

**RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:**

**Bid Receiving - PWGSC / Réception des
soumissions - TPSGC**

11 Laurier St. / 11, rue Laurier

Place du Portage, Phase III

Core 0A1 / Noyau 0A1

Gatineau

Quebec

K1A 0S5

Bid Fax: (819) 997-9776

**REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION**

**Proposal 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.

**Proposition 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 sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaires

Title - Sujet CHILLED WATER PLANTS AND PUMPS	
Solicitation No. - N° de l'invitation W8472-135497/A	Date 2013-04-09
Client Reference No. - N° de référence du client W8472-135497	
GETS Reference No. - N° de référence de SEAG PW-\$\$FX-003-23683	
File No. - N° de dossier 003fx.W8472-135497	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2013-05-27	Time Zone Fuseau horaire Eastern Daylight Saving Time EDT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Passmore, Russ	Buyer Id - Id de l'acheteur 003fx
Telephone No. - N° de téléphone (819) 939-3234 ()	FAX No. - N° de FAX (819) 994-9127
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: Specified Herein Précisé dans les présentes	

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address

Raison sociale et adresse du

fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution

Frigate Life Extension (FELEX) Project / Bureau de projet
de prolongation de la vie des frégates (BP FELEX)

455 Blvd de la Carrière

Gatineau

Quebec

K1A 0K2

Delivery Required - Livraison exigée See Herein	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

Destination Code - Code destinataire	Destination Address - Adresse de la destination	Invoice Code - Code bur.-comptable	Invoice Address - Adresse de facturation
D - I	CPO1 ADM (Mat) DGMFPM/DGLEFPM/DGAFPM ON CANADA	W8472	DEPARTMENT OF NATIONAL DEFENCE ATTN DGMFPM CAP - DMARP 101 COLONEL BY DR. ATTN: AL CRYTES , D MAR P 7-2-3 OTTAWA Ontario K1A0K2 Canada

Item Article	Description	Dest. Code Dest.	Inv. Code Fact.	Qty Qté	U. of I. U. de D.	Unit Price/Prix unitaire FOB/FAM Destination	Plant/Usine	Del. Offered Liv. offerte
1	CHILLED WATER PLANTS AND PUMPS	D - I	W8472	50	Each	\$ XXXXXXXXXXXXX		See Herein

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Solicitation No. - N° de l'invitation

W8472-135497/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

003fx

Client Ref. No. - N° de réf. du client

W8472-135497

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PART 1 - GENERAL INFORMATION

1. Introduction

The bid solicitation is divided into seven parts plus attachments and 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;
- 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, 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 Statement of Work, the Delivery Schedule, the Contracts Delivery Requirements List, the Mandatory Evaluation Criteria, the SOW Compliance Checklist, and the Milestone Payment Schedule.

2. Summary

The Department of National Defence, as part of the Halifax Class Modernization, has a requirement to replace the existing 85 Ton Chillers with higher capacity plants and pumps to meet the growing cooling demand of various ship systems. The acquisition is for a total of fifty (50) Chilled Water Plants and fifty (50) Chilled Water pumps in accordance with **Annex "A" - Statement of Work**. Forty Eight (48) Chilled Water Plants and Pumps will be for the 12 Halifax Class vessels (4 per vessel) and two (2) Chilled Water Plants and Pumps will be utilized as Training Units.

Installation of the chilled water plants and pumps is not included in the scope of the contract. The installation will be done by a third party under a separate contract.

It is Canada's intention to compete a separate repair and overhaul contract in support of the chilled water plants and pumps at a later date.

The requirement is subject to the provisions of the Agreement on Internal Trade (AIT), the North American Free Trade Agreement (NAFTA) and the World Trade Organization Agreement on General Procurement (WTO-AGP).

3. Debriefings

After contract award, bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days of receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

PART 2 - BIDDER INSTRUCTIONS

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 2012-11-19 Standard Instructions - Goods or Services - Competitive Requirements**, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of 2003, Standard Instructions - Goods or Services - Competitive Requirements, is amended as follows:

Delete: sixty (60) days
Insert: ninety (90) days

1.1 SACC Manual Clauses

B1000T	2007-11-30	Condition of Material
D5401T	2007-11-30	Quality Plan – Solicitation

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.

Due to the nature of the bid solicitation, bids transmitted by facsimile to PWGSC will not be accepted.

3. Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than 10 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.

4. Applicable Laws

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

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.

5. Improvement of Requirement During Solicitation Period

Should bidders consider that the specifications or Statement of Work contained in the bid solicitation could be improved technically or technologically, bidders are invited to make suggestions, in writing, to the Contracting Authority named in the bid solicitation. Bidders must clearly outline the suggested improvement as well as the reason for the suggestion. Suggestions that do not restrict the level of competition nor favour a particular bidder will be given consideration provided they are submitted to the Contracting Authority at least 10 days before the bid closing date. Canada will have the right to accept or reject any or all suggestions.

6. Bidders' Conference

A bidders' conference will be held at CFB Halifax Dockyard on May 2, 2013. The conference will begin at 9:00am, in Building 247, Room 318. The scope of the requirement outlined in the bid solicitation will be reviewed during the conference and questions will be answered. It is recommended that bidders who intend to submit a bid attend or send a representative.

Bidders are requested to communicate with the Contracting Authority before the conference to confirm attendance. Bidders should provide, in writing, to the Contracting Authority, the names of the person(s) who will be attending and a list of issues they wish to table at least 5 working days before the scheduled conference.

Any clarifications or changes to the bid solicitation resulting from the bidders' conference will be included as an amendment to the bid solicitation. Bidders who do not attend will not be precluded from submitting a bid.

7. Optional Site Visit

It is recommended that the Bidder or a representative of the Bidder visit the work site. Arrangements have been made for a tour of the work site. The site visit will be held on May 3, 2013 at 9:00am, CFB Halifax Dockyard. Bidders must communicate with the Contracting Authority no later than 5 day(s) before the scheduled visit to confirm attendance and provide the name(s) of the person(s) who will attend. Bidders who do not confirm attendance and provide the name(s) of the person(s) who will attend as required will

not be allowed access to the site. Bidders will be requested to sign an attendance form. Bidders who do not attend or send a representative will not be given an alternative appointment but they will not be precluded from submitting a bid. Any clarifications or changes to the bid solicitation resulting from the site visit will be included as an amendment to the bid solicitation.

Note: Bidders must provide their own safety boots.

PART 3 - BID PREPARATION INSTRUCTIONS

1. Bid Preparation Instructions

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

Section I: Technical Bid (3) hard copies and three (3) soft copies on DVD

Section II: Financial Bid (2) hard copies and (2) soft copies on DVD

Section III: Certifications (2) hard copies

If there is a discrepancy between the wording of the soft copy and the hard copy, the wording of the hard copy will have priority over the wording of the soft copy.

Prices must appear in the financial bid only. 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 should:

- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and 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: Technical Bid

In their technical bid, bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work identified in Annex "A" Statement of Work.

The technical bid should address clearly and in sufficient depth the points that are subject to the evaluation criteria against which the bid will be evaluated. Simply repeating the statement contained in the bid solicitation is not sufficient. In order to facilitate the evaluation of the bid, Canada requests that bidders

address and present topics in the order of the evaluation criteria under the same headings. To avoid duplication, bidders may refer to different sections of their bids by identifying the specific paragraph and page number where the subject topic has already been addressed.

The Bidder must provide sufficient detail to demonstrate a thorough understanding of the scope and objectives of the work.

Any supporting technical documentation must be provided with the bid at time of bid closing. Technical brochures or technical data must be provided to verify compliance to the Technical mandatory requirements. The Bid and Supporting technical documents must be presented in a professional format and include, as required, useable drawings:

i) Professional format is defined as typed and/or word processed documents only, with chronological numbering of all sections, subsections and pages; the bidder should include the company name on each page of the bid package (not required for supporting technical documents and brochures) and a clear and accurate index.

ii) Useable drawings are defined as level one (1) drawings and produced using a 3D software (e.g. Autocad).

Bidders may choose to complete Annex D – Mandatory Evaluation Criteria. Annex D outlines all mandatory evaluation criteria which must be included. If a Bidder chooses to complete Annex D, then bidders should indicate in the column marked “proposal references,” where the requirement is detailed in their proposal and include paragraph and section numbers.

Technical Information

The Bidder must include in their technical proposal, as a minimum:

- **Technical Solution** - The Bidder must provide a detailed summary of their approach to achieve all the mandatory requirements and must clearly demonstrate that their proposed solution satisfies all the technical requirements outlined in Annex “A” Statement of Work. It is MANDATORY that bidders provide all relevant information and substantiate all claims of compliance; failure to do so will cause a proposal to be rejected. Should the minimum requirements be exceeded, bidders should make a statement to that effect, and provide the necessary information. It is recommended that the bidder complete Annex “E” – SOW Compliance Matrix.
- **Description of System** - The Bidder must demonstrate the preliminary system and performance specifications by providing a description of the system and equipment, including make and models, and a system block diagram.
- **Weight and Dimensions** - The Bidder must provide the weight and dimensions of all proposed hardware components (actual and/or approximate values).
- **Drawing/Sketch** - The Bidder must provide a system sketch or drawing to prove that the proposed solution will fit within the space envelope and fit through the soft patches (SOW A1.1.2.12 and A1.1.2.13).
- The Bidder should provide a list and description of features and advantages of the proposed system that are unique to the Bidder's proposal;
- The Bidder should provide any other information that the Bidder considers pertinent to this requirement to allow comprehensive evaluation of its capabilities.

Corporate Profile

The Bidder must include in their proposal, as a minimum:

- **History/ Previous Experience:** The Bidder must provide a company profile, indicating comparable project experience and technical capability. The Bidder must demonstrate 60 months of experience within the last 10 years designing and delivering Chilled Water Plants in a Marine Environment (Sea going vessel) by providing specific examples of comparable projects. The Bidders must include at minimum: start date, end date, description, justification to demonstrate similar scope.
- **Management Organization -** The Bidder must provide details of its management organization by providing a recent organization chart that identifies a minimum of 5 management personnel intended on being assigned to this project. The chart must include the individual's roles and responsibilities and indicate the reporting structure. Project personnel must include as a minimum: a Project Manager, Quality Control Manager, Finance Manager, Production Manager, and Shock and Vibration Manager. The company must provide a resume for each of the 5 management personnel identified above and assigned to this project that demonstrates that they have successfully managed at least one project comparable in scope and complexity of work to the proposed project.

Project Management Plan

The Bidder must include in their proposal, as a minimum:

- **Preliminary Project Schedule -** The Bidder must provide a preliminary project schedule indicating the sequence and the completion dates of project milestones, deliverables, and project tasks based on a contract award as "day 0."
- **Quality Assurance System -** The Bidder must demonstrate its Quality Assurance capabilities. The company must either: Show that it is ISO-9001:2008 certified, or Provide details of its Quality Assurance system in accordance with the requirements of ISO-9001:2008.

Section II: Financial Bid

1.1 Bidders must submit their financial bid in accordance the Financial Bid Presentation Sheet - Annex "G", in Canadian Dollars (CAD). Customs duties included and Goods and Services Tax (GST) or Harmonized Sales Tax (HST) must be shown separately, if applicable.

1.1.2 SACC Manual Clauses

B4052T 2008-05-12 Recommended Spare Parts List

B4051T 2008-05-12 Provisioning Parts Breakdown

1.2 Exchange Rate Fluctuation

The requirement does not provide for exchange rate fluctuation protection. Any request for exchange rate fluctuation protection will not be considered and will render the bid non-responsive.

Section III: Certifications

Bidders must submit the certifications required under Part 5.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

1. Evaluation Procedures

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

1.1 Technical Evaluation

1.1.1 Mandatory Technical Criteria

In order to be compliant, Bidder's proposal must, to the satisfaction of Canada, meet all requirements and provide all information required under Part 3, Section I - Technical Bid.

1.2 Financial Evaluation

In order to be compliant, Bidder's proposal must, to the satisfaction of Canada, meet all requirements and provide all information required under Part 3, Section II - Financial Bid.

1.2.1 Evaluation of Price

A0220T 2007-05-25 Evaluation of Price

2. Basis of Selection

2.1 Mandatory Technical Criteria

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

PART 5 - CERTIFICATIONS

Bidders must provide the required certifications and related documentation to be awarded a contract. Canada will declare a bid non-responsive if the required certifications and related documentation are not completed and submitted as requested.

Compliance with the certifications bidders provide to Canada is subject to verification by Canada during the bid evaluation period (before award of a contract) and after award of a contract. The Contracting Authority will have the right to ask for additional information to verify bidders' compliance with the certifications before award of a contract. The bid will be declared non-responsive if any certification made by the Bidder is untrue, whether made knowingly or unknowingly. Failure to comply with the certifications, to provide the related documentation or to comply with the request of the Contracting Authority for additional information will also render the bid non-responsive.

1. Mandatory Certifications Required Precedent to Contract Award

1.1 Code of Conduct and Certifications - Related documentation

By submitting a bid, the Bidder certifies as per section 01 of Standard Instructions 2003, for himself and his affiliates, to be in compliance with the Code of Conduct and Certifications clause of the Standard instructions. The related documentation therein required will help Canada in confirming that the certifications are true.

2. Additional Certifications Precedent to Contract Award

The certifications listed below should be completed and submitted with the bid but may be submitted afterwards. If any of these required certifications is not completed and submitted as requested, the Contracting Authority will so inform the Bidder and provide the Bidder with a time frame within which to meet the requirement. Failure to comply with the request of the Contracting Authority and meet the requirement within that time period will render the bid non-responsive.

2.1 Federal Contractors Program - Certification

1. The Federal Contractors Program (FCP) requires that some suppliers, including a supplier who is a member of a joint venture, bidding for federal government contracts, valued at \$200,000 or more (including all applicable taxes), make a formal commitment to implement employment equity. This is a condition precedent to contract award. If the Bidder, or, if the Bidder is a joint venture and if any member of the joint venture, is subject to the FCP, evidence of its commitment must be provided before the award of the Contract.

Suppliers who have been declared ineligible contractors by Human Resources and Skills Development Canada (HRSDC) are no longer eligible to receive government contracts over the threshold for solicitation of bids as set out in the Government Contracts Regulations. Suppliers may be declared ineligible contractors either as a result of a finding of non-compliance by HRSDC, or following their voluntary withdrawal from the FCP for a reason other than the reduction of their workforce to less than 100 employees. Any bids from ineligible contractors, including a bid from a joint venture that has a member who is an ineligible contractor, will be declared non-responsive.

2. If the Bidder does not fall within the exceptions enumerated in 3.(a) or (b) below, or does not have a valid certificate number confirming its adherence to the FCP, the Bidder must fax (819-953-8768) a copy of the signed form LAB 1168, Certificate of Commitment to Implement Employment Equity, to the Labour Branch of HRSDC.
3. The Bidder, or, if the Bidder is a joint venture the member of the joint venture, certifies its status with the FCP, as follows:

The Bidder or the member of the joint venture

- (a) is not subject to the FCP, having a workforce of less than 100 full-time or part-time permanent employees, and/or temporary employees having worked 12 weeks or more in Canada;
- (b) is not subject to the FCP, being a regulated employer under the Employment Equity Act, S.C. 1995, c. 44;
- (c) is subject to the requirements of the FCP, having a workforce of 100 or more full-time or part-time permanent employees, and/or temporary employees having worked 12 weeks or more in Canada, but has not previously obtained a certificate number from HRSDC (having not bid on requirements of \$200,000 or more), in which case a duly signed certificate of commitment is attached;

- (d) () is subject to the FCP, and has a valid certificate number as follows: _____ (e.g. has not been declared an ineligible contractor by HRSDC.)

Further information on the FCP is available on the HRSDC Web site.

2.2 Former Public Servant Certification

Contracts with former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, bidders must provide the information required below.

Definitions

For the purposes of this clause, "former public servant" is any former member of a department as defined in the Financial Administration Act, R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- (1) an individual;
- (2) an individual who has incorporated;
- (3) a partnership made of former public servants; or
- (4) a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means, a pension or annual allowance paid under the Public Service Superannuation Act (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the Supplementary Retirement Benefits Act, R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the Canadian Forces Superannuation Act, R.S., 1985, c.C-17, the Defence Services Pension Continuation Act, 1970, c.D-3, the Royal Canadian Mounted Police Pension Continuation Act, 1970, c.R-10, and the Royal Canadian Mounted Police Superannuation Act, R.S., 1985, c.R-11, the Members of Parliament Retiring Allowances Act, R.S., 1985, c.M-5, and that portion of pension payable to the Canada Pension Plan Act, R.S., 1985, c.C-8.

Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension? Yes (___) No (___)

If so, the Bidder must provide the following information, for all FPS in receipt of a pension, as applicable:

- (1) name of former public servant;
- (2) date of termination of employment or retirement from the Public Service.

By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with Contracting Policy Notice: 2012-2 and the Guidelines on the Proactive Disclosure of Contracts.

Work Force Reduction Program

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? Yes (___) No (___)

If so, the Bidder must provide the following information:

- (1) name of former public servant;
- (2) conditions of the lump sum payment incentive;
- (3) date of termination of employment;
- (4) amount of lump sum payment;
- (5) rate of pay on which lump sum payment is based;
- (6) period of lump sum payment including start date, end date and number of weeks;
- (7) number and amount (professional fees) of other contracts subject to the restrictions of a work force reduction program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including the Goods and Services Tax or Harmonized Sales Tax.

2.3 Status and Availability of Resources

The Bidder certifies that, should it be awarded a contract as a result of the bid solicitation, every individual proposed in its bid will be available to perform the Work as required by Canada's representatives and at the time specified in the bid solicitation or agreed to with Canada's representatives. If for reasons beyond its control, the Bidder is unable to provide the services of an individual named in its bid, the Bidder may propose a substitute with similar qualifications and experience. The Bidder must advise the Contracting Authority of the reason for the substitution and provide the name, qualifications and experience of the proposed replacement. For the purposes of this clause, only the following reasons will be considered as beyond the control of the Bidder: death, sickness, maternity and parental leave, retirement, resignation, dismissal for cause or termination of an agreement for default.

If the Bidder has proposed any individual who is not an employee of the Bidder, the Bidder certifies that it has the permission from that individual to propose his/her services in relation to the Work to be performed and to submit his/her résumé to Canada. The Bidder must, upon request from the Contracting Authority, provide a written confirmation, signed by the individual, of the permission given to the Bidder and of his/her availability.

PART 6 - SECURITY, FINANCIAL AND OTHER REQUIREMENTS

1. Financial Capability
A9033T (2012-07-16) Financial Capability
2. Subcontractors
A7035T (2007-05-25) List of Proposed Subcontractors

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 provide Chilled Water Plants and Pumps in accordance with the Requirement at Annex "A" Statement of Work and the Contractor's technical bid entitled (to be completed at contract award), dated (to be completed at contract award).

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 (2012-11-19), General Conditions - Higher Complexity - Goods, apply to and form part of the Contract.

2.2 Supplemental General Conditions

4006 (2010-08-16) Contractor to Own Intellectual Property Rights in Foreground Information, apply to and form part of the Contract.

Subsection 04 of 4006 Contractor to Own Intellectual Property Rights in Foreground Information is amended as follows:

-delete paragraph 3 (d) and replace with the following:

3 (d) without restricting the scope of any license or other right in the Background Information that Canada may otherwise hold, the right to exercise such of the Intellectual Property Rights in the Background Information as may be required for the installation, use, operation, maintenance, repair or overhaul of the Work.

3. Security Requirement

There is no security requirement associated with the requirement.

4. Term of Contract

The period of the contract shall be from Contract award to the end of the one (1) year warranty period for the last delivered and accepted Chilled Water Plant and Pump.

4.1 Delivery

The Contractor shall deliver quantity (28) Chilled Water Plants and Pumps to Halifax, Nova Scotia, quantity (20) Chilled Water Plants and Pumps to Esquimalt, British Columbia and quantity (2) Chilled Water Plants and Pumps training units (including the instructor panels): one (1) to Halifax, Nova Scotia and one (1) to Esquimalt, British Columbia in accordance with the Statement of Work Annex "A" and Annex "B" - Delivery Schedule.

The Contractor shall store and maintain each Chilled Water Plant and Pump until DND is ready to receive

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each Chilled Water Plant and Pump for installation in accordance with Annex B – Delivery Schedule.

Canada has the right to delay the delivery of each Chilled Water Plant and Pump subject to the following conditions:

A) Where Canada gives not less than 60 calendar days advance notice of a delay, the Contractor may claim no additional cost when the delivery date is delayed up to a maximum of 60 calendar days beyond the date specified in Annex B – Delivery Schedule.

B) Where Canada does not provide 60 calendar days advance notice of a delay, Canada will pay only the Daily Storage and Maintenance Fee referred to in the Basis of Payment for the period of the delay beyond the date specified in Annex B – Delivery Schedule and until the date that DND is ready to receive the Chilled Water Plant and Pump.

Preparation for delivery for items shall be in accordance with Canadian Forces Packaging Specification D-LM-008-036/SF-000 (the latest issue).

The delivery address of items is:

Consignee Shipping Address

East Coast: B701 Base Supply
Canadian Forces Base Halifax
Bldg 210 dockyard
Halifax, NS
B3K 5X5

West Coast: B202 Dept. of National Defence
Main Warehouse, Building 66 Colwood
CFB Esquimalt
Victoria, BC
V9A 7N2

4.1.2 Shipping Instructions - Delivery at Destination

Shipment shall be consigned to the destination specified in Annex "B" - Delivery Schedule, and delivered:

DDP Delivered Duty Paid CFB Halifax, Nova Scotia Incoterms 2000

and/or

DDP Delivered Duty Paid CFB Esquimalt, British Columbia Incoterms 2000

The Contractor will be responsible for all delivery charges, administration, cost and risk of transport and custom clearance, including the payment of customs duties and taxes.

When the goods are shipped, copies of the appropriate shipping notices are to be forwarded to the PWGSC Contracting and the DND Procurement Officer

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4.1.3 Preparation for Delivery

The Contractor must prepare item number(s) 1-50 for delivery in accordance with the latest issue of the Canadian Forces Packaging Specification D-LM-008-036/SF-000, DND Minimum Requirements for Manufacturer's Standard Pack.

4.2 SACC Manual Clauses

D2000C	2007-11-30	Marking
D2001C	2007-11-30	Labelling

5. Authorities

5.1 Contracting Authority

The Contracting Authority for the Contract is:

Russ Passmore
Supply Team Leader
Public Works and Government Services Canada
Frigate Life Extension Project
Louis St-Laurent Building 3rd Floor - 3NB04
455 De la Carriere Blvd, Gatineau, Quebec K1A 0S5
Tel: 819-939-3234 Cell: 613-316-3751

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 Project Authority

(To be completed at contract award)

The Project 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 Project Authority; however, the Project 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 Quality Assurance Authority / Inspection Authority

National Defence Headquarters
MGen George R. Pearkes Building
Ottawa ON K1A 0K2

Attention: DQA 5-3

Telephone: *(To be completed at contract award)*

Who is the Quality Assurance Authority for all work to be provided under the terms of this contract and certifying work.

5.4 Procurement Authority*(To be completed at contract award)*

The Procurement Authority is the representative of the department or agency for whom the Work is being carried out under the Contract. The Procurement Authority is responsible for the implementation of tools and processes required for the administration of the Contract. The Contractor may discuss administrative matters identified in the Contract with the Procurement Authority however the Procurement Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of Work can only be made through a contract amendment issued by the Contracting Authority.

5.5 Technical Authority:*(To be completed at contract award)*

The Technical Authority named above 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.

5.6 Contractor's Representative*(To be completed at contract award)***6. Proactive Disclosure of Contracts with Former Public Servants**

Not applicable

7. Payment**7.1 Basis of Payment**

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm price of \$_____CAD. Customs duties included and Goods and Services Tax or Harmonized Sales Tax is extra, if applicable.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

7.1.1 Storage and Maintenance Fee

In the event that Canada delays the delivery of a Chilled Water Plant and Pump beyond what is permitted in Article 4.1, Canada agrees to pay the Contractor the Daily Storage and Maintenance 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 Daily Storage and Maintenance Fee for each Chilled Water Plant and Pump is \$_____ (CAD), Goods and Services Tax or Harmonized Sales Tax is extra, if applicable

This fee is firm and not subject to any additional charges.

7.2 Milestone Payments

Canada will make milestone payments in accordance with the Schedule of Milestones detailed in Annex F to the Contract and the payment provisions of the Contract if:

- a) an accurate and complete claim for payment using 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) all the certificates appearing on form PWGSC-TPSGC 1111 have been signed by the respective authorized representatives;
all work associated with the milestone and as applicable any deliverable required
- c) has been completed and accepted by Canada.

7.3 Milestone Instructions

All Claims for Milestones payments shall be supported/accompanied by evidence demonstrating that each requested milestone does not exceed the sum of incurred costs and the pro-rated portion of profit or fee for the associated work. Each Milestone will clearly demonstrate progress commensurate with the value of the Milestone (value for money) with clear non-ambiguous evidence of the achievement and acceptance of the work supplied to Canada to substantiate payment of the Milestone. The Contractor shall include detailed DID's and CDRL's for all Milestones deliverables.

7.4 Schedule of Milestones

The schedule of milestones for which payments will be made in accordance with the Contract is attached as Annex "F" Milestone Payment Schedule.

8. Invoicing Instructions

The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.

Invoices must be distributed as follows:

- a. The original and one (1) copy must be forwarded to the consignee.
- b. One (1) copy must be forwarded to:

Department of National Defence
National Defence Headquarters
101 Colonel By Drive,
Ottawa, Ontario K1A 0K2
Attention: D Mar P 7-2-3
Allan Crytes

- c. One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

Payments will only be made on receipt of satisfactory invoices duly supported by specific release documents and/or other documents prior to shipment of material.

9. Certifications

9.1 Compliance

Compliance with the certifications and related documentation provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the term of the Contract. If the Contractor does not comply with any certification, provide the related documentation or if 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.

10. Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in _____. *(Insert the name of the province or territory as specified by the bidder in its bid, if applicable.)*

11. Priority of Documents

If there is a discrepancy between the wording 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 4006 (2010 08 16) Contractor to Own Intellectual Property Rights in Foreground Information;
- (c) the general conditions 2030 (2012-11-19), General Conditions - Higher Complexity - Goods;
- (d) Annex "A", Statement of Work;
- (e) Annex "B", Delivery Schedule;
- (f) Annex "C", Contract Deliverables Requirements List (CDRLs and DIDS);
- (g) Annex "F", Milestone Payment Schedule;
- (h) the Contractor's bid dated _____, *(insert date of bid)* *(If the bid was clarified or amended, insert at the time of contract award: ", as clarified on _____" or ", as amended on _____" and insert date(s) of clarification(s) or amendment(s)).*

12. Defence Contract

The Contract is a defence contract within the meaning of the Defence Production Act, R.S.C. 1985, c. D-1, and must be governed accordingly.

Title to the Work or to any materials, parts, work-in-process or finished work must belong to Canada free and clear of all claims, liens, attachments, charges or encumbrances. Canada is entitled, at any time, to remove, sell or dispose of the Work or any part of the Work in accordance with section 20 of the Defence Production Act.

13. SACC Manual Clauses

B9028C	2007-05-25	Access to Facilities and Equipment
A1009C	2008-05-12	Work Site Access
D5540C	2010-08-16	ISO 9001:2008 Quality Management Systems Requirements (QAC Q)

D5510C	2012-07-16	Quality Assurance Authority (DND) - Canadian-based Contractor
D5515C	2012-07-16	Quality Assurance Authority (DND) - Foreign-based and United States Contractor
D5620C	2012-07-16	Release Documents - Distribution
D5604C	2008-12-12	Release Documents (DND) - Foreign-based Contractor
D5605C	2010-01-11	Release Documents (DND) - United States-based Contractor
D5606C	2012-07-16	Release Documents (DND) - Canadian-based Contractor
A2000C	2006-06-16	Foreign Nationals (Canadian Contractor)
A2001C	2006-06-16	Foreign Nationals (Foreign Contractor)

14. NATO CODIFICATION

- i. The Contractor must provide the Department of National Defence (DND), which is the National Codification Bureau (NCB) for Canada, sufficient technical data to permit the Director, Supply Chain Operations (DSCO) to classify, codify and describe new items being introduced into the Canadian Government Cataloguing System.
- ii. Technical data for each item may include the manufacturer's engineering drawing (minimum level 2), standard, specification and/or data specification sheet (brochure). Regardless of which of these formats is provided, the data must clearly provide the following, as applicable:
- the name and address of the true manufacturer, or Design Control Authority;
 - the manufacturer's unique part number;
 - the physical characteristics (material, dimensions, tolerances);
 - performance data (i.e. functional and operating requirements such as speed, load);
 - electrical and/or electronic characteristics;
 - mounting requirements;
 - special features which contributed to the uniqueness of the item(s);
 - the end item application; and, if applicable
 - manufacturer's unique bar code number.
- iii. Technical descriptive data are not required for items that are identified in a Canadian or United States government specification or in a Military Standard which completely describes the item.
- iv. The Contractor is responsible for advising DND Technical Authority and the NCB (DSCO 5) of any proprietary data or restrictions imposed on the release of its technical data to government entities in Canada or abroad.
- v. In the event of disputes regarding the acceptability of technical data submitted by the Contractor, the ruling of the NCB (DSCO) must prevail.
- vi. The Contractor is ultimately responsible, under the conditions of the Contract, for the provision of the technical data for all of the items identified in the Contract. The Contractor must include the terms of this clause in any subcontracts, to ensure the availability of the technical data to DND and the NCB (DSCO).
- vii. For end items procured by the Contractor from a subcontractor or supplier, the Contractor must provide the name of the actual manufacturer and their unique identifying part number along with all necessary technical documentation, and their bar code number if available.
- viii. The Contractor must submit all data to the DND Technical Authority at least sixty (60) days before

delivery of the equipment. Items must not be released for shipment unless identified with a NATO Stock Number provided for in the Contract, or unless specifically authorized by the Contracting Authority.

ix. The Contractor must contact the DSCO for any further clarification of the codification technical data requirements at:

National Defence Headquarters
Mgen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A 0K2
Attention: Director Supply Chain Operations (DSCO)

15. Recommended Spare Parts List

i. The Contractor must, within 45 days after contract award (See DID-07), provide to the Procurement Authority a Recommended Spare Parts List (RSPL) prepared in accordance with the current issue of Canadian Forces Specification D-01-100-214/SF-000. The RSPL must contain the Contractor's recommendation for spares required to maintain the equipment for a 24-month period, and must provide the basis for the spares selection to be made by Department of National Defence. Upon request from the Contractor, the specification will be provided by the Contracting Authority.

ii. Supplementary Provisioning Technical Documentation (SPTD), as prepared by the actual manufacturer of the item, is required for the codification and cataloguing of all items listed in the RSPL. The SPTD called up in the above specification must accompany the RSPL as detailed in the specification. Specific details of the data elements required must be listed on a Provisioning Documentation Selection Sheet, prepared in accordance with the above specification, and be submitted in electronic ASCII text format.

iii. Questions regarding the preparation, format or contents of the above provisioning documentation must be directed to the Procurement Authority.

16. Meetings

16.1 Progress Meeting

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's 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.

16.2 Meeting Minutes

The requirement for meeting minutes shall be specified in the Statement of Work. In addition to the copies required by the Procurement Authority, Technical Authority, one copy of all such reports shall be delivered to the PWGSC Contracting Officer.

16.3 Progress Review Meetings

Progress review meeting shall encompass total project status as of the review date. The Contractor, at a minimum, must report on the following:

- a. Progress to date;
- b. Variation from planned progress and the corrective action to be taken during the next reporting period;

- c. A general explanation of foreseeable problems and proposed solutions, including an assessment of their impact on the contract in terms of schedule, technical performance and risk. The proposed solution should include the effort involved and the consequences to the schedule (Risk Register);
- d. Proposed changes to the schedule;
- e. Progress on action items, problems or special issues;
- f. Deliverables submitted prior to PRM;
- g. Milestones (technical and financial);
- h. Activities planned for the next reporting period;
- i. Status of Intellectual Property (IP) agreements, International Traffic in Arms Regulations (ITAR), Technical Assistance Agreements (TAA), Controlled Technology Access and Transfer (CTAT) or other agreements;
- j. Status of any change notifications and requests;
- k. Any changes to the PMP; and
- l. Other business as mutually agreed to by CANADA and the Contractor.

17. Travel and Living

Contractor personnel may be required to travel to NDHQ or other military establishments, to other Contractor's plants, and to other locations within Canada and internationally, as may be designated by the Technical Authority.

17.1 Travel and Living Expenses

The Contractor will be reimbursed its authorized travel and living expenses reasonably and properly incurred in the performance of the Work, at cost, without any allowance for profit and/or administrative overhead, in accordance with the meal, private vehicle and incidental expenses provided in Appendices B, C and D of the National Joint Council Travel Directive and with the other provisions of the directive referring to "travellers", rather than those referring to "employees".

All travel must have the prior authorization of the Contracting Authority.

All payments are subject to government audit.

18. Provisioning

18.1 Provisioning Parts Breakdown

i. The Contractor must, 15 days after the design of a deliverable is accepted by the Technical Authority (see DID-07), provide to the Procurement Authority a Provisioning Parts Breakdown (PPB) prepared in accordance with the current issue of Canadian Forces Specification D-01-100-214/SF0-000. Copies of all assembly level drawings and parts lists required to verify the complete and current configuration of the equipment must accompany the PPB. Upon request from the Contractor, the specification will be provided by the Contracting Authority.

ii. Supplementary Provisioning Technical Documentation (SPTD), as prepared by the actual manufacturer of the item, is required for the codification and cataloguing of all items listed in the PPB. The SPTD called up in the above specification must be supplied, as detailed in the specification, within twenty (20) working days after receipt of a request from the Director Supply Chain Operations (DSCO). Specific details of the data elements required must be listed on a Provisioning Documentation Selection Sheet, prepared in accordance with the above specification and the PPB, and be submitted in electronic ASCII text format.

iii. Final acceptance of the PPB and the SPTD will be made by DSCO. Questions regarding the

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preparation, format or contents of the above provisioning documentation must be directed to Procurement Authority.

19. Quality Plan

No later than 15 days after the effective date of the Contract, the Contractor must submit for acceptance by the Department of National Defence (DND) a Quality Plan prepared according to the latest issue (at contract date) of ISO 10005:2005 "Quality management systems - Guidelines for quality plans". The Quality Plan must 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 Quality Plan.

The documents referenced in the Quality Plan must be made available when requested by Public Works and Government Services Canada or DND.

If the Quality Plan was submitted as part of the bidding process, the Contractor must review and, where appropriate, revise the submitted plan to reflect any changes in requirements or planning which may have occurred as a result of pre-contract negotiations.

Upon acceptance of the Quality Plan by DND, the Contractor must implement the Quality Plan. The Contractor must make appropriate amendments to the Quality Plan throughout the term of the contract to reflect current and planned quality activities. Amendments to the Quality Plan must be acceptable to DND.

If the Contract includes the option for software design, development or maintenance of software, the Contractor must interpret the requirements of ISO 9001:2008 "Quality management systems - Requirements", according to the guidelines of the latest issue (at contract date) of ISO/IEC 90003:2004 "Software engineering - Guidelines for the application of ISO 9001:2000 to computer software".

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Annex "A"

Attached as a separate document

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Annex "B"

Attached as a separate document

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Annex "C"

Attached as a separate document

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Annex "D"

Attached as a separate document

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Annex "E"

Attached as a separate document

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CCC No./N° CCC - FMS No/ N° VME

Annex "F"

Attached as a separate document

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File No. - N° du dossier

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CCC No./N° CCC - FMS No/ N° VME

Annex "G"

Attached as a separate document

ANNEX A

STATEMENT OF WORK

**THE HALIFAX CLASS
CHILLED WATER PLANTS AND PUMPS**

ANNEX A

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ANNEX A

1. Scope

1.1 Purpose

1.1.1 This document states the requirements of the Department of National Defence for the design, manufacture, test, supply, documentation, and support of fifty (50) Chilled Water (CW) Plants and fifty (50) CW pumps and spares, for use on board Canada's twelve (12) Halifax Class ships and two (2) Navy Training establishments.

1.1.2 Installation of the abovementioned CW Plants and CW pumps is not included in the scope of the contract. The installation will be done under a separate contract.

1.1.3 It should be noted that DND's intention is to compete a separate repair and overhaul contract in support of the chilled water plant and pump at a later date.

1.1.4 This Statement of Work (SOW) shall be used in an RFP to define the functional, technical, and design requirements the Contractor must satisfy in his performance of the contract.

1.1.5 For the purposes of this SOW, a Chilled Water Plant is defined as the combination of components designed and built for the purpose of maintaining the supply water through the chilled water piping to the cooling equipment at a pre-determined temperature.

The components of the CW Plant must include, but is not limited to:

- compressor,
- compressor motor,
- condenser,
- evaporator,
- expansion valve,
- capacity control system.

1.2 Background

1.2.1 The Department of National Defence (DND) plans to replace the existing CW plants fitted to the HALIFAX Class ships with higher capacity plants and pumps in order to meet the growing demand for chilled water and in order to meet Federal Halocarbon Regulations (FHR). The CW system provides the necessary cooling to various ship systems. The current CW Plants use R22 refrigerant to provide cooling. As of January 1st, 2020 charging utilizing R22 will be forbidden.

1.2.2 The new CW Plant replacement will be required to use refrigerant R134a or a suitable substitute IAW Federal Halocarbon Regulations (FHR), 2003 and Ozone Depleting Substance Regulations (ODSR). R134a meets FHR and ODSR criteria and provides the necessary cooling properties.

ANNEX A

1.2.3 General descriptions of the existing CW plants can be found at Appendix 2.

1.2.4 General descriptions of the existing CW system can be found at Appendix 3.

1.3 Acronyms and Terminology

AAMR – Aft Auxiliary Machinery Room
AC – Alternating Current
AER – Aft Engine Room
AIL – Action Item List
ATP – Acceptance Test Procedure
CA – Contracting Authority
CB – Circuit Breaker
CD – Compact Disk
CFTO – Canadian Forces Technical Order
“Contractor” means successful bidder
CTAT – Controlled Technology Access and Transfer
CWCP – Chilled Water Control Panel
CW – Chilled Water
CWS- Chilled Water System
CSP – Chlorosulphonated polythene
CSU – Central Station Unit
CW – Chilled Water
“Days” means calendar days
DC – Direct Current
DED – Data Element Description
DID – Data Item Description
DND – Department Of National Defence
DWP – Docking Work Period
EDWP – Extended Docking Work Period
FAT – Factory Acceptance Test
FER – Fwd Engine Room
FHR – Federal Halocarbon Regulations
FMF – Fleet Maintenance Facility
FAMR – Fwd Auxiliary Machinery Room
FOC – First of Class
FSR – Field Service Representative
HMCS – Her Majesty’s Canadian Ship
HVAC – Heating, Ventilating and Air-Conditioning
IAW – In Accordance With
ILS – Integrated Logistics Support
IMCS – Integrated Machinery Control System
Installer - Shipyard or DND dockyard
IPMS – Integrated Platform Management System
ITAR – International Traffic in Arms Regulations
KW – Kilowatt

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LED – Light Emitting Diode
LORA – Level of Repair Analysis
LRU – Lowest Repairable Unit
MBF - Minimum bypass flow
MCC – Machinery Control Console
MSV – Machinery Space Ventilation
MSDS – Material Safety Data Sheet
MTBF – Mean Time Before Failure
MTTR – Mean Time To Repair
NEMA – National Electrical Manufacturers Association
ODS – Ozone Depleting Substance
ODSR – Ozone Depleting Substance Regulations
OEM – Original Equipment Manufacturer
PAC – Primary Air Conditioning
PCB - Polychlorinated Biphenyls
PHST – Packing, Handling, Storage, Transportation
PM – Project Manager
PMP – Project Management Plan
PPB – Provisioning Parts Breakdown
PRM – Progress Review Meeting
PS – Project Schedule
PVC - Polyvinyl Chloride
R&O – Repair & Overhaul
RFP – Request For Proposal
RH – Relative Humidity
RCN – Royal Canadian Navy
ROM – Rough Order of Magnitude
RSPL – Recommended Spare Parts List
RV – Relief Valve
SKID – the chiller components and base that are all housed/mounted together. For the legacy 85T chiller, the chiller Motor Controller and SW Regulating Valve are not mounted on the skid.
SOW – Statement Of Work
SPTD – Supplementary Provisioning Technical Documentation
SPTATE – Specialised Tools and Test Equipment
STW – Set To Work
SW – Sea Water
TA – Technical Authority
TAA – Technical Assistance Agreement
TDP – Technical Data Package
USN – United States Navy
VE – Vibration Eliminators
W - Watt
WBS – Work Breakdown Structure
WHMIS – Workplace Hazardous Material Information System

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1.4 Applicable Documents

- a. The following documents form part of this SOW to the extent specified herein, and are supportive of the SOW when referenced. Unless otherwise specified the issue or amendment of documents effective for this contract shall be those in effect on the date of contract award:

DND Supplied References	
1	D-03-010-000/SG-001, Standard for Environmental Qualification of Equipment for use on Surface Combatants
2	D-23-003-005/SF-002, Specification For Maintenance Painting Of HMCS Ships
3	D-01-400-001/SG-000, Engineering Drawing Practices For Class Drawing And Technical Data List
4	D-03-003-018/SG-001, DND Specification for Machinery Balancing Criteria
5	D-03-003-005/SF-000, General Electrical Specifications for Canadian Forces ships
6	D-03-003-021/SG-005, Standard For The Design And Installation Of Shock, Vibration And Acoustic Hardware Components In Ships
7	D-03-003-007/SG-000, Specification For Design And Test Criteria For Shock Resistant Equipment In Naval Ships
8	C-03-010-000/MM-001, Canadian Naval Shipboard Techniques For Electromagnetic Compatibility
9	C-03-005-012/AM-001 NAMMS Volume 1
10	C-01-100-100/AG-006, Specification: Writing, Format And Production Of Technical Publications
11	C-03-007-000/AG-001, Engineering Change Specification Procedure
12	D-01-100-226/SF-001, Specification for preparation of Test Sheets for Shipboard Systems and Equipment
13	C-01-100-100/AG-005, Acceptance of Commercial and Government Publications as adopted Publications
14	D-02-002-001/SG-001, CF Standard Identification Marking of Canadian Military Property
15	D-01-100-214/SF-000, Preparation of Provisioning Parts Breakdowns for CF Equipment
16	D-01-100-215/SF-000, Specification of Materiel Change Notice
17	D-49-003-003/SF-002 "Pipe Welding And Brazing Specification for HMCS Ships And Auxiliaries",
18	Colored Drawings (Fig.1 Existing CW Plant (top view) / Fig.2 (front view) / Fig.3 (side view))
NON- DND references (not supplied)	
1	ASME VIII DIV 1 BOILER AND PRESSURE VESSELS
2	CSA B-52 Refrigerant Piping code
3	Federal Halocarbon Regulations 2003
4	Ozone Depleting Substance Regulations (ODSR)
5	Workplace Hazardous Material Information System (WHMIS)
6	ASTM B111
7	ASTM B171
8	ASTM B61
9	MIL-A-19521B
10	ASME B15.1 – 2000

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11	OSHA 1910.219 - 1996
12	MIL-S-901
13	MIL-C-2212F
14	MIL-DTL-2212H
15	MIL-E-2036
16	MIL-DTL-16743
17	MIL-STD-167-1
18	MIL-DTL-16032
19	MIL-S-15291E(SH)
20	MIL-S-901D(SH)
21	MIL-C-2212G(SH)
22	MIL-STD-881C
23	ANSI B73.1
24	MIL-STD-2073
25	DS 02-345

- b. As new Standards or Specifications are promulgated they may become part of this requirement, as approved under a Contract amendment, Task or other notification, such as by letter, e-mail, or minutes of meeting.

2 Chilled Water Plant/System Requirements

2.1 Shock Requirements

2.1.1 Equipment Shock Qualification

- a. The contractor must provide the technical authority a minimum of thirty (30) days notice of any planned shock test event. The TA or their designated representatives may elect to witness this testing.
- b. For valid equipment qualification by physical shock test the following requirements apply:
- i. The designated shock test machine and test-procedure are to be documented and presented to the technical authority in accordance with requirements of CFTO D-03-003-007/SG-001 for prior approval.
 - ii. A shock test report/certificate from the testing establishment and an associated functional report must be delivered to the technical authority for review. The shock test report/certificate must comply with the requirements of D-03-003-007/SG-001 and must, as a minimum, include:
 - a. The shock grade designation of the equipment.
 - b. The levels to which the equipment was tested. The test levels must be reported in accordance with STANAG 4142 in terms of shock spectra.
 - c. The test machine and establishment employed.

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- d. Details of the test machine fixture arrangement.
- e. A record of the time history of the shock input to the equipment (i.e. above-mount motion response).
- f. A signature of the appropriate test house authority.
- g. Acceptance of shock qualification shall be achieved by the technical authority in a written approval of the shock test procedure, a shock test certificate, and a functional test report. These reports shall be prepared by the contractor or their test facility and submitted to the technical authority, before the delivery of the equipment.

2.2 Materials of Construction

- 2.2.1 All materials and components used in the construction of the chiller units are to be new, not previously used, and designed for the application. Mass produced equipment/components must have an expected continued production of 15 years minimum, from the date of first chiller delivery.

3 Acceptance Test Procedures

- 3.1.1 The Contractor must provide copies of FAT Test Procedures as per DID 05.
- 3.1.2 The FAT Test Procedure must contain all conditions, precautions, adjustments, expected test results, tolerances, and a list of the tools and test equipment required to verify the correct operation of the entire Chilled Water Plant.
- 3.1.3 The Contractor must perform factory acceptance testing on a minimum of two of the Chilled Water Plants.
- 3.1.4 The conduct of the factory acceptance test may be witnessed and approved by DND or its designated authority.
- 3.1.5 The Technical Authority assigned by DND must be given no less than thirty (30) days advanced notice prior to conducting the FAT.
- 3.1.6 Upon completion of the FAT, the Contractor must provide DND with a FAT Acceptance Report as per DID 06.

4 Logistics Requirements

4.1 Integrated Logistic Support:

- 4.1.1 An ILS Drawing Package must be submitted, in accordance with DID 09.
- 4.1.2 The contractor must submit Provisioning Documentation, including the Provisioning Parts Breakdown, Recommended Spare Parts List, and Supplementary Provisioning Technical Documentation in accordance with DID 07.
- 4.1.3 The contractor must submit the Consolidated Support Equipment Provisioning List in accordance with DID 15.

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- 4.1.4 The Contractor must prepare Materiel Change Notices in accordance with DID 16 subsequent to the FAT and until the last equipment manufactured under this contract is delivered, in accordance with CF Specification D-01-100-215/SF-000.

4.2 Technical Data Requirements

- 4.2.1 Technical Data Package:
A TDP must be provided in accordance with DID 11.
- 4.2.2 Installation Guidance Package:
An Installation Guidance Package must be submitted in accordance with DID 04.

4.3 Technical Manual

- 4.3.1 The contractor must provide an Operating and Maintenance manual, in accordance with DID 08.

4.4 Packing Handling Storage and Transportation Considerations

- 4.4.1 The contractor must provide a Special PHST Consideration Items in accordance with DID 12.
- 4.4.2 All packaging must be in accordance with DID 13.

5 Training

- 5.1.1 In addition to the 48 chiller units and pumps for the ships, the following equipment is required to support the coastal training facilities:
- a. two (2) full chiller units and pumps for the purpose of training maintainers (one per coast);
 - b. two (2) instructor panels for the instructor to induce the faults in the control panel for training purposes (one per coast).
- 5.1.2 The contractor must deliver Training Course Material as per DID 10.
- 5.1.3 The contractor is to deliver the first four (4) maintainer courses (two per coast) using the equipment provided in 5.1.1 and the documentation in 5.1.2 for approximately 20 students per course.

6 Project Management

6.1 Organization

- 6.1.1 The Contractor shall establish an internal organization, headed by a single Project Manager (PM), to carry out the work required for the Chilled Water Plants and Pumps project. The PM shall have sufficient authority to plan, direct, control and make decisions for the

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Contractor. The PM shall be the main point of contact with the Crown's Contract Authority (CA) and the DND Technical Authority (TA).

6.2 Project Management Plan

- 6.2.1 The Contractor must prepare and deliver a PMP in accordance with DID 01 to identify how the Contractor intends to fulfill the Project Management requirements of this SOW.

6.3 Quality Plan

- 6.3.1 The Contractor must prepare and deliver a Quality Plan (QP), as per SACC D5402C, to identify how the Contractor intends to ensure adherence to quality standards. This QP will be included as an appendix in the final PMP as per DID 01.

6.4 Meeting Arrangements

- 6.4.1 When the Contractor is tasked to arrange and coordinate a meeting, it shall be done in accordance with this section.
- 6.4.2 Supporting Documents. The Contractor shall prepare and submit supporting documents required for a meeting at least 5 days in advance of each review or meeting.
- 6.4.3 Agenda. The Contractor shall prepare and submit an agenda at least 5 days in advance of each review or meeting except in the case of unscheduled meetings in which case the Contractor shall submit an agenda as soon as possible prior to the meeting.
- 6.4.4 Meeting Minutes. The Contractor shall record, produce, deliver and revise, as required, minutes for all meetings. The Contractor shall prepare minutes in accordance with DID 02. Meeting minutes are accepted once signed by the TA. The TA will advise the Contractor of any issues within three (3) days receiving the minutes. The Contractor will distribute electronic PDF versions of the signed minutes to meeting attendees within two (2) days of receipt.

6.5 Meeting Cancellation

- 6.5.1 The TA or CA may cancel PRMs at their discretion with a minimum five (5) days notice. Rescheduling of meetings by the Contractor shall be done only with the explicit agreement of the TA and CA.

6.6 Correspondence

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- 6.6.1 Turn around time for all enquiries shall be five (5) days or less from time stamp, unless time lines are previously agreed upon by all parties.

6.7 Progress Reports

- 6.7.1 The Contractor shall monitor progress and deliver monthly Progress Status Reports (PSR) in accordance with DID 03.
- 6.7.2 The Contractor shall monitor progress and deliver by email, a monthly Project Status Report in accordance with DID 03 as well as a formal debrief of PSR to the DND PM.

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Appendix 1: Technical Requirements

A1.1. Chilled Water Plant/System Requirements

A1.1.1. *Mechanical Interface Requirements*

A1.1.1.1. The CW Plant mounts to the ship structure in the same location as originally used by the legacy CW System.

- a. See Figure 2 and Figure 3 for location of current mounts (marked in blue).

A1.1.1.2 Chilled Water Connections

- a. The proposed Chilled Water Plant design must connect to the existing ships CW system mechanically through flexible connections.
 - i The flexible connections must comply with Def Stan 02-345 (or equivalent).
 - ii The flexible connections must be sized such that they can meet the CW flow as stated at A1.1.2.1.
 - iii Since the flexible connections have a limited shelf life, each flexible connection must have a 'date of manufacture' no more than six months earlier than date of chiller delivery.

Note: The flexible connections are the only components which are permitted to breach the required envelope as stated at A1.1.2.12.

- b. CW flanges on the Evaporator must be sized appropriately for durable Evaporator service for the design CW flow. For purposes of connecting ship's legacy piping to the new chiller, it is required that the pipe connection locations (on the new chiller) match, or be as close as possible to the pipe locations on the legacy chiller, as follows.
 - i See Figure 1 and Figure 3 for location of current CW connections (marked in red).
 - ii At the wet weight condition, on shock mounts, the CW inlet flange center must match the legacy CW inlet flange center (preferred) or be no further than 15 centimetres from the legacy center, and have the same orientation.
 - iii At the wet weight condition, on shock mounts, the CW outlet flange center must match the legacy CW outlet flange center (preferred) or be no further than 15 centimetres from the legacy center, and have the same orientation.

Note: the "CW inlet flange" and "CW outlet flange" do not necessarily have to be the

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same as the evaporator inlet and outlet flanges. It is acceptable to pipe between flanges (as long as the piping remains in the required envelope, as stated at A1.1.2.12).

A1.1.1.3 Sea Water Connections

- a. The proposed Chilled Water Plant design must connect to the existing ships SW system mechanically through flexible connections.
 - i The flexible connections must comply with Def Stan 02-345 (or equivalent).
 - ii The flexible connections must be sized such that they can meet the SW flow as stated at A1.1.2.1.
 - iii Since the flexible connections have a limited shelf life, each flexible connection must have a 'date of manufacture' no more than six months earlier than date of chiller delivery.

Note: The flexible connections are the only components which are permitted to breach the required envelope as stated at A1.1.2.12.

- b. SW flanges on the Condenser must be sized appropriately for durable service for the maximum SW flow. For purposes of connecting ship's legacy piping to the new chiller, it is required that the pipe connection locations (on the new chiller) match, or be as close as possible to the pipe locations on the legacy chiller, as follows:
 - i See Figure 1 and Figure 3 for location of current SW connections (marked in green).
 - ii At the wet weight condition, on shock mounts, the SW inlet flange center must be as close as possible to, but be no further than 15 centimetres away from, the legacy SW inlet flange center, and have the same orientation.
 - iii At the wet weight condition, on shock mounts, the SW outlet flange center must be as close as possible to, but be no further than 15 centimetres away from, the legacy SW outlet flange center, and have the same orientation.

Note: the "SW inlet flange" and "SW outlet flange" do not necessarily have to be the same as the condenser inlet and outlet flanges. It is acceptable to pipe between flanges (as long as the piping remains in the required envelope, as stated at A1.1.2.12).

A1.1.1.4 The CW System must consist of four chilled water plants located in the same four locations as the legacy units.

- a. See DND Supplied Drawing refs 1 and 2 for ship location of current CW plants.

A1.1.1.5 The CW Plants must occupy the same space or less as the legacy units.

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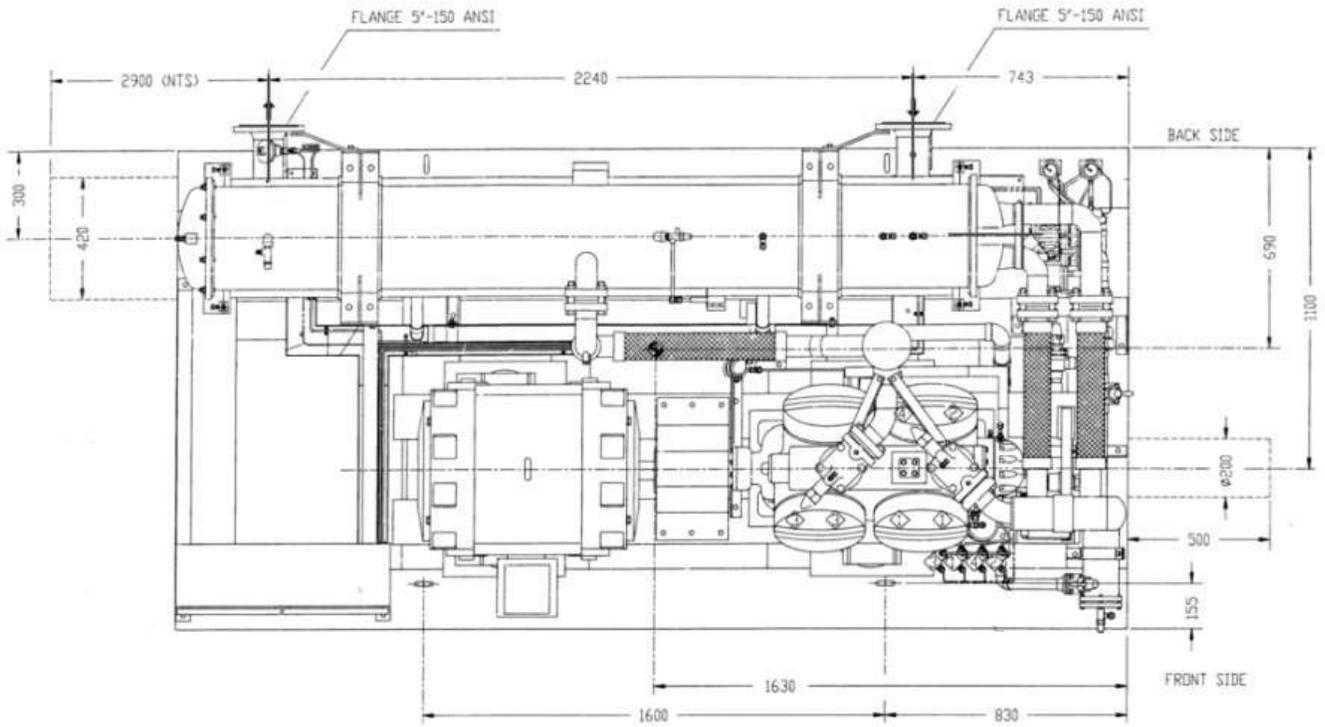


Figure 1 - Existing CW Plant (top view)

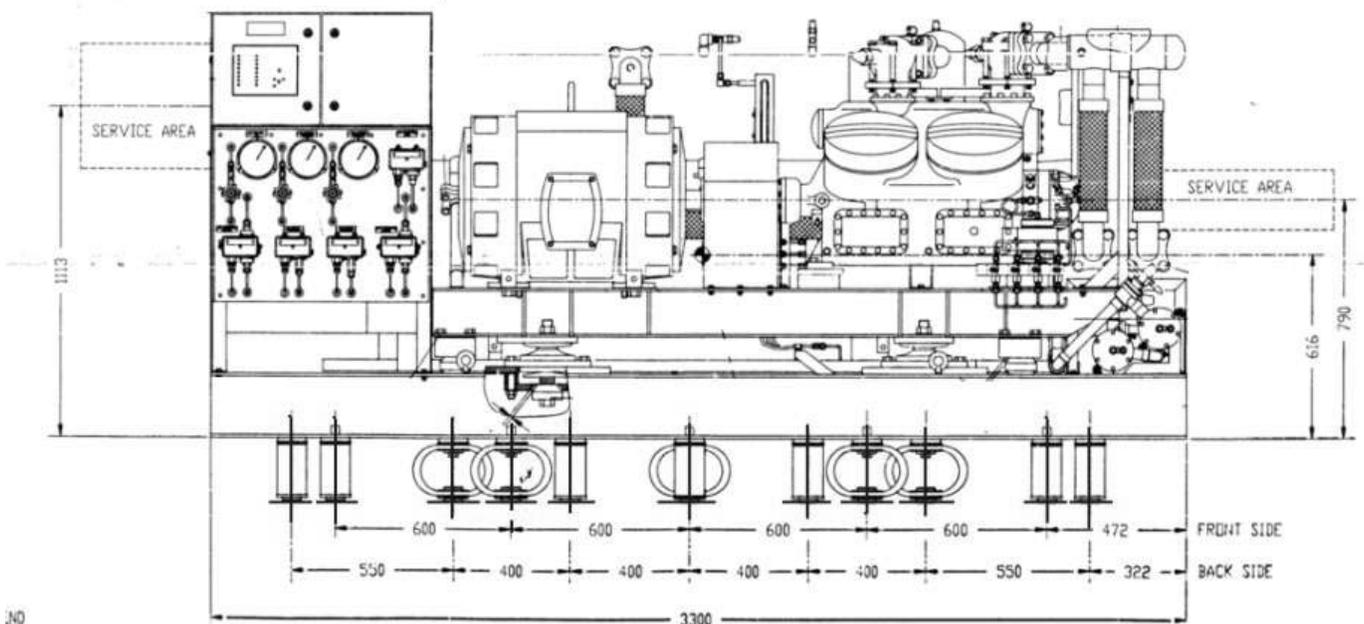


Figure 2 - Existing CW Plant (front view)

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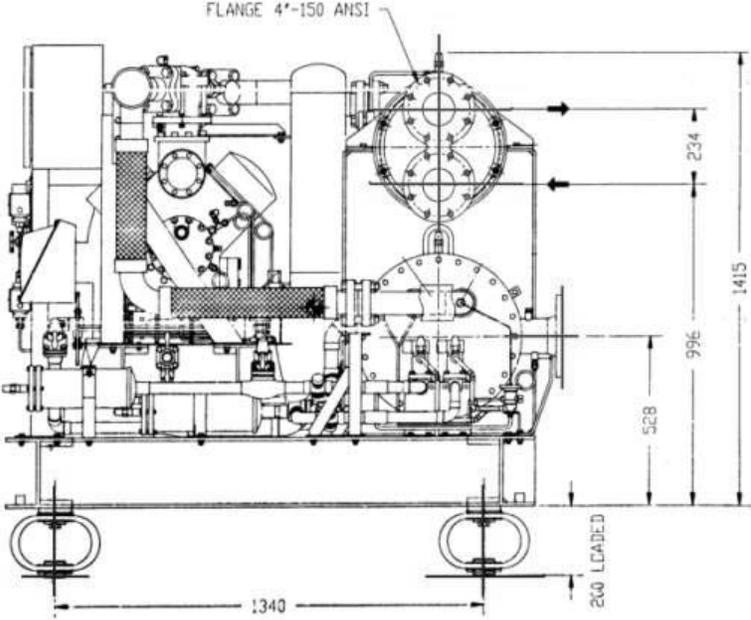


Figure 3 – Existing CW Plant (side view)

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A1.1.2. Operational Requirements

A1.1.2.1. Chiller Rated Capacity and Conditions: The chiller must be designed for and capable of achieving the following rated capacity at the listed conditions:

- | | |
|---|---|
| a. Chiller Cooling Capacity: | 400 kW |
| b. Entering Sea Water Temperature: | 35C |
| c. CW Flow: | 1700 liters / minute |
| d. CW leaving Temperature: | 7.8C |
| e. CW Fluid: | city quality fresh (potable) water with corrosion inhibitor, nil glycol |
| f. Ambient temperature surrounding chiller: | as noted at para A1.1.7.1 |
| g. Maximum available power | see para A.1.1.5 |
| h. Maximum available Sea Water flow: | 1970 Liters / minute |

A1.1.2.2. Other Operating Conditions:

- The HVAC system/chiller is a constant flow system. When the chiller is initially put into service, the CW flow will be 1400 L/min. Anticipated future load growth will result in a progressive increase in the CW flow, approaching the rated flow noted above. The chiller must be designed to accommodate this variance in CW flow.
- Each ship has four chillers and four CW Pumps with one pump dedicated to each chiller. Three CW pumps must run at all times. The number of operating chillers varies from one to three, depending on ship's A/C load. Therefore chillers must be designed to allow the continuous flow-through of the CW from its dedicated pump, whether the chiller is operating or not. If a chiller trips off, its dedicated CW pump must not trip off, but continue to operate.
- The four chillers installed on each ship are completely independent of each other. Each chiller's load at any time will be defined by its CW flow and entering water temperature. Each chiller's load is normally expected to be the same, or within 15% of the others, due to differences in entering water temperature. It will be ship's staff responsibility to shut-down or start-up the chillers, for purposes of efficient operation (when the loading of the operating chillers becomes excessively high or low). However, as part of the "unattended" operation mandate, the chiller must automatically shutdown if the load drops below the manufacturer's recommended minimum load for continuous and reliable operation of the chiller.
- At any time, each chiller's flow is expected to be relatively constant with variations of up to 5% through that one chiller. At any time, the entering water temperature is expected to be nearly identical for all chillers, with variations of up to 1 degree C among chillers. Each chiller's control system must sense Leaving CW temperature and adjust capacity to achieve the Leaving temperature set-point.

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- e. The chillers must be capable of continuous, unattended, reliable service, 24 hours/day, 365 days/year, except for scheduled preventative maintenance and overhaul maintenance periods.
- f. The chillers must only start by operator action, either local start, or remote start from the Machinery Control Room (per para A1.2.4.3). If chiller trips off due to internal cause (e.g., high pressure) or external cause (e.g., power failure), it must remain off (even if the cause is corrected), until restarted by deliberate operator action. Tripping off of one chiller must not affect the remaining operational chillers (except to increase their load).
- g. The chiller must be designed to operate with chilled water comprised of fresh water without glycol, or other additives intended to lower the freezing point of the chilled water. To protect against potential freeze damage, the following safety shutdowns must be included as a minimum: (i) LOW refrigerant pressure (by Control System and by independent mechanical switch); (ii) LOW leaving water temperature (by Control System); (iii) LOW CW flow (by Control System and by independent mechanical switch); (iv) LOW CW pressure drop (across Evaporator) (by independent mechanical switch); (v) Interlocked with CW Pump operation (by Control System).
- h. Chiller leaving water temp set-point must be user adjustable between 6.5C to 8.0C.
- i. Chiller must be able to operate continuously at a reduced capacity in the range between 20% to 100% capacity.
- j. Chiller must be able to operate with higher than normal CW entering temperature, up to 14C. In the event that motor amps exceed the maximum (per para A1.1.5.2), Chiller Control must automatically reduce chiller capacity, to keep chiller continuously operational.
- k. At SW temperatures above 35C and/or at conditions of heavy condenser fouling, when motor current exceeds the maximum value noted at para A1.1.5.2, the Chiller Control must automatically reduce compressor capacity to keep motor amps within maximum and to keep the chiller running continuously and reliably. Occurrence of this operational event must be noted by the Chiller Control system.

A1.1.2.3 Chiller with Dual Compressors / Dual Motors (Optional):

- a. When the dual compressor/dual motor chiller is operating, and the “Lag” compressor is (routinely) shut-off due to low load (by the chiller control), it is acceptable for the “Lag” compressor to routinely and automatically restart (by the chiller control) when load increases again. See para A1.1.5.4 for Lag compressor starting current limitations.
- b. Upon every manual start of the chiller, the Lead/Lag compressors must automatically alternate. Controls must also allow the operator to select the Lead compressor.

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- c. At manual startup of the dual compressor/dual motor chiller, the compressors shall always start sequentially, for the purpose of limiting starting current.
- A1.1.2.4 The CW Plants must use refrigerant R134a or a suitable substitute iaw FHR and ODSR, as the refrigerant. The refrigerant must be a single substance or an azeotropic mixture. Zeotropic mixtures must not be used.
- A1.1.2.5 The Chilled Water Plant and System must be capable of continuous independent operation under the following operating conditions of inclination as per D-03-010-000/SG-001:
- (1) Permanent list of 20° port or starboard;
 - (2) Permanent trim of plus or minus 5°;
 - (3) Ship rolling 40° either side of the vertical plane and pitching plus or minus 10 degrees about the horizontal plane.
- A1.1.2.6 The CW Plants must have a life expectancy of no less than twenty (20) years from date of installation.
- A1.1.2.7 The CW Plants must have integrated control and indication as stated in section A1.2.4.
- A1.1.2.8 The CW Plants must have coatings that meet the specifications defined in document D-23-003-005/SF-002.
- A1.1.2.9 The CW Plants must be of a water resistant design as detailed in D-01-400-001/SG-000 section 1.3.3.
- A1.1.2.10 The CW plants must have a MTBF of no less than 20,000 hrs.
- A1.1.2.11 The CW Plants must have preventative maintenance routines (as recommended by OEM) to achieve the MTBF as stated in A1.1.2.10
- A1.1.2.12 The CW plants must not exceed 3300mm in length, 1650mm in width and 1640mm in height.
- A1.1.2.13 The CW plant subcomponent's dimensions must allow for transport through the ship to the necessary locations, they must be sized to clear the smallest opening as per the AER access route:
- AER:
- i. Portable Plate Deck 1 – Clear opening is 1650mm x 1300mm
 - ii. Portable Plate Deck 2 – Clear opening is 1650mm x 1300mm
 - iii. Portable Plate Deck 3 – Clear opening is 1650mm x 1300mm

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A1.1.3. Noise and Vibration Requirements

A1.1.3.1. Vibration Levels

- a. The CW Plants must meet the noise and vibration requirements defined by this specification. The requirements are based on the existing equipment which is known to meet all the specified criteria.
- b. The contractor must guarantee that the vibration levels specified in this article are met as a basis of equipment suitability prior to acceptance.

A1.1.3.2. In-Place Balancing Requirements

- a. The rotating components of the replacement machinery are considered noise critical and must be shown by measurement to meet the balance criteria specified by shipboard equipment balancing standard CFTO D-03-003-018/SG-001. Notwithstanding, all electrical motors must also meet the criteria for precision bearings, alignment, general design and balance specified by the General Electrical Specification D-03-003-005/SF-000.

A1.1.3.3. Impeller Blade Number

- a. The number of impeller blades/vanes must be a prime number and a minimum of 5 or greater (preferably 7 or more).

A1.1.3.4. Structure Borne Vibration (Self-Generated)

- a. The contractor must demonstrate to DND prior to acceptance that the calculated power average vertical vibration levels determined from the measured vibration levels on the Chiller Plant and Chilled Water Pump specified in this article are met.
- b. Prior to acceptance for delivery, the chiller plant and chilled water pump vibration levels must be measured by the Contractor at the Contractors facility using the same mounting system that will be fitted in service while under the normal load and operating conditions.
- c. The vibration requirements specified in Table 1 define the mandatory performance of the equipment measured directly below each of the equipment mounts on the chiller plant raft. The vibration requirements specified in Table 2 define the mandatory performance measured directly above each of the equipment mounts on the chilled water pump. The information listed in Tables 1 - 4 is for use only in response to the solicitation.

Vibration Levels (VdB ref 10^{-8} m/s)											
Frequency (Hz)	8	16	31.5	63	125	250	500	1K	2K	4K	8K

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	84	84	84	90	88	86	80	74	68	62	56
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Table 1: CALCULATED POWER AVERAGE VERTICAL VIBRATION LEVELS BELOW UPPER STAGE MOUNTS (Chiller Plant)

Vibration Levels (VdB ref 10 ⁻⁸ m/s)											
Frequency (Hz)	8	16	31.5	63	125	250	500	1K	2K	4K	8K
	97	97	97	100	97	93	90	87	83	80	77

Table 2: CALCULATED POWER AVERAGE VERTICAL VIBRATION LEVELS ABOVE MOUNTS (Chilled Water Pump)

- d. The measured test results must be submitted to the TA for review and approval in accordance with DID 06.

A1.1.3.5. Airborne Noise

- a. Acceptance of the equipment shall be subject to it meeting the specified airborne noise levels measured in near free field conditions under normal load and operating conditions.
- b. The un-weighted octave band airborne noise levels measured 1m directly above and at 1m from each end and front and back of the chiller plant and chilled water pump at a height of 1.5 m above the factory floor in a near free field environment must not exceed the levels specified in Table 3 and Table 4 respectively.
- c. The measured test results must be submitted to the TA for review and approval in accordance with DID 06. Failure to comply with the requirements shall be grounds for rejection of the equipment and rework at no-charge to the crown.

Airborne Noise Sound Pressure Levels (dB(A) ref 20μPa @ 1 m)										
Octave Band Centre Frequency (Hz)										
	31.5	63	125	250	500	1K	2K	4K	8K	dB(A)
	88	88	86	83	81	80	79	78	78	86

Table 3: AIRBORNE NOISE REQUIREMENTS – CHILLER PLANT

Airborne Noise Sound Pressure Levels (dB(A) ref 20μPa @ 1 m)										
Octave Band Centre Frequency (Hz)										
	31.5	63	125	250	500	1K	2K	4K	8K	dB(A)
	80	80	78	78	76	75	73	70	68	80

Table 4: AIRBORNE NOISE REQUIREMENTS – CHILLED WATER PUMP

A1.1.3.6. Additional Requirements

- a. The contractor must incorporate all noise and vibration requirements within the planned Factory Acceptance Test program (FAT). Details of the acoustic component of the FAT

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program must be provided to the technical authority a minimum of 30 days prior planned test date.

- b. In the event mount types other than those which exist onboard the HAL class CW system are selected, the contractor must arrange for mount certification and acceptance by the TA. Mounts which are listed in D-03-003-021/SG-005 are already certified.

A1.1.4. Shock Requirements

A1.1.4.1. Equipment Shock Qualification:

- a. Canadian shock qualification policy is outlined in CFTO D-03-003-007/SG-001. Qualification following RN or USN practice is allowed on the condition that the method and test levels are shown to be equivalent to CFTO D-03-003-007/SG-001. Shock testing using an appropriately sized test machine is required. North American facilities allow the use of Mil-S-901 test machines for this qualification. The equipment is to be demonstrated as being able to continue working before, during and after the application of this shock. Note that for equipment that has been previously shock qualified, the department is prepared to grant qualification by extension or similarity based on previous shock qualification that can be shown to be equivalent.
- b. Demonstration by physical shock testing is the required method of shock qualification for all non-qualified equipment. Qualification by extension or similarity is allowed for previously qualified equipment. Qualification by analysis is allowed for structural modifications which may be required to accommodate design changes in way of the new equipment. In particular equipment seating and foundations will require qualification by analysis where such are not part of the shock test procedure.
- c. The TA must have full access to the planning and preparation of the equipment for physical shock testing.
- d. All metallic materials used on the chiller must have an elongation property of 5% or greater in tensile testing, in accordance with ASTM A370.

A1.1.5. Electrical Requirements

A1.1.5.1. The Chilled Water Plant and CW pump must be designed to operate with 440 volt / 60Hz / 3 - Phase, ungrounded system electrical power.

A1.1.5.2. The chiller must be designed such that at moderate SW temperatures (approximately SW temperatures less than 32C), the chiller must operate with a maximum of 200 amps. At extreme SW temperatures (SW temperatures above approximately 32C) the chiller's current may exceed 200 amps if necessary, but not exceed 215 amps.

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- A1.1.5.3. During cold start-up (i.e., operator action required), the maximum starting current must not exceed 700 amps.
- A1.1.5.4. Should the chiller be fitted with dual compressor/motors, and when the lag compressor will routinely and automatically start (i.e. without operator action, for purposes of capacity turndown), the lag compressor starting current must not exceed 550 amps.
- A1.1.5.5. Additional power is available at 115V, 60Hz 1 Phase, for any chiller ancillaries.
- A1.1.5.6. The maximum available power (for each chiller) from the 115V, 60Hz 1-Phase power is 650 W.
- A1.1.5.7. All control panels, power supply cabinets and monitoring cabinets must comply with C-03-003-005/SF-000 section 10.3
- A1.1.5.8. Motors supplied as part of the CW Plant unit must meet the following:
 - a. Capable of making a minimum of ten (10) starts a day; and
 - b. Have built-in overload protection.
- A1.1.5.9. The Chilled Water Control Panel(s) (CWCP) must provide:
 - a. Power to AC motors;
 - b. Power for control, operational indicators and alarm devices.
- A1.1.5.10. Design features to be included in the replacement CWCP's:
 - a. Operation – the CWCP's must be designed to provide for fully automatic and manual override operation complete with switches, push buttons, indicating lights, alarms and emergency shutdown features required to fulfill the requirements of this specification;
 - b. Loss of Power – the Contractor must ensure that in the event of loss of power, the control circuitry will remain de-energized until a Reset push button is depressed; and
 - c. Alarms – the alarm indicating lights must be energized by a minimum of the following; loss of power to the unit and temperatures which exceed those identified in this specification.

A1.1.6 Electromagnetic Compatibility

- A1.1.6.1 The designed equipment must conform to all aspects of electromagnetic compatibility in accordance with CFTO C-03-010-000/MM-001

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A1.1.7 Environmental

A1.1.7.1 The chiller must be designed for, and capable of reliable and continuous operation at rated capacity under the following Design Maximum and Design Minimum conditions:

Parameter	Design Maximum	Normal	Design Minimum
Machinery Space Temperature	60 °C [note 1.7.1.1]	10 to 50°C	4°C
Relative Humidity	100%, non-condensing	30% to 70%	10%
Sea Water Temperature	35°C	2 to 31°C	Minus 2.2°C

Note: The Chiller and CW Pump must be designed for an ambient temperature of 60°C or higher. The exception is the Chiller Control Panel, which must be designed for 50°C ambient, or higher. DND will arrange local ventilation supply air to be discharged onto the Control Panel.

A1.1.8 Material

A1.1.8.1 The unit components must be constructed of materials thoroughly resistant to the corrosive and erosive effects of the marine environment and at temperatures and pressures encountered during normal ship operation. Frames and panel enclosures are to be of structural steel and coated for corrosion protection.

A1.1.8.2 The following materials must not be used:

- a. Asbestos in any form;
- b. Cadmium plating;
- c. Polychlorinated biphenyls (PCB) ;)
- d. Chlorosulphonated polythene (CSP) and polyvinyl chloride (PVC) as insulators for electrical cables;) and
- e. Radioactive material.

A1.1.8.3 Workplace Hazardous Material Information (WHMIS) Material Safety Data Sheets (MSDS) are to be provided for cleaning agents and any other components that require MSDS under WHMIS legislation.

A1.1.8.4 Good piping fabrication practices must be used. Pipes must align without force being required to line up mating connections. Where vibration eliminators (VE)/flexible

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connections are required, each service (e.g., discharge VE) must be identical and interchangeable among all chillers. This will require each chiller's piping to be fabricated with precision such that the common VE spare part will bolt in place and meet the alignment tolerances as required by the OEM of the VE/flexible connection. VE/flexible connections must connect to adjacent piping by flanged joint where possible. VE/flexible connections must be kept to a minimum and used only where essential. VE/flexible connections must not be used to connect mis-aligned piping.

A1.1.8.5 Refrigerant Circuit Valves:

- a. Refrigeration circuit isolation valves must be fitted to enable isolation of all refrigerant inventory in the condenser or receiver. As a minimum, valves are required on the refrigerant piping at condenser inlet and outlet, at each filter/dryer inlet and outlet, and condenser level gauge top and bottom. When refrigerant is isolated in the condenser, VE/flexible connections must not be part of the containment boundary.
- b. Fill/evacuation valves should be fitted to the following components to allow the connection of a recovery unit for the removal of refrigerant prior to servicing: filter/dryers, compressor, condenser gas side and condenser liquid side, system low pressure side.

A1.1.8.6 Pressure Relief Devices: The condenser and all other pressure vessels must, as a minimum, be fitted with relief devices to the requirements of CSA B-52. Required at each location are dual relief valves, dual rupture discs complete with gauges and a 3-way shut-off valve, such that only one rupture disc/relief valve set can be rendered inoperative at a time. The gap between the rupture disc and RV must be fitted with a pressure sensor to detect the increased pressure (when rupture disc bursts) and send an alarm signal to chiller control system and to IPMS (for transmission to MCR).

A1.1.8.7 Insulation: Chiller cold surfaces less than 15C (60F) either during normal operation or when not operating, must be insulated including vapour barrier. Where used, closed-cell foam insulation must be navy approved, non halogen, low smoke type such as "Armaflex NH."

A1.1.8.8 Power Failure/Hot Machinery Space: All components of the chiller must have a pressure rating of no less than the saturation pressure of the refrigerant at 62C. The pressure rating of all rupture discs and RVs shall be no less than this pressure.

A1.1.9 Materials of Construction

A1.1.9.1 Commercial off-the-shelf" components are to be used where possible. Custom designed/fabricated components may be used where no satisfactory standard component is available.

A1.1.9.2 Contractors are responsible to ensure that all materials used are compatible with each

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other and when combined, will not create corrosion potential.

A1.1.9.3 Condenser Heat Exchanger (sea-water cooled):

- a. Condenser components in contact with SW must be made from solid materials that are inherently resistant to corrosion and erosion. Lesser materials with cladding or coating must not be used.
- b. Condenser must be shell and straight tube type, tubes replaceable, designed, built and stamped to CSA B52 or ASME VIII DIV 1 BOILER AND PRESSURE VESSELS. To allow for fouling in service, the design shall be based upon the use of a heat transfer coefficient that no greater than 85% of the value applicable to clean tubes.
- c. SW velocity in tubes must be selected for durable service and the prevention of corrosion/erosion of the tube surfaces exposed to the flowing SW. Bids shall state the SW velocity at maximum SW flow.
- d. If available space and SW velocity limitations allow, the tubes must be 70/30 Cu/Ni to ASTM B111 Alloy 715. Tube sheets must be 70/30 Cu/Ni to ASTM B171 Alloy 715. Tube walls must be a minimum of 1.24mm (0.049 inches) thick.
- e. End covers must be Bronze to ASTM B61 or equivalent. SW inlet and outlet flanges are to be marine bronze alloy.
- f. If available space and SW velocity limitations do not allow the use of 70-30 CuNi tubes, alternate materials, such as titanium tubes must be used. Tubesheet and End Cover materials must be compatible to the tubes used, and be of equivalent quality to those listed at paras A1.1.9.3 (b) and (c).
- g. Unless a separate receiver is fitted on the chiller skid, the condenser internal volume must be sized to contain the full refrigerant inventory, as liquid, without exceeding 80% full. The condenser must be fitted with a ½" liquid connection and vapour connection, positioned suitably for liquid refrigerant transfer to an off-skid receiver (by DND).
- h. For CuNi tubes, the condenser SW side must be fitted with mild steel corrosion preventive anodes at the beginning of each condenser pass (i.e., where water enters the tubes). Anode mass and surface area must be no less than required by MIL-A-19521B(SH), Appendix, 4 May 1992. Anodes must be removable/replaceable without removing condenser heads. For titanium tubes, best marine practices must be applied wrt engineering and fitting of sacrificial anodes.
- i. The SW inlet chamber must be fitted with a hand-hole opening, positioned to enable manual cleaning of the inlet tube-sheet without disturbing the SW piping connections. Burrs and sharp edges must be removed from the opening. It must have a clear opening of 100mm (minimum) X 160mm (minimum). The inlet chamber must be designed for smooth flow of SW into the tube inlets. The configuration of the hand-hole opening must

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be designed to minimize turbulence of SW entering the tubes.

- j. The SW side design pressure must be no lower than 1200 kPa (12 bar). (for potential use of firemain SW coolant -- upset condition)
- k. If required for normal operation, the chiller must include a SW regulating valve. SW system pressure must not be used to power the valve. (SW pressure may not be adequate). If the valve is not located on the chiller skid, it must be designed to be located in the ship's SW piping between Condenser and overboard discharge (same location as the legacy SW regulating valve). The valve must have integral flanges iaw ASME/ANSI B16.5. the valve must have a minimum pressure rating of 1200 kPa (upset condition). The valve must meet the shock requirements of para A1.1.4 as a hard mounted item, if it is located in the ship's piping.

A1.1.9.4 Oil Cooler: If an Oil cooler is required, it must be SW cooled and have the same features as at the Condenser paragraphs A1.1.9.3. The hand-hole size may be smaller, but must be no smaller than 100mm X 140mm..

A1.1.9.5 Evaporator Heat Exchanger (chilled water cooler):

- a. If the evaporator is shell and straight tube type, the tubes must be replaceable and designed, built and stamped to CSAB52 / VIII DIV 1 BOILER AND PRESSURE VESSELS
- b. For shell and tube type, tubes must be 90/10 CuNi, ASTM B111, Alloy 706. Tube walls must be a minimum of 1.24mm (0.049 inches) thick. Tubesheets must be 90/10 CuNi, ASTM B171, Alloy 706.
- c. For shell and tube type, sufficient bottom drains must be installed in the shell bottom, such that particulate matter can be flushed out through the drains, for the entire shell side.
- d. If the evaporator is a plate type then strainers of sufficient capacity must be fitted to ensure no egress of contaminants from the chilled water system can plug the plates. Strainers must be easily accessible for cleaning and / or replacement
- e. All materials in contact with the chilled water fluid must be a solid material resistant to corrosion by fresh water and oxygen (including shell, tubesheets, tubes, tube supports, and plates, as relevant). Preferred materials include stainless steel and copper alloys. Carbon steel must not be used.
- f. The CW side design pressure must be no lower than 1035 kPa (150 psig).
- g. The CW side of the evaporator must be fitted with high point vent(s), including a manual valve, at each separate high point.

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A1.1.9.6 Receiver

- a. Receivers (if fitted) must be capable of containing the full charge of refrigerant plus 20%.

A1.1.9.7 Equipment Identification Plate Data:

- a. All Equipment Identification Plates must be in accordance with DID 14.

A1.1.10 Refrigerant Containment:

A1.1.10.1 DND is governed by the Federal Halocarbon Regulations (FHR2003) which requires that any leak, even of very small size, must be stopped/repared within 7 days. For this reason the chiller must be designed and built for maximum refrigerant containment/very low leakage over extended time durations, thermal cycling (frequent starts/stops), and under the vibration and pulsations normally produced by an operating chiller. Leak-tightness features must include but not be limited to the following:

- a. If open drive is used (separated motor and compressor), highest quality shaft seals must be used on the compressor, and seal and system must be designed for frequent starts in a cold machinery space;
- b. All permanent piping connections must be brazed or welded iaw D-49-003-003/SF-002. Soldered connections must not be used;
- c. Take-apart joints must be kept to a minimum and used only where required for maintenance/ component removal purposes. Flanged joints must utilize flanges and gaskets of highest tightness performance;
- d. Use of flare connections and threaded joints must be kept to an absolute minimum if used at all;
- e. Where shell and tube type Evaporator, with refrigerant in the tube-side, is installed, the End Covers must be designed to be absolutely leak-free for a minimum of 48 months in the service described in this SOW, briefly as follows: frequent starts, varying ambient temperature, periods of operating and not-operating, power failures, overpressure events, and annual leak/pressure hold tests with nitrogen at 1400 kPa for 12 hours.

A1.1.10.2 Contractors must state all of their design and manufacturing features that contribute to exceptional refrigerant containment of their offered chiller.

A1.1.11 Safety

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A1.1.11.1 The CW Plant and CW Pump/Motor must incorporate safety interlocks, which prevent damage to equipment or injury to personnel while the equipment is energized.

A1.1.11.2 The CW Plant must be designed such that:

- a. The unit can be de-energized prior to enabling access to any powered source;
- b. Maximum safety of the operator/maintainer is to be designed for, including (but not limited to) installation of rotating machinery guards meeting the requirements of ASME B15.1-2000 and OSHA 1910.219-1996, hot surface guards/insulation for surfaces above 60C, relief valve discharge clearly marked and positioned to discharge in a safe location and direction (positioned low on skid and directed downwards). Provide a flanged end at the RV discharge termination.

A1.2. Chilled Water Plant - Design Requirements

A1.2.1 Mounting

A1.2.1.1 The CW Plants must be placed on resilient mounts so as they meet the shock, noise and vibration requirements defined in A1.1.3 and A1.1.4.

A1.2.2 Flow Measurements

A1.2.2.1 Flow measurement devices are installed in the adjacent piping by DND, complete with output signal. Chiller controls must be capable of receiving, processing and storing the signal (4-20 mA) from the flow-meter.

A1.2.3 Lubricating Oil

A1.2.3.1 If heated lubricating oil is required for start-up, the Lubricating Oil System must be heated when the CW Plant is not operational. The contractor must specify time duration and temperature requirements of the oil prior to startup.

A1.2.3.2 DND has an Oil Condition Analysis Program which requires regular monthly samples of the oil be taken. As such the contractor must provide an easily accessible sampling point on the chiller or compressor in order that these samples can be taken. The sampling point must not allow any air ingress into the refrigerant side of the chiller.

A1.2.4 Chilled Water Plant Local and Remote Control and Monitoring

A1.2.4.1 Each CW Plant must have its own Local Control Unit and have the ability to integrate with the Integrated Platform Management System (IPMS).

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- a. The IPMS is capable of monitoring and displaying status information from a local control unit
- b. The IPMS is capable of controlling equipment, including initiating sequences in several modes (auto/semi-auto/manual)
- c. All output/input signals shall be Ethernet type, copper CAT 5 type cable, with RJ 45 connectors.
- d. Ethernet interface to IPMS must be provided for controlling the equipment, providing system status, remote alarm indications, system faults, and power off conditions, etc).

A1.2.4.2 The CW Plant Local Control Unit must be comprised, as a minimum, of the following:

- a. Temperature Control Unit
- b. CW Plant Indication
- c. Alarm and Protection System
- d. Compressor controls , and
- e. Ability to lockout the remote start capability

A1.2.4.3 The CW Plant Remote Control must be able to provide the following:

- a. All alarms, indications and protections listed in A1.2.5.3,
- b. Remote start and stopping of each Chiller unit,
- c. Indication of load on each chiller unit,
- d. Indication of operational status of each chiller , and
- e. Indication of failure.

A1.2.4.4 The contractor must supply a list of control signals for integration with IPMS. The contractor, while not responsible for this system integration with IPMS, is responsible to ensure integration is technically feasible.

A1.2.5 Chilled Water Local Plant Indication, Alarm and Protection System

A1.2.5.1 The Plant Indication, Alarm and Protection System must consist of a Processor Unit and a Display Unit.

A1.2.5.2 The Plant Indication, Alarm and Protection System must have an established system performance baseline as well as safety limits for each monitored parameter.

A1.2.5.3 Performance of the Plant Indication, Alarm and Protection System:

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- a. The Plant Indication, Alarm and Protection System must be capable of continuously monitoring the selected system parameters. These are further defined in Section A1.2.5.4.a.
- b. The Plant Indication, Alarm and Protection System must be capable of giving a continuous readout of the system parameters.
- c. The Plant Indication, Alarm and Protection System must be capable of either altering CW Plant operation or shutting down the CW Plant if a performance deviation beyond the safety limits is detected.
- d. The Plant Indication, Alarm and Protection System must be capable of shutting down a CW Plant in the event of a system failure.
- e. The Plant Indication, Alarm and Protection System must give an alert once the Chilled Water Outlet Temperature is at or below a settable temperature.
- f. The Plant Indication, Alarm and Protection System must give an alert once the Chilled Water Outlet Temperature at or above a settable temperature.
- g. The Plant Indication, Alarm and Protection System must shut down the CW Plant if Chilled Water Outlet Temperature at or below a settable temperature.
- h. The Plant must be equipped with a locally operated emergency shut down.

A1.2.5.4 Processor Units:

- a. The Processor Unit must be capable of continuously monitoring, as a minimum, the following system parameters for the Chiller:
 - i Compressor Lube Oil Differential Pressure (if applicable);
 - ii Compressor Refrigerant Discharge Pressure;
 - iii Compressor Refrigerant Suction Pressure;
 - iv Compressor Refrigerant Discharge Temperature;
 - v Compressor Refrigerant Suction Temperature;
 - vi Condenser Water Inlet Temperature;
 - vii Condenser Water Outlet Temperature;
 - viii Condenser Liquid Refrigerant Temperature
 - ix Chilled Water Differential Pressure;
 - x Chilled Water Inlet Temperature;
 - xi Chilled Water Outlet Temperature; and
 - xii Compressor Motor Current.
 - xiii Condenser Sea water Inlet pressure
 - xiv Condenser Sea water Outlet pressure

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A1.2.5.5 Display Units

- a. The Display Unit must be capable of giving a continuous readout of the system parameters identified in Para. A1.2.5.4.a.
- b. The Display unit must also be capable displaying, for parameters identified in Para. A1.2.5.4.a, the values at which the system will trigger a warning and a shutdown.
- c. The display unit must have visual warning system that is used to indicate which parameter is operating outside an established baseline.
- d. In the event of a system failure, the display unit must have a visual indicator system that identifies which parameter caused the fault.
- e. In the event of a system shut down, the display unit must have a visual indicator that can be used to identify which parameter caused the shut down.
- f. The display unit must also have a means of accepting and resetting individual warnings, faults and shutdowns as well as resetting all of them at once.
- g. The display unit must have a means of testing the operation of lamps, LEDs and warning alarms.

A1.2.5.6 Local Compressor Motor Control

- a. In addition to the CW Plant Control Unit, the Compressor Motor must have a local control panel with the following controls:
 - i Off/Remote switch which, when set to Remote gives start/stop control to the CW Plant Control Units and lights up the respective Control Available Switch:
 - ii Locally operated emergency shut down device to prevent catastrophic failure and protect the operator from injury
 - iii Motor running indicator;
 - iv Overheat indicator; and
 - v Elapsed Time Meter which indicates the number of hours the compressor and motor have run.

A1.2.5.7 Protective Shutdowns:

- a. The chiller must include protective shutdowns. The contractor is responsible to design the plant to highest industry standards, to be safe, reliable, have low MTTR, have long MTBF, and be self-protective from damage due to internal and external malfunction, by the inclusion of shutdowns. Shutdowns must occur via the Chiller Control and by independent mechanical switch. Where a shutdown is required by both methods the mechanical switch is required as a backup. Design of the Controls may have both shutdowns occur at the

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same value, or may stagger them (e.g., “high” trip by Control System, and “high-high” trip by Mechanical Switch).

i Shutdowns via the Control System PLC or Logic: As a minimum these must include:

- High Pressure Switch
- Low Pressure Switch
- Oil Pressure Switch
- CW Flow Switch
- Freeze Protection Switch

ii Shutdowns via independent Mechanical Switches: These shutdowns must function independently of the chiller control system. The switches used must meet Grade A, Class 1, Type A service referred to MIL-S-901, MIL-C-2212F, MIL-DTL-2212H, MIL-E-2036, MIL-DTL-16743, MIL-STD-167-1, MIL-DTL-16032, as relevant to each application. As a minimum, these must include:

- High Pressure Switch
- Low Pressure Switch
- Oil Pressure Switch
- CW Flow Switch
- Freeze Protection Switch

A1.2.6 Maintenance Requirements

A1.2.6.1 The Contractor shall provide a comprehensive maintenance regime that includes all preventive maintenance routines along with fault-finding and corrective maintenance procedures in accordance with NAMMS Volume 1.

A1.2.7 Acceptance Test Procedure

A1.2.7.1 The Contractor must produce and deliver an Acceptance Test Procedure for the Factory Acceptance Test (FAT) that provides an overall outline of the entire spectrum of test activities of the Chilled Water plants. The FAT will cover at a minimum the following:

- a. Demonstrate shock qualification adherence as noted in A1.1.4 of this Appendix.
- b. Demonstrate Noise & Vibration level adherence as noted in A1.1.3 of this Appendix.
- c. Demonstrate the Control system functions for the plant.
- d. Demonstrate the performance of the plant under full load 100% of rated cooling load and reduced capacities as follows:

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- i. 75% of rated cooling load for 2 runs at 6hrs
 - ii. 50% of rated cooling load for 2 runs at 6hrs
 - iii. 25% of rated cooling load for 2 runs at 6hrs
 - iv. 15% of rated cooling load for 2 runs at 6hrs
- e. Demonstrate the chilled water plant design operates within design and contractual constraints.
- f. Demonstrate the Chilled Water Plant has accumulated a total of 500 hrs operations time (including test runs).
- g. Demonstrate uncontrolled shutdown of plant simulating a loss of electrical supply. This activity will simulate four (4) power losses over a three (3) hour period with plant restarted and operational within fifteen (15) minutes of loss.
- h. Demonstrate the electrical power loading as follows:
- i. Starting current expressed in Amps
 - ii. 100% load expressed in kW/hrs
 - iii. 75% load expressed in kW/hrs
 - iv. 50% load expressed in kW/hrs
 - v. 25% load expressed in kW/hrs
 - vi. 15% load expressed in kW/hrs

A1.3. Chilled Water Pump, Motor Requirements

A1.3.1 CW Pump, Motor and Motor Controller:

- A1.3.1.1 Each chiller must have one dedicated CW Pump. The pump takes suction from the ship's CW system. It then pumps the CW through the chiller and back to the ship's CW system.
- A1.3.1.2 The Chilled Water pump/motor/base assembly (CW Pump) and Motor Controller must meet all requirements specified for the Chiller, such as documentation, painted finish, materials not permitted, ship motion, safety, etc.
- A1.3.1.3 The CW Pump supply must include a Pump/Motor assembly, a mounting base, resilient mounts and fasteners, a separately mounted Motor Controller and a bypass orifice. The latter must be sized by the pump OEM to provide the OEM's recommended MBF. Purpose of bypass is to protect pump in the event that it is operated with blocked flow.
- A1.3.1.4 The CW Pump/Motor/Base must meet the vibration and air-borne noise requirements at para A1.1.3.

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A1.3.1.5 The CW Pump/Motor/Base must meet the shock requirements at para A1.1.4 when mounted as noted at para A1.3.3.6.

A1.3.2 CW Pump Performance Requirements:

A1.3.2.1 The CW Pump must be rated for 1700 L/min + minimum bypass flow (MBF) at a pressure increase of 580 kPa PLUS the pressure drop of 1700 L/min flow through the Evaporator and piping that are included as components of the Chiller.

A1.3.2.2 When new, the CW Pump must be performance tested and must fully meet this rating when new (nil reduction permitted). The first pump will be FAT tested including performance and vibration testing. Further, a minimum of four (4) additional pumps will be randomly selected by DND for performance and vibration testing. If performance and/or vibration is not met by any tested pump more pumps may be required to undergo testing. Any pump that does not meet requirements will be returned for rework and retest until requirements are met.

A1.3.2.3 With modification, the CW Pump must also be capable of an additional 75 kPa of pressure, above the total pressure at para A1.3.2.1, achieved only by the action of installing a larger impeller. Thus the pump casing must be capable of accepting the larger impeller, and the fitted motor must have enough reserve HP to power the larger impeller at pump runout, without exceeding motor maximum amps.

A1.3.2.4 Pump must be suitable for a normal Suction pressure of 250 kPa[g] and a minimum suction pressure of 140 kPa[g].

A1.3.2.5 Pump must be suitable for pumped fluid (as specified to flow through the chiller), at the following temperatures. Operating pumps will normally see fluid temperature in the range of 10 to 15C. When shutdown, or during abnormal operations (system flushing), pumped fluid temperature will be in the range of 4C to 50C.

A1.3.2.6 Normally three CW pumps run at all times. However there are some circumstances when only one or only two pumps will operate, thus at higher than rated flow.

A1.3.3 CW Pump Mechanical Requirements:

A1.3.3.1 The pump must be direct driven, close-coupled to motor, end suction, centerline discharge-up configuration (identical physical configuration as the Legacy CW Pump). The pump shall have integral flanges to ASME/ANSI B16.5. The pump discharge flange shall not be smaller than three (3) inch nominal size.

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- A1.3.3.2 The Pump must be fitted with a Mechanical Seal. The casing and impeller must have wear rings. It must be suitable for installation with shaft horizontal and parallel to fore/aft axis of the ship.
- A1.3.3.3 All materials in contact with the pumped CW fluid must not corrode in the presence of fresh water and oxygen. Materials in contact with the CW must be stainless steel, copper alloy or similar corrosion resistant material. All external CW Pump and base fasteners must be corrosion resistant in the marine environment.
- A1.3.3.4 The legacy pump bypass restriction is a solid monel tube, 5 inch long, ¾” NPT ends, with a 3/8” dia. internal bored hole. The new bypass device must be identical except re-calculated bore diameter (to achieve pump vendor’s MBF).
- A1.3.3.5 Pump/Motor Maximum Dimensions: The assembly of Pump, Motor, Base and Resilient Mounts must not exceed the following dimensions.
- | | |
|---|---------|
| a. Maximum o/a Length: | 1030 mm |
| b. Maximum o/a width, excluding junction box: | 560 mm |
| c. Maximum height, including unloaded resilient mounts: | 675 mm |
- A1.3.3.6 The CW Pump/Motor and Base must be mounted to the ship using resilient mounts in order to meet shock and vibration requirements. Note: the current mounts used on the legacy pump are 7E450, NSN 5342-00-664-4473. Mount selection must be such that under Grade 1 shock condition, the mount must not deflect more than 35 mm in the vertical direction.

A1.3.4 Motor:

- A1.3.4.1 The Motor for the CW Pump must meet the following requirements:
- The motor must be TEFC, 440V/3 Ph/60 Hz, ungrounded system, rated for 60C ambient (or higher);
 - The motor must be fitted with pre-lubricated cartridge type bearings, requiring no periodic lubrication;
 - The motor must be rated for continuous duty. Most pump/motors will run almost continuously, accumulating over 8700 hours/year. Number of starts will be typically one per day, but occasionally 10 starts in 8 hours. One motor per ship will be standby duty, not operating for weeks or months at a time (except for brief runs for maintenance purposes). All motors must be designed/built to meet any of these duty cycles.
 - The motor must be fitted with resistance temperature detectors, one per phase and one per bearing. RTDs must trip the motor on high temperature detection;

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- e. The motor must be fitted with anti-condensation heaters (115V, single phase);
- f. The pump/motor/base assembly must meet the shock requirements of para A1.1.4.
- g. Complete Motor Master Plan drawings must be provided, including shaft detail drawing, bearing information and material list;

A1.3.5 CW Pump Motor Controller:

A1.3.5.1 Each pump must include a motor controller to be mounted separately from the pump. Installation of the pump, controller and connecting wiring is not part of this contract. Controllers must meet the following requirements:

- a. Reduced current starting is not required.
- b. Power supply: 440 volt, 3 phase, 60 Hz, ungrounded system
- c. Duty: Continuous
- d. Ambient temperature: 60C minimum
- e. Load isolation: Required
- f. Protection required: low voltage protection (LVP), overload relay, temperature sensor actuated
- g. Enclosure: Drip proof Protected 45 degree, in accordance with MIL-E-2036D(SH), latest version
- h. Switches: Must be in accordance with MIL-S-15291E(SH), latest version
- i. Anti-condensation heaters must be fitted
- j. Shock: The fully assembled Controller assembly must be tested and meet the shock requirements at para A1.1.4
- k. Controllers must meet the requirements of MIL-C-2212G(SH), 12 Feb 1990 (or latest version)

A1.3.6 Pump Control and Monitoring Functions:

A1.3.6.1 The pump controls must be capable of the following:

- a. Local START / local STOP
- b. Local indicator lights for pump ON and pump OFF
- c. Remote START / remote STOP from MCR via connection to IPMS
- d. Output signals to IPMS for remote indication of Pump ON, Pump OFF at MCR
- e. Local lockout of remote START / remote STOP
- f. Control interlock between CW Pump and associated Chiller such that: (a) chiller will not start if CW Pump is not operating; (b) chiller will trip off if CW Pump stops

APPENDIX 1 TO ANNEX A

operating, or if operator shuts down CW Pump (these trips are in addition to the low CW flow trip).

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Appendix 2: Existing CW Plant Characteristics

A2.1 *General Description of the Existing CW Plants*

A2.1.1. Each Halifax Class ship is installed with four chillers on board. The CW Plants are located in the forward Auxiliary Machinery Room (1), the Aft Engine Room (2) and in the Aft Auxiliary Machinery Room (1). They are double raft mounted to the deck using resilient mounts.

A2.1.2. The chillers supply chilled water to all terminal units within the system for air conditioning purposes. The main chilled water system is capable of maintaining the specified water temperature with three chillers in operation. The fourth chiller serves as a standby unit.

A2.1.3. Each chiller must be started manually via IMCS or locally. Loading of the chiller is automatic based on sensed conditions. Each chiller has a capacity of 298 kW which allows it to cool 50.3 m³/hr of chilled water from 13°C to 7.8°C. At this condition each chiller requires 60 m³/hr of cooling sea water entering the condenser at a maximum temperature of +31°C. Changing conditions are automatically compensated either by controls (for example compressor will unload in response to leaving water temperature) or by the nature of the machine itself (for example sea water in excess of 31°C will cause reduction in capacity, increase in power requirements or in extreme will overload motor and chiller will stop).

A2.1.4. Chilled water used is a mixture of fresh water and ethylene glycol and Corrosion Inhibitor (CI). The volume of the Chilled Water System is approximately 6700L.

A2.1.5. Sea Water is supplied to the condenser at a pressure of 100kPa and an approx flow of 1000L/min.

A2.1.6. R22 is used as refrigerant, of which a full charge is 90.70kg per chiller.

A2.1.7. Each chiller is made up of the following components:

a. Compressor:

One reciprocating, open type compressor, direct-driven, via a flexible coupling fitted with a coupling guard, by a motor with a single-ended driveshaft. Carrier 5H86, 1770 rpm

b. Capacity Control System:

The compressor is equipped with an external capacity control system, by means of which the chiller's capacity can modulate between 25% and 100% depending on the chilled water outlet temperature. The compressor is fitted with a three way solenoid valve system which can unload cylinders down to 25% of the total compressor capacity, in the following stages: 100%, 87.5%, 62.5%, 50% and 25%.

APPENDIX 2 TO ANNEX A

- c. Motor:
An open, drip proof, squirrel cage design motor with a single shaft.
Power Output 93.3 kW
Power Supply 440 V-3 PH-60 Hz
Speed 1800 RPM
Type HSB, 445TNS Frame, 125 HP, 57C ambient, 1250 lbs, nodular iron motor frame,
- d. Condenser:
A horizontal, R-22 refrigerant, sea-water condenser constructed from a bundle of integrally finned cupronickel tubes rolled into Aluminum bronze tube sheets, which are welded to a steel shell. The end covers are made of cast bronze.
- e. Evaporator:
A horizontal, R-22 refrigerant, direct expansion evaporator constructed of a bundle of copper tubes with internal aluminum fins, rolled in steel tube sheets which are welded into a steel shell; the covers are made of steel. The evaporator has two refrigerant circuits. Later replacement evaporators were made with only SS and copper/copper alloy in contact with CW.
- f. Other:
Additional components include the Refrigerant System and the Controls, Instruments and Safety Switches
- g. The components described above are all assembled rigidly on a main frame and a sub-frame, both of structural steel. The two frames are interconnected by means of flexible mounts and snubbers. The main frame is supported by means of leaf spring mounts (qty 12, 'X' mount, NSN 5340-99-520-8427). The motor and a compressor are mounted rigidly to the sub-frame. On the main frame, equipment such as condenser and chiller are mounted rigidly. Resilient mounts separating sub-frame from main frame are qty 4, 6E2000 Snubber, NSN 5342-00-598-8825. The 85 Ton Chiller has 85 Tons of cooling capacity and is a customized assembly to fit into the allotted space onboard.
- h. Motor Controller:
The Controller is mounted separately to the chiller. Exceptions to MIL-C-2212, PC No. 17, 18, 19, 20, 21, 22, 23, 25; 440V/3Ph/60Hz, 125HP (max); Continuous duty; Size 5, reduced voltage (auto transformer); 850 lbs x 73" high x 32" wide x 18" deep; shock tests performed periodically on individual components by Cutler-Hammer. The Controller is hard-mounted to the deck adjacent to the chiller..

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- i. Legacy Chilled Water Pump/Motor Assembly: Rated point = 227 usgpm at 120 ft; to ANSI B73.1; Buffalo 2" x 3" 609 CCRE; M-3 bearing frame; end suction; centerline-up discharge; close-coupled pump/motor assembly; standard ANSI B73.1 configuration, 200 lb weight. Navy bronze Casing and Cover; monel Wearing Rings at casing and impeller; stainless steel Impeller (6 1/4" dia) and Impeller fasteners; nickel copper shaft sleeve; mechanical type shaft seal.

Alternate CW Pump/Motor Assemblies have recently been installed: Colfax IMO pump / Allweiler AG, NB65-160/01; 16 L/sec, 35.5 meters, 3500 rpm, 2" X 3" B16.5 flanges; 14.5 kW motor.

- j. Minimum flow bypass orifice:
Monel nipple, 5" long, 1 1/4" OD, 3/8" diameter bore, 3/4" NPT thread at each end.
- k. CW Pump Motor:
15 HP; TEFC; 440V; 3500 rpm; 50C ambient; steel body; nodular iron head and terminal box; cartridge bearings; 250 lb weight; ~11.5 bhp at rated point; ~13.5 bhp at runout.
- l. CW Pump/ Motor/ steel Base assembly:
Complete assembly shock tested by vendor for CPF project; wet weight = 550 lbs; connected to ship structure by four resilient mounts, NSN 5342-00-664-4473.
- m. CW Pump Motor Controller:
Size 2; continuous duty; across the line start; 50C ambient; 56 lb weight; internal components periodically shock tested by Cutler Hammer; complete assembly shock tested by Controller OEM for CPF project. The controller is hard-mounted.

APPENDIX 3 TO ANNEX A

Appendix 3: Existing CW System Characteristics

A3.1 *General Description of the Existing CW System*

A3.1.1. The Chilled Water Distribution System is comprised of four reciprocating chillers, system of distribution piping, pumps, flow meters, expansion tanks, thermometers, chemical treatment tank, filters, regulating valves and strainers, suitably insulated to ensure a regular supply of chilled water is available to:

- Primary Air Conditioning Plants (PAC 1 and 2)
- Primary Air Conditioning Plant (Galley) (PAC 3)
- Fan Coil Units
- Booster Convector Units (K Units)
- Central Station Air Conditioners (CSU)
- Various Electronic Cabinets
- Chilled Water Coils in the F.E.R.
- Chilled Water Coils in the F.A.M.R.
- Chilled Water Coils MSF 1, 2, 3 and 6

A3.1.2. The Chilled Water System is considered a two pipe direct return system. The system utilizes a water-glycol mixture, which is circulated in piping throughout most areas of the ship. The water-glycol mixture is pumped through the chiller units which cools the water supplied to the AC Plants and terminal units as required, to maintain the desired temperature in the spaces and electronic cabinets throughout the ship.

A3.1.3. The Chilled Water System is the key system to allow for temperature control throughout the ship. Four chillers are installed, however three chillers have had sufficient capacity to cater to the full cooling load, i.e. any one unit is kept at standby. The Chilled Water fluid is comprised of fresh water, uninhibited ethylene glycol and corrosion inhibitor. Each chiller has its own chilled water circulating pump and when a chiller is operational; its corresponding CW pump must also be operational. The system is designed to operate with three pumps running at all times. The chiller unit and associated chilled water pump are completely automatic in operation after manual start up.

A3.1.4. The principle of the CW system is constant flow using a direct return piping distribution circuit.

A3.1.5. The chilled water flow through each chiller is constant and independent of the chiller loading (output capacity status).

A3.1.6. As three chilled water pumps continue to operate, chilled water is pumped through the chiller units to a main distribution header located on No. 4 deck. If one unit is not operating, the water will pass through the chiller and leave the unit with an unchanged temperature thus causing mixing to occur. This will affect the CW system as a whole.

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- A3.1.7. From the distribution header, one 150mm riser and two 125mm risers are run feeding the chilled water distribution main located on No. 2 deck; only one of the three risers are used, the others are valved off as standby.
- A3.1.8. The chilled water distribution system is zoned in four sections using isolation valves. This permits continuous operation of chilled water flow to large areas in the event of individual damage to sections of the distribution system. The chilled water circulating pumps maintain chilled water flow in the system. During emergency conditions, one chilled water pump can circulate chilled water in an isolated zone.
- A3.1.9. A pressurized 60 litre capacity expansion tank is located on the suction side of each chilled water pump. The tank allows for expansion and contraction of the chilled water in any particular zone.
- A3.1.10. Chilled Water is supplied to all terminal units within the system. A consta-flow valve (flow restrictor) is installed on the supply line to each chilled water coil and terminal unit to limit the flow to the maximum capacity of the coil/unit.
- A3.1.11. A three-way water regulating valve is installed on the return line from each coil/unit and based on the cooling needs, the control valve will allow chilled water to flow either through the coil or through the bypass line around the cooling coil, allowing the chilled water system pressure to essentially remain constant.
- A3.1.12. A chemical treatment tank is fitted to permit periodic addition of uninhibited ethylene glycol and corrosion inhibitor to the CW system. Control of water chemistry promotes the system efficiency and prolongs the life of system compartments and keeps the system clean.
- A3.1.13. Two Chilled Water Filter Assemblies are fitted to help maintain the cleanliness of the system. The filter assemblies are located on 2 deck at frames 22 and 38. Two grades of filter bags are stocked for the filter assemblies. One is a 75 Micron size for use when the system is initially started, after any major repairs to the system or after the system has been shut down for a prolonged period of time. The other is a 5 Micron size which is in use the majority of the time once the system is clean.

ANNEX B

DELIVERY SCHEDULE

The following schedule shows the tentative date of delivery for the various platforms. As the dates approach, the exact timeframes will be finalized:

<u>Platform</u>	<u>Date</u>	<u>Coast</u>	<u>Number of units</u>
HMCS OTTAWA	15-May-2014	West	Four (4) chillers + Four (4) pumps
East Coast School	15-May-2014	East	One (1) chiller + One (1) pump + One (1) Instructor Panel
West Coast School	15-May-2014	West	One (1) chiller + One (1) pump + One (1) Instructor Panel
HMCS VILLE DE QUEBEC	01-Oct-2014	East	Four (4) chillers + Four (4) pumps
HMCS REGINA	01-Apr-2015	West	Four (4) chillers + Four (4) pumps
HMCS TORONTO	08-Jul-2015	East	Four (4) chillers + Four (4) pumps
HMCS HALIFAX	01-Jun-2016	East	Four (4) chillers + Four (4) pumps
HMCS CALGARY	01-Apr-2017	West	Four (4) chillers + Four (4) pumps
HMCS FREDERICTON	01-Jul-2017	East	Four (4) chillers + Four (4) pumps
HMCS MONTREAL	01-Mar-2018	East	Four (4) chillers + Four (4) pumps
HMCS WINNIPEG	01-Apr-2018	West	Four (4) chillers + Four (4) pumps

HMCS CHARLOTTETOWN	01-Dec-2018	East	Four (4) chillers + Four (4) pumps
HMCS VANCOUVER	01-Dec-2018	West	Four (4) chillers + Four (4) pumps
HMCS ST JOHN'S	01-Dec-2018	East	Four (4) chillers + Four (4) pumps

ANNEX C

CONTRACT DATA REQUIREMENTS LIST

DID Sequence Index

DID #	SUBJECT	Due Date	Section in SOW
01	Project Management Plan	2 weeks after Contract Award	6.2.1
02	Meeting Minutes	Draft 1 week after meeting, Final 2 weeks after meeting	6.4.4
03	Progress Status Reports (PSRs)	1 MACA, monthly	6.7.1
04	Installation Guidance Package	2 WAFAT	4.2.2
05	FAT Test Procedures	3 WBFAT	3.1.1
06	FAT Acceptance Report (Test Report)	1 WAFAT	3.1.6
07	Provisioning Documentation (PPB, SPTD and RSPL)	Major Components PPB 2 weeks after Contract Award; RSPL 45 days after Contract Award; Final 13 WAFAT	4.1.2
08	Operating and Maintenance Manuals	7 MACA, Final 2 months prior to training	4.3.1
09	ILS Drawing Package	3 MACA	4.1.1
10	Training Course Material	7 MACA, Final one month after training	5.1.2
11	Technical Data Package	2 WAFAT	4.2.1
12	Special PHST Consideration Items List	4 WAFAT	4.4.1
13	Packaging Data	Concurrent with Unit Delivery	4.4.2
14	Equipment Plate Identification Data	Concurrent with Unit Delivery	Appendix 1 – 1.9.7
15	Consolidated Support Equipment Provisioning List	7 MACA	4.1.3
16	Materiel Change Notice	If/as required	4.1.4

NOTES: DID FORMATTING, REFERENCES, AND ABBREVIATIONS

1. Abbreviations:

MACA = months after contract award

MADDM = months after detailed design meeting (Detailed Design Meeting is 2 MACA)

WBFAT = weeks before factory acceptance test (FAT is 3 MACA)

WAFAT = weeks after factory acceptance test

2. Unless otherwise stated, due dates in ‘days’ refer to calendar days.

3. Unless otherwise stated, the delivered Data Item shall have the exact same main title as the corresponding DID. If the contractor chooses to use a suitable preexisting or alternatively titled document, said document shall be submitted as an appendix to the delivered Data Item.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 01
2. Title: Project Management Plan (PMP)
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 2 weeks after Contract Award
5. Number of Copies: 1
6. PM Approval Required: Yes
7. Approval Lead Time: 2 weeks
8. Subsequent Submission: Update as required.
9. Remarks: The Contractor shall carry out the work in accordance with the PMP. The Contractor shall provide a project schedule in Microsoft Project 2000 (or later) electronic format with monthly updates in electronic format showing completion status and advise the PM of all delays and their effect on the overall project. The PMP shall schedule the project management meetings, technical reviews, equipment and documentation delivery and design reviews as detailed in the SOW

Content - The PMP shall, as a minimum, contain the following information.

Project Management Plan Outline - This section shall identify the purpose and the scope of the PMP. References and terminology used in the plan shall be clearly defined. The Contractor shall include in the PMP a Work Breakdown Structure (WBS) and a Project Master Schedule (PMS) with sufficient detail to permit the Crown to gain a thorough knowledge of the project activities and monitor their progress against the schedule and the plan.

The Contractor shall define the work to be performed in each work package in a dictionary, which shall accompany the WBS. In conjunction with the PMP, the WBS shall form the basis of reporting on the conduct and progress of the Contract work to the Crown.

Management Organization and Responsibilities - The PMP shall identify, by name, all key management personnel and shall clearly indicate lines of responsibility, including the person who will have overall responsibility for the entire project (Project Manager). Personnel who will interface directly with PWGSC and representatives of Canada shall be identified with their scope of responsibility and authority stated.

Work Breakdown Structure - This section shall quantify and detail the work required in the project. A Work Breakdown Structure, identifying specific work packages with detailed task descriptions, shall be provided along with resource requirements. WBS shall be in accordance with Section 2.2 of MIL-STD-881C

Quality Assurance Plan - This section shall deliver a QAP in accordance to SOW 6.2.1 and include it as an appendix in the final PMP.

Schedule and Milestones - This section shall detail how the proposed work to be carried out under

this contract is to be organized, monitored and reported. A proposed schedule shall be provided, detailing milestones, tasks, and resource allocation. The critical path shall be clearly identified. Codes on schedule forms shall be clearly defined.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 02
2. Title: Meeting Minutes
3. Description of Data: These minutes will record the results of the Meetings, and shall include the items in the Remarks below.
4. First Submission: Draft 1 week after meeting,
5. Number of Copies: 1 soft copy
6. PM Approval Required: Yes
7. Approval Lead Time: 5 days
8. Subsequent Submission: Final 2 weeks after meeting (in case of changes)
9. Remarks: Meeting minutes will be provided for the following meetings and any other scheduled meetings as identified in the SOW:

Project Kick-Off Meeting
Progress Review Meetings
Detailed Design Review Meeting

General: The Meeting Minutes may be prepared in the Contractor's format. The minutes shall identify topics discussed and action requirements. Action items identified during the Meeting shall be tabled at the next Review Meeting and their status identified. As required, the minutes shall include, but not be limited to, the following:

- a. attendance record;
- b. significant topics discussed;
- c. corrections to previous minutes;
- d. status of SOW items;
- e. action items and their status
- f. risk items and their status
- g. schedule update
- h. clarifications reached during the meeting; and
- i. contractor or government replies and reports submitted.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 03
2. Title: Project Status Reports (PSR)
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 1 MACA
5. Number of Copies: 1 softcopy
6. PM Approval Required: No
7. Approval Lead Time: N/A
8. Subsequent Submissions: Monthly
9. Remarks:

The Contractor shall ensure that PSRs identify progress to date, schedule status, status of action and/or concern items, status of risk management activities, work planned for the next reporting period and any problems or concerns facing the Contractor in the performance of the work.

The PSR shall be the primary tool for logging, and for tracking the progress and resolution of action items and items of concern.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 04
2. Title: Installation Guidance Package
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 2 WAFAT
5. Number of Copies: two (2) hard copies, one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission N/A
9. Remarks: The Installation Guidance Package shall provide all the necessary information for DND's Design Agent (Fleetway) to create an EC Installation Specification, for the installation of Contractor furnished equipment. R

a. The IGP shall include at least the following parameters:

- i. Physical details including dimensions, weight and center of gravity,
- ii. Mechanical mounting requirements,
- iii. Electrical power requirements,
- iv. Cable connection requirements including cable and connector types, connector pinout details, and signal details
- v. Detailed drawings
- vi. Parts list (including, but not limited to); manufacturer, manufacturer's part number, material, quantity of material, drawing reference)
- vii. Chilled Water Plant Assembly / Disassembly instructions (such that the components can be transported throughout the ship as per Annex A - Section A.1.1.2.13)
- viii. Set-to-work instructions (and any requisite tests/trials)
- ix. General guidance/Instructions regarding the installation of the equipment, including subsidiary items, and the preparation of the area
- x. Any/All Hazardous materials (Hazmat)

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 05
2. Title: FAT Test Procedures
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 3 WBFAT
5. Number of Copies: 1 soft copy
6. PM Approval Required: Yes
7. Approval Lead Time: 2 weeks
8. Subsequent Submission: As required in case of changes
9. Remarks: The FAT test procedures shall:
 - a. Describe the specifications to be verified by the procedure
 - b. Describe the setup and equipment required
 - c. Provide a sample signoff sheet.
 - d. Be written IAW the following reference: D-01-100-226/SF-001(all paragraphs from sections 3.2 to 3.3.1(c), and from sections 3.3.2 through 3.7.3.3, and including any Figures referenced in these sections).

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 06
2. Title: FAT Acceptance Report (Test Report)
3. Description of Data: Include all elements cited in the Remarks below.
4. Reference: SOW
5. First Submission: 1 WAFAT
6. Number of Copies: 1 soft copy
7. PM Approval Required: Yes
8. Approval Lead Time: 1 week
9. Subsequent Submission: As required in case of changes
10. Remarks: The FAT acceptance report shall include the following:
 - a. Shall indicate pass or failure for each test procedure
 - b. Shall elaborate on any failures or conditional passes
 - c. Shall list all test equipment and include serial numbers
 - d. Shall include signoff sheet for each procedure.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 07
2. Title: Provisioning documentation
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 2 weeks after Contract Award
5. Number of Copies: 1 soft copy
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission: 45 days after Contract Award
9. Final Submission: 13 WAFAT
10. Remarks: To provide the data needed by the Crown to identify, catalogue, calculate and procure the range and depth of repairable and consumable spares needed by each line of maintenance provisioned by the Crown (and as installation and checkout spares).
 - 10.1 For each item considered for provisioning, the Provisioning Documentation shall be selected as follows in accordance with D-01-100-214/SF-000.
 - 10.2 The documentation shall be provided electronically in the precise format required for input into the automated supply system.
11. Provisioning Parts Breakdown (PPB) of Major Components due 2 weeks after Contract Award as follows:
 - a. Compressor
 - b. Motor
 - c. Condenser
 - d. Evaporator
 - e. Receiver, if fitted
 - f. Expansion valves
 - g. Chilled water pumps

DATA FIELDS REQUIRED
Item Number (unique sequence no. for each list)
Indenture Code
Item Name
Reference (manufacturer's part) No.
NSCM/CAGE Code
OEM's Part Number
NATO Stock Number (if available)
Quantity Per Assembly
Standard Unit Price
Unit Of Issue (UOI)
Unit of Measure

Repairability Indicator (REP)
Government Supplied Material (GSM)
Procurement Lead Time (PLT)
Reference Designation
Shelf Life
Usage Rate
Recommended Buy Quantity
SMR Code
Logistics Control Number (LCN)
Used On Code

12. Recommended Spare Parts List (RSPL) due 45 days after Contract Award as follows:

DATA FIELDS REQUIRED	
Item Number (unique sequence no. for each list)	
Item Name	
OEM's Part Number	
Standard Unit Price	
Recommended Buy Quantity	

13. Final Provisioning Parts Breakdown (PPB) due 13 WAFAT as follows:

DATA FIELDS REQUIRED	
Item Number (unique sequence no. for each list)	
Indenture Code	
Item Name	
Reference (manufacturer's part) No.	
NSCM/CAGE Code	
OEM's Part Number	
NATO Stock Number (if available)	
Quantity Per Assembly	
Standard Unit Price	
Unit Of Issue (UOI)	
Unit of Measure	
Repairability Indicator (REP)	
Government Supplied Material (GSM)	
Procurement Lead Time (PLT)	
Reference Designation	
Shelf Life	
Usage Rate	
Recommended Buy Quantity	
SMR Code	
Logistics Control Number (LCN)	
Used On Code	

14. Supplementary Provisioning Technical Documentation: To uniquely identify, for cataloguing purposes, each item in each provisioning list (that had not already been assigned a NATO stock number).

- a. The SPTD shall include sufficient data to clearly define each item for cataloguing
- b. The SPTD shall include:
 - i. Item Name;
 - ii. Reference (Manufacturer's Part) No. ; and
 - iii CAGE Code.
- c. The SPTD shall include, as applicable:

- i. Configuration - drawing of item; assembly, wiring or schematic drawing; illustrated parts list
 - ii. Technical specification, including relevant standards
 - iii. Physical characteristics, such as dimensions, tolerances, materials, mandatory processes, surface finish, protective coating;
 - iv. Electrical characteristics;
 - v. Performance data, including the environmental and operating conditions under which the item must perform;
 - vi. Mounting requirements;
 - vii. Special features which contribute to the uniqueness of the item; and
 - viii. Commercial catalogue data.
- d. The SPTD shall be sequenced in the same order as the provisioning list that it supplements.
- e. The SPTD shall include identification of any limitations on the use or publication of any data provided

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 08
2. Title: Operations and Maintenance Manual
3. Description of Data: Include all elements cited in the Reference and under Remarks below. Format as described in Remarks.
4. First Submission: 7 MACA
5. Number of Copies: Initial: one (1) modifiable electronic (MS Word/MS Excel/CAD)
Final: fourteen (14) hard copies, one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission: Final manual 2 months prior to first formal course
9. Remarks:

Content - The Operation and Maintenance Manual shall describe the system characteristics and maintenance procedures. It shall contain all the information as required to operate and maintain the system and be based on the existing commercial manual(s) for the system's equipment. A draft (English only) manual shall be delivered IAW item 5 above.

The complete final manual shall be provided in bilingual side-by-side format and prepared in accordance with the following sections of reference document C-01-100-100/AG-005: Part 2, Section 1, subsections 2 through 6, and Part 2, Section 2, subsections 1 through 18.

NOTE: ignore the reference to C-01-100-100/AG-006 in subsection 18.

The complete final manual shall be delivered IAW item 5 above.

Manual shall include, but not limited to:

- a. General information and safety precautions.
- b. Function description of CW Plant.
- c. Scheduled and corrective maintenance requirements and procedures. Scheduled maintenance activities must fit within a sixty (60) month operational cycle. Each cycle will include a sixteen (16) or seventeen (17) week alongside docking work period (DWP). Scheduled maintenance activities must specify the tools, skill-sets, and facilities required.
- d. Any maintenance or preservation recommendations for CW plants which have not yet been installed (i.e. stored in warehouse for 3+ months)
- e. Illustrated parts breakdown.
- f. The manuals shall be in provided by the manufacturer in English and French.
- g. The contractor shall provide 14 hard copies and an electronic copy.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 09
2. Title: ILS Drawing Package
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 3 MACA
5. Number of Copies: two (2) hard copies, one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
- Subsequent Submission: If required

8. Remarks:

The primary purpose of the ILS-DP is to provide the necessary configuration and identification information necessary for the maintenance of the system, and the Life Cycle Material Management for that family of equipment.

- a. The ILS-DP document and drawing package shall be in both paper and a copy on CD-ROM format readable in Adobe Acrobat PDF file.
- b. The first submission of the ILS-DP shall consist of EDS drawings for NATO cataloguing purposes.
- c. The ILS-DP shall contain the following information:
 - i. System/Equipment Family Trees
 - ii. Documentation of any intra-system wiring, interfacing (electrical and mechanical), and procedures not covered in System Specification
 - iii. Any production updates to the System Specification and Set To Work documents
 - iv. Any updates or upgrades to hardware, firmware, software, protocols, and applications to project closure.
 - v. Identification of version, variant, model, of all equipment and serviceable hardware and firmware components.
 - vi. Identification of version, variant, model, of all software programs and modules.
 - vii. Any intra-system wiring and/or configuration changes not addressed above
 - viii. Serial numbers for all self contained equipment (as a minimum)

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 10
2. Title: Training Course Material
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 7 MACA
5. Number of Copies: five (5) hard copies, one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission: One month after delivery of training
9. Remarks: The complete set of training material shall contain the full course material utilized in the classroom. The material shall be geared to the training of the users and maintainers of the system. It is assumed that a draft of the full Operation and Maintenance Manual, will be available as auxiliary material for this course.

- 9.1 The training manuals shall be delivered in paper and soft copy format. The Contractor shall supply the DND with five (5) bilingual training manuals, in hard copy format, covering, but not limited to, the operation and maintenance philosophy of the Chilled Water Plants and pumps.
- 9.2 The Contractor shall supply DND with one (1) bilingual version of the manuals in soft copy format.
- 9.3 The Contractor shall deliver a hard copy of the manuals and the electronic versions to DND prior to installation of the first system.
- 9.4 The Contractor shall supply training lectures in PowerPoint format.
- 9.5 The Contractor shall deliver training course material, covering Operation and Maintenance, in accordance with DID 08.

The 'Draft Training Packages' shall contain:

one (1) *Train the Trainer* course package with the purpose of educating the future training staff on the new system and on how to use the mock up.

one (1) power point/ e-learn package to complement the mock up,

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 11
2. Title: Technical Data Package
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 2 WAFAT
5. Number of Copies: one (1) modifiable electronic (MS Word/MS Excel/CAD), three (3) hard copies, a reproducible CD of '*as delivered CW Plant*' drawings and associated lists
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission: Update as required.
9. Remarks: TDP shall include:
 - a. A list of all materials used in the Chilled Water Plants and Associated equipment;
 - b. Technical specifications of the materials used and Material Safety Data Sheets (MSDS) for the applicable materials.
 - c. Engineering Drawings:
 - i. Engineering drawings, Associated Lists and Reference Data must be provided in accordance with C-01-100-100/AG-006.
 - ii. Data Lists and Cover Sheets must be provided as part of the Engineering Drawing and Technical Data Package and must be prepared in accordance with common commercial practice.
 - iii. All drawings, Data Lists, and Cover Sheets must be in both official languages.
 - d. '*As Delivered*' Drawings; The '*as delivered*' drawings must include:
 - i. Footprint and mounting arrangement;
 - ii. Suction and discharge pipe connections location and size;
 - iii. Overall dimension of pump, motor, coupling;
 - iv. Schematic arrangement of CW Plant;
 - v. Required maintenance envelope,
 - vi. Electrical schematics including detailed wiring master plan drawings; and,
 - vii. Certification Data Sheets must be provided for the rotating machinery incorporated in the CW Plant design.
 - e. Three (3) complete sets in hard copy as well as a reproducible CD of '*as delivered CW Plant*' drawings and associated lists, must be delivered to DND forty-five (45) days before delivery of first chiller.
 - f. Parts List – Parts lists must be prepared integral to the drawings.

- g. Electrical Drawings – Electrical connection drawings must be detailed and in accordance with commercially accepted standards.
- h. Units of Measure – The units of measure must be metric.
- i. Integration – The contractor must be fully responsible for the integration of existing and new drawings to form a complete Engineering Drawing Package.
- j. Quality Assurance Provisions must be stated by the contractor.
- k. Inspection – Inspection of the engineering drawings and associated lists delivered is the responsibility of the contractor.
- l. Acceptance – Acceptance of the engineering drawing package shall be the responsibility of the DND Technical Authority.
- m. Custom Designed/Manufactured Components:

The TDP shall include a GA or “process” drawing of each chiller component. Typical custom made items include Condenser, Oil Cooler, Evaporator, VE/flexible piping spools, etc. For example, the process drawing for a custom condenser shall include:

- i. Overall dimensions, piping connection location & sizes, operating weight;
- ii. At rated condition: SW inlet and outlet temperature, SW flow and pressure drop, SW side design pressure and temperature.
- iii. At rated condition: Refrigerant inlet and outlet conditions, refrigerant flow, refrigerant side design pressure and temperature, condensing duty;
- iv. Materials of construction.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 12
2. Title: Special PHST Consideration Items List
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 4 WAFAT
5. Number of Copies: one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission: Three months prior to delivery of first system
9. Remarks:
 - 9.1 Include the following data in the Special PHST Consideration Items List:
 - a. Item Number (unique sequence number for each list)
 - b. Item Name
 - c. Reference (Manufacturer's Part) Number
 - d. NSCM/CAGE Code
 - e. NATO Stock Number (if available)
 - f. Description of Special Consideration
 - g. Applicable Standard (for protection, handling) (if appropriate)
 - 9.2 Special PHST consideration items include:
 - a. Subject to damage from electrostatic discharge
 - b. Subject to damage from shock (of more than 25G instantaneous)
 - c. Subject to degradation from magnetic or electromagnetic radiation
 - d. Subject to degradation from freezing
 - e. Subject to degradation from humidity
 - f. Subject to degradation from heat
 - g. Subject to degradation from ultra-violet light
 - h. That are dangerous goods
 - i. That are hazardous material
 - j. That must be kept in a special orientation
 - k. That require special external blocking or bracing
 - l. That must have an internal blocking/locking device engaged
 - m. That emit electromagnetic radiation that could degrade nearby susceptible items
 - n. That require continuous power application
 - o. That can be without power application only for a short period of time
 - p. That should not have protective packaging removed except in a clean room environment
 - q. That can only be removed from a special storage environment for a short period of time
 - r.. That are classified and must have an escort
 - s. That require a special container

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 13
2. Title: Packaging Data
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: Concurrent with Unit Delivery
5. Number of Copies: one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 week
8. Subsequent Submission:
9. Remarks: To identify packaging requirements for items to be shipped to or stored at a Crown facility (such as spare parts, bulk items, special tools, support equipment, test equipment and training equipment.
These data may be submitted/accessed in electronic media.

9.1 Provide the following data:

9.1.1 Item Identification

- a. Item Name
- b. Reference (Manufacturer's Part) Number
- c. NSCM/CAGE code
- d. NATO Stock Number (if assigned)

9.1.2 Packaging Data

- a. Unit Pack Size (length, width, depth) (inches)
- b. Unit Pack Weight (pounds)
- c. Packing Code (A, B, C)
- d. Hazardous Code (Regulated/Non-regulated)
- e. Special packaging instruction (for items on Special PHST Consideration Items List)

- Notes:**
1. To reduce the need for redundant data, similar items may be grouped with the same packaging data applying to the group.
 2. The Canadian Forces Supply System requires size in meters and weight in kilograms.
 3. To use the special packaging instruction number, the contractor will need to prepare an enumerated list of instructions, consistent as possible with MIL-STD-2073-1 and -2.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 14
2. Title: Equipment Identification Plate Data
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: Concurrent with Unit Delivery
5. Number of Copies: one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 week
8. Subsequent Submission:
9. Remarks: The Equipment Identification Plate Data shall be prepared in accordance with Canadian Forces specification D-02-002-001/SG-001. Those items which require identification markings or name plates are to be identified in accordance with A-A-50271.

DATA ITEM DESCRIPTION (DID)

1. Sequence Number: 15
2. Title: Consolidated Support Equipment Provisioning List
3. Description of Data: Include all elements cited in the Remarks below.
4. First Submission: 7 MACA
5. Number of Copies: one (1) modifiable electronic (MS Word/MS Excel/CAD)
6. PM Approval Required: Yes
7. Approval Lead Time: 1 month
8. Subsequent Submission: If/as required
9. Remarks:
 - 9.1 For each required item of Support Equipment (SE) include:
 - SE Item Name
 - SE Reference (Manufacturer's Part) Number
 - NSCM/CAGE Code
 - NSN (if available)
 - Maintenance Level
 - Recommended Buy Quantity
 - Standard Unit Price
 - Date of First Article Delivery
 - 9.2 For complex support equipment, including automatic test equipment include:
 - Description and Function of Support Equipment
 - Support Equipment Development Cost
 - 9.3 The above list may be divided into sections as appropriate:
 - Common Hand Tools
 - Special Purpose Tools
 - Operations Support Equipment
 - Maintenance Support Equipment
 - Ground Handling Equipment
 - Calibration Equipment
 - Metrology Equipment
 - Technical Publications Viewers, Readers and Consoles
 - Test, Measurement and Diagnostic Equipment (TMDE)
 - General Purpose
 - Special Purpose
 - Maintenance Jigs and Fixtures
 - Automatic Test Equipment (ATE) and its Test Program Set (TPS)
 - Test and Diagnostic Facility
 - Computer Resources Support Requirement
 - Other

- 9.4 If ATE is required, identify the adapter/interconnect devices and test program sets/instructions.
- 9.5 Identify items that are currently held and do not need to be procured. Indicate which can be used as is and which require modification.
- 9.6 Include the system/equipment itself if it is required for fault diagnosis, testing or other maintenance purposes.

- Recommended Buy Quantity
- Logistics Control Number (LCN)
- Used-On Code

_____	_____
_____	_____
_____	_____

CHANGE NARRATIVE
Remarks

ANNEX D

MANDATORY EVALUATION CRITERIA

	Evaluation Criteria	Required Scoring	Compliance		Detailed Requirements	Proposal References (para#, sect#)
			Met	Not Met		
M1	History/Previous Experience	Mandatory	Met	Not Met	<p>The bidder must provide a company profile, indicating comparable project experience and technical capability. Therefore the company must:</p> <ul style="list-style-type: none"> • Demonstrate 60 months of experience within the last 10 years designing and delivering Chilled Water Plants in a Marine Environment (Sea going vessel) by providing specific examples of comparable projects. The Bidders must include at minimum: start date, end date, description, justification to demonstrate similar scope 	
M2	Management Organization	Mandatory	Met	Not Met	<p>The company must provide details of its management organization by providing:</p> <ul style="list-style-type: none"> • A recent organization chart that identifies a minimum of 5 management personnel intended on being assigned to this project. The chart must include the individual's roles and responsibilities and indicate the reporting structure. • Project personnel must include as a minimum: a Project Manager, Quality Control Manager, Finance Manager, Production Manager, and Shock and Vibration Manager • The company must provide a resume for all 5 management personnel identified above and assigned to this project that demonstrates that they have successfully managed at least one project comparable in scope and 	

					complexity of work to the proposed project.	
M3	Quality Management System	Mandatory	Met	Not Met	The company must demonstrate its Quality Management capabilities. The company must either: <ul style="list-style-type: none"> • Show that it is ISO-9001:2008 certified, or • Provide details of its Quality Management system in accordance with the requirements of ISO-9001:2008 	
M4	Technical Solution	Mandatory	Met	Not Met	The company must clearly demonstrate that their proposed solution satisfies all the technical requirements outlined in Appendix 1 of the SOW (see template in Annex E).	
M5	Description of System	Mandatory	Met	Not Met	The company must demonstrate the preliminary system and performance specifications by providing a description of the system and equipment, including make and models, and a system block diagram	
M6	Weight and Dimensions	Mandatory	Met	Not Met	The company must provide the weight and dimensions of all proposed hardware components (actual and/or approximate values)	
M7	Drawing/Sketch	Mandatory	Met	Not Met	The company must provide a system sketch or drawing to prove that the proposed solution will fit within the space envelope and fit through the soft patches (SOW A1.1.2.12 and A1.1.2.13).	
M8	Preliminary Project Schedule	Mandatory	Met	Not Met	The company must provide a preliminary project schedule indicating the sequence and the completion dates of project milestones, deliverables, and project tasks based on a contract award as “day 0”	

ANNEX E

COMPLIANCE CHECKLIST

Company Name: _____

The following technical specifications for the system to be designed shall be cross-referenced to substantiating text, specifications, or data in the body of the proposal.

Mandatory SOW Appendix 1 Requirement (section#)	
A1.1.Chilled Water Plant/System Requirements	
A1.1.1 Mechanical Interface Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.1.1	
A1.1.1.2.a	
A1.1.1.2.a.i	
A1.1.1.2.a.ii	
A1.1.1.2.a.iii	
A1.1.1.2.b	
A1.1.1.2.b.i	
A1.1.1.2.b.ii	
A1.1.1.2.b.iii	
A1.1.1.3.a	
A1.1.1.3.a.i	
A1.1.1.3.a.ii	
A1.1.1.3.a.iii	
A1.1.1.3.b	
A1.1.1.3.b.i	
A1.1.1.3.b.ii	
A1.1.1.3.b.iii	
A1.1.1.4	
A1.1.1.5	
A1.1.2 Operational Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.2.1.a	
A1.1.2.1.b	
A1.1.2.1.c	
A1.1.2.1.d	
A1.1.2.1.e	
A1.1.2.1.f	
A1.1.2.1.g	

A1.1.2.1.h	
A1.1.2.2.a	
A1.1.2.2.b	
A1.1.2.2.c	
A1.1.2.2.d	
A1.1.2.2.e	
A1.1.2.2.f	
A1.1.2.2.g	
A1.1.2.2.h	
A1.1.2.2.i	
A1.1.2.2.j	
A1.1.2.2.k	
A1.1.2.3.a	
A1.1.2.3.b	
A1.1.2.3.c	
A1.1.2.4	
A1.1.2.5	
A1.1.2.6	
A1.1.2.7	
A1.1.2.8	
A1.1.2.9	
A1.1.2.10	
A1.1.2.11	
A1.1.2.12	
A1.1.2.13	
A1.1.3 Noise and Vibration Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.3.1.a	
A1.1.3.1.b	
A1.1.3.2.a	
A1.1.3.3.	
A1.1.3.4.a	
A1.1.3.4.b	
A1.1.3.4.c	
A1.1.3.4.d	
A1.1.3.5.a	
A1.1.3.5.b	
A1.1.3.5.c	
A1.1.3.6.a	
A1.1.3.6.b	
A1.1.4 Shock Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.4.1.a	
A1.1.4.1.b	
A1.1.4.1.c	

A1.1.4.1.d	
A1.1.5 Electrical Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.5.1	
A1.1.5.2.	
A1.1.5.3.	
A1.1.5.4.	
A1.1.5.5	
A1.1.5.6.	
A1.1.5.7.	
A1.1.5.8.a	
A1.1.5.8.b	
A1.1.5.9.a	
A1.1.5.9.b	
A1.1.5.10.a	
A1.1.5.10.b	
A1.1.5.10.c	
A1.1.6 Electromagnetic Compatibility	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.6.1	
A1.1.7 Environmental	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.7.1	
A1.1.8 Material	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.8.1	
A1.1.8.2	
A1.1.8.3	
A1.1.8.4	
A1.1.8.5.a	
A1.1.8.5.b	
A1.1.8.6	
A1.1.8.7	
A1.1.8.8	
A1.1.9 Materials of Construction	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.9.1	
A1.1.9.2	
A1.1.9.3.a	
A1.1.9.3.b	
A1.1.9.3.c	
A1.1.9.3.d	
A1.1.9.3.e	
A1.1.9.3.f	
A1.1.9.3.g	

A1.1.9.3.h	
A1.1.9.3.i	
A1.1.9.3.j	
A1.1.9.3.k	
A1.1.9.4	
A1.1.9.5.a	
A1.1.9.5.b	
A1.1.9.5.c	
A1.1.9.5.d	
A1.1.9.5.e	
A1.1.9.5.f	
A1.1.9.5.g	
A1.1.9.6	
A1.1.9.7.a	
A1.1.10 Refrigerant Containment	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.10.1	
A1.1.10.1.a	
A1.1.10.1.b	
A1.1.10.1.c	
A1.1.10.1.d	
A1.1.10.1.e	
A1.1.10.2	
A1.1.11 Safety	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.1.11.1	
A1.1.11.2.a	
A1.1.11.2.b	
A1.2.Chilled Water Plant Design Requirements	
A1.2.1 Mounting	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.1.1	
A1.2.2 Flow Measurements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.2.1	
A1.2.3 Lubricating Oil	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.3.1	
A1.2.3.2	
A1.2.4 Chilled Water Plant Local and Remote Control and Monitoring	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.4.1.a	
A1.2.4.1.b	
A1.2.4.1.c	

A1.2.4.1.d	
A1.2.4.2.a	
A1.2.4.2.b	
A1.2.4.2.c	
A1.2.4.2.d	
A1.2.4.2.e	
A1.2.4.3.a	
A1.2.4.3.b	
A1.2.4.3.c	
A1.2.4.3.d	
A1.2.4.3.e	
A1.2.4.4	
A1.2.5 Chilled Water Local Plant Indication, Alarm and Protection System	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.5.1	
A1.2.5.2	
A1.2.5.3.a	
A1.2.5.3.b	
A1.2.5.3.c	
A1.2.5.3.d	
A1.2.5.3.e	
A1.2.5.3.f	
A1.2.5.3.g	
A1.2.5.3.h	
A1.2.5.4.a	
A1.2.5.5.a	
A1.2.5.5.b	
A1.2.5.5.c	
A1.2.5.5.d	
A1.2.5.5.e	
A1.2.5.5.f	
A1.2.5.5.g	
A1.2.5.6.a	
A1.2.5.7.a	
A1.2.6 Maintenance Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.6.1	
A1.2.7 Acceptance Test Procedure	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.2.7.1	
A1.3.Chilled Water Pump, Motor Requirements	
A1.3.1 CW Pump, Motor, and Motor Controller	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)

A1.3.1.1	
A1.3.1.2	
A1.3.1.3	
A1.3.1.4	
A1.3.1.5	
A1.3.2 CW Pump Performance Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.3.2.1	
A1.3.2.2	
A1.3.2.3	
A1.3.2.4	
A1.3.2.5	
A1.3.2.6	
A1.3.3 CW Pump Mechanical Requirements	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.3.3.1	
A1.3.3.2	
A1.3.3.3	
A1.3.3.4	
A1.3.3.5	
A1.3.3.6	
A1.3.4 Motor	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.3.4.1.a	
A1.3.4.1.b	
A1.3.4.1.c	
A1.3.4.1.d	
A1.3.4.1.e	
A1.3.4.1.f	
A1.3.4.1.g	
A1.3.5 CW Pump Motor Controller	Proposal reference to confirm compliance (E.g. Page Number(s) / Paragraph / Section / etc)
A1.3.5.1.a	
A1.3.5.1.b	
A1.3.5.1.c	
A1.3.5.1.d	
A1.3.5.1.e	
A1.3.5.1.f	
A1.3.5.1.g	
A1.3.5.1.h	
A1.3.5.1.i	
A1.3.5.1.j	
A1.3.5.1.k	
A1.3.6 Pump Control and	Proposal reference to confirm compliance

Monitoring Functions	(E.g. Page Number(s) / Paragraph / Section / etc)
A1.3.6.1.a	
A1.3.6.1.b	
A1.3.6.1.c	
A1.3.6.1.d	
A1.3.6.1.e	
A1.3.6.1.f	

ANNEX F

Basis of Payment

Percentage value of Contract	Number	Milestone	DIDs	Firm Due Date
1.00%	1	Planning Documentation	DID 01 Project Management Plan, DID 07 Provisioning Documentation (First Submission)	2 weeks after contract award
2.00%	2	Installation Guidance Package and ILS Drawing Package	DID 04 Installation Guidance Package, DID 09 ILS Drawing Package	2 WAFAT
3.00%	3	Factory Acceptance Test (FAT) First ship and Documentation	DID 05 FAT Test Procedures, DID 06 FAT Acceptance Report, DID 11 Technical Data Package, DID 12 Special PHST Considerations	4 WAFAT
2.00%	4	Provisioning Documentation	Final DID 07 Provisioning Documentation	13 WAFAT
2.00%	5	Training Documentation	DID 08 Operating and Maintenance Manuals (First Submission), DID 10 Training Course Material (First Submission), DID 15 Consolidated Support Equipment Provisioning List	7 MACA
8.00%	6	Chilled Water Plant and Pumps Delivery 1 (HMCS Ottawa), West Coast Training Set	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	13 MACA
1.00%	7	East Coast Training Set	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	13 MACA
1.00%	8	Training - East Coast	Final DID 08 Operating and Maintenance Manuals, Final DID 10 Training Course Material	14 MACA
1.00%	9	Training - West Coast	Final DID 08 Operating and Maintenance Manuals, Final DID 10 Training Course Material	14 MACA
7.00%	10	Chilled Water Plant and Pumps Delivery 2 (HMCS Ville de Québec)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	11	Chilled Water Plant and Pumps Delivery 3 (HMCS Regina)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B

7.00%	12	Chilled Water Plant and Pumps Delivery 4 (HMCS Toronto)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	13	Chilled Water Plant and Pumps Delivery 5 (HMCS Halifax)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
2.00%	14	Factory Acceptance Test (FAT) Sixth Ship and Documentation	DID 05 FAT Test Procedures, DID 06 FAT Acceptance Report, DID 11 Technical Data Package, DID 12 Special PHST Considerations	IAW Annex B
7.00%	15	Chilled Water Plant and Pumps Delivery 6 (HMCS Calgary)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	16	Chilled Water Plant and Pumps Delivery 7 (HMCS Fredericton)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	17	Chilled Water Plant and Pumps Delivery 8 (HMCS Montréal)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	18	Chilled Water Plant and Pumps Delivery 9 (HMCS Winnipeg)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	19	Chilled Water Plant and Pumps Delivery 10 (HMCS Charlottetown)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	20	Chilled Water Plant and Pumps Delivery 11 (HMCS Vancouver)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
7.00%	21	Chilled Water Plant and Pumps Delivery 12 (HMCS St-John)	DID 13 Packaging Data, DID 14 Equipment Plate Identification Data, Release documents, as per contract	IAW Annex B
100.00%	Total			

Abbreviations:

MACA = months after contract award

MADDM =months after detailed design meeting (Detailed Design Meeting is 2 MACA)

WBFAT = weeks before factory acceptance test (FAT is 3 MACA)

WAFAT = weeks after factory acceptance test

IAW = in accordance with

ANNEX G

This Annex shall be completed by the Bidder in the spreadsheet provided, as per clause **1.1 Section II - Financial Bid.**

Price for Evaluation:

A)	<p>Known Work: In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm price of \$ _____ \$ _____ CAD. Customs duties and excise taxes included. Goods and Services Tax or Harmonized Sales Tax are extra, if applicable.</p>	<p>\$ _____</p>
B)	<p>Daily Storage and Maintenance Fee for evaluation purpose only: As per Part 7, Articles 4.1 Delivery and 7.1.1. Storage and Maintenance Fee</p> <p>f) Ninety (90) working days X \$ _____ firm daily service fee. Customs duties and excise taxes included. Goods and Services Tax or Harmonized Sales Tax are extra, if applicable.</p>	<p>\$ _____</p>
C)	<p>TOTAL EVALUATED PRICE: [A + B]:</p> <p align="right">For a TOTAL EVALUATION PRICE of : \$ _____</p>	<p>_____</p>