintenance on forward ship's windlass and the related winch (Drawing #900-400-354).

A.2 Perform overhaul of (#2) Port forward mooring winch brake

A.3 Perform overhaul of one Port-Colborne type fairlead. Starboard, forward (for #2 winch)

17.1.B References

B.1 Specifications

B.1.1 Fabricant : Pacific Winches Ltd

B.2 Drawings

B.2.1 Windlass

a) H-3110 Anchor Windlass Arrgt

b) 900-400-134D Windlass Assy

c) 900-400-351 Shaft & Motor Assy

d) 900-400-352 Clutch Assy

e) 900-400-355 Brake Assy

f) 900-400-354 Mooring Winch and Windlass - Schematic

B.2.2 Port forward mooring winch

a) 900-400-342 Brake Assy

b) 900-400-343 Mooring Winch Assy

c) 900-400-282 Mooring Winch – Schematic

B.3 Picture and information

B.3.1 IMG_2213 Name plate Etatech Marine Motor

B.3.2 Service information - Staffa B200 motors

17.1.C Statement of work

C.1 Windlass and the related winch (Drawing #900-400-354)

C.1.1 The Contractor must empty the oil from the hydraulic unit (80 gals). Immediately dispose of it in accordance with the environmental regulations in effect. Do not leave waste oil containers on the vessel deck.

C.1.2 The Contractor must completely disassemble each windlass' parts.

C.1.3 The Contractor must clean the parts.

C.1.4 The Contractor must check for wear, take and records measurements, on the following components, including their keyways, seals and bushings:

a) Warping head;

b) Pinion shaft;

c) Output pinion;

d) Wildcat;

e) Wildcat shaft;

f) Output gear;

g) All braking mechanisms, including the brake bands;

h) All clutches components.

C.1.5 The Contractor must verify the condition of all shaft sleeves and bearings, take measurements and record them in the report.

C.1.6 The Contractor must verify all the lubrication points. Replace all the grease nipples with 316 high-pressure stainless steel nipples. All components must be lubricated with grease (Petro-Canada PXL2C30, Precision XL EP2) supplied by the Contractor.

C.1.7 The Contractor must perform a liquid penetrant inspection of all pins and gears to detect any crack and provide a report.

C.1.8 The Contractor must verify the straightness of the shafts. Provide a report of this verification.

C.1.9 The Contractor must check and record the gear clearances.

C.1.10 The Contractor must show the dismantled parts and measurements to the TCMS inspector and CCG representative. All parts deemed to be damaged following this inspection will be replaced and treated separately via form PWGSC 1379.

C.1.11 The Contractor must reassemble all the parts as described in the manufacturer's user guide with new, high-quality packing seals (OEM required).

C.1.12 The Contractor must replace all nuts, bolts and washers (flat and lock) in the seating of the various equipment by new, Grade 5 parts with the same dimensions. All other disassembled nuts, bolts and washers (flat and lock) must be replaced by new parts of the same grade and dimensions. Everything must be reassembled with an industrial quality anti-seize paste.

C.1.13 The Contractor must supply and replace the filter component in the hydraulic systems of the windlass and its related winch.

a) Filters currently used:

i) Mahle Filter Element, 6 micron, 77999915 2/winch

ii) Donalson 550388

iii)Western Filter E0211B1P20

C.1.14 The Contractor must clean the hydraulic oil tank and transmission case and have it inspected by the vessel's Chief Engineer before closing it. Close the inspection plates with new packing seals. See drawings # 900-400-282 and 900-400-354.

C.1.15 The Contractor must replace all pressure gauges, isolation valves, needle valves and ball valves on the equipment (windlass and hydraulic unit). If required, add ball

valves to isolate the tank in order to allow for maintenance of the components without emptying all the oil out of the tank. See drawings # 900-400-282 and 900-400-354.

C.1.16 The Contractor must reassemble all parts with NPT threads with the Master Metallic Compound (grey) product.

C.1.17 The Contractor must disassemble the following components and bring them to the workshop in order to review and verify their performance on the test stand: main pump, auxiliary pump, hydraulic motor, hydraulic brake, operation control. The Contractor must replace the packing seals and ball bearings. If other components are found to be damaged when parts are opened, they will be dealt with separately. Before opening any components, it is important to know whether the parts can be delivered within the allowed work period. The vessel's windlass must be operational when she returns to sea. If the parts for the main pump, auxiliary pump or main motor are no longer available, the Contractor must supply a price list, in annex, for replacement of the obsolete component with the same specifications, from the same manufacturer and include the modifications necessary to install the new parts. The Contractor must provide a report on the trial runs and work on each component.

a) Windlass:

i) Hydraulic Motor winch «STAFFA - B200/S, Serial: 153841 , Qty : 1»

ii) Hydraulic Motor Windlass «Hagglund 63-DG800, Qty : 1»

iii)Pump «Rexroth AA4V125-HD-1R-302020, Qty : 2»

iv)Electric Motor «Etatech Frame 326 TC, Qty : 2»

b) Winch:

i) Hydraulic Motor «Hagglund, 43-03800, Qty : 1»

ii) Pump «Rexroth AA4V125-HD-1R-302020, Qty : 1»

iii)Electric Motor «Etatech Frame 326 TC, Qté : 1»

C.1.18 The Contractor must ship the electric motor of the hydraulic unit to a specialized firm for a complete overhaul, cleaning, balancing and replacement of the ball bearings (high-quality and sealed), and to have it painted with grey epoxy. Provide a report on the trial runs and work on the motor.

C.1.19 The Contractor must replace the coupling on the two (2) pumps with new couplings of the same type.

C.1.20 The Contractor must clean and check the two (2) hydraulic oil heating elements and supply the ground insulation resistance, the resistance of each element and the amperage of the current in each element. Check that the thermostats are functioning properly and replace them as necessary. Adjust them to the manufacturer's specifications.

C.1.21 The Contractor must check the operation of the thermostat that prevents the pump from starting up if oil temperature is below 10°C.

C.1.22 The Contractor must bid to replace all piping and hydraulic hoses on the windlass and hydraulic unit. The piping located in the exterior and in the control panel should be 316 stainless steel. Following the Chief Engineer inspection, if some items do not need to be replaced, the discount will be negotiated using PWGSC 1379 form.

C.1.23 On the windlass and the associated winch, the Contractor must fill the tank and transmission case with new oil supplied by the Contractor. The empty barrels and containers must be recovered by the Contractor. The type of oil that is currently used is: Hydrex MV22.

C.1.24 The Contractor must seal any oil leaks observed during the work.

C.1.25 The Contractor must overhaul the manual brakes. The brake bands must be replaced by OEM (Original Equipment Manufacturer) bands supplied by the Contractor.

C.1.26 The Contractor must clean the windlass with a degreaser made by International. The rust on the windlass and its components must be mechanically cleaned off down to bare metal. The Contractor must take care to avoid getting any paint on the gypsies. All painting and painting preparation work must be done according to International's latest recommendations. Apply the paint as follows:

a) Two (2) layers: Paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), white colour at 3 mils dry per layer on exposed metal,

b) Two (2) layers: Paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), buff colour at 2 mils dry per layer on all surfaces.

C.1.27 The Contractor must apply two layers of paint, red deck, compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings) on the piping and bare metal components near the deck.

C.1.28 The Contractor must take care to avoid getting paint on the hoses and other components. The Contractor must supply the paint. If the work is done on board the vessel, it must be done with brushes and rollers. Do not spray paint. Before painting, the Contractor must protect the deck and all the components pointed out by the Chief Engineer. The Contractor must remove this protection when the work is finished.

C.1.29 The Contractor must, once the paint has dried and to the satisfaction of the Chief Engineer, lubricate all the components with a type of grease with arrange of efficiency between temperatures of -50 to +30 C° (EP2) supplied by the Contractor.

C.1.30 The Contractor must touch up the paint on the installed bolts and other scratches according to the instructions given in this description.

C.1.31 The Contractor must, if necessary, apply a sealer around the footing where the equipment will be bolted before installing the windlass on the deck.

C.1.32 The Contractor must supply and apply a highly resistant, rugged PTFE tape, impervious to steam, salt water, air, refrigerants, fuels, acids and alkalis, solvents and gases on all hose connectors.

C.1.33 The Contractor must, after each day's work, ensure that the area around the windlass is clean and safe.

C.1.34 The Contractor must perform the windlass commissioning and adjustments, and repair all deficiencies.

C.2 Port forward mooring winch brake

C.2.1 The Contractor must dismantle the brake mechanism and clean all components in order to submit them to the CGTA inspection.

C.2.2 The Contractor must measure and register the brake band bushings thickness at five (5) locations on the upper band and four (4) locations on the lower band.

C.2.3 Following the CGTA inspection, if some components need to be repaired or replaced by the Contractor, the cost must be negotiated using PWGSC 1379 form.

C.2.4 The Contractor must reassemble the brake mechanism and adjust it in presence of the CGTA.

C.3 Port-Colborne type fairlead, starboard, forward

C.3.1 The Contractor must dismantle the fairlead and clean all components in order to submit them to the CGTA inspection.

C.3.2 Following the CGTA inspection, if some components need to be repaired or replaced by the Contractor, the cost must be negotiated using PWGSC 1379 form.

C.3.3 The Contractor must reassemble the fairlead mechanism, adjust it in presence of the CGTA and demonstrate the fairlead rotation to 360° on both directions.

17.1.D Proof of performance

D.1 The Contractor must perform a complete trial run of the windlass and the port forward mooring winch in the presence Transport Canada surveyor and the CGTA.

D.2 The Contractor must demonstrate the fairlead rotation to 360° on both directions with a mooring line inserted.

17.1.E Deliverables

E.1 The Contractor must provide, to the TA, before the end of the contract and in a Microsoft Office Word 2003 or more recent format, on an USB stick, not protected by a password, the following reports:

E.1.1 Report on condition and measurements of all shaft sleeves and bearings.

E.1.2 Report on penetrant inspection of all pins and gears.

E.1.3 Report on the verification of the straightness of the shafts.

E.1.4 Report of maintenance and trials performed in the shop.

E.1.5 Report on the trial runs and work on the electric motor of the hydraulic unit.

17.2 SPEED CRANE – FIVE YEAR MAINTENANCE

(17C01D)

17.2.A Identification

A.1 Perform five (5) year maintenance on "Speed Crane" following Transport Canada regulations. (TCMS)

17.2.B References

B.1 Rigging Assembly

B.1.1 17.3 SPEED CRANE – Rigging Assy

B.1.2 17.3 SPEED CRANE – Pulleys list

17.2.C Statement of work

C.1 The Contractor must supply parts and manpower to perform the following task :

C.1.1 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the 20 ton MAIN CARGO system following TCMS regulations. This includes pulleys # 1, 2, 3, 5 and hook # 4.

C.1.2 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the 8 ton AUX. CARGO system following TCMS regulations. This includes pulleys # 6, 7, 8 and hook # 23.

C.1.3 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the 5 ton AUX. CARGO system following TCMS regulations. This includes pulleys # 19, 20, 21 and hook # 22. Please note that the hook presently installed on the 5 ton whip is certified for 8 ton because it is the spare for the 8 ton whip.

C.1.4 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the Port and Starboard TOPPING system following TCMS regulations. This includes pulleys and fixation points # 9, 10 A, 10 B, 10 C, 10 D et 11 and the swivel at the becket (Upper fixation point).

C.1.5 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the Port and Starboard COMPENSATOR system following TCMS regulations. This includes pulleys # 12, 13, 14 and 15.

C.1.6 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the Port and Starboard SLEWING system following TCMS regulations. This includes pulleys and fixation points # 16, 17 and 18.

C.1.7 Dismantle and inspect each component of pulley, swivel, fixation point and hook of the TRUNNION following TCMS regulations. Take shaft and bushing measurements. Renew the trunnion oil which will be supplied by Coast Guard.

C.1.8 Complete inspection and perform speed crane trials to the TCMS surveyor's requirements. The load trial must be of 125% of the rated load. Weights must be supplied by the Contractor.

C.1.9 Additional instructions

a) Steel cables must be removed and reinstalled by the Contractor

b) All required inspections must be performed in presence of the TCMS surveyor and the CGTA.

c) All accessories, such as swivels, shafts, shackles, etc must be inspected just like the pulleys.

d) All parts must be cleaned and rust removed using a sand blast or another system in order to obtain a profile for painting. Special care must be taken to clean the hydraulic passages to the shafts and other components.

e) All components requiring lubrication upon re-assembly must be greased in presence of the CGTA.

f) The Speed Crane boom must be re-installed in such a way that all grease nipples are aligned in order to facilitate access for greasing. Upon re-assembly, the CGTA must be present to ensure grease nipples alignment.

g) The Speed Crane boom and all bare metal parts must be covered with on coat of paint compatible with the vessel's existing coating system (See document titled: Hull, masts and superstructures coatings), RAL 9003, white and two (2) coats of Paint compatible with the vessel's existing coating system, RAL 070 7040, buff, following paint manufacturer's specifications.

h) Each assembly must ne stamped after painting..

i) All defaults must be reported to the CGTA before proceeding forward.

j) If necessary, to TCMS surveyor's requirement, non-destructive tests are performed on any component (sheave or shaft), their cost must be negotiated using PWGSC 1379 form.

k) Particular care must be taken with shafts. If approved by the CGTA, the bushing will be replaced.

l) Cost of dismantling and installation of bushing must be included in the bid.

m) Particular care must be taken with the sheaves grooves to make sure that their surface is smooth and even. Contact surface must be perfect to restrain cable and groove wear. The swivel grooves must be, if required, machined to allow for a maximum cable support (8% on diameter).

n) If required, steel used for machining must be of certified type 4140.

o) RE-assembly of Speed Crane and its components must be performed using new, Contractor supplied, dowel pins and locking devices.

17.2.D Proof of performance

D.1 A load test at 125% rating capacity must be performed in presence of the TCMS surveyor and the CGTA. The weights must be supplied by the Contractor.

17.2.E Deliverables

E.1 The Contractor must provide, to the CGTA, before the end of the contract and in a Microsoft Office Word 2003 compatible or more recent format, on an USB stick, not protected by a password, the following reports:

E.1.1 Report on condition and measurements of all shaft pulleys, swivels, connection points, hooks, sheaves, etc.

E.1.2 Report on penetrant inspection of all shafts and bushings.

E.1.3 Report on the verification of the straightness of the shafts.

E.1.4 Report of maintenance and trials performed in the shop.

17.3 DUMBWAITER

(17C04)

17.3.A Identification

A.1 IMPORTANT NOTE: WORKS REQUIRED FOR THIS ITEM MUST BE PERFORMED BETWEEN SEPTEMBER 1ST AND 15TH 2018.

A.2 Annual inspection and maintenance for recertification of this equipment.

17.3.B References

B.1 Standards

B.1.1 CAN/CSA-B44-M90, section 12

B.2 Equipment particulars:

B.2.1 Dumb-waiter

i) Make : D.A. Mathot

ii) Model: 100

iii)Serial: 17572

17.3.C Statement of work

C.1 The Contractor must provide parts and specialized labor to perform inspection and annual maintenance of the ship's dumb-waiter in accordance with section 12 of CAN/CSA-B44-M90 norms.

C.2 Upon completion of tasks, update maintenance register for each equipment.

17.3.D Proof of performance

D.1 Inspection

D.1.1 All work must be to the satisfaction of the Chief Engineer.

D.2 Trials

D.2.1 Chief Engineer must witness all inspections and trials.

D.3 Certificates

D.3.1 Provide original, individual certificates for each system, identifying the firm performing the inspection, certificate number, name and signature of technician. Contractor must provide the certificate originals to the Chief Engineer and also electronic format (.pdf), to the Chief Engineer and to the Vessel Maintenance Manager.

17.3.E Deliverables

E.1 Report

E.1.1 Upon completion, contractor must provide a written report describing in detail all work performed the causes of noted deficiencies, corrective actions taken and parts replaced. Contractor must provide the report in electronic format (.pdf compatible), to the Chief Engineer and to the Vessel.

18.0 VESSEL COMMUNICATIONS AND NAVIGATION EQUIPMENT

18.1 SPEED LOG TRANSDUCER SUCTION VALVE

(18A07)

18.1.A Identification

A.1 Replace the speed log transducer suction valve by a new one supplied by Coast Guard.

18.1.B References

B.1 Drawings

B.1.1 108-H-022 Docking Plan

B.1.2 71-50-01 Arrangement Overboard discharges

B.1.3 005005-0125-001 Doppler Transducers, gate Valve and Tank Mount / for Doppler Speed Log Systems NAVIKNOT

B.2 Gate Valve to replace:

B.2.1 Gate valve – two inches

B.2.2 Membrure 127 - Bâbord

18.1.C Statement of work

C.1 The Contractor must supply all equipment necessary to perform the work.

C.2 The Contractor must remove interference items necessary to access the valve noted in this specification. These will include but not be limited to grids, floor plating and sections of piping. Location of these interference items can be sighted at the time of viewing. On completion of all work all removed interference items must be returned to "as found" condition. All sections of piping that have been removed must be reinstalled using new gaskets.

C.3 The Contractor must perform the following work on the speed log sea suction valve.

a) Remove existing identified valve.

b) Visually inspect both external and internal components of the new valve. Any defects found must be brought to the attention of the CGTA for remedial action.

c) The final closing up of the valve is to be witnessed by the CGTA. Following inspection, the valve is to be reassembled in the closed position and checked for water tightness.

d) Replace the Speed log and isolation valve by an equivalent, supplied by CCG. Gate Valve and speed log to be installed as seen in reference “Speed Log Doppler 5005-0125-01" (page 53).

e) The shipside flange for securing the isolation valve will also have to be removed, and a new flange welded in its place. The entrepreneur will be responsible for the gas freeing of adjacent spaces, as well if necessary.

f) The Contractor must apply two coats of paint, compatible with the existing paint system of the vessel, to the interior of the valve surfaces as per manufacturer’s recommendations.

g) The Contractor must supply all gaskets, valve stem packing, cleaning fluids, rags, anti-corrosive paint, etc. New gasket and valve stem packing must be of the same type as those removed unless substitution is approved by the TA.

h) The Contractor must visually inspect the overboard penetration for any form of defect and report them to the Technical Authority.

18.1.D Proof of performance

D.1 Inspection

D.1.1 The TCMS Surveyor and the CGTA must witness the inspection the new valve to be installed.

D.2 Testing

D.2.1 The Contractor must perform the following test in presence of the CGTA:

a) Water tight integrity of the reassembled valve.

D.3 Certificates

D.3.1 Provide original, individual certificates for each system, identifying the firm performing the inspection, certificate number, name and signature of technician.

Contractor must provide the certificate originals to the Chief Engineer and also electronic format (.pdf), to the Chief Engineer and to the Vessel Maintenance Manager.

18.1.E Deliverables

E.1 Report

E.1.1 The Contractor must supply the CGTA an electronic version, in a Microsoft Office Word 2013 compatible format on an USB stick, not protected by a password, of a report detailing the work undertaken, defects, repairs made and measurements and readings taken.

E.1.2 The Contractor must also provide a copy TCMS Division III survey credit to the TA.

E.1.3 The Contractor must provide a Quality Assurance (QA) report indicating that the valve installation has been inspected by the Contractor's QA Department for correct installation and fit.