



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 0B2 / Noyau 0B2

Gatineau

Québec

K1A 0S5

Bid Fax: (819) 997-9776

**SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION**

The referenced document is hereby revised; unless otherwise
indicated, all other terms and conditions of the Solicitation
remain the same.

Ce document est par la présente révisé; sauf indication contraire,
les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

Vendor/Firm Name and Address

Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution

Marine Machinery and Services / Machineries et
services maritimes

11 Laurier St. / 11, rue Laurier

Place du Portage III, 8B3

Gatineau

Québec

K1A 0S5

Title - Sujet Marine Growth Prevention Systems Système antiparasitaires marins	
Solicitation No. - N° de l'invitation F7044-211437/A	Amendment No. - N° modif. 003
Client Reference No. - N° de référence du client F7044-211437	Date 2022-11-03
GETS Reference No. - N° de référence de SEAG PW-\$\$ML-066-28821	
File No. - N° de dossier 066ml.F7044-211437	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM Eastern Standard Time EST on - le 2022-11-18 Heure Normale du l'Est HNE	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Durocher, Daniel	Buyer Id - Id de l'acheteur 066ml
Telephone No. - N° de téléphone (873) 455-3877 ()	FAX No. - N° de FAX () -
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	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

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This Amendment 003 to the Solicitation is raised to extend the closing date to the 18 November 2022 due to many important modifications into, but not limited to the RFP, the SOW, the Mandatory Technical Criteria and the Basis of Payment of the RFP.

Delete the Solicitation in its entirety and insert:

Request for Proposal for Marine Growth Prevention Systems (MGPS) to be procured for the offshore fisheries science vessels (OFSV)

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1. PART 1 - GENERAL INFORMATION

1.1. Procurement Summary

Canadian Coast Guards has a requirement for new Marine Growth Prevention Systems (MGPS), also interchangeably called an anti-fouling system, to be procured for the offshore fisheries science vessels (OFSV). The MGPS will be installed on vessels to prevent the obstruction of seawater pipes and other equipment by marine growth. The system must operate on the principle that a low, continuous or pulsed dose of a biocide will prevent organism survival and growth.

This initial contract will be for the procurement of one (1) MGPS for one (1) vessel, the CCGS Jacques Cartier, plus two (2) options of one (1) MGPS for the remaining OFSV vessels.

The 3 vessels all have the same hull design and were constructed at Vancouver Shipyards.

The requirement includes all associated technical requirement described herein including the Statement of Work (SOW) attached as Annex "A".

1.2. Debriefings

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 from receipt of the results of the bid solicitation process. The debriefing may be in writing or by telephone.

1.3. epost Connect service

This bid solicitation requests bidders to use the epost Connect service provided by Canada Post Corporation to transmit their bid electronically. Bidders must refer to Part 2 entitled Bidder Instructions, and Part 3 entitled Bid Preparation Instructions, of the bid solicitation, for further information.

1.4. Security requirements

The Bidder must meet the security requirements as indicated in Part 6 - Resulting Contract Clauses.

2. PART 2 - BIDDER INSTRUCTIONS

2.1. Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/1/2003/26) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/1/2003/26>) 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 \(2022-03-29\)](#) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

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2.1.1. Condition of Material – Bid

Material supplied must be new, manufactured within the last five (5) years and conform to the latest issue of the applicable drawing, specification and/or part number that is in effect on the bid solicitation closing date.

2.1.2 Packaging

- a) The dispatch packaging must adequately secure and protect from damage the parts and components during transport and handling;
- b) Each dispatch packaging (pallet unit or dispatch carton) must be marked using a shipping label that can resist and remain attached during transport and handling;
- c) Each dispatch packaging must contain a packing slip that must contain, but not limited to, the following: name and address of the Shipper, name and address of the recipient, a packing slip number, an itemized list of the contents, and the Contract number.

2.2. Submission of Bids

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

Note: For bidders choosing to submit using epost Connect for bids closing at the Bid Receiving Unit in the National Capital Region (NCR) the email address is:

tpsgc.dgareceptiondessoumissions-abbidreceiving.pwgsc@tpsgc-pwgsc.gc.ca

Note: Bids will not be accepted if emailed directly to this email address. This email address is to be used to open an epost Connect conversation, as detailed in Standard Instructions [2003](#), or to send bids through an epost Connect message if the bidder is using its own licensing agreement for epost Connect.

2.2.1. Transmission by using the epost Connect Service

Bids must be submitted with the epost Connect service in accordance with Standard Instructions 2003 (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/1/2003/26>) Goods or Services Competitive Requirements.

Unless specified otherwise in the bid solicitation, bids may be submitted by using the [Connect service \(https://www.canadapost-postescanada.ca/cpc/en/business/postal-services/digital-mail/connect.page\)](https://www.canadapost-postescanada.ca/cpc/en/business/postal-services/digital-mail/connect.page) provided by Canada Post Corporation.

The only acceptable email address to use with epost Connect for responses to bid solicitations issued by Public Works and Government Services Canada (PWGSC) in the National Capital Region is: TPSGC.DGAreceptiondessoumissions-ABBidReceiving.PWGSC@tpsgc-pwgsc.gc.ca

To submit a bid using epost Connect service, the Bidder must either:

- a) send directly its bid only to the specified PWGSC Bid Receiving Unit, using its own licensing agreement for epost Connect provided by Canada Post Corporation; or,
- b) send as early as possible, and in any case, at least six federal government business days prior to the bid solicitation closing date and time, (in order to ensure a response), an email that

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includes the bid solicitation Number to the specified PWGSC Bid Receiving Unit requesting to open an epost Connect conversation. Requests to open an epost Connect conversation received after that time may not be answered.

If the Bidder sends an email requesting epost Connect service to the specified Bid Receiving Unit in the bid solicitation, an officer of the Bid Receiving Unit will then initiate an epost Connect conversation. The epost Connect conversation will create an email notification from Canada Post Corporation prompting the Bidder to access and action the message within the conversation. The Bidder will then be able to submit its bid afterward at any time prior to the bid solicitation closing date and time.

If the Bidder is using its own licensing agreement to send its bid, the Bidder must keep the epost Connect conversation open until at least 30 federal government business days after the bid solicitation closing date and time.

The bid solicitation Number should be identified in the epost Connect message field of all electronic transmissions.

The use of epost Connect service requires a Canadian mailing address. Should a Bidder not have a Canadian mailing address, they may use the Bid Receiving Unit address specified in the bid solicitation in order to register for the epost Connect service.

For bids submitted by epost Connect service, Canada will not be responsible for any failure attributable to the transmission or receipt of the bid including, but not limited to, the following:

- a) receipt of a garbled, corrupted or incomplete bid;
- b) availability or condition of the epost Connect service;
- c) incompatibility between the sending and receiving equipment;
- d) delay in transmission or receipt of the bid;
- e) failure of the Bidder to properly identify the bid;
- f) illegibility of the bid;
- g) security of bid data; or
- h) inability to create an electronic conversation through the epost Connect service.

The Bid Receiving Unit will send an acknowledgement of the receipt of bid document(s) via the epost Connect conversation, regardless of whether the conversation was initiated by the supplier using its own license or the Bid Receiving Unit. This acknowledgement will confirm only the receipt of bid document(s) and will not confirm if the attachments may be opened nor if the content is readable.

Bidders must ensure that they are using the correct email address for the Bid Receiving Unit when initiating a conversation in epost Connect or communicating with the Bid Receiving Unit and should not rely on the accuracy of copying and pasting the email address into the epost Connect system.

A bid submitted by epost Connect service constitutes the formal bid of the Bidder and must be submitted in accordance with Section 5 Submission of Bids, of Standard Instructions 2003 (2020-05-28), Goods or Services Competitive Requirements.

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

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2.3. Enquiries - Bid Solicitation

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

Bidders inquiries must be referred to the solicitation items by using the same numbering and heading. 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 question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all Bidders. Enquiries not submitted in a form that can be distributed to all Bidders may not be answered by Canada.

2.4. Applicable Laws

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

2.5. Bid Challenge and Recourse Mechanisms

- (a) Several mechanisms are available to potential suppliers to challenge aspects of the procurement process up to and including contract award.
- (b) Canada encourages suppliers to first bring their concerns to the attention of the Contracting Authority. Canada's Buy and Sell website, under the heading "Bid Challenge and Recourse Mechanisms" contains information on potential complaint bodies such as:
 - a. Office of the Procurement Ombudsman (OPO); and,
 - b. Canadian International Trade Tribunal (CITT).

Note: Suppliers should note that there are **strict deadlines** for filing complaints, and the time periods vary depending on the complaint body in question. Suppliers should therefore act quickly when they want to challenge any aspect of the procurement process.

3. PART 3 - BID PREPARATION INSTRUCTIONS

3.1. Bid Preparation Instructions

Canada requests that the Bidder submits its bid in accordance with section 05 of the 2003 standard instructions (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/1/2003/26#submission-of-bids>). The epost Connect system has a limit of 1GB per single message posted and a limit of 20 GB per conversation.

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The bid must be gathered per section and separated as follows:

Section I : Technical Bid;
Section II : Financial Bid; and
Section III : Certifications.

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Due to the nature of the bid solicitation, bids transmitted other than by epost Connect system will not be accepted.

Section I: Technical Bid

The Technical Bid must include:

- (a) A duly completed Annex "D" Mandatory Technical Criteria ; and,
- (b) A duly completed Statement of Compliance to the Annex "A" Statement of Work (SOW) in a requirement matrix format as per Annex "E".

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Basis of Payment in Annex "B" and the Financial Evaluation Plan in Annex "F".

3.1.1. Electronic Payment of Invoices – Bid

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Annex "C" Electronic Payment Instruments, to identify which ones are accepted.

If Annex "C" Electronic Payment Instruments is not completed, it will be considered as if Electronic Payment Instruments are not being accepted for payment of invoices.

Acceptance of Electronic Payment Instruments will not be considered as an evaluation criterion.

3.1.2. Exchange Rate Fluctuation

The requirement does not offer exchange rate fluctuation risk mitigation. Requests for exchange rate fluctuation risk mitigation will not be considered. All bids including such provision will render the bid non-responsive.

Section III: Certifications

Bidders must submit the certifications and additional information required under Part 5.

4. PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

4.1. Evaluation Procedures

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

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4.1.1. Technical Evaluation

IAW Part 3, section 3.1, the following Bidder's technical deliverables will be evaluated:

- (a) A duly completed Annex "D" Mandatory Technical Criteria; and,
- (b) A duly completed Statement of Compliance to the Annex "A" Statement of Work (SOW) in a requirement matrix format as per Annex "E".

4.1.2. Financial Evaluation

IAW Part 3, section 3.1, the following Bidder's financial deliverables will be evaluated:

- (a) The full legal name of the Bidder;
- (b) Complete contact information of the company's representative responsible for the proposal; and,
- (c) Duly completed Annex "B" Basis of Payment and Annex "F" Financial Evaluation Plan. The price of the bid will be evaluated in Canadian dollars, Applicable Taxes excluded, Incoterms® 2020 (Delivered Duty Paid - DDP), Canadian customs duties and excise taxes included.

4.2. Basis of Selection

A bid must comply with all the requirements of the bid solicitation and meet all the Technical Criteria listed under section 4.1.1 above and meet all the Financial Criteria listed under section 4.1.2 above to be declared responsive. The responsive bid with the lowest Total Evaluation Price of the Proposal IAW the Annex "F" FINANCIAL EVALUATION PLAN, will be recommended for award of a contract.

5. PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

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

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

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

5.1. Certifications Required with the Bid

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

5.1.1. Integrity Provisions - Declaration of Convicted Offences

In accordance with the Integrity Provisions of the Standard Instructions, all bidders must provide with their bid, **if applicable**, the declaration form available on the Forms for the Integrity Regime website (<http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html>), to be given further consideration in the procurement process.

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5.2. Certifications Precedent to Contract Award and Additional Information

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

5.2.1. Integrity Provisions – Required Documentation

In accordance with the section titled Information to be provided when bidding, contracting or entering into a real property agreement of the Ineligibility and Suspension Policy (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

5.2.2. Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the Employment and Social Development Canada (ESDC) - Labour's website(<https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#>).

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

Canada will also have the right to terminate the Contract for default if a Contractor, or any member of the Contractor if the Contractor is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list during the period of the Contract.

The Bidder must provide the Contracting Authority with a completed annex titled Federal Contractors Program for Employment Equity - Certification, before contract award. If the Bidder is a Joint Venture, the Bidder must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

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6. PART 6 - RESULTING CONTRACT CLAUSES

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

6.1. Security Requirements

6.1.1. SECURITY MANAGEMENT

6.1.2. Access to Canada's Facilities

The Contractor may be provided access to Canada's Facilities, on an as required basis and non-interference basis, to allow the Contractor to view systems and obtain relevant data. Site visits may also be used to interview Customer Subject Matter Experts (SMEs) to determine or confirm equipment functionality and operational parameters.

6.1.3. Visit Clearance Request (VCR)

VCR must be approved before departure to any CCG sites. The contractor must provide at least two weeks' notice for any site visits.

6.2. Requirement

Canadian Coast Guards has a requirement for new Marine Growth Prevention Systems (MGPS), also interchangeably called an anti-fouling system, to be procured for the offshore fisheries science vessels (OFSV). The MGPS will be installed on vessels to prevent the obstruction of seawater pipes and other equipment by marine growth. The system must operate on the principle that a low, continuous or pulsed dose of a biocide will prevent organism survival and growth.

The Contract is for the procurement of one (1) MGPS for one (1) vessel, the CCGS Jacques Cartier, plus two (2) options of one (1) MGPS for the remaining OFSV vessels.

The 3 vessels all have the same hull design and were constructed at Vancouver Shipyards.

The requirement includes all associated technical requirement described herein including the Statement of Work (SOW) attached as Annex "A".

6.2.1. Conduct of the Work

This section applies despite any other provision of the Contract and adds to the 2030 General Conditions - Higher Complexity – Goods (2008-05-12), Section 2030 05 (2008-05-12) Conduct of the Work.

1. In the performance of the Work, the Contractor shall supply, other than Government Supplied Material (GSM), all the resources, facilities, labour, management, services, equipment, materials, drawings, tools technical data, technical assistance, engineering services and planning necessary to complete the Work.
2. The Contractor agrees to:
 - a. commence and carry out the Work promptly and diligently and upon the terms and conditions and in the manner contemplated by this Contract;

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- b. carry out the Work IAW good, modern shipbuilding practices;
 - c. provide efficient and effective supervision and inspection of the carrying out of the Work; and,
 - d. provide material and workmanship of the highest quality commensurate with the nature of the work and take all such steps as are necessary to ensure that the Work is completed according to the Contract.
- 3. No material or parts shall be used or processed and no finished Work shall be submitted for acceptance or delivery unless approved by the Technical Authority. The Contractor shall complete the Work to the satisfaction of Technical Authority and fully in accordance with the Contract and deliver all of the Work as required by the Contract.
- 4. The Contractor shall submit for examination by the Technical Authority any designs, drawings, models, completed or under preparation by it or its behalf in connection with the Work at any time.
- 5. The Contractor shall provide such reports on the performance of the Work as are required by the Contract and such other reports as may be reasonably required by the Contracting Authority and the Technical Authority.
- 6. The Contractor shall provide the services required under the Contract. In case of failure by the Contractor to provide any of the described services in the Contract, Canada may suspend payment until such failure has been corrected to the satisfaction of Canada.

6.2.2. Design Check

- 1. The Design Check shall be completed and design packages deliverables submitted in accordance with the SOW.
- 2. The Contractor shall submit the design packages deliverables for each of the Design Reviews.
- 3. Where Canada alleges and the Contractor agrees that the design is defective or deficient, the Contractor shall correct the design.
- 4. Where the Contracting Authority and the Contractor's representative are unable to resolve the design defect or deficiency, they agree to follow the prescriptions of the Contract Dispute Resolution clause.

6.2.3. Master Schedule

- 1. The Master Schedule shall be developed in order to meet the various delivery requirements IAW the Contract Annex "A" section 8 CDRL's.
- 2. The Contractor is responsible for planning and scheduling the Work required herein. The Master Schedule shall be updated on a continuous basis.

6.2.4. Drawings during Design, Manufacturing, Integration and Installation Phase

- 1. All drawings shall be submitted to the Technical Authority for examination.

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2. The review of the Contractor's drawings by Canada shall not relieve him of its contractual responsibility and the same applies to the subcontracts issued by the Contractor to the subcontractor. In particular, examination or approval of drawings shall not:
 - (a) Relieve the Contractor of its obligation to ensure that all details are correct;
 - (b) Obligate Canada to accept an item that does not meet the Contract requirements;
 - (c) Confirm that an item complies with the Contract requirements; and,
 - (d) Relieve the Contractor of the responsibility for any omissions and the consequences resulting thereof.
3. Any drawings which are supplied to the Contractor by or on behalf of Canada are for such purpose as the Contractor may wish to use them but are not evidence of any interpretation to be given to the Contract requirements. Any such use by the Contractor shall not relieve the Contractor of any responsibility under this Contract. The Contractor shall indemnify and save harmless Canada from any claims, actions, suits or proceedings based upon the use by the Contractor of such drawings.

6.2.5. Additional / Unscheduled Work including Design Change

1. The Contractor hereby acknowledges that Canada may require the Contractor to perform Additional / Unscheduled Work at any time and from time to time, during this Contract. The Additional / Unscheduled Work could include but not be limited to:
 - (a) Additions or variations to the Work including Design Changes; and,
 - (b) Dispensing with or change to any portion of the Work.
2. Any Additional / Unscheduled Work will be processed according to the Annex "G", Procedure for Processing Additional / Unscheduled Work.
3. The Contractor shall perform the Additional / Unscheduled Work under the same terms and conditions of the Contract. The Additional / Unscheduled Work will be negotiated using the Unscheduled Work labor rates and mark-ups provided by the Contract.
4. The Contractor may request a change to the Work for Canada's consideration by submission of a request for change proposal to the Contracting Authority.
5. Request for extensions in the delivery date as a result of the Additional / Unscheduled Work must be presented at the time of the proposal otherwise extensions to the delivery date will not be considered.
6. No cost, Additional / Unscheduled Work; Notwithstanding the foregoing, should Canada deem it advisable to make any reasonable change in the Work during the course of the Work, provided the change is ordered before that particular part of the Work to which Canada refers is commenced and involves no extra cost to the Contractor, such changes shall be made by the Contractor without extra cost to Canada.

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6.2.6. Inspection and Acceptance of the Work

This section applies despite any other provision of the Contract and adds to the 2030 General Conditions - Higher Complexity – Goods (2008-05-12), section 2030 12 (2014-09-25) Inspection and acceptance of the Work.

1. All reports, deliverables, documents, goods and all services rendered under this Contract shall be subject to inspection by the Technical Authority. Should any report, document, good or service not be in accordance with the requirements of the Contract, the Technical Authority shall have the right to reject it or require its correction at the sole expense of the Contractor before recommending payment. Any communication with a Contractor regarding the quality of Work performed pursuant to this Contract shall be undertaken by official correspondence through the Contracting Authority;
2. The Contractor shall be responsible for properly setting up, preparing, providing access to and presenting Work for inspection and for giving adequate notice to the Technical Authority and the Regulatory Body that the Work is complete, and having been pre-tested or inspected, is ready for the inspection;
3. Inspection will be done by the Technical Authority at the most appropriate location to be determined and agreed with the Contractor: and,
4. Inspection requirements shall be in accordance with the provisions of this Contract including 2030 (2022-07-07), General Conditions - Higher Complexity - Goods, and the following procedures:

- (a) Non-conformance Report (NCR): A NCR will be issued for each Non-conformance noted by the Technical Authority. Each report will be uniquely numbered for reference purposes, will be signed and dated by the Technical Authority, and will describe the Non-conformance.

When the Non-conformance has been corrected by the Contractor and has been re-inspected and accepted by the Technical Authority, the Technical Authority will complete the NCR by signing and dating the NCR; and,

- (b) Notwithstanding the above including the Inspection by the Technical Authority, the discrepancy notices, the Non-conformance reports, or absences thereof, or corrections thereto, or acceptance thereof, do not relieve the Contractor of its obligations to satisfy the requirements of this Contract. As such, the Contractor shall correct any and all defects or deficiencies discovered at no additional cost to Canada.

6.2.7. Tests and Demonstrations Acceptance:

1. To enable the Technical Authority to certify that the Work has been performed satisfactorily, in accordance with the Contract, the Contractor shall schedule, coordinate, perform, and record all specified Tests and Demonstrations required by the Contract;
2. Where the Contract contains a specific performance requirement for any component, equipment, subsystem or system, the Contractor shall test such component, equipment, subsystem or system to the satisfaction of the Technical Authority, to prove that the specified performance has been achieved and that the component, equipment, subsystem or system performs as required by the Contract;

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3. Tests and demonstrations shall be conducted in accordance with a logical, systematic schedule which shall ensure that all associated components and equipment are proven prior to subsystems demonstration or testing, and subsystems are proven prior to system demonstration or testing;
4. Where the Contract does not contain specific performance requirements for any component, equipment, subsystem or system, the Contractor shall demonstrate the performance of such component, equipment, subsystem or system to the satisfaction of the Technical Authority;
5. The Contractor shall keep written records of all tests and demonstrations conducted, including all rejections, comments, or recommendations made at such times. Records shall be in a format, and contain data, such that the Technical Authority can certify compliance of the component, equipment, subsystem, or system with the specified requirements; and
6. The Contractor shall in all respects be responsible for the conduct of all tests in accordance with the requirements of this Contract.

Canada reserves the right to defer starting or, continuing with any tests for any reasonable cause including but not limited to equipment failure or degradation, lack of qualified personnel and inadequate safety standards, this at no extra costs to Canada.

6.2.8. Final Work Acceptance

1. The Final Work Acceptance (FWA) of each MGPS will take place no later than 30 calendar days following at the successful completion of their respective Site Acceptance Trials (SAT).
2. At time of the FWA, **all the Work** must be completed and accepted. Should there be outstanding work at the time of FWA, depending upon the nature of the outstanding work, Canada will decide to either:
 - (a) Remove the outstanding work from the contract with adequate compensation; or,
 - (b) Report the FWA and allow the Contractor with additional working time to complete the outstanding work.
3. The FWA must be done using the PWGSC 1205 form " Final Work Acceptance – Acceptation final des travaux " that will be the Final Work Acceptance document, see Annex "I". The completion of the outstanding work or its removal from the contract will be done in accordance with the following:
 - (a) The Technical Authority (TA) in conjunction with the Contractor will prepare a list of outstanding work and that list will be annexed to the 1205 form. A FWA meeting will be convened by Canada at the work completion date to review and sign off the FWA document. At the same time Canada will determine how the outstanding work will be addressed;
 - (b) For outstanding work that will not be completed and removed from the contract, adequate compensation will be determined as follow:
 - i. For any outstanding work that Canada decides that it will not be completed under this contract and for which the Contractor is not responsible for its non-completion, Canada will be credited by the value of the outstanding work; and,

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- ii. For any outstanding work that Canada decides that it will not be completed under this contract and for which the Contractor is responsible for its non-completion, Canada will be credited by the **double** of the outstanding work value.
- (c) The Contracting Authority (CA) will consult with the TA, and the Contractor's Representative to:
 - 1) Decide if the outstanding work will be completed or not under this contract;
 - 2) Extend or not the work period for outstanding work completion;
 - 3) Determine the liability of a work period extension;
 - 4) Determine the liability for the non-completion of outstanding work; and,
 - 5) Determine the value of any outstanding work to be credited against the contract.
- (d) The CA will amend the contract to reflect all determinations and decisions made at the FWA;
- (e) All determinations and decisions made by the CA will have to be substantiated with rationales and transmitted to the TA and the Contractor's Representative. Determinations and decisions made by the CA are final and challenge against them will have to be addressed IAW the contract Dispute Resolution section 11 and,
- (f) The FWA document will be completed by the TA and the original with 2 signed copies will be distributed by the TA as follow:
 - i. Original to the Contracting Authority;
 - ii. One copy to the Technical Authority; and,
 - iii. One copy to the Contractor.

6.3. 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.

6.3.1. General Conditions

2030 (2022-07-07) General Conditions - Higher Complexity - Goods, as amended below, apply to and form part of the Contract.

The article 2030 06 (2013-06-27) Subcontracts, is amended as follow:

Delete in entirety the article 2030 06 (2013-06-27) Subcontracts and replace by the following article;

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2030 06 Subcontracts

1. The Contractor must obtain the Contracting Authority's written consent before subcontracting or permitting the subcontracting of any part of the Work other than the Work specifically authorized to be subcontracted in the Contract. A subcontract includes a contract entered into by any subcontractor at any tier to perform any part of the Work.
2. The Contractor is not required to obtain from the Contracting Authority written consent to purchase "off-the-shelf" items and any standard articles and materials that are ordinarily produced by manufacturers in the normal course of business.
3. In all subcontracts, the Contractor must, unless the Contracting Authority agrees in writing, ensure that the subcontractors are bound by conditions compatible with and, in the opinion of the Contracting Authority, not less favourable to Canada than the conditions of the Contract, with the exception of requirements under the Federal Contractors Program for employment equity which only apply to the Contractor. For the purpose of the MGPS Contract F7044-211437/001/ML, the conditions compatible with and, in the opinion of the Contracting Authority, not less favourable to Canada than the conditions of the Contract, are the entire Contract's Conditions.
4. Even if Canada consents to a subcontract, the Contractor is responsible for performing the Contract and Canada is not responsible to any subcontractor. The Contractor is responsible for any matters or things done or provided by any subcontractor under the Contract and for paying any subcontractors for any part of the Work they perform.

The article 2030 22 (2014-09-25) Warranty, is amended as follow:

At the end of the paragraph 1, add the following sentences:

"For the purpose of the Warranty only of each MGPS , the Final Work Acceptance will take place IAW Part 6 – Resulting Contract Clauses - 2.8"; and,

Delete in its entirety the paragraph 2, insert the following:

2. In the event of a defect or non-conformance in any part of the Work during the warranty period, the Contractor, at the request of Canada to do so IAW Annex "H" WARRANTY CLAIM PROCEDURES, must as soon as possible repair, replace or otherwise make good at its own option and expense the part of the Work found to be defective or not in conformance with the requirements of the Contract.

1031-2 (2012-07-16) Contracting Cost Principles, apply to and form part of the Contract.

6.3.2. Supplemental General Conditions

4013 (2022-06-20) Compliance with on-site measures, standing orders, policies, and rules.

The Contractor must comply and ensure that its employees and subcontractors comply with all security measures, standing orders, policies or other rules in force at the site where the Work is performed.

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6.4. Term of Contract

The Contractor grants to Canada the irrevocable option to extend the term of the Contract by up to two (2) additional one (1) year period(s) under the same conditions. The Contractor agrees that, during the extended period of the Contract, it will be paid in accordance with the applicable provisions as set out in the Annex "B"- Basis of Payment.

Canada may exercise this option at any time by sending a written notice to the Contractor at least one calendar day before the expiry date of the Contract. The option may only be exercised by the Contracting Authority, and will be evidenced for administrative purposes only, through a contract amendment.

6.4.1. Period of the Contract

The initial period of the Contract is from the Contract award date to March 31 2023 inclusive.

6.4.2. Delivery Date

All the deliverables must be received on or before March 31st 2023 or before.

6.4.3. Initial Procurement

One (1) MGPS for:	Address
CCGS Capt. Jacques Cartier	c/o 05C Warehouse, Door #1 13 Akerley Blvd Dartmouth, NS B3B 1S6

6.4.4. Canada will have the right to exercise any of the following options

The Contractor grants to Canada the irrevocable options to acquire the goods, services or both under the same conditions and at the prices and/or rates stated in the Contract. The option(s) may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment. The Contracting Authority may exercise the option(s) at any time before the expiry of the Contract by sending a written notice to the Contractor.

Canada will have the right to exercise one or both of the following options:

a. Options for additional quantities

As per Table below, Canada reserves the right to exercise one or both of the following options:

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Optional MGPS for:	Address
Option 1: One (1) MGPS for CCGS John Cabot	Attn: Chief Engineer, Canadian Coast Guard Stores 280 Southside Rd St. John's, NL A1C 5X1
Option 2: One (1) MGPS for CCGS John Franklin	Attn Chief Engineer, Institute of Ocean Sciences 9860 West Saanich Rd Sidney, BC V8L 4B2

b. Option for additional periods

The initial contract period will have a duration of up to March 31st 2023. Before the end of the Initial Contract period and any Optional Contract period(s), Canada reserves the right to extend the Contract period by one (1) additional year, this until all options for additional quantities are exercised or until Canada intends to keep the options for additional quantities valid.

At time of Optional Contract period exercise, all prices for non-exercised option(s) of quantities, will be subject to an Economic Price Adjustment (EPA).

6.4.5. Comprehensive Land Claims Agreement(s)

The Contract is NOT subject to any Comprehensive Land Claims Agreement

6.4.6. Delivery Point

Delivery of the requirement will be made to delivery point(s) specified in the following:

CCGS Capt. Jacques Cartier
c/o 05C Warehouse, Door #1
13 Akerley Blvd
Dartmouth, NS
B3B 1S6

CCGS John Cabot (Option 1)
Attn: Chief Engineer, Canadian Coast Guard Stores
280 Southside Rd
St. John's, NL
A1C 5X1

CCGS John Franklin (Option 2)
Attn Chief Engineer, Institute of Ocean Sciences
9860 West Saanich Rd
Sidney, BC
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6.5. Authorities

6.5.1. Contracting Authority

The Contracting Authority for the Contract is:

Name: Daniel Durocher
Title: Supply Specialist
Public Works and Government Services Canada
Defence and Marine Procurement Branch
Refit Logistics and Small Vessel Construction Directorate

Address:
11 rue Laurier
Place du Portage III, 6A2
Gatineau, QC
K1A 0S5

Telephone: 873-455-3877
E-mail address: daniel.durocher@tpsgc-pwgsc.gc.ca

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.

6.5.2. Technical Authority

The Technical Authority for the Contract is:

Name:
Title:
Organization:

Address:
Telephone: ____ ____
Facsimile: ____ ____
E-mail address: _____

(the contracting authority will insert the Technical authority information's at the contract award)

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

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6.5.3. Contractor's Representative

The Contractor's Representative is:

Name:

Title:

Organization:

Address:

Telephone: ____

Facsimile: ____

E-mail address:

(the contracting authority will insert the Contractor's Representative as specified by the Bidder in its bid).

6.6. Payment

6.6.1 Basis of Payment - Firm Prices

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid the Firm Prices, as indicated in Annex "B" Basis of Payment, Incoterms® 2020 "Delivered Duty Paid" (DDP) to destinations, Canadian customs duties and excise taxes included and Applicable Taxes are extra.

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.

If the option is exercised, the Contractor will be paid the Firm Prices in Annex "B" – Basis of Payment.

6.6.1.1. Multiple Payments

Canada will pay the Contractor upon completion and delivery of units in accordance with the payment provisions of the Contract if:

- a. an accurate and complete invoice and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- b. all such documents have been verified by Canada; and
- c. the Work delivered has been accepted by Canada.

6.6.2. Basis of Payment – Additional and Unscheduled Work (A/U)

6.6.2.1. The A/U Work Hourly Labour Rates for authorized A/U Work including Design Change, Engineering Change or change in the scope of work will be paid in accordance with:

- a. Annex "B" Basis of Payment;
- b. Annex "G" Procedure for Processing A/U Work;

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- c. Contract Cost Principles [1031-2 \(2012-07-16\)](#) and inclusive of a profit in accordance with Chapter 10 - Cost and Profit of the Supply Manual, Public Works and Government Services Canada (PWGSC); and,
- d. The firm A/U Work Hourly labour rate must be a blended rate of all classes of labour including field service representative "FSR", required to achieve the Known Work of the Contract and not being part of the Contractor's and/or Contractor's subcontractors overhead costs. The firm A/U Work Hourly labour rate must be all inclusive and include, without being limited to, the labourer salary, the fringe benefits, the applicable overhead and the profits.

6.6.2.2. The Additional / Unscheduled Work (A/U Work) related to Material, Subcontracts and Travel & Living for authorized A/U Work including Design Change, Engineering Change or change in the scope of work will be paid in accordance with:

- a. Annex "G" Procedure for Processing A/U Work; and,
- b. The Contractor will be reimbursed for the authorized Unscheduled and Additional Material and Subcontracts costs (other than Subcontract costs where the applicable A/U Work Hourly Labour Rate of the Annex "B" applies) reasonably and properly incurred in the performance of the A/U Work, at cost, in accordance with Contract Cost Principles [1031-2](#).

The following allowance will be paid as follows:

- i. Administrative overhead: ten (10) percent of authorized Material and Subcontracts costs; and
- ii. Profit: zero (0) percent of authorized Material and Subcontracts costs.

All payments are subject to government audit.

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, and private vehicle allowances specified in Appendices B, C and D of the [National Joint Council Travel Directive](#), and with the other provisions of the directive referring to "travelers", rather than those referring to "employees". Canada will not pay the Contractor any incidental expense allowance for authorized travel. All travel must have the prior authorization of the Contracting Authority. All payments are subject to government audit.

6.6.2.3. Discretionary Audit for Additional / Unscheduled Work Only

SACC Manual clause C0100C (2010-01-11), Discretionary Audit - Commercial Goods and/or Services

6.6.2.4. Time Verification for Additional / Unscheduled Work Only

SACC Manual clause C0711C (2008-05-12), Time Verification

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6.6.3. Economic Price Adjustment (EPA)

The initial contract period will have a duration of up to March 31st 2023. Before the end of the Initial Contract period and any Optional Contract period(s), Canada reserves the right to extend the Contract period by one (1) additional year, this until all options for additional quantities are exercised or until Canada intends to keep the options for additional quantities valid.

At time of Optional Contract period exercise, all prices for non-exercised option(s) of quantities, will be subject to an Economic Price Adjustment (EPA).

6.6.3.1. Calculation of the Economic Price Adjustment

At the beginning of each Optional Contract period, all Firm Price(s) indicated in the Annex "B" Basis of Payment will be adjusted upward or downward to account for inflation or deflation. The adjusted Firm Price(s) for the coming twelve (12) months period shall be calculated IAW with the formula below and they will be firm for the coming twelve (12) months.

$$P(x) = P(o) \times \text{Index}(x) / \text{Index}(o)$$

$P(x)$ = Firm Price for the coming twelve (12) months period

$P(o)$ = Firm Price for the Initial Period of Contract

Index (x) = The index used to calculate the EPA will be obtained from the Consumer Price Index, monthly, not seasonally adjusted, Table 18-10-004-001, Geography Canada, Products and product groups All-items, Published by Statistic Canada. [Consumer Price Index, monthly, not seasonally adjusted \(statcan.gc.ca\)](http://statcan.gc.ca) The index to be used shall be the one that is three (3) months prior to the end date of the Initial Contract period or the end date of the last Optional Contract period.

Index (o) = The index used to calculate the EPA will be obtained from the Consumer Price Index, monthly, not seasonally adjusted, Table 18-10-004-001, Geography Canada, Products and product groups All-items, Published by Statistic Canada. [Consumer Price Index, monthly, not seasonally adjusted \(statcan.gc.ca\)](http://statcan.gc.ca) The index to be used shall be the one that is three (3) months prior to the Initial Contract award date or the last Optional Contract period award date.

6.6.4. Limitation of Price

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.

6.6.5. SACC Manual Clauses

C2605C (2008-05-12) Canadian Customs Duties and Sales Tax - Foreign-based Contractor.

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6.6.6. Electronic Payment of Invoices – Contract

(The Contracting Authority will reproduce below, the information from Annex "C" Electronic Payment Instruments, in which were identified electronic payment instruments accepted by the Bidder)

The Contractor accepts to be paid using any of the following Electronic Payment Instrument(s):

- a. Visa Acquisition Card;
- b. MasterCard Acquisition Card;
- c. Direct Deposit (Domestic and International);
- d. Electronic Data Interchange (EDI); and,
- e. Wire Transfer (International Only).

6.7. Invoicing Instruction

1. 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.

Each invoice must be supported by a copy of the release document and any other documents as specified in the Contract.

2. Invoices must be distributed as follows:

- a. The original and one (1) copy must be forwarded to the following address for certification and payment:
Canadian Coast Guard

(the contracting authority will insert the address and the e-mail at contract award)

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

6.8. Certifications and Additional Information

6.8.1. Compliance

Unless specified otherwise, the continuous compliance with the certifications provided by the Contractor in its bid or precedent to contract award, and the ongoing cooperation in providing additional information are conditions of the Contract and failure to comply will constitute the Contractor in default. Certifications are subject to verification by Canada during the entire period of the Contract.

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6.8.2. 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).

6.8.3. 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) 2030 (2022-05-12), General Conditions - Higher Complexity - Goods), apply to and form part of the Contract;
- (c) Annex "A", Statement of Work;
- (d) Annex "B", Basis of Payment;
- (e) Annex "F", Financial evaluation;
- (f) Annex "G", Procedure for Processing additional / Unscheduled Work; and,
- (g) Annex "H", Warranty Claim Procedures; and,
- (h) Annex "I", Final Work Acceptance – Acceptation final des travaux
- (i) The Contractor's bid dated _____ (the Contracting Authority will insert date of bid as specified by the Bidder in its bid).

Note: Annexes C, D and E are used only for the RFP

6.8.4. Dispute Resolution

- (a) The parties agree to maintain open and honest communication about the Work throughout and after the performance of the contract.
- (b) The parties agree to consult and co-operate with each other in the furtherance of the contract and promptly notify the other party or parties and attempt to resolve problems or differences that may arise.
- (c) If the parties cannot resolve a dispute through consultation and cooperation, the parties agree to consult a neutral third party offering alternative dispute resolution services to attempt to address the dispute.
- (d) Options of alternative dispute resolution services can be found on Canada's Buy and Sell website under the heading "Dispute Resolution".

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6.9. Insurance - No Specific Requirement

SACC Manual clause G1005C (2016-01-28) Insurance - No Specific Requirement

6.10. SACC Manual Clauses

B1501C (2018-06-21) Electrical equipment
 B7500C (2006-06-16) Excess Goods
 D2000C (2007-11-30) Marking
 D2001C (2007-11-30) Labelling
 D2025C (2017-08-17) Wood Packaging Materials
 D6010C (2007-11-30) Palletization
 D9002C (2007-11-30) Incomplete Assemblies

6.11. Condition of Material – Contract

The Contractor must provide material that is new production¹ of current manufacture supplied by the principal manufacturer or its accredited agent. The material must conform to the latest issue of the applicable drawing, specification and part number, as applicable, that was in effect on the bid closing date of the Request for Proposal.

¹ The material supplied to the Canadian Coast Guard must have been produced within the last five (5) years.

6.12. Packaging:

- a. The dispatch packaging must adequately secure and protect from damage the parts and components during transport and handling;
- b. Each dispatch packaging (pallet unit or dispatch carton) must be marked using a shipping label that can resist and remain attached during transport and handling; and,
- c. Each dispatch packaging must contain a packing slip that must contain, but not limited to, the following: name and address of the Shipper, name and address of the recipient, a packing slip number, an itemized list of the contents, and the Contract number.

6.13. Shipping Instructions

Delivered Duty Paid (DDP) To the corresponding ship address in Section 4.6 Delivery Point, Incoterms® 2020, Canadian customs duties and excise taxes included, for shipments from a commercial contractor.

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ANNEX A

STATEMENT OF WORK (SOW)

FOR THE PROCUREMENT OF

A

MARINE GROWTH PREVENTION SYSTEM

FOR THE

CANADIAN COAST GUARD (CCG) OFFSHORE FISHERY SCIENCE CLASS VESSELS (OFSV)

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1. Scope of Work:

1.1. Purpose

This Statement of Work (SOW) defines the technical and performance requirements for a new marine growth prevention system, also interchangeably called an anti-fouling system, to be procured for the offshore fisheries science vessels (OFSV). The Marine Growth Prevention Systems (MGPS) will be installed on vessels to prevent the obstruction of seawater pipes and other equipment by marine growth. The system must operate on the principle that a low, continuous or pulsed dose of a biocide will prevent organism survival and growth.

1.2. Background

The three offshore fisheries science vessels (OFSV) are the primary platform for Fisheries and Oceans scientists, and the Canadian Coast Guard, to conduct important research activities. This work will include monitoring the health of fish stocks, better understanding the impacts of climate change on our environment, and supporting research that allows us to better protect our oceans. Each vessel contains more than 10 kilometers of various sized piping supporting over 20 systems and is composed of over 130,000 individual parts

The vessels to be considered for the MGPS system are classed under the Offshore Fisheries Science Vessels (OFSV) and named as follows:

Table 1 : OFSV Details

CGGS Name	Length	Breadth	Draft	Gross Tonnage	Region
Jacques Cartier	63.4 m	16.0 m	6.2 m	2975 t	Atlantic
John Cabot	63.4 m	16.0 m	6.2 m	2975 t	Atlantic
Sir John Franklin	63.4 m	16.0 m	6.2 m	2975 t	Pacific

1.3. Objective

The objective of this procurement is to provide an efficient and reliable MGPS that once installed and operational onboard the OFSV Class vessels will protect the vessels from marine growth by introducing a biocide into the sea water IAW Section 5 of this SOW.

1.4. Drawings of the OFSV vessels

All reference drawings available for this procurement are listed in Table 2. They are provided as a reference only. The Contractor must visit the vessel after the contract award IAW Part 6 – Resulting Contract Clauses - Security requirements 1.2 and 1.3 of the RFP and each optional vessel when options are exercised to validate measurements, arrangements, and configurations.

The Contractor is responsible to timely verify the exactitude of the information provided by these drawings as the requested above. The Contractor will not be compensated for additional costs incurred that are related to any discrepancy between the information provided by the drawings and what can be found inside the OFSV vessels if the previous validations of measurements,

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arrangements, and configurations have not been timely made by the Contractor IAW the above requirements.

2. Documents

2.1. GOVERNMENT DOCUMENTS

The prescribed versions of the following documents are to form a part of this specification to the extent specified herein. The documents listed below are applicable only as set out in this SOW. The revisions of the documents listed below in table 2 are those in effect as of the date shown on the title page of this SOW.

Table 2: List of Government Documents

Item	Document Number	Title
1	TP127E	Ships Electrical Standards revision 3 (May 2018) https://tc.canada.ca/sites/default/files/migrated/tp127e.pdf
2	EKME 3049715v4	Canadian Coast Guard Standard: Welding Specification
3	18-080-000-SG-003 (Formerly DFO/5884)	Canadian Coast Guard Standard: Paints and Coatings Standard
4	EKME 3750834	Technical Drawings Modification (Red-lining / Mark-Ups) and Workflow Process
5	190-210.10-001	Machinery Arrangement
6	190-163.10-001	Sea Bays and Sea Chests As-Built LR
7	190-256.10-001	SW Cooling System Diagram
8	190-633.00-001	Cathodic Protection As-Built
9	DWG J22003-S01-R1	Modifications for New Antifouling System
10	DWG J22003-S02-R0	Structural Modifications for Drop Keel Sea Box
11	DWG J22003-S03-R1	Antifouling System Control Panel Installation

See attached documents if no link

2.2. NON GOVERNMENT DOCUMENTS

Where standards are referenced in this document, unless specifically directed, the whole standard will apply. Where applicable, the title will indicate what tailoring is required by the Technical Authority (TA).

If any referenced Standard in Table 3 has been superseded by a new revision or it has become obsolete and it has been replaced by a new standard or it has not been replaced, then the Contractor must use the latest revision or replaced standard or an equivalent standard respectively.

Table 3: List of Non-Government Documents

Item	Standard	Title
1	ABS Ship Classification Standards	ABS Rules for Building and Classing Marine Vessels (2022)
2	ISO 10005:2018	Quality Management - Guidelines For Quality Plans
3	CSA 47.1 - 2019	Fusion Welding of Steel Company Certification

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2.3. ORDER OF PRECEDENCE

In the event of a conflict between the contents of this document and the applicable portions of the referenced technical documents, the contractor must inform the Technical Authority (TA) of the differences and request for a resolution.

3. Marine Growth Prevention System (MGPS) - DELIVERY

3.1. GENERAL

The Contractor must deliver the MGPSs IAW all requirements of this SOW.

Shipping - The contractor must deliver new Marine Growth Prevention System (MGPS) IAW Part 6 – Resulting Contract Clauses - 4.3 and 4.4 for options.

3.2. MGPS DELIVERY

The Contractor must deliver one MGPS IAW section 5 with all the elements composing an MGPS.

3.3. PROJECT MANAGEMENT DELIVERY

The Contractor must provide Project Management services as detailed in section 4, DID-PM-01 to DID-PM-04 inclusively and CDRL-PM-05 of the SOW.

3.4. DESIGN AND ENGINEERING DELIVERY:

a. Quality Assurance Plan (QAP) delivery

The Contractor must deliver the QAP IAW CDRL-EN-01 and DID-EN-01

b. Design check delivery

The Contractor must deliver to the TA the design check IAW CDRL-EN-02 and DID-EN-02. The Contractor must complete any changes, if applicable, requested by the TA to the documents indicated in the Design Check. The deliverables of the Design Check are:

1. System Requirement Review (SRR) data package. The System Requirements Review ensures that all the requirements of the SOW are understood and will be addressed and reviewed during the Design Check. The System Requirement Review Data Package must provide all of the review materials required to complete the Design Check.
2. The number of anodes and their individual weights, their dimensions, and locations of their intended installation IAW Section 5
3. The location of the control panel and its method of mounting to the vessel's structure IAW Section 5
4. Details of the electrical wiring and passages through any bulkheads or watertight structures IAW Section 5
5. Red-line drawings of the proposed changes and installations IAW EKME 3750834 Technical Drawings Modification (Red-lining / Mark-Ups) and Workflow Process.

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6. One electronic copy (PDF) of each of the following in both English and French:
 - a. Installation instruction manual;
 - b. User manual;
 - c. Maintenance manual; and,
 - d. Troubleshooting manual for the anodes and control panel.
7. Demonstration through calculations that the proposed system will deliver 2.0 PPB of dissolved copper over the minimum 3 years IAW 5.3.1.e

3.5. Testing and Acceptance Deliverables

The Contractor must deliver all testing and acceptance deliverables IAW 8.3.3. Acceptance CDRL summary, 8.6. Test and acceptance CDRL details and the following DID's:

- a. DID-AT-01 Factory Acceptance Test Plan;
- b. DID-AT-02 Factory Acceptance Test Procedures;
- c. DID-AT-03 Factory Acceptance Test Reports;
- d. DID-AT-04 Laboratory Water Sample Test Reports;
- e. DID-AT-05 Set to Work Plan (STW);
- f. DID-AT-06 Site Acceptance Test. and,
- g. DID-AT-07 Site Acceptance Test Report.

3.6. Logistic Support

- a. The Contractor must provide telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday; and,
- b. The Contractor must provide parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule.

4. PROJECT MANAGEMENT

4.1. ORGANIZATION

The Contractor must name a Project Manager responsible to carry out the work required for the MGPS production program.

4.1.1. Project Manager

The Contractor's Project Manager must have the authority to plan, direct, control and make decisions for the Contract.

4.1.1.1. Contractor's Point of contact

The Contractor's Project Manager must be the main point of contact with Canada.

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4.2. **PROJECT MANAGEMENT PLAN**

The Contractor must prepare and deliver to the TA a Project Management Plan (PMP) IAW CDRL-EN-01 and DID-PM-01.

4.2.1. **Quality Assurance (QA) Plan**

- a. In Accordance with CDRL-EN-01 and DID-EN-01, the Contractor must submit for acceptance at contract date his Quality Plan to the TA prepared according to the latest issue of ISO 10005:2018 "Quality management systems - Guidelines for quality plans".
- b. The Contractor must implement the aforementioned 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 accepted by CCG.

4.2.2. **Set to Work (STW) Plan**

The Contractor must structure a STW plan to show how each MGPS component will be installed, integrated and tested IAW DID-AT-05

4.2.3. **Factory Acceptance Test (FAT) Plan**

The contractor must submit the FAT plan IAW DID-AT-01 and report IAW DID-AT-03, to show how each MGPS component will be tested at the factory. The FAT plan must be presented to the TA for review and acceptance.

4.2.4. **Site Acceptance Test (SAT) Plan**

The Contractor must develop and submit to the CCG TA approval a Site Acceptance Test (SAT) Plan IOT meet the requirements of this SOW section 6.4.4 and DID-AT-06.

4.3. **PROJECT MEETINGS**

4.3.1. **Project Kick-Off and System Requirement Review Meeting**

Within six (6) weeks of the Contract Award, the contractor must conduct a project Kick-Off Virtual Meeting IAW Contract Data Requirements List (CDRL) Item CDRL-PM-05. The discussion must include but not be limited to a review of the:

- a. The Project Management Plan IAW Item CDRL-PM-01 and DID-PM-01;
- b. System Requirement Review Data Package IAW CDRL-EN-02 and DID-EN-02;
- c. Technical Specification;
- d. Critical path activities;
- e. Plans for activities during the following period;
- f. Risk management concerns and mitigation actions; and,
- g. Any other contractual or programmatic issues associated with the project as mutually agreed between the Authorities to the Contract and the Contractor.

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4.3.2. **Project Review Meetings**

The Contractor must conduct and coordinate Progress Review Meetings (PRMs) once each month or as mutually agreed between Canada and the Contractor. These may be conducted via Video Tele-Conferencing (VTC) at Canada's discretion.

The Contractor must hold the first PRM within one month following the Kick-Off Meeting.

PRMs must encompass total project status as of the review date.

4.3.3. **Final Project Review Meeting**

A Final Project Review (FPR) meeting is required to provide a complete review of the deliverables.

The Contractor must hold the FPR meeting at a time to be determined by Canada but this meeting will take place no later than thirty (30) calendar days after acceptance of the last deliverable.

4.3.4. **Other Scheduled Meetings**

The Contractor may identify through other requirements stipulated in this SOW, and the submission of his various plans the necessity to schedule other meetings. The Contractor must identify these meetings in the Project Schedule (PS). Canada's approval of the PS will confirm Canada's intention to attend such meetings.

4.3.5. **Meeting Arrangements**

When the Contractor is tasked to arrange and coordinate a meeting, it must be done IAW this section.

The Contractor must prepare and submit supporting documents required in Word format for a meeting at least five (5) working days in advance of each review or meeting.

The Contractor must prepare and submit an agenda IAW CDRL Item CDRL-PM-02 and DID-PM-02 at least five (5) working days in advance of each review or meeting except in the case of unscheduled meetings in which case the Contractor must submit an agenda 24 hours prior to the meeting.

Canada and the Contractor must mutually agree to the contents of the agenda.

4.3.6. **Meeting Support**

The Contractor shall must and attend project reviews and meetings as required by this SOW, at the Contractor's facility or elsewhere as agreed to by Canada.

For all reviews and meetings hosted by the Contractor, the Contractor must:

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- a. Arrange the venue, including parking as appropriate;
- b. Co-ordinate with Canada as appropriate;
- c. Provide all administrative facilities and presentation equipment;
- d. Ensure that qualified Contractor and subcontractor personnel attend the reviews or meetings;
- e. Ensure and report that action items and decisions under the control of the Contractor as a result of the various meetings and reviews are implemented where applicable; and
- f. Maintain and provide to CCG files, records, documents of all reviews and meetings.

4.3.7. **Meeting Minutes**

The Contractor will record, produce, deliver and revise, as required, minutes for all meetings. The Contractor must prepare and distribute within five (5) working days an electronic copy of the minutes to Canada's attendees IAW CDRL Item CDRL-PM-03 and DID-PM-03. Meeting minutes are accepted once signed by the TA. Canada will advise the Contractor of any issues within two working days of receiving the minutes.

4.3.8. **Meeting Cancellations**

The TA or the CA may cancel PRMs or any other review meetings at their discretion with a minimum of five (5) working days' notice. Rescheduling of meetings by the Contractor must be done only with the explicit agreement of Canada.

4.4. **REPORTING AND COMMUNICATIONS**

4.4.1. **Progress Reports**

The Contractor must monitor progress and deliver monthly Project Status Reports (PSRs) IAW CDRL Item CDRL-PM-04 and DID-PM-04

4.4.2. **Problem Reporting**

The Contractor must advise Canada by email within three (3) working days of the date the Contractor have determined there is a schedule alteration or contractual issue.

Upon such notification Canada will advise whether an unscheduled meeting or other action is required.

4.4.3. **Data Reviews and Revisions**

The contractor must submit all deliverable data in PDF format for Canada's review.

The Contractor must ensure that the draft document consists of a complete document compliant with the requirements of the SOW.

Unless otherwise noted, Canada's review process will take no more than ten (10) working days from receipt of the data.

The provision of comments by Canada on draft deliverables will not be construed as approval of the data deliverable.

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Unless otherwise noted, the Contractor must address Canada's comments and resubmit the document showing a new revision number, within ten (10) working days of reaching agreement on the comments.

The Contractor must ensure that final documents consist of the draft document modified to include changes as authorized by Canada.

When revisions and amendments have been made to data deliverables required under this SOW, the Contractor must submit the revisions/amendments to Canada.

4.4.4. **ACTION ITEM LIST (AIL)**

The Contractor must maintain a historical, chronological and up-to-date list of Action Items resulting from reviews, meetings, or correspondence between the TA and the Contractor in a format acceptable to the TA for the duration of the project.

In the list the Contractor must record, as a minimum: identification number; title or description, date opened, action required, priority, organization responsible for taking action, brief statement of results in sufficient detail to clearly identify and track the action taken, date closed, and, status (open/closed).

The Contractor must ensure that, once entered, no entry is deleted.

The Contractor must include a subset of the list containing all open action items as an attachment to the monthly status reports.

The Contractor must make a copy or reproduction of the most current AIL or any portion thereof available to Canada upon request at any time.

5. **Requirements:**

5.1. **The Contractor must provide a MGPS in accordance with the following requirements:**

- a. The Contractor must provide a MGPS that uses Cu anodes and Fe anodes, and produces dissolved copper as biocide.
- b. The anodes must be installed in the following locations only:
 1. Port Side Sea Chest;
 2. Drop Keel Trunk Sea Chest Box; (Not installed yet); and,
 3. Sea Bay if required to achieve 2.0 PPB of dissolved copper as identified in 5.1.h.1
- c. The Drop Keel Trunk Sea Chest Box is approximately 19.6 inches in height, 38.5 inches in width, and 21.2 inches in depth.
 1. In regards to dimensions width is taken to be in the forward – aft direction, and depth is taken to be in the inboard – outboard direction;
 2. The Drop Keel Trunk Sea Chest Box has not been installed yet and will be constructed by CCG.
All dimensions regarding the Drop Keel Trunk Sea Chest Box are given for reference purposes only IAW 1.4
- d. The treated anti-fouling sea water must not damage the stern tube, stern tube bearings, or shaft liners.

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- e. The vessel has sacrificial zinc anodes installed. The MGPS must not interfere with, reduce the performance of, or reduce the service life of the sacrificial zinc anodes.
- f. The MGPS must consist of two type of anodes: one of an anti-fouling type and one of an anti-corrosion type. If this is the case the anti-corrosion anode must be ferrous (FE) in order to be compatible with the vessel's Cupro-Nickel or Copper-Nickel (CuNi) piping.
 - 1. The CuNi piping is galvanically isolated from the ship's hull
- g. The minimum longevity of the anodes before requiring replacement must not be less than 3 years.
- h. The control must have a pre-set current level:
 - 1. Calibrated to obtain no less than 2.0 PPB of dissolved copper at the maximum flow rates identified in Section 5.
 - 2. To protect the following equipment and spaces including but not limited to:
 - a. Port Side Sea Chest;
 - b. Drop Keel Trunk;
 - c. sea water strainers;
 - d. Sea Bay;
 - e. Stern Tube Water Quality Package;
 - f. Internal pipe works served by the sea chests, and,
 - g. heat exchangers.
- i. The control must have a closed loop system to maintain the pre-set currents or level of dissolve copper;
 - 1. To prevent variation of current or level of dissolve copper when the system flow varies; and,
 - 2. To optimize the life span of the Cu anodes
- j. The control panel must meet the following requirements:
 - 1. The control panel must be able to be supplied by a 220V 60Hz ship's power supply;
 - 2. All electrical connections from the ship's power supply to the control panel, and from the control panel to the anodes must be IAW TP127E;
 - 3. The control panel must be constructed of steel and be rated to IP65;
 - 4. All penetrations on the control panel must be sealed as per TP127E;
 - 5. The control panel must have visual alarm indicator for each anode to indicate the following conditions:
 - (a) Low current when below OEM recommended calibrated value;
 - (b) Over current when above OEM recommended calibrated value;
 - (c) No current or voltage; and,
 - (d) Electrical ground.

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5.2. **Sea water (SW) flow rates are in the following range:**

Table 4: Sea Water Flow Rates and Conditions

Machinery	Frequency and Condition	Flow Rate
Up to Three main engines running	When the vessel is under power, year-round	Up to 240 m³/hr
Self-Contained Unit (Engine Room)	Summer Only	30 m³/hr;
Up to two sea water auxiliary cooling pumps	When the vessel is under power, year-round	Up to 180 m³/hr
Fire Pump	Program Only, supplies water to the wet lab	40 m³/hr
Stern tube Water Quality Package	When the vessel is under power, year-round	5.5 m³/hr
Ballast Pump	Year-round to adjust the trim and heel of the vessel	Unknown, only used occasionally
Live catch cooling	Specific Science Program Only	Unknown

5.3. **Proof of Performance:**

5.3.1. **Engineering Required:**

- a. The Contractor must by way of drawings prove that the anodes are able to fit into:
 - i) The port side sea chest;
 - ii) The Drop Keel Trunk sea chest box; and,
The sea bay if required to achieve 2.0 PPB of dissolved copper as identified in 5.1.h.1
- b. The drawings must clearly indicate the dimensions of the anodes and clearances from each other while respecting minimum distances from the vessel's structure;
- c. The Contractor must provide red-line drawings IAW EKME 3750834 Technical Drawings Modification (Red-lining / Mark-Ups) and Workflow Process to the TA that clearly indicate the locations of the anodes, control panel, electrical connections, and passages for electrical wiring;
- d. The Contractor must provide the individual weights of the anodes that the total weight of proposed anodes meets the total calculated weight of copper at a given input data;
- e. The Contractor must demonstrate through calculations that the proposed MGPS will be able to provide 2.0 PPB in dissolved copper for no less than 3 years; and,
- f. The Contractor must be responsible during commissioning to sample the treated sea water under the following conditions:
 - i. The vessel must be at sea with all the 3 main engines online;
 - ii. The vessel must have no less than 2 auxiliary cooling pumps running on full;
 - iii. The self-contained cooling unit in the engine room must be online;
 - iv. The sea water recirculating valves, if applicable, must be closed and the sea water overboard discharge valves, if applicable, must be fully open for the systems identified in Table 4;
 - v. The above conditions must be in place for no less than 2 hours;
 - vi. The MGPS must be online for no less than 24 hours prior;

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- vii. The vessel's fire pump must be online and discharging overboard or to a fire station for no less than 15 minutes;
- viii. The sample(s) must be taken IAW 6.5.1; and,
- ix. The sample taken must be sent to an independent laboratory to verify the level of dissolved copper is no less than 2.0 PPB.

6. ACCEPTANCE TESTING

The purpose of the acceptance tests is to demonstrate that the MGPS performance and functional requirements have been satisfactorily met.

6.1. SET TO WORK (STW)

6.1.1. Set to Work Procedures

In preparation for the SAT, the MGPS must be Set-to-Work. The Contractor must provide the TA with a Set to Work procedure IAW with DID-AT-05. The procedures must be in line with the methodologies applicable to the OEM MGPS. The STW must be accepted by the TA prior to beginning the work.

6.2. FACTORY ACCEPTANCE TEST (FAT)

The Contractor must perform a Factory Acceptance Test on each part of the MGPS. A report detailing the FAT and results must be sent to and accepted by the TA or its delegated representative IAW DID-AT-03.

6.3. SITE ACCEPTANCE TEST (SAT)

The SAT will be conducted by CCG. The contractor must provide a Field Service Representative (FSR) for the duration of the SAT. The SAT will be conducted on all MGPS and on both coasts.

6.4. TEST MANAGEMENT

6.4.1. Factory Acceptance Test (FAT) Plan

The Contractor must produce and deliver a FAT plan that provides an overall outline of the entire spectrum of test activities of the MGPS production program, IAW CDRL item CDRL-AT-01 and DID-AT-01.

6.4.2. Factory Acceptance Test (FAT) Procedures

The Contractor must produce and deliver the MGPS FAT Procedures. The FAT procedures 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 MGPS. The FAT procedures must be delivered IAW CDRL item CDRL-AT-02 and DID-AT-02.

6.4.3. Factory Acceptance Test (FAT) Reports

The Contractor must prepare the MGPS FAT reports and submit them IAW -CDRL-AT-03 and DID-AT-03. All completed tests and/or demonstrations must have the signature and date of the person who carried out the tests and also have the signature and stamp of the Quality Assurance person (as necessary) OR will have the signature of the Project Manager with the date signed.

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Table 5: Factory Acceptance Test Certification requirements

<u>FAT Certification</u>	<u>S.O.R.</u>
The FAT must describe in detail all testing for connections and conditions of the Control Panel	DID-AT-01

6.4.4. Site Acceptance Test (SAT)

The SAT will be conducted will be conducted by the Contractor and CCG in accordance with CDRL-AT-06 and DID-AT-06 on each MGPS on each vessel. The contractor shall provide a Field Service Representative (FSR) for the duration of the SAT. The FSR shall witness the SAT and in a case of a malfunction / defect / breakdown of the MGPS, the FSR shall troubleshoot and repair the MGPS and all of its sub-systems in order not to delay the SAT. If the FSR was not able to repair the MGPS and/or its sub-systems, the FSR must return until a solution is found.

6.5. CERTIFICATION

6.5.1. Certification by an Independent Test Laboratory

- i) A Certification from a certified independent test Laboratory must be obtained for each Sample Test.
 1. The sea water sample(s) must be taken IAW the conditions identified in 5.3.1.f at the fire hose point or a point mutually agreed upon by the Contractor and the TA;
 2. The Contractor must be responsible for providing clean, unused sample container(s) and the instructions for sampling from the laboratory; and,
 3. The Contractor must seal the sample container(s) in the presence of the TA and send the sample(s) to the laboratory.
- ii) The Contractor must be responsible to obtain the 2.0 PPB of dissolved copper as identified in 5.1.h.1. In the event the laboratory test results do not indicate 2.0 PPB the Contractor must return, re-calibrate, adjust, and re-test to obtain the 2.0 PPB and all other requirements IAW Section 5. Canada and the CCG will not be responsible for any costs incurred by the Contractor in this occurrence.

Table 6 Site Acceptance Test Certification requirements

<u>Level of dissolved Copper</u>	<u>SAT Certifications</u>
Requirement is 2.0 PPB	Samples Test with 2.0 PPB results

6.5.2. Final Work Acceptance

The final work acceptance (FWA) must be done IAW Part 6 – Resulting Contract Clauses - 6.2.8

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7. Acronyms:

CCG	Canadian Coast Guard
MGPS	Marine Growth Prevention System (aka anti-fouling system)
DK Trunk	Drop Keel Trunk
TA	Technical Authority
FSR	Field Service Representative
ABS	American Bureau of Shipping
OEM	Original Equipment Manufacturer
SCU	Self-contained Cooling Unit
PPB	Parts per Billion
SW	Sea Water
IAW	In Accordance With
ITP	Inspection and Test Plan
AIL	Action Item List
STW	Set to Work
CDRL	Contract Data Requirements List

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8. CONTRACT DELIVERABLE REQUIREMENT LIST (CDRL) AND DATA ITEM DESCRIPTION (DID)

8.1. General

8.1.1. Document Changes/Updates

All the approved documents must be prepared and updated as required by the CDRL. All changes to updated versions of documents must be identified as follows:

1. On a change page indicating page numbers, paragraph numbers, date of change and reason for change;
2. Within the hard copy, by use of change bars in the side margins of the printed document; and
3. Within the soft copy, using a method appropriate to the authoring tools that clearly differentiates old content from new or revised content.

Proposed amendments and the list of effective pages must be forwarded to the TA for approval as described in the CDRL.

8.2. Deliverable Format and Number of Copies

The number of documentation copies required for each CDRL is defined within each CDRL.

NOTE: All soft copies of documentation shall be in the original PDF file format.

8.2.1. Abbreviations:

The following abbreviations are used in the CDRLs and DIDs.

A	Approval	PCA	Physical Configuration Audit
AT	Acceptance Test	PDR	Preliminary Design Review
CA	Contract Award	R	Review
I	Information only	SRR	System Requirements Review
Month	Calendar month	STW	Set To Work
wks	Weeks	wd	Working day
FTP	File Transfer Protocol		

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8.3. CDRL

8.3.1. Project Management CDRL Summary

Project Management CDRL					
CDRL #	DID #	Deliverable	Review Level	Due	Section in SOW
CDRL-PM-01	DID-PM-01	Project Management Plan	A	Project Kick Off Meeting date -10 wd	4.2
CDRL-PM-02	DID-PM-02	Meeting Agendas	A	Meeting date - 5 wd	4.3.5
CDRL-PM-03	DID-PM-03	Meeting Minutes	A	Meeting date + 5 wd	4.3.7
<u>CDRL-PM-04</u>	<u>DID-PM-04</u>	<u>Project Status Reports</u>	<u>R</u>	<u>5th wd of each month</u>	<u>4.4.1</u>
<u>CDRL-PM-05</u>	<u>N/A</u>	<u>Project Kick Off Meeting</u>	<u>R</u>	<u>CA +6 wks</u>	<u>4.3.1</u>

8.3.2. Engineering CDRL Summary

Engineering CDRL					
<u>CDRL #</u>	<u>DID #</u>	<u>Deliverable</u>	<u>Review Level</u>	<u>Due</u>	<u>Section in SOW</u>
<u>CDRL-EN-01</u>	<u>DID-EN-01</u>	<u>Quality Assurance Plan</u>	<u>R</u>	<u>Kick Off Meeting date -10 wd</u>	<u>4.2.1</u>
<u>CDRL-EN-02</u>	<u>DID-EN-02</u>	<u>Design Check</u>	<u>A</u>	<u>Kick Off Meeting date -10 wd</u>	<u>3.2.b, 3.2.d, and 5</u>

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8.3.3. Acceptance Testing CDRL Summary

Acceptance Testing CDRL					
CDRL #	DID #	Deliverable	Review Level	Due	Section in SOW
CDRL-AT-01	DID-AT-01	Factory Acceptance Test Plan	A	STW-10 wd	6.4.1 and Table 5
CDRL-AT-02	DID-AT-02	Factory Acceptance Test Procedures	A	STW Test-10 wd	6.4.2 and Table 5
CDRL-AT-03	DID-AT-03	Factory Acceptance Test Reports	R	Acceptance Test+10 wd	6.4.3 and Table 5
CDRL-AT-04	DID-AT-04	Laboratory Water Sample Test Results	A	MGPS commissioning +10 wd	6.4.4 and 6.5.1
CDRL-AT-05	DID-AT-05	Set to Work plan	A	<u>Kick Off Meeting date -10 wd</u>	4.2.2, 5.3.1, and 6.1.1
CDRL-AT-06	DID-AT-06	Site Acceptance Test	A	STW Test-10 wd	4.2.4, 5.3.1.f, and 6.4.4
CDRL-AT-07	DID-AT-07	Site Acceptance Test Report	A	MGPS commissioning +10 wd	4.2.4, 5.3.1.f, and 6.4.4

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8.4. Project Management CDRL Details

8.4.1. CDRL-PM-01

1	Sequence Number:	PM-01
2	Title or Description of Data	Project Management Plan
3	Data Item Description Number:	DID-PM-01
4	Reference:	SOW section 4.2.
5	First Submission:	Project Kick Off Meeting date -10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	10 wd
9	Subsequent Submission:	As required, if changes needed. Deliver soft copy of the change pages only
10	Remarks:	Deliver via email or FTP

8.4.2. CDRL-PM-02

1	Sequence Number:	PM-02
2	Title or Description of Data:	Meeting Agendas
3	Data Item Description Number:	DID-PM-02
4	Reference:	SOW para 4.3.5
5	First Submission:	Meeting Date -5 days
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

8.4.3. CDRL-PM-03

1	Sequence Number:	PM-03
2	Title or Description of Data:	Meeting Minutes
3	Data Item Description Number:	DID-PM-03
4	Reference:	SOW para 4.3.7
5	First Submission:	Meeting date + 5 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

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8.4.4. CDRL-PM-04

1	Sequence Number:	PM-04
2	Title or Description of Data:	Project Status Reports
3	Data Item Description Number:	DID-PM-04
4	Reference:	SOW para 4.4.1
5	First Submission:	5 th wd of each month
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	No
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

8.4.5. CDRL-PM-05

1	Sequence Number:	PM-05
2	Title or Description of Data:	Project Kick Off Meeting
3	Data Item Description Number:	N/A
4	Reference:	SOW para 4.3.1
5	First Submission:	CA + 6 wks
6	Number of Copies:	N/A
7	TA Approval Required:	No
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

8.5. Engineering CDRL Details

8.5.1. CDRL-EN-01

1	Sequence Number:	EN-01
2	Title or Description of Data:	Quality Assurance Plan
3	Data Item Description Number:	DID-EN-01
4	Reference:	SOW section 4.2.1
5	First Submission:	Kick Off Meeting -10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	No
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

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8.5.2. **CDRL-EN-02**

1	Sequence Number:	EN-02
2	Title or Description of Data:	Design Check
3	Data Item Description Number:	DID-EN-02
4	Reference:	SOW section 3.2.b, 3.2.d, 3.2.1, and 5
5	First Submission:	Kick Off Meeting -10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

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8.6. Testing and Acceptance CDRL Details

8.6.1. CDRL-AT-01

1	Sequence Number:	AT-01
2	Title or Description of Data:	Factory Acceptance Test Plan
3	Data Item Description Number:	DID-AT-01
4	Reference:	SOW section 6.4.1 and Table 5
5	First Submission:	STW-10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

8.6.2. CDRL-AT-02

1	Sequence Number:	AT-02
2	Title or Description of Data:	Factory Acceptance Test Procedure
3	Data Item Description Number:	DID-AT-02
4	Reference:	SOW para 6.4.2 and Table 5
5	First Submission:	STW Test -10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	As required, if changes
10	Remarks:	Deliver via email or FTP

8.6.3. CDRL-AT-03

1	Sequence Number:	AT-03
2	Title or Description of Data:	Factory Acceptance Test Reports
3	Data Item Description Number:	DID-AT-03
4	Reference:	SOW para 6.4.3 and Table 5
5	First Submission:	STW Test Completed + 10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	No
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

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8.6.4. **CDRL-AT-04**

1	Sequence Number:	AT-04
2	Title or Description of Data:	Laboratory Water Sample Test Reports
3	Data Item Description Number:	DID-AT-04
4	Reference:	SOW para 6.4.4 and 6.5.1
5	First Submission:	Commissioning+10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

8.6.5. **CDRL-AT-05**

1	Sequence Number:	AT-05
2	Title or Description of Data:	Set to Work Plan
3	Data Item Description Number:	DID-AT-05
4	Reference:	SOW para 4.2.2, 5.3.1, and 6.1.1
5	First Submission:	Kick Off Meeting -10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

8.6.6. **CDRL-AT-06**

1	Sequence Number:	AT-06
2	Title or Description of Data:	Site Acceptance Test
3	Data Item Description Number:	DID-AT-06
4	Reference:	SOW 4.2.4, 5.3.1.f, and 6.4.4
5	First Submission:	STW Test-10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	Yes
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

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8.6.7. **CDRL-AT-07**

1	Sequence Number:	AT-07
2	Title or Description of Data:	Site Acceptance Test Report
3	Data Item Description Number:	DID-AT-07
4	Reference:	SOW 4.2.4, 5.3.1.f, and 6.4.4
5	First Submission:	Commissioning +10 wd
6	Number of Copies:	1 soft copy in source format
7	TA Approval Required:	No
8	Approval Lead Time:	N/A
9	Subsequent Submission:	N/A
10	Remarks:	Deliver via email or FTP

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8.6.8. Project Management DIDs

8.6.8.1. DID-PM-01

1. TITLE		2. IDENTIFICATION NUMBER	
Project Management Plan		DID-PM-01	
3. DESCRIPTION / PURPOSE			
To provide a Project Management Plan for the MGPS.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI)		6. SPARE
	Technical Authority		
7. APPLICATION / INTERRELATIONSHIP			
CDRL - PM-01			
SOW Ref: section 4.2			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS			
10.1 The Project Management Plan (PMP) may be prepared in Contractor's format.			
10.2 Structure - The PMP must contain, as a minimum, the following sections:			
1. Introduction;			
2. Management Organization and Responsibilities;			
3. Work Breakdown Structure (WBS) identifying how the Contractor intends to fulfill the project management requirements of this SOW;			
4. Master Schedule with Milestones;			
5. Risk Management Plan that establishes procedures for identification, assessment, management, reporting, tracking, reduction and elimination of risks arising from the performance of work;			
6. Quality Assurance (QA) Plan IAW 4.2.1;			
7. Factory Acceptance Test (FAT) Plan IAW 4.2.3.			
8. Set To Work (STW) Plan IAW 6.1.1; and,			
9. Site Acceptance Test (SAT) IAW 6.3			

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8.6.8.2. DID-PM-02

1. TITLE Meeting Agendas		2. IDENTIFICATION NUMBER DID-PM-02	
3. DESCRIPTION / PURPOSE The purpose of the Meeting / Teleconference / Conference Supporting Documentation and Agenda is to provide the proposed subject items for review and discussion.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority		6. SPARE
7. APPLICATION / INTERRELATIONSHIP CDRL - PM-02 SOW Ref: section 4.3.5			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 Supporting documentation and agenda may be prepared in the Contractor's format. 10.2 The Agenda must include the following: <ol style="list-style-type: none">1. Purpose of the meeting;2. List of expected attendees;3. Time, date, location and expected duration of the meeting;4. Facilities and equipment to be provided for attending personnel;5. List of data items and documents to be reviewed or provided to support the meeting. Adequate copies of all such data and documentation shall be provided; and,6. Adequate copies of the current AIL where appropriate.			

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8.6.8.3. DID-PM-03

1. TITLE Meeting Minutes		2. IDENTIFICATION NUMBER DID-PM-03	
3. DESCRIPTION / PURPOSE The purpose of Meeting / Teleconference / Conference Minutes is to document discussions, agreements and action items identified (with the responsible parties and closure dates) reached during subject meetings.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority		6.SPARE
7. APPLICATION / INTERRELATIONSHIP CDRL-PM-03 SOW Ref: section 4.3.7			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS - INSTRUCTIONS SUR LA PRESENTATION DES DONNEES			
10.1 Meeting / Teleconference / Conference Minutes may be prepared in the Contractor's format and must include the following information: <ol style="list-style-type: none">1. Date and location of meeting;2. Name, organization, phone number, e-mail address and title of each person that attended the meeting;3. Statement relating to the purpose and/or objective of the meeting; and,4. The original agenda and any revisions to the agenda - this may be accomplished by reference to attachments or enclosures.			
10.2 Minutes must include a record of each item discussed or reviewed during the meeting, including: <ol style="list-style-type: none">1. A brief statement identifying the item or problem and their status;2. A summary of pertinent information associated with the item;3. A recommendation;4. An action item - identifying the person or organization responsible for taking and/or co-ordinating required action with key dates; and,5. An updated Action Item List (AIL).			
10.3 Meeting minutes must be distributed, where possible, at the end of the meeting and signed by the responsible parties before leaving. Otherwise the meeting minutes will be delivered as directed in CDRL.			

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8.6.8.4. DID-PM-04

1. TITLE Project Status Reports (PSR)		2. IDENTIFICATION NUMBER DID-PM-04	
3. DESCRIPTION / PURPOSE Project Status Reports provide the project status of work in progress, management and mitigation of risk, and schedule. The report will be used to evaluate progress and to identify project management, technical, and schedule issues.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority		6. SPARE
7. APPLICATION / INTERRELATIONSHIP CDRL-PM-04 SOW Ref: section 4.4.1			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 The Project Status Reports may be prepared in the Contractor's format and contain necessary amendments to the PMP as appropriate. 10.2 The Project Status Reports must include at least the following information: <ol style="list-style-type: none">1. A narrative report providing sufficient detail to enable the Contracting and the Technical Authorities to evaluate the progress of the work to date;2. Risk management activities. Significant problems or concerns encountered together with recommended course of action;3. Schedules status, schedule changes and planned activities for the next reporting period;4. A summary of any issues for meeting requirements / specifications;5. Running summary of hardware and system observations and problems that have been opened, are in progress or have been resolved; and,6. Subset of Action Item List containing all open action items.			

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8.6.9. Engineering DIDs

8.6.9.1. DID-EN-01

1. TITLE		2. IDENTIFICATION NUMBER	
Quality Assurance Plan		DID-EN-01	
3. DESCRIPTION / PURPOSE			
The Quality Assurance 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.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI)		6. SPARE
	Technical Authority		
7. APPLICATION / INTERRELATIONSHIP - APPLICATION / INTERDEPENDENCE			
CDRL-EN-01			
SOW Ref: section 4.2.1			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS			
10.1 The following document must be provided for the Quality Assurance Plan :			
<ol style="list-style-type: none">1. A Quality Assurance Plan must be submitted ten (10) days to the TA after contract award. The Quality Assurance Plan must be prepared according to the latest issue of ISO 10005:2018 "Quality management systems - Guidelines for quality plans" at contract date.2. The Quality Assurance Plan must include the Inspection and Test Plan (ITP), to cover as a minimum:<ol style="list-style-type: none">a) FAT;b) Integration and installation on the vessel;c) SAT; and,d) All the test reports to be used to meet the ITP.			

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8.6.10. Engineering DIDs

8.6.10.1. DID-EN-02

1. TITLE Design Check		2. IDENTIFICATION NUMBER DID-EN-02	
3. DESCRIPTION / PURPOSE The Design Check must describe in detail to the TA all the components that constitute a MGPS, their location and method of installation, and all instructions required to complete the installation.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority		6. SPARE
7. APPLICATION / INTERRELATIONSHIP - APPLICATION / INTERDEPENDENCE CDRL-EN-02 SOW Ref: Sections 3.2.b, 3.2.d, 3.2.1, and 5			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 The design check may be prepared in the Contractor's format The design check must include the following information: <ul style="list-style-type: none"> 1. System Requirement Review (SRR) data package. The System Requirements Review ensures that all the requirements of the SOW are understood and will be addressed and reviewed during the Design Check. The System Requirement Review Data Package must provide all of the review materials required to complete the Design Check. 2. The number of anodes and their individual weights, their dimensions, and locations of their intended installation IAW Section 5 3. The location of the control panel and its method of mounting to the vessel's structure IAW Section 5 4. Details of the electrical wiring and passages through any bulkheads or watertight structures IAW Section 5 5. Red-line drawings of the proposed changes and installations IAW EKME 3750834 Technical Drawings Modification (Red-lining / Mark-Ups) and Workflow Process. 6. One electronic copy (PDF) of each of the following in both English and French: <ul style="list-style-type: none"> a. Installation instruction manual; b. User manual; c. Maintenance manual; and, d. Troubleshooting manual for the anodes and control panel. 7. Demonstration through calculations that the proposed system will deliver 2.0 PPB of dissolved copper over the minimum 3 years IAW 5.3.1.e 8. A list of OEM recommended spare parts. 			

8.6.11. Acceptance Testing DIDs

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8.6.11.1. DID-AT-01

1. TITLE Factory Acceptance Test (FAT) Plan		2. IDENTIFICATION NUMBER DID-AT-01	
3. DESCRIPTION / PURPOSE The contractor must develop and submit the FAT plan for the applicable equipment and components of the MGPS to show how each of them will be tested at the factory. The FAT Plan must describe the test environments to be used for the testing, identify the tests to be performed, and provide schedules for test activities.			
4. APPROVAL DATE		5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority	6. SPARE
7. APPLICATION / INTERRELATIONSHIP CDRL-AT-01 SOW Ref: section 6.4.1 and Table 5			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 May be prepared in the Contractor's format. 10.2 This document must contain the following generic information items: <ul style="list-style-type: none"> a. Date of issue; b. Scope of work required; c. Identification of Testing personnel; d. References for each test; e. Approval authority and signature block; f. Schedule of events; g. Resources (Special Tools/Instruments) and their allocation; h. Responsibilities of test personnel; i. Quality Control and Quality Assurance responsibilities; and, j. Interfaces among parties involved. 10.3 This document must contain the following specific information items: <ul style="list-style-type: none"> 1. The number of anodes and their individual weights 2. General test conditions; 3. Data recording and analysis; 4. Planned tests, including items and their identifiers; 5. Test schedules; 6. Identity of tester(s) and corresponding signature block; 7. Approval Authority and signature block and stamp; 8. Signed copy for each test by tester(s) and Approval Authority; and, 9. The FAT must describe in detail all testing for connections and conditions of the Control Panel This document must conform to test standards			

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8.6.11.2. DID-AT-02

1. TITLE:		2. IDENTIFICATION NUMBER:	
Factory Acceptance Test Procedure		DID-AT-02	
3. DESCRIPTION / PURPOSE - DESCRIPTION / OBJET			
The Contractor must produce and deliver the MGPS FAT Procedures. The FAT procedures 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 all equipment and components involved into the MGPS.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI)		6. SPARE
	Technical Authority		
7. APPLICATION / INTERRELATIONSHIP			
CDRL-AT-02			
SOW Ref: section 6.4.2 and Table 5			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS			
10.1 May be prepared in the Contractor's format.			
10.2 The FAT acceptance test procedure must contain the following, as a minimum:			
<ol style="list-style-type: none">1. Brief description of each system under test;2. Set-up plan and procedures;3. A clear and concise detailed description of the steps to be followed in the setting to work of each system;4. Set up Procedures and required test parameters;5. Conditions, precautions and adjustments required during set up procedures;6. Expected test results for mechanical, electrical and pneumatic systems;7. List of the tools and equipment required to verify the correct operation of the MGPS;			

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8.6.11.3. DID-AT-03

1. TITLE Factory Acceptance Test Reports		2. IDENTIFICATION NUMBER DID-AT-03
3. DESCRIPTION / PURPOSE The contractor must prepare and produce a FAT Report for each of the MGPS applicable components and equipment.		
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority	6. SPARE
7. APPLICATION / INTERRELATIONSHIP CDRL-AT-03 SOW Ref: para 6.4.3 and Table 5		
8. ORIGINATOR	9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 May be prepared in the Contractor's format. 10.2 The Factory Acceptance Test (FAT) Report must include the following as a minimum: <ul style="list-style-type: none">1. Description of the system and the test set up environment;2. Copies of the Factory Acceptance Test plan, the Factory Acceptance Test procedures, and the results of all Factory Acceptance Tests;3. Signed Copies of all the test reports; and,4. A summary of the status of the equipment, any changes / modifications that were made during the set up and details of any failures experienced, and the remedial action that was taken to restore the equipment to its specified operating conditions. 10.3 Summary of any recommendations.		

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8.6.11.4. DID-AT-04

1. TITLE		2. IDENTIFICATION NUMBER	
Laboratory Water Sample Test Reports		DID-AT-04	
3. DESCRIPTION / PURPOSE			
The Laboratory Test Reports details the test results of the sampling conducted during the SAT			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI)		6. SPARE
	Technical Authority		
7. APPLICATION / INTERRELATIONSHIP - APPLICATION / INTERDEPENDENCE			
CDRL-AT-04			
SOW Ref: Sections 6.4.4 and 6.5.1			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS			
10.1 The Laboratory Water Sample Test Report must name the Laboratory contracted to perform the tests on the sea water sample to show the concentration of copper in ppb; and,			
10.2 The Laboratory Water Sample Test Report must include the test procedures used by the laboratory and the test results of the sample(s) taken during the SAT.			

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8.6.11.5. DID-AT-05

1. TITLE Set to Work Plan (STW)		2. IDENTIFICATION NUMBER DID-AT-05	
3. DESCRIPTION / PURPOSE The Contractor must develop a STW plan that will show how each MGPS component will be installed, integrated and tested on board the vessel.			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority	6. SPARE	
7. APPLICATION / INTERRELATIONSHIP CDRL-AT-05 SOW Ref: section 4.2.2, 5.3.1, and 6.1.1			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 Supporting documentation and agenda may be prepared in the Contractor's format. 10.2 The STW must describe in detail: a. All equipment, tools, safety procedures, and human resources required for the installation of the MGPS; b. Locations and number of hull penetrations for the installation of anodes IAW 3.4.b.6 c. Locations and instructions for the installation of anodes IAW 3.4.b.6 d. The installation instructions for the MGPS control panel including electrical instructions and all wiring and wire passages IAW 3.4.b.6; e. Setup, calibration, and testing procedures for the MGPS; f. Control panel alarm troubleshooting; and, g. The Site Acceptance Test procedures which must be IAW 6.5.1 and 5.3.1.e.			

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DID-AT-06

1. TITLE Site Acceptance Test		2. IDENTIFICATION NUMBER DID-AT-06	
3. DESCRIPTION / PURPOSE The Site Acceptance Test details the conditions and steps to perform the SAT			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority	6. SPARE	
7. APPLICATION / INTERRELATIONSHIP CDRL-AT-06 SOW Ref: section 4.2.4, 5.3.1.f, and 6.4.4			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 Supporting documentation and agenda may be prepared in the Contractor's format. 10.2 The site acceptance test must be performed under the following conditions: 1. The vessel must be at sea with all the 3 main engines online; 2. The vessel must have no less than 2 auxiliary cooling pumps running on full; 3. The self-contained cooling unit in the engine room must be online; 4. The sea water recirculating valves, if applicable, must be closed and the sea water overboard discharge valves, if applicable, must be fully open for the systems identified in Table 4; 5. The above conditions must be in place for no less than 2 hours; 6. The MGPS must be online for no less than 24 hours prior; and, 7. The vessel's fire pump must be online and discharging overboard or to a fire station for no less than 15 minutes 10.3 A water sample must be taken and sent to an independent laboratory IAW 6.5.1 under the conditions identified in 5.3.1.e.			

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8.6.11.6. DID AT-07

1. TITLE Site Acceptance Test Report		2. IDENTIFICATION NUMBER DID-AT-0507	
3. DESCRIPTION / PURPOSE The Site Acceptance Test reports details the required information for the SAT report			
4. APPROVAL DATE	5. OFFICE OF PRIMARY INTEREST (OPI) Technical Authority		6. SPARE
7. APPLICATION / INTERRELATIONSHIP CDRL-AT-0507 SOW Ref: section 4.2.4, 5.3.1.f, and 6.4.4			
8. ORIGINATOR		9. APPLICABLE FORMS	
10. PREPARATION INSTRUCTIONS 10.1 Supporting documentation and agenda may be prepared in the Contractor's format. 10.2 The site acceptance test report must include the following: <ol style="list-style-type: none">1. The date the MGPS was installed;2. The date and time the MGPS was first turned on;3. Initial settings and calibration of the currents as setup in the control panel;4. Any flaws or deficiencies, and corrections or recommendations that were needed to activate the MGPS IAW the STW plan;5. The date, time, and location of the vessel when and where the sea water sample was taken including the sea water depth;6. The weather conditions prevalent at the time the sea water sample was taken; and,7. Location the sample was drawn from.			

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ANNEX "B"

BASIS OF PAYMENT

1. Initial Procurement

Item	Initial Procurement Deliverables	Firm Prices
1	Delivery and acceptance of one MGPS IAW SOW section 3.2	\$
2	Delivery and acceptance of Project Management Services IAW SOW section 3.3.	\$
3	Delivery and acceptance of the Quality Assurance Plan (QAP) IAW SOW 3.4. a	\$
4	Delivery and acceptance to the design check IAW SOW Section 3.4.b	\$
5	Delivery and acceptance of all testing plans, procedures and reports IAW SOW section 3.5.	\$
6	Delivery of telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday IAW SOW section 3.6.	\$
7	Delivery of parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule IAW SOW section 3.6.	\$
Total Firm Price for the Initial Procurement – Item 1 to Item 7		\$

1.1 Initial Procurement Additional and Unscheduled Work Labor Rates

Item	Descriptions	Firm Hourly Labor Rates
1	Blended Hourly Labor Rate for Regular Time applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$
2	If different than above Regular Time Hourly Rate, the Blended Hourly Labor Rate for Time and one half Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$
3	If different than above Regular Time and/or Time and one half Overtime Rates, the Blended Hourly Labor Rate for Double Time Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$

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2. Option 1 - One (1) additional MGPS

Item	Option 1 Deliverables	Firm Prices
1	Delivery and acceptance of one MGPS IAW SOW section 3.2	\$
2	Delivery and acceptance of Project Management Services IAW SOW section 3.3.	\$
3	Delivery and acceptance of the Quality Assurance Plan (QAP) IAW SOW 3.4. a	\$
4	Delivery and acceptance to the design check IAW SOW Section 3.4.b	\$
5	Delivery and acceptance of all testing plans, procedures and reports IAW SOW section 3.5.	\$
6	Delivery of telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday IAW SOW section 3.6.	\$
7	Delivery of parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule IAW SOW section 3.6.	\$
Total Firm Price for the Option 1 – Item 1 to Item 7		\$

2.1 Option 1 - Additional and Unscheduled Work Labor Rates

Item	Descriptions	Firm Hourly Labor Rates
1	Blended Hourly Labor Rate for Regular Time applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$
2	If different than above Regular Time Hourly Rate, the Blended Hourly Labor Rate for Time and one half Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$
3	If different than above Regular Time and/or Time and one half Overtime Rates, the Blended Hourly Labor Rate for Double Time Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$

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3. Option 2 - One (1) additional MGPS

Item	Option 2 Deliverables	Firm Prices
1	Delivery and acceptance of one MGPS IAW SOW section 3.2	\$
2	Delivery and acceptance of Project Management Services IAW SOW section 3.3.	\$
3	Delivery and acceptance of the Quality Assurance Plan (QAP) IAW SOW 3.4. a	\$
4	Delivery and acceptance to the design check IAW SOW Section 3.4.b	\$
5	Delivery and acceptance of all testing plans, procedures and reports IAW SOW section 3.5.	\$
6	Delivery of telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday IAW SOW section 3.6.	\$
7	Delivery of parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule IAW SOW section 3.6.	\$
Total Firm Price for the Option 2 – Item 1 to Item 7		\$

3.1 Option 2 - Additional and Unscheduled Work Labor Rates

Item	Descriptions	Firm Hourly Labor Rates
1	Blended Hourly Labor Rate for Regular Time applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$
2	If different than above Regular Time Hourly Rate, the Blended Hourly Labor Rate for Time and one half Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$
3	If different than above Regular Time and/or Time and one half Overtime Rates, the Blended Hourly Labor Rate for Double Time Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	\$

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ANNEX "C"
PART 3 OF THE BID SOLICITATION

Electronic Payment Instrument(s)

As indicated in Part 3, clause 3.1.1, the Bidder must identify which electronic payment instruments they are willing to accept for payment of invoices.

The Bidder accepts any of the following Electronic Payment Instrument(s):

- ☐ Visa Acquisition Card;
- ☐ MasterCard Acquisition Card;
- ☐ Direct Deposit (Domestic and International);
- ☐ Electronic Data Interchange (EDI); and,
- ☐ Wire Transfer (International Only).

Signed: _____ **Date:** _____

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ANNEX "D"
Mandatory Technical Evaluation Criteria

Item #	Criteria	Compliant		Reference to Applicable page and paragraph of
		Yes	No	
1	<p>Bidder's Qualification as an Original Equipment Manufacturer (OEM) or as the Authorized Representative of an OEM:</p> <p>(a) The Bidder must demonstrate that they are the OEM of an MGPS or the Authorized Representative of an OEM as demonstrated by a Letter of Authority from the OEM; and,</p> <p>(b) The Bidder as an OEM or as a OEM authorized representative, must demonstrate that it has designed, manufactured and produced itself complete Marine Growth Prevention Systems (MGPS) for marine service on board vessels. Identity of the Designer and Manufacturer is evidenced by the name appearing on the purchased goods and on all accompanying documentation.</p>			
2	<p>Bidder's past experience as an Original Equipment Manufacturer (OEM) or as the Authorized Representative of an OEM:</p> <p>Bidder must demonstrate that it has designed, manufactured and successfully commissioned no less than three (3) MGPS for service on board marine vessels in the last five (5) years of similar complexity and capacity with copper concentration of no less than 2.0 PPB at no less than 75% of the maximum flow ratings identified in the SOW.</p>			

3	<p>Bidder's capacity to meet the Solicitation Requirements</p> <p>The Bidder must demonstrate its understanding of the requirements contained in the Bid Solicitation and explain how it will meet these requirements. The Bidder must demonstrate its capability and describe its approach in a thorough, concise and clear manner for carrying out the work and address as a minimum the items listed below.</p> <p>This demonstration must address clearly and in sufficient depth each of the items listed below. Simply repeating the statement contained in the Bid Solicitation is not sufficient. In order to facilitate the evaluation of this Mandatory Technical Criteria, Canada requests that the Bidder addresses and presents topics in the order described below and under the same headings:</p> <p>Reference SOW Annex "A" section 3 Marine Growth Prevention System (MGPS) - DELIVERY</p> <ul style="list-style-type: none"> 3.2. MGPS DELEVERY; 3.3. PROJECT MANAGEMENT SERVICES DELEVERY; 3.4. DESIGN AND ENGINEERING DELIVERY; <ul style="list-style-type: none"> a. Quality Assurance Plan (QAP) delivery b. Design check delivery 3.5. Testing and Acceptance Deliverables; and, 3.6. Logistic Support. 			
4	<p>Bidder Quality Management System</p> <p>Bidder must demonstrate that it has in place a Quality Management System (QMS) developed in accordance with ISO 10005:2018 "Quality management systems - Guidelines for quality plans". In order to achieve this demonstration, the Bidder must:</p> <ul style="list-style-type: none"> 1. provide its valid ISO 9001:2015 certification if applicable; 2. provide an example of its Quality Control Plans (QCP) as applied on a previous project for MGPS designing, manufacturing and commissioning onboard vessel; 3. provide its Inspection and Test Plans (ITP) developed in accordance with its QCP in 2 above; and, 4. provide a minimum of three (3) Inspection and Test Reports (ITR) developed, conducted, filled and signed in accordance with its ITP in 3 above. 			

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5.	<p>Contractor Service Requirements:</p> <p>The vessels involved operate on all coasts of Canada and are based in the home ports noted in section 1.2 of the SOW. The Bidder must demonstrate that they are providing the following OEM support:</p> <ol style="list-style-type: none">1. Telephone technical service support for MGPS; and,2. Parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule.			
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Signed: _____ Date: _____

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ANNEX "E"

STATEMENT OF COMPLIANCE TO THE SOW IN A REQUIREMENT MATRIX FORMAT

SOW REF # Including Sub-Sections	SOW PARAGRAPH TITLE	COMPLIANCE	CROSS REFERENCE IN BIDDER'S PROPOSAL	INITIALS
1.1	Purpose	Comply	Read and understood	
1.2	Background	Comply	Read and understood	
1.3	Objective	Comply	Read and understood	
1.4	Drawing of the OFSV vessels	Comply	Read and understood	
2.	Documents	Comply	Read and understood	
3.	Marine Growth Prevention System (MGPS) - DELIVERY	Comply	Read and understood	
3.1.	GENERAL	Comply	Read and understood	
3.2.	MGPS DELIVERY	Comply	Read and understood	
3.3.	PROJECT MANAGEMENT DELIVERY	Comply	Read and understood	
3.4.	DESIGN AND ENGINEERING DELIVERY	Comply	Read and understood	
3.5.	Testing and Acceptance Deliverables	Comply	Read and understood	
3.6.	Logistic Support	Comply	Read and understood	
4.	PROJECT MANAGEMENT	Comply	Read and understood	
4.1	ORGANIZATION	Comply	Read and understood	
4.2	Project Management Plan	Comply	Read and understood	
4.3	PROJECT MEETINGS	Comply	Read and understood	
4.4	REPORTING AND COMMUNICATIONS	Comply	Read and understood	
5.1	Requirements	Comply	Read and understood	
5.2	Sea water (SW) flow rates	Comply	Read and understood	
5.3.1	Engineering Required	Comply	Read and understood	
6.	ACCEPTANCE TESTING	Comply	Read and understood	

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6.1.	SET TO WORK (STW)	Comply	Read and understood	
6.2.	FACTORY ACCEPTANCE TEST (FAT)	Comply	Read and understood	
6.3.	SITE ACCEPTANCE TEST (SAT)	Comply	Read and understood	
6.4.	TEST MANAGEMENT	Comply	Read and understood	
6.5.	CERTIFICATION	Comply	Read and understood	
8.	(CDRL) AND DATA ITEM DESCRIPTION (DID)	Comply	Read and understood	

Signed: _____ **Date:** _____

Instruction to Bidder: It is mandatory that all sections of the SOW must be addressed in the Compliance Matrix.

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ANNEX "F" FINANCIAL EVALUATION PLAN

1.0 Financial Evaluation of Initial Procurement.

Item	Initial Procurement Deliverables	Firm Prices
1	Delivery and acceptance of one MGPS IAW SOW section 3.2	\$
2	Delivery and acceptance of Project Management Services IAW SOW section 3.3.	\$
3	Delivery and acceptance of the Quality Assurance Plan (QAP) IAW SOW 3.4. a	\$
4	Delivery and acceptance to the design check IAW SOW Section 3.4.b	\$
5	Delivery and acceptance of all testing plans, procedures and reports IAW SOW section 3.5.	\$
6	Delivery of telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday IAW SOW section 3.6.	\$
7	Delivery of parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule IAW SOW section 3.6.	\$
T1	Total Firm Price for the Initial Procurement – Item 1 to Item 7	\$

1.1 Initial Procurement Additional and Unscheduled Work Evaluation

Item	Description	Level of effort for Evaluation purpose only	Firm Hourly Labor Rate	Additional and Unscheduled Evaluation Prices
1	Blended Hourly Labor Rate for Regular Time applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	160 Hours	\$	\$
2	If different than above Regular Time Hourly Rate, the Blended Hourly Labor Rate for Time and one half Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	40 Hours	\$	\$
3	If different than above Regular Time and/or Time and one half Overtime Rates, the Blended Hourly Labor Rate for Double Time Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	40 Hours	\$	\$
T2	Total Evaluation Price of Initial Procurement Additional and Unscheduled Work Item 1 to Item 3			\$

1.2 Total Evaluation Price for the Initial Procurement

T3	Total Evaluation Price for the Initial Procurement T1+T2	\$
-----------	-----------------------------------------------------------------	-----------

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2.0 Financial Evaluation of Option 1.

Item	Initial Procurement Deliverables	Firm Prices
1	Delivery and acceptance of one MGPS IAW SOW section 3.2	\$
2	Delivery and acceptance of Project Management Services IAW SOW section 3.3.	\$
3	Delivery and acceptance of the Quality Assurance Plan (QAP) IAW SOW 3.4. a	\$
4	Delivery and acceptance to the design check IAW SOW Section 3.4.b	\$
5	Delivery and acceptance of all testing plans, procedures and reports IAW SOW section 3.5.	\$
6	Delivery of telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday IAW SOW section 3.6.	\$
7	Delivery of parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule IAW SOW section 3.6.	\$
T4	Total Firm Price for the Option 1 – Item 1 to Item 7	\$

2.1 Option 1 Additional and Unscheduled Work Evaluation

Item	Description	Level of effort for Evaluation purpose only	Firm Hourly Labor Rate	Additional and Unscheduled Evaluation Prices
1	Blended Hourly Labor Rate for Regular Time applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	160 Hours	\$	\$
2	If different than above Regular Time Hourly Rate, the Blended Hourly Labor Rate for Time and one half Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	40 Hours	\$	\$
3	If different than above Regular Time and/or Time and one half Overtime Rates, the Blended Hourly Labor Rate for Double Time Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	40 Hours	\$	\$
T5	Total Evaluation Price of Option 1 Additional and Unscheduled Work, Item 1 to Item 3			\$

2.2 Total Evaluation Price for the Option 1

T6	Total Evaluation Price for the Option 1=T4+T5	\$
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3.0 Financial Evaluation of Option 2.

Item	Option 2 Deliverables	Firm Prices
1	Delivery and acceptance of one MGPS IAW SOW section 3.2	\$
2	Delivery and acceptance of Project Management Services IAW SOW section 3.3.	\$
3	Delivery and acceptance of the Quality Assurance Plan (QAP) IAW SOW 3.4. a	\$
4	Delivery and acceptance to the design check IAW SOW Section 3.4.b	\$
5	Delivery and acceptance of all testing plans, procedures and reports IAW SOW section 3.5.	\$
6	Delivery of telephone technical service support for the MGPS between the hours of 08:00 ATL and 17:00 PST Monday to Friday IAW SOW section 3.6.	\$
7	Delivery of parts supply service for operational maintenance and major overhauls as required in the OEM's published maintenance schedule IAW SOW section 3.6.	\$
T7	Total Firm Price for the Option 2 – Item 1 to Item 7	\$

3.1 Option 2 Additional and Unscheduled Work Evaluation

Item	Description	Level of effort for Evaluation purpose only	Firm Hourly Labor Rate	Additional and Unscheduled Evaluation Prices
1	Blended Hourly Labor Rate for Regular Time applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	160 Hours	\$	\$
2	If different than above Regular Time Hourly Rate, the Blended Hourly Labor Rate for Time and one half Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	40 Hours	\$	\$
3	If different than above Regular Time and/or Time and one half Overtime Rates, the Blended Hourly Labor Rate for Double Time Overtime applicable to the MGPS Additional and Unscheduled Work IAW with 6.6.2.	40 Hours	\$	\$
T8	Total Evaluation Price of Option 2 Additional and Unscheduled Work Item 1 to Item 3			\$

3.2 Total Evaluation Price for the Option 2

T9	Total Evaluation Price for the Option 2 = T7+T8	\$
-----------	--------------------------------------------------------	-----------

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4.0 Total Evaluation Price of the Proposal

Item	Offshore Fisheries Science Vessels (OFSV)	Prices
T3	Annex F, 1.2, Total Evaluation Price for the Initial Procurement	\$
T6	Annex F, 2.2, Total Evaluation Price for the Option1	\$
T9	Annex F, 3.2, Total Evaluation Price for the Option 2	\$
Total Evaluation Price of the Proposal		\$

The full legal name of the Bidder: _____

Complete contact information of the company's representative responsible for the proposal:

Signed: _____ Date: _____

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ANNEX "G"

PROCEDURE FOR PROCESSING ADDITIONAL / UNSCHEDULED WORK

1. Purpose

The Additional / Unscheduled Work (A/U Work) Procedure has been instituted for the following purposes:

- A) To establish a uniform method of dealing with requests for A/U Work;
- B) To obtain the necessary Technical Authority approval and Contracting Authority authorization before A/U Work commences; and,
- C) To provide a means of maintaining a record of A/U Work requirements including Serial Numbers, dates, and accumulated costs. The Contractor shall have a cost accounting system that is capable of assigning job numbers for each A/U Work requirement so that each requirement can be audited individually.

2. Definitions and Particulars:

- A) An A/U Work Procedure is a contractual procedure whereby changes to the scope of Work under the Contract may be defined, priced and contractually agreed to. Such changes may arise from:
 - i. "Work Arising" from the contracted Work (Unscheduled Work); or,
 - ii. "New Work" not initially contracted but requiring to be done in order to achieve the contract (Additional Work).
- B) The procedure does not allow for the correction of deficiencies in the Contractor's Proposal;
- C) No A/U Work may be undertaken by the Contractor without written authorization of the Contracting Authority except under emergency circumstances described in Sub. Paragraph 3(b);
- D) Work undertaken without written Contracting Authority authorization will be considered the Contractor's responsibility and cost; and,
- E) The form PWGSC-TPSGC [1379](#) (10/2011) will contain the final description of the A/U Work requirement, and the prices negotiated and agreed to.

3. Procedures:

- A) The procedure involves the electronic form PWGSC-TPSGC [1379](#) (10/2011) for refit and repair and will be the only form for authorizing all A/U Work;
- B) Emergency measures required to prevent loss or damage to the Procured Equipment and /or the Vessel which would occur if this A/U Work procedure were followed, shall be taken

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by the Contractor on its own authority. The responsibility for the cost of such measures shall be determined in accordance with the terms and conditions of the Contract;

- C) The Technical Authority will initiate a work estimate request by defining the A/U Work requirement. It will attach drawings, sketches, additional specifications, other clarifying details as appropriate, and allocate their Serial Number for the request;
- D) Notwithstanding the foregoing, the Contractor may propose to the Technical Authority in writing, either by letter or some type of Defect Advice Form (this is the Contractor's own form) that certain A/U Work should be carried out;
- E) The Technical Authority will either reject or accept such Proposal, and advise the Contractor and Contracting Authority. Acceptance of the Proposal is not to be construed as authorization for the work to proceed. If required, the Technical Authority will then define the A/U Work requirement in accordance with Sub. Paragraph 3.C;
- F) The Contractor will electronically submit its Proposal to the Contracting Authority together with all price support, any qualifications, remarks or other information requested;

The price support must demonstrate the relationship between the scope of work, the Contractor's estimated costs and its selling blended hourly Labor rate of the Annex B, Basis of Payment. It is a breakdown of the Contractor's Blended Hourly Labor Rate, estimate of material cost per item, for both the contractor and all of its subcontractors, estimates of any related impact, and an evaluation of the contractor's time required to perform the A/U Work;

- G) The Contractor must provide copies of purchase orders and paid invoices for Subcontracts and/or materials, including stocked items, in either case. The Contractor shall provide a minimum of two quotations for Subcontracts or materials. If other than the lowest, or sole source is being recommended for quality and/or delivery considerations, this shall be noted. On request to the Contractor, the Contracting Authority shall be permitted, to meet with any proposed Subcontractor or material supplier for discussion of the price and always with the Contractor's representative present;
- H) After discussion between the Contracting Authority and the Contractor and if no negotiation is required, the Contracting Authority will seek Technical Authority confirmation to proceed by signing the form. The Contracting Authority will then sign and authorize the A/U Work to proceed;
- I) In the event the Technical Authority does not wish to proceed with the work, it will cancel the proposed A/U Work through the Contracting Authority in writing; and,
- J) In the event the negotiation involves a Credit, the appropriate PWGSC form will be noted as "credit" accordingly.

NOTE: PWGSC 1379 forms bearing Serial Numbers with a suffix "A" shall not to be included in any contract amendments, and therefore no payment shall be made until final resolution of the price and incorporation into the contract.

4. Amendment to Contract or Formal Agreement

The Contract will be amended from time to time in accordance with the Contract terms to incorporate the costs authorized on the appropriate PWGSC 1379 forms.

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ANNEX "H"

WARRANTY CLAIM PROCEDURES

1. Scope

The following are the procedures that suit the particular requirements for warranty considerations after the Final Work Acceptance.

2. Reporting Failures With Warranty Potential:

- a) The initial purpose of a report of a failure is to facilitate the decision as to whether or not to involve warranty and to generate action to effect repairs. Therefore in addition to identification, location data, etc. the report must contain details of the defect. Warranty decisions as a general rule are to be made locally and the administrative process is to be in accordance with procedures as indicated; and,
- b) These procedures are necessary as invoking a warranty does not simply mean that the warrantor will automatically proceed with repairs at his expense. A review of the defect may well result in a disclaimer of responsibility, therefore, it is imperative that during such a review the Department is directly represented by competent technical authority qualified to agree or disagree with the warrantor's assertions. The Technical Authority will assume this role.

3. Procedures

- a) Immediately it becomes known to the Ship's Staff or the onsite representative that an equipment/system is performing below accepted standards or has become defective, the procedures for the investigation and reporting are as follows:
 - I. The vessel advises the Technical Authority (TA) when a defect, which is considered to be directly associated the Work, has occurred.
 - II. On reception of the advice, the TA will review the Specification and the Acceptance Document and will consult with the Contracting Authority (CA) as required to confirm if the reported defect is subject to warranty or not. Following the verification of a valid/invalid warranty claim, the TA in consultation with the Ship's Staff or the onsite representative will complete the Tombstone Data and Appendix 1 section 1 of the Warranty Claim Form (Refit) Appendix 1 of Annex H. In case of an invalid claim, the TA will complete the appropriate portion of the Section 5 of the claim and will return the claim to the onsite representative with a copy to the CA.

Warranty defect claims may be forwarded in hard copy, by fax or by e-mail whichever format is the most convenient.
- b) On reception of the warranty claim, the Contractor must review the claim, investigate and determine their position:
 - I. Assuming the Contractor accepts full responsibility for repair, the Contractor completes the appropriate portion of the Appendix 1 Section 2, providing details on actions to be taken with date and location and return it to the TA with copy to the CA,

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II. In the event that the Contractor disputes the claim and disclaims its responsibility or agrees to share the responsibility, the contractor is to complete the appropriate portion of the Appendix 1 Section 2, providing reasons supporting its position and return the claim to the CA with copy to the TA.

- c) When a warranty defect claim is disputed by the Contractor, the CA will collect all the available information, will consult with the TA and the Contractor and will come to a decision as of how the claim shall be handled. The CA will then complete the Appendix 1 Section 3 of the claim and will provide reasons supporting the decision. If the Contractor still dispute the CA's decision then the contract clause 14-Dispute Resolution must be followed.

Depending on the severity of the claim, the CA may recommend that the TA correct the defect using in-house resources or by contracting the work out. In both cases, all associated costs for the repairs are to be recorded as a possible credit against the contract by PWGSC action. Material costs and man-hours expended in correcting the defect will be recorded and entered in Appendix 1 Section 4 of the Warranty Claim Form. On completion of the repair work, the TA will forward the Warranty Claim Form to the CA. During that whole process the TA will ensure that defective parts are to be retained pending settlement of claim.

- d) Defective equipment associated with potential warranty should not normally be dismantled until the Contractor's representative has had the opportunity to observe the defect.
- e) Upon acceptance of the warranty claim and related corrective actions by the Contractor, Canada or both, the TA will ensure that the work is accepted and the warranty claim is closed out. By acting in this manner, the TA will ensure that the appropriate portion of the Appendix 1 Section 5 of the Warranty Claim is completed and signed by the required authorities and representatives and will forward to CA and Contractor.

4. Liability


- a) Agreement between the Contracting Authority, Technical Authority and the Contractor will result in one of the following conditions:
- I. The Contractor accepts full responsibility to repair or overhaul under the warranty provisions of the contract;
 - II. The Technical Authority accepts full responsibility for repair and overhaul of item concerned; or,
 - III. The Contractor and the Technical Authority agree to share responsibility for the costs to repair or overhaul the unserviceable item, in such cases the PWGSC Contracting Authority will negotiate the best possible sharing arrangement.
- b) In the event of a dispute as in paragraph 3.c), the Contracting Authority will take necessary action with the Contractor while the Technical Authority will inform its Senior Management and will take appropriate action to ensure that all cost associated to the repair with any pertinent data are recorded.

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

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		Travaux publics et Services gouvernementaux Canada		Public Works and Government Services Canada	
APPENDIX 1 TO ANNEX HH					
WARRANTY CLAIM FORM (Refit)					
FORMULAIRE DE RÉCLAMATION DE GARANTIE (Radoub)					
Vessel Name - Nom du navire		File No. - No. du dossier		Contract No. - No. du contrat	
Customer Department - Ministère client				Warranty Claim Serial No. No. de série de réclamation de garantie	
Defect's Impact on Vessel's Operations Conséquence du défaut sur les opérations du navire			The Defect Must Be Corrected; Le défaut doit être corrigé;		
Vessel out of service Navire hors d'usage	Vessel Limited Operation Opération réduite du navire	No immediate consequence Sans conséquence immédiate	Immediately Immédiatement	When directed by Canada Tel qu'avisé par le Canada	To be agreed between Canada and Contractor À être entendue entre le Canada et l'entrepreneur
1. Description of the Defect - Description du défaut					
<p>Note: This section must be filled by Technical Authority (TA) in consort with the Ship's Staff (on site responsible) . On a determination of a valid claim, the TA will forward the claim to the Contractor and CC the Contracting Authority (CA). - Cette section doit être complétée par l'Autorité Technique conjointement avec l'équipage (responsable sur place). Si la réclamation est jugée valable l'AT transmettra la réclamation à l'entrepreneur avec copie à l'Autorité Contractante (AC).</p>					
Reference to Contract Article and/or Specification No. Référence à l'article du contrat et/ou devis no.					
Description					
Prepared by the on site responsible Préparé par le responsable sur place			Approved by Technical Authority Approuvé par l'Autorité Technique		
Date			Date		

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2. Contractor's Investigation and Position - Examen et position de l'entrepreneur					
Note: The Contractor must investigate the claim, determine its position, complete this section 2 and return the claim to the TA and cc the CA. - L'entrepreneur doit faire l'examen de la réclamation, déterminer sa position, compléter la présente section 2 et retourner la réclamation l'AT avec copie à l'AC.					
Contractor recognizes its total responsibility and will proceed with corrective action(s) L'entrepreneur reconnaît son entière responsabilité et corrigera le défaut					
Provide details on action(s) to take place with date and location. Fournir les détails de(s) action(s) qui seront prise ainsi que la date et le lieu.					
Contractor recognizes a partial responsibility. L'Entrepreneur reconnaît une responsabilité partielle.					
Provide details supporting the above position with proposed sharing. Fournir les détails justifiant la position ci-dessus ainsi que le partage proposé.					
Contractor disclaims any responsibility. L'entrepreneur refuse toute responsabilité.					
Provide details supporting the above position. Fournir les détails justifiant la position ci-dessus					
Contractor's representative Représentant de l'entrepreneur					
Date					

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5. Work Acceptance and Warranty Claim Closing - Acceptation des travaux et fermeture de la réclamation de garantie					
Valid claim corrected by the Contractor and work accepted by Canada - Réclamation valable corrigée par l'entrepreneur et travaux acceptés par le Canada					
Remarks Remarques					
Contractor's representative - Représentant de l'entrepreneur			Technical Authority - Autorité technique		
Date			Date		
Valid claim corrected by the Contractor and Canada and work accepted by Canada - Réclamation valable corrigée par l'entrepreneur et le Canada et travaux acceptés par le Canada					
Remarks Remarques					
Contractor's representative - Représentant de l'entrepreneur			Technical Authority - Autorité technique		
Date			Date		
Contracting Authority - Autorité contractante					
Date					
Valid claim corrected by Canada and work accepted by Canada - Réclamation valable corrigée par le Canada et travaux acceptés par le Canada					
Remarks Remarques					
Technical Authority - Autorité technique			Contracting Authority - Autorité contractante		
Date			Date		
Invalid claim - Réclamation non fondée					
Remarks Remarques					
Technical Authority - Autorité technique			Contracting Authority - Autorité contractante		
Date			Date		

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Annex I
Final Work Acceptance – Acceptation final des travaux



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

Final Work Acceptance – Acceptation final des travaux

Project No. - N° du projet		File No. - N° du dossier		Contract Serial No. - N° de série du contrat	
Vessel - Navire			Owner - Propriétaire		Contractor's Name - Nom de l'entrepreneur
Specification - Devis					
We the undersigned, certify that the work as outlined in the Specification dans les			Nous, soussignés, attestons que le travail exposé dans le Devis et		
and Additional Work Arisings has been duly completed in keeping with the terms of the captioned contract.			états de travaux additionnels qui en découlent est dûment achevé conformément aux conditions du contrat susmentionné.		
All outstanding items, deviation or deficiencies are as noted on the qu'ils sont			Tous les postes non terminés, déviations et manquements sont tels		
Appendix form "A" and will be delt with in accordance with the contract			indiqués à l'Appendice (formule A); il sera disposé en conformité des		
For Contractor - Pour l'entrepreneur			Title - Titre		
Signature					
Inspection Authority - Autorité d'inspection			Title - Titre		
Signature					
Owner's Representative - Représentant du propriétaire			Title - Titre		
Signature					
Contracting Authority – Autorité contractante			Title - Titre		
Signature					
Date		Location - Endroit			

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Remarks - Remarques

See attached Appendix 'A'

PWGSC-TPSGC 1205 (11/09)

A			B		C		D		E		F	
CONNECTIONS TO THE SEABAY			ND (MM)	ID * (MM)	AREA (SQ.MM)	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION			
MACHINERY COOLING PUMP INLET #1 (1)			100	97.2	7416.6	(PI)	PRESSURE INDICATOR		PUMP			
MACHINERY COOLING PUMP INLET #2 (1)			100	97.2	7416.6	(CP)	COMPOUND PRESSURE INDICATOR		GAUGE COCK			
GENSETS PUMP INLET (1)			150	146.3	16801.9	(DP)	DIFFERENTIAL PRESSURE INDICATOR		GLOBE VALVE			
BALLAST PUMP INLET (1)			100	97.2	7416.6	(TS)	TEMPERATURE SENSOR		BUTTERFLY VALVE			
FIRE PUMP INLET (1)			80	73.7	4259.2		OVERBOARD DISCHARGE		LUG TYPE BUTTERFLY VALVE			
SCU FW COOLER PIPE			65	58.9	2723.3							
TOTAL					46034.1							
SEA CHEST / SEABAY CONNECTION (1)			250	243.0	46353.5		FLEXIBLE HOSE		THERMOSTATICALLY CONTROLLED VALVE			
SEA CHEST SHELL OPENINGS (5 TIMES THE INLET PIPE AREA)					231767.3		REDUCER		BALL VALVE			
NUMBER OF SLOTS (20mm x 225mm)					53		ORIFICE PLATE		GATE VALVE			
(1) BASED ON CS SCH 80 PIPING CONNECTIONS USED							HEAT EXCHANGER		STOP CHECK VALVE			
						(TI)	TEMPERATURE INDICATOR		CHECK VALVE			
						(PT)	PRESSURE TRANSMITTER		WATER CHECK VALVE			
						(TS)	TEMPERATURE SENSOR		SIMPLEX STRAINER			
									DUPLEX STRAINER C/W CHANGE OVER VALVE			

EQUIPMENT LIST									
ITEM No.	TAG NO.	ITEM	QTY.	CAPACITY (EA)	SPECIFICATION	VSY PART#			
1	256.10-A0007 256.10-A0008	MACHINERY SW COOLING PUMP	2	60 m³ /hr @ 3 BAR	MU 65-250	PUM00008			
2	256.10-A0012 256.10-A0013	MACHINERY COOLING HEAT EXCHANGER	2	750 kW	TRANSTER GCP-026-M-5-NR-48	AME00085			
3	256.10-A0010	MAIN MACHINERY SPACE SCU COOLER	1	82 kW	ANA MARINE	MT000370			
4	256.10-A0011	MAIN MACHINERY SPACE SCU COOLER PUMP	1	24 m³ /hr @ 2 BAR	MU 40-200	PUM00003			
5	256.10-A0032	BOW THRUSTER HEAT EXCHANGER	1	45 kW	TRANSTER UXP-005-H-6-UI-25	AME00136			
6	256.10-A0001 256.10-A0002	SIMPLEX STRAINER-SEA CHEST	2	10", 5MM MESH	ASTM 395, ANSI B16.42	STR000073			
7	256.10-A0003	DUPLEX STRAINER, MACHINERY COOLING	1	6", 2MM MESH	ASTM B62, ANSI B16.5	STR000082			
8	256.10-A0005 256.10-A0006	SIMPLEX STRAINER, TO MACHINERY SW COOLING PUMP	2	4", 5MM MESH	ASTM B62, ANSI B16.5	STR000071			
9	256.10-A0009	SIMPLEX STRAINER, TO MAIN SPACE SCU COOLING PUMP	1	2-1/2", 5MM MESH	ASTM B62, ANSI B16.5	STR000072			
10	256.10-V0049	3WAY ACTUATED VALVE/THERMOSTATIC CONTROLLER	1	3W-BL, BRZ, 6", THERMO OP	ASTM B62, ANSI B16.10, 110V ACTUATOR, 4-20MA ELECTRIC POSITIONER	VLV00614			
11	256.10-V0054 256.10-V0055	ORIFICE PLATE, TO MAC. COOLING	2	4", HOLE 1.875, PLATE THK. 1/8"	ALLOY STEEL - 316	VLV00557			
12	256.10-V0056	ORIFICE PLATE, TO MAC. COOLING	1	2", HOLE 0.75, PLATE THK. 1/8"	ALLOY STEEL - 316	VLV00555			
13	243.10-A0003	STERNUTUBE WATER QUALITY UNIT	1	5 m³ /hr @ 3 BAR	WARTISLA DWG# H30677-01	POM00015			

VANCOUVER AIR SERVICES

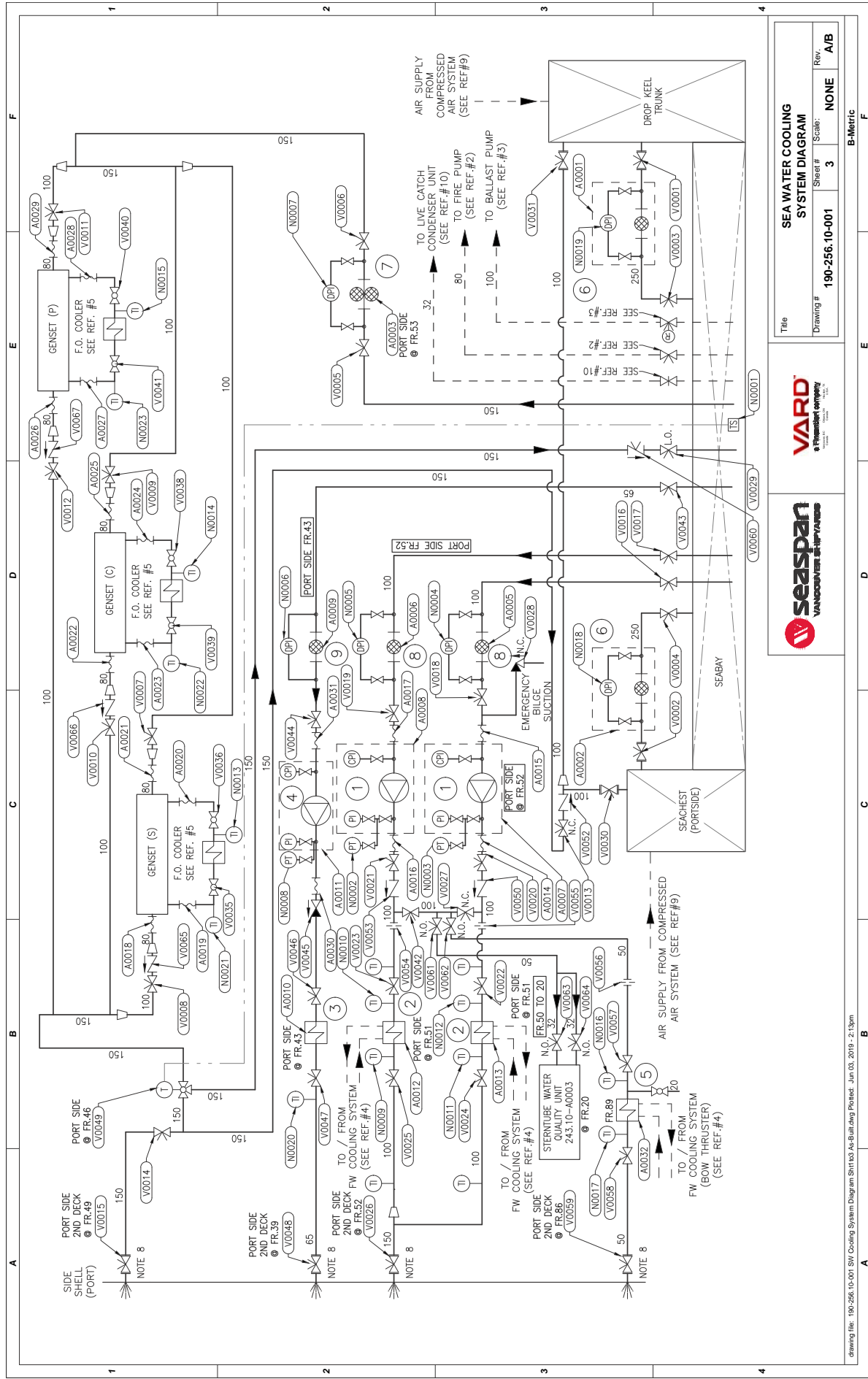
a Flender company

Title
Drawing # 190-256.10-001
Sheet # 2
Scale: NONE
Rev. A/B

190-256.10-001 SW Cooling System Diagram Sheet 03 As-Built-02

Jun 03, 2019 - 2:13pm

EQUIPMENT LIST						
ITEM No.	TAG NO.	ITEM	QTY.	CAPACITY (EA)	SPECIFICATION	VSY PART#
1	256.10-A0007 256.10-A0008	MACHINERY SW COOLING PUMP	2	60 m ³ /hr @ 3 BAR	MU 65-250	PUM00008
2	256.10-A0012 256.10-A0013	MACHINERY COOLING HEAT EXCHANGER	2	750 kW	TRANIER GCP-026-M-5-NR-48	AME00085
3	256.10-A0010	MAIN MACHINERY SPACE SCU COOLER	1	82 kW	ANA MARINE	MT000370
4	256.10-A0011	MAIN MACHINERY SPACE SCU COOLER PUMP	1	24 m ³ /hr @ 2 BAR	MU 40-200	PUM00003
5	256.10-A0032	BOW THRUSTER HEAT EXCHANGER	1	45 kW	TRANIER UXP-005-H-6-UI-25	AME00136
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7	256.10-A0003	DUPLEX STRAINER, MACHINERY COOLING	1	6", 2MM MESH	ASTM B62, ANSI B16.5	STR00082
8	256.10-A0005 256.10-A0006	SIMPLEX STRAINER, TO MACHINERY SW COOLING PUMP	2	4", 5MM MESH	ASTM B62, ANSI B16.5	STR00071
9	256.10-A0009	SIMPLEX STRAINER, TO MAIN SPACE SCU COOLING PUMP	1	2-1/2", 5MM MESH	ASTM B62, ANSI B16.5	STR00072
10	256.10-V0049	3WAY ACTUATED VALVE/ THERMOSTATIC CONTROLLER	1	3W-BL, BRZ, 6", THERMO OP	ASTM B62, ANSI B16.10, 110V ACTUATOR, 4-20MA ELECTRIC POSITIONER	VLV00614
11	256.10-V0054 256.10-V0055	ORIFICE PLATE, TO MAC. COOLING	2	4", HOLE 1.875, PLATE THK. 1/8"	ALLOY STEEL — 316	VLV00557
12	256.10-V0056	ORIFICE PLATE, TO MAC. COOLING	1	2", HOLE 0.75, PLATE THK. 1/8"	ALLOY STEEL — 316	VLV00555
13	243.10-A0003	STERNUBE WATER QUALITY UNIT	1	5 m ³ /hr @ 3 BAR	WARTISLA DWG# H30677-01	POM00015





Fisheries and Oceans
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Canadian
Coast Guard

Garde côtière
canadienne

EKME #3750834

Integrated Technical Services



Safety First, Service Always



Technical Drawings Modification (Red-lining / Mark-ups) and Workflow process

Specification

Published under the Authority of:
Integrated Technical Services Directorate
Fisheries and Oceans Canada
Canadian Coast Guard
Ottawa Ontario, K1A 0E6

<http://intra.coast-guard.ca/ITS/Home>

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Disponible en français : Modification des dessins techniques (révision / annotations) et processus de flux de travail - Spécification

MGCE n° 3885376

Record of Amendments

#	Date	Description	Initials
0.1	April 2018	DRAFT	YJ
0.2	Sep 2018	Draft – changes incorporated from NMC review	YJ

Approvals







Office of Primary Interest (OPI)/ Bureau de première responsabilité (BPR)		Yvon Johnson	Date 19 Oct 18	Approval/Approbation 
Director/Directeur Technical Management/ Gestion technique		Crista-lynn Ferguson	19 Oct 2018	
Request Additional ITS Director Approval/ Demande d'approbation de directeur STI supplémentaire	✓ EI: T. Montor		Oct 19, 2018	
	✓ MCI: J. Murphy		Oct 24/18	
	✓ ME: C. Harvey <i>unt</i>		Nov 19/18	
Director General/ Directeur général Integrated Technical Services / Services techniques intégrés		Sam Ryan	NOV 21 2018	
Notification will be sent to: <ul style="list-style-type: none"> Regional and HQ ITS personnel Exec. Director/ Director of Studies, CCGC CCG Operations DGO RD Program Management VP Engineering Support Group, CCG S&S group 			La notification sera envoyée à : <ul style="list-style-type: none"> Le personnel des STI au niveau régional et de l'AC ; Directeur exécutif et le directeur des études, au GCCC DGO des opérations de la GCC ; Directeurs régionaux de la gestion des programmes; VP Groupe de soutien technique, et la Groupe de S & S de la GCC 	
Comments/Commentaires : small revision to 1-1-1-D				

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Document Management

1. Authority

This document is issued by the Director General, Integrated Technical Services, CCG's National Technical Authority under delegation from the Deputy Minister, Fisheries and Oceans and the Commissioner of the Canadian Coast Guard.

2. Responsibility

The Manager, Configuration Management and Technical Data Management, is responsible for:

- a. the creation and promulgation of the document; and
- b. the identification of an Office of Primary Interest (OPI) who is responsible for the coordination and the content of the document

The OPI is responsible for:

- a. the validity and accuracy of the content;
- b. the availability of this information;
- c. the update as needed;
- d. the periodical revision; and
- e. the follow-up of all requests, comments and/or suggestions received by the originator.

3. Inquiries and/or Revision Requests

All inquiries regarding this document, including suggestions for revision and requests for interpretation shall be addressed to:

Project/Technical Officer, Technical Data
Integrated Technical Services (ITS)
Mail Stop 7N135B
200 Kent Street, Ottawa, ON K1A 0E6.

All requests should be clear, concise; and reference the specific Section, Figure or Table.

Foreword

This Specification document provides a source of information for Canadian Coast Guard (CCG) personnel and is intended to clarify the expectations of management regarding how the Technical Data Management (TDM) of the modification (mark-ups or red-lining) to Technical Drawings must be performed. It is based upon the American Society of Mechanical Engineers (ASME) Y14.35M-1997 (reaffirmed 2003) document entitled “Revision of Engineering Drawings and Associated Documents” and is to be used in conjunction with the CCG Standard for Computer Assisted Design using AutoCAD, CT-014-000-ES-TD-001 EKME #263153, as well as the Technical Data Management Standard CA-014-000-NS-TD-001, EKME#719352. This document will guide personnel in ensuring that a common approach to Technical Drawing mark-ups will be carried out throughout the CCG regardless of region.

This document has equal authority in either official language. Where problems of interpretation arise, preference shall be given to the most recent version of this document, followed by the other CCG TDM-related Publications referenced in Section 3. Where gaps and/or omissions are encountered within this document, ASME Y14.35M will be used to address any such shortcomings.

1. Purpose

The purpose of this Specification is to provide the details necessary for the CCG Technical Community to have nationally consistent Technical Drawings and a national convention regarding the indication of changes to those drawings.

2. Scope

This Specification applies to the management of Technical Drawings that are representative of CCG Shore based and Floating Assets. It is directed towards ITS engineering and production personnel, operators, clients, as well as outsourced suppliers and contractors when contractually required by CCG to provide drawings as a project or procurement deliverable (such as to potential subcontractors for estimating purposes when changes are required to be promulgated for refit or other asset work activities).

It is not applicable to Non-CCG Assets, or publications, drawings, diagrams, or illustrations not considered Technical Data as described in the Technical Data Management Standard CA-014-000-NS-TD-001, EKME #719352.

3. Objectives

The objectives of this specification are as follows:

- a. To establish the requirements to be met regarding how Technical Data, more specifically Technical Drawings related to CCG Assets, are marked-up (or red-lined);
- b. To provide a nationally consistent workflow to be followed involving the changes to Technical Drawings; and
- c. To identify the procedures and tools necessary to arrive at a nationally consistent product in the form of Technical Drawings.

4. Functional Responsibilities

The following responsibilities are associated with the Technical Drawings Modification (Mark-ups) and Workflow process:

- a. The Manager, Configuration Management and Technical Data Management (CMTDM) is responsible and held accountable for the performance of the National Configuration Management and Technical Data Management Program;
- b. The Technical / Project Officer, Technical Data is responsible for the delivery of Technical Data Management Program services to the CCG Technical Community. He / she reports to the Manager, CMTDM;
- c. The Superintendent Technical Management (TM) (formerly Superintendent Integrated Logistic Support (ILS)) is responsible for management of the regional Configuration Management and Technical Data Management program within their respective region;
- d. The Supervisor, Configuration Management and Technical Data Management is responsible for the management of the Configuration Management and Technical Data Management Officers under their purview;
- e. The Configuration Management and Technical Data Management (CMTDM) Officer (formerly Technical Data Management (TDM) Officer) is responsible for receiving the clients' marked-up drawings, working with the client to incorporate resultant revisions to the master copies in the controlled repository, after the requisite approvals have been obtained;
- f. The Superintendent of the applicable Technical Stream (Marine Engineering, Electronics and Informatics, Maritime Civil Infrastructure) is responsible for ensuring their staff employ this specification and process, and ensures effective communication and collaboration exists between operator/end user, engineering, and the Configuration Management and Technical Data Management Officer;
- g. The Engineering Manager of the applicable Technical Stream (Marine Engineering, Electronics and Informatics, Maritime Civil Infrastructure) is responsible for ensuring the technical drawings associated with the assets under their responsibility conform to the standards and processes of the CCG Configuration Management and Technical Data Management program; and
- h. The Life Cycle Manager (LCM) / Asset Class Manager (ACM) is ultimately responsible for any modifications to assets, equipment or systems under their purview and the approval thereof. As the delegated Technical Authority, he/she is advised of any CCRs and associated changes to Technical Data under their responsibility.

Section 1 MARK-UP SPECIFICATION

The following information is provided to improve the quality of the marked-up prints and thereby facilitate preparation of formally released revisions of drawings, usually as a minimum, the final “As-Fitted” or “As-built” drawings, but also Component, Assembly, System, Line and Interface Control Drawings, etc., if interrelated and applicable to the proposed change. The most important requirement is that the marked-up changes on the prints are complete, legible and employ the convention and instructions described within this document.

It should be noted that the rationale for adopting the following Mark Up Specification and Process is based on a well-established regime that requires detailed identification and description of all items to be changed in the drawing, in order that future reviewers of the Marked-up drawings, including the draftsperson, will be able to determine that all items have been verified, questioned or changed, and that no items have been missed from this activity.

The consistent mark-up by the end user and drawing rendering by the CMTDM Officer will further facilitate Configuration Management of the assets in the Maximo Asset Management System and the Meridian Technical Data Management System. This process will also facilitate the engineering, production and Integrated Logistic Support elements’ (Maintenance Management, Supply Chain Management, Technical Training Management, Configuration Management and Technical Data Management) activities associated with the particular CCG Asset affected.

1.1 REQUIREMENTS

1.1.1 Components of a Technical Drawing

An example of a marked-up drawing is shown in Figure 1. A technical drawing will consist of the following basic components and will be developed using the ITS Standard for Computer Aided Design using AutoCAD CT-014-000-TD-ES-001 (EKME #263153):

- a. Drawing Area;
- b. Border;
- c. Title Block that contains:
 - 1) Asset (Site/Ship), Drawing (Title / Nomenclature);
 - 2) Drawing Number (unique drawing identifier);
 - 3) Drawing Date;
 - 4) Vendor / Manufacturer data; and
 - 5) Drawn / Designed / Reviewed and Approved by, and dates; and
- d. Revision Status block containing:
 - 1) Revision Number;
 - 2) Revision Date;
 - 3) Description; and
 - 4) Revised By.

Technical Drawings Modification (Red-lining / Mark-ups) and Workflow process

Mark-up Specification

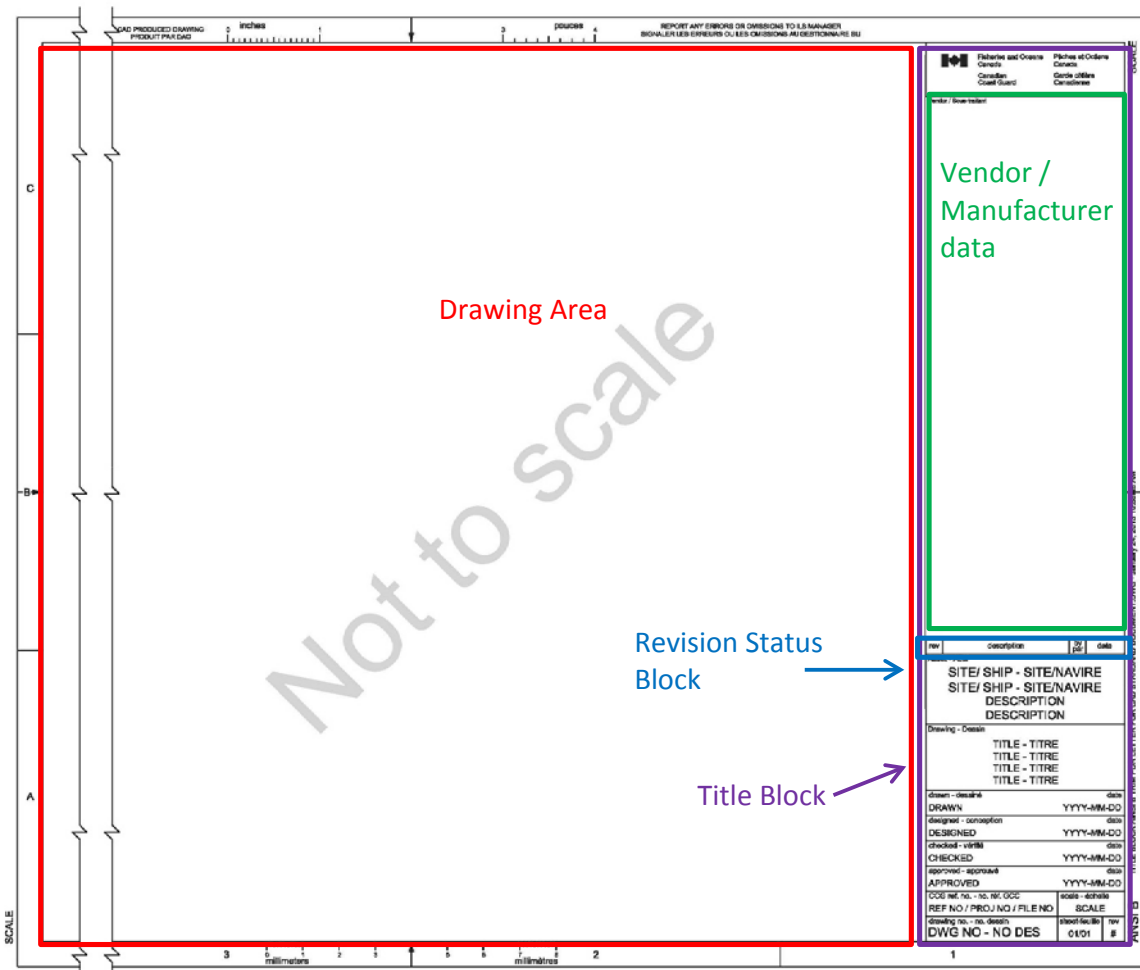


Figure 1 Components of a Technical Drawing

1.1.2 General Requirements

- When revisions to technical drawings require corrections in the form of additions or deletions to the contents of a drawing, these will be indicated with red indelible ink.
- The revisions will be identified with a numbered delta triangle and will include graphics, dimensions and notes describing the modification requested.
- Revisions will be documented in the Revision status portion of the Title Block of the drawing with a red numbered delta triangle and a description of the modification.
- To ensure consistency between the marked-up drawing and the most recent approved and released revision, the person proposing the drawing change is responsible to ascertain and take responsibility as the change Engineering Officer of Primary Interest (OPI) and are available and required to discuss the change details with the CMTDM Officer designated as the draftsman. The change OPI remains responsible to ensure that:

Mark-up Specification

- 1) technical drawing change is representative of the physical configuration of the Product described;
 - 2) sufficient information is provided to describe the change; and
 - 3) technical drawing mark-up review and approval workflow stakeholders are identified to the CMTDM Officer engaged in the workflow.
- e. The marked-up drawings will be scanned as PDF's and linked to the relevant approved Configuration Change Request (CCR) / Configuration Change Order (Maximo Work Order) Number for historical references.
- f. Once the change has been authenticated and approved by the Technical Authority, the final modified drawings will be issued to the national repository (Meridian Technical Data Management System (TDMS)) for stakeholders' use.

1.1.3 Mark-ups or Red-lining

- a. The marking up (or red-lining) of drawings will be performed by the end user, engineering or production personnel, contractor, etc. according to this specification.
- b. The proposed modifications to a technical drawing in the form of mark-ups by the end user or external contractor will be communicated for endorsement by the corresponding Engineering sectors' representative prior to engaging the services of the TDM Officer. This is required so that the drawing mark-ups are clearly contemplated and identified and so that the proposed mark-ups are easily interpreted by the CMTDM Officers.
- c. The production of the formal revision to the technical drawing according to the marked-up (red-lined) drawing will be performed by the TM CMTDM Officer.
- d. The changes on a paper or electronic copy of the drawing, as proposed by the end user, shall respect and follow the mark-up conventions as follows:
 - 1) Mark-ups to a technical drawing will be encompassed and highlighted using a "cloud" symbol.
 - 2) The next revision of the drawing will be identified as an increment to the revision identifier (alpha or numeric) already listed in the Revision Status Block, and will also be identified inside a triangle next to the "cloud" symbol denoting the modification.
 - 3) Within the cloud symbol that encompasses the proposed mark-up, provide a textual statement as to the actions required of the proposed change, preceded by one or more of the following words:
 - i. "Remove", to indicate that a portion of the drawing was not constructed, installed, or implemented, or needs to be removed for other reasons, the word "remove" will be inscribed at or near the corresponding delta triangle in the drawing area as well as in line with the corresponding delta triangle in the Revision Status block. Graphics and /or text related to the removed content, as encapsulated within the cloud symbol, will be crossed out (X) or marked through (strikethrough). To

Mark-up Specification

identify a drawing view (e.g. section, details, plans, profiles, elevation, etc.) to be removed, draw a cloud symbol around the drawing view or design option, and place an “X” across the cloud and write “not used” within the box. The end user will ensure that associated notes accompany the selected area, or will refer to attached notes, in line with the delta triangle both in the drawing area as well as within the Revision Status block (see examples Figures 2 and 3);

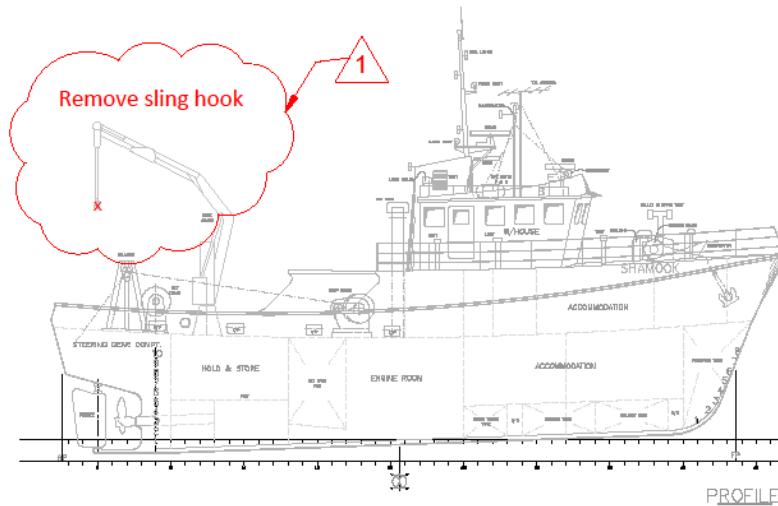


Figure 2 Example of “Remove” mark-up to the content of a technical drawing in the drawing area

Technical Drawings Modification (Red-lining / Mark-ups) and Workflow process

Mark-up Specification



	2017-11-15	Removed sling hook as per Work Order Request 123	D.P.
rev.	date	description	by
		323 Kenmount Road P.O. Box 13545, Stn. A St. John's, Nfld., CANADA A1B 4B8 Phone: (709)739-4321 Fax : (709)739-4421	
CLIENT: DEPT. OF FISHERIES AND OCEANS			
TITLE: F.R.V. SHAMOOK GENERAL ARRANGEMENT			
APPROVALS:	SCALE: 1/4" = 1'-0"	DWN. BY: T.R.E.	DATE: 20/07/94
OWNERS:	CSI:	JOB NO.: 94043	SHT:
CLASS:	FLB:	DWG. NO.:	

Figure 3 Example of “Remove” mark-up to the Revision Status area of a technical drawing Title Block

- ii. “Add”, to indicate additions to the drawing, the word “add” will be inscribed at or near the corresponding delta triangle in the drawing area as well as in line with the corresponding delta triangle in the Revision Status block. A cloud symbol will be drawn to encompass the entire affected graphics and / or text within the drawing area, with associated notes as needed to describe the addition (see examples Figures 4 and 5);

Technical Drawings Modification (Red-lining / Mark-ups) and Workflow process

Mark-up Specification

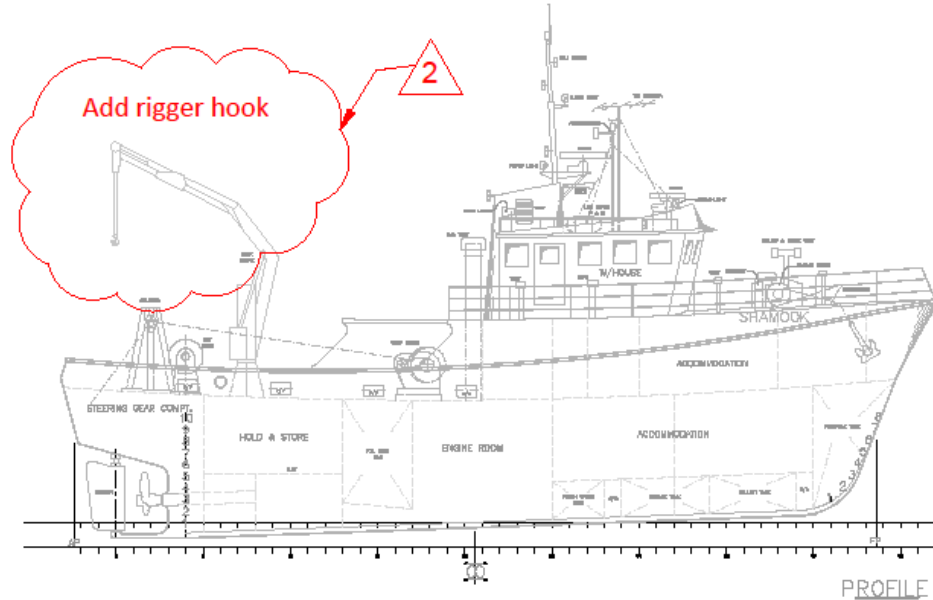


Figure 4 Example of “Add” mark-up to the Revision Status area of a technical drawing Title Block

	2017-11-16	Added rigger hook as per Work Order Request 123	D.P.
	2017-11-15	Removed sling hook as per Work Order Request 123	D.P.
rev.	date	description	by
		323 Kenmount Road P.O. Box 13545, Stn. A St. John's, Nfld. CANADA A1B 4B8 Phone: (709)739-4321 Fax : (709)739-4421	
CLIENT: DEPT. OF FISHERIES AND OCEANS			
TITLE: F.R.V. SHAMOOK GENERAL ARRANGEMENT			
APPROVALS:	SCALE: 1/4" = 1'-0"	DWN. BY: T.R.E.	DATE: 20/07/94
OWNERS:	CSL:	JOB NO.: 94043	SHT:
CLASS:	FLB:	DWG. NO.:	

Figure 5 Example of “Add” mark-up to the Revision Status area of a technical drawing Title Block

Mark-up Specification

- iii. “Replace”, to indicate that a portion of the drawing needs to be replaced according to corresponding instructions without separately articulating the actions of deletions or additions as in the previous subparagraphs, the word “Replace” will be inscribed at or near the corresponding delta triangle in the drawing area as well as in line with the corresponding delta triangle in the Revision Status Block. A cloud symbol will be drawn to encompass the entire affected graphics and / or text within the drawing area, with associated notes as needed to describe the modification (see examples Figures 6 and 7); and
- iv. Other succinct action terms as needed.

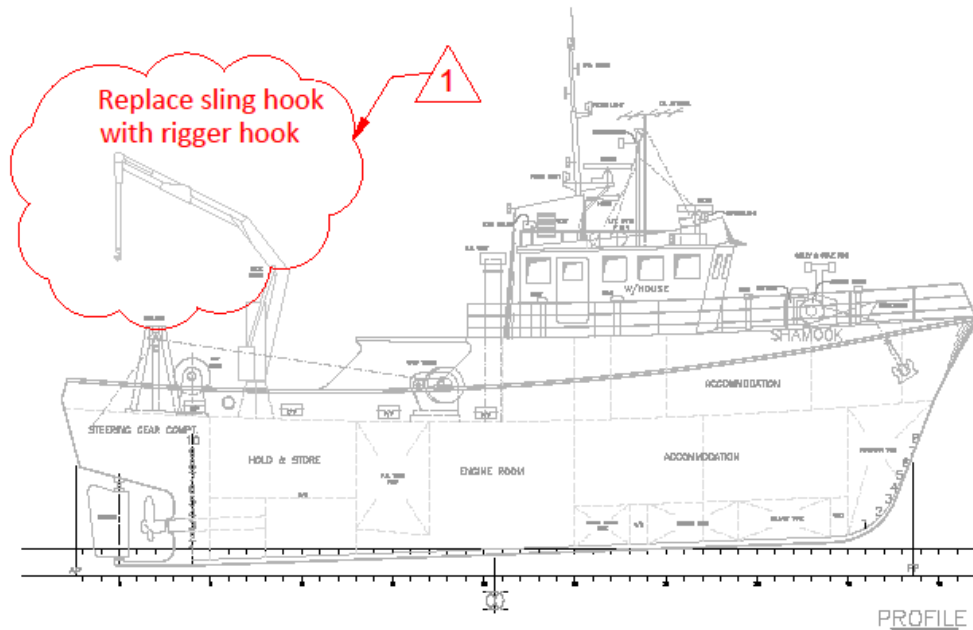


Figure 6 Example of “Replace” mark-up to the content of a technical drawing in the drawing area

- 4) Include as many cloud symbols as required to clearly identify the proposed change.
- 5) If a lack of physical space precludes inscribing the textual statement(s) (or associated notes) within the drawing area, use of a separate notes page is affixed to the marked-up drawing.

Technical Drawings Modification (Red-lining / Mark-ups) and Workflow process

Mark-up Specification



	2017-11-15	Replaced sling hook with rigger hook as per Work Order Request 123	D.P.
rev.	date	description	by
		323 Kenmount Road P.O. Box 13545, Stn. A St. John's, Nfld. CANADA A1B 4B8 Phone: (709)739-4321 Fax : (709)739-4421	
CLIENT: DEPT. OF FISHERIES AND OCEANS			
TITLE: F.R.V. SHAMOOK GENERAL ARRANGEMENT			
APPROVALS:	SCALE: 1/4" = 1'-0"	DWN. BY: T.R.E.	DATE: 20/07/94
OWNERS:	CSI:	JOB NO.: 94043	SHT:
CLASS:	FLB:	DWG. NO.:	

Figure 7 Example of “Replace” mark-up to the Revision Status area of a technical drawing Title Block

- 6) The drawing’s Revision Status field of the Title Block will be modified to include the following:
- Following the last identified revision level, in the next available revision data field (row), insert the number/letter of the next increment and, if required continue the increments in sequential order, to list the individual steps/annotations related to the mark-ups inserted. (see Figures 3, 5 and 7);
 - At a minimum, in-line with the revision increment, a statement will be added such as: “Revised in accordance with the Approved CCR XXXX”, or “Maximo Work Order Number XXXX” (where XXXX represents the number) as applicable; and
 - The change Engineering Officer of Primary Interest (OPI)’s initials.

Section 2 MARK-UP WORKFLOW PROCESS

Change to Technical Data (TD) including technical drawings describing the product being changed would normally be initiated by the Configuration Change Request (CCR) process, specifically as a result of a corresponding Maximo Work Order for implementation of an approved CCR, and the work is carried out and reported using Maximo. In exceptional cases, changes to TD can be requested using the TD Change Request Form (see Technical Data Management Standard CA-014-000-NS-TD-001, EKME #719352).

2.1 TECHNICAL DRAWINGS MODIFICATION WORKFLOW

Figure 8 depicts the workflow associated with the modification of Technical Drawings and the stakeholders' responsibilities.

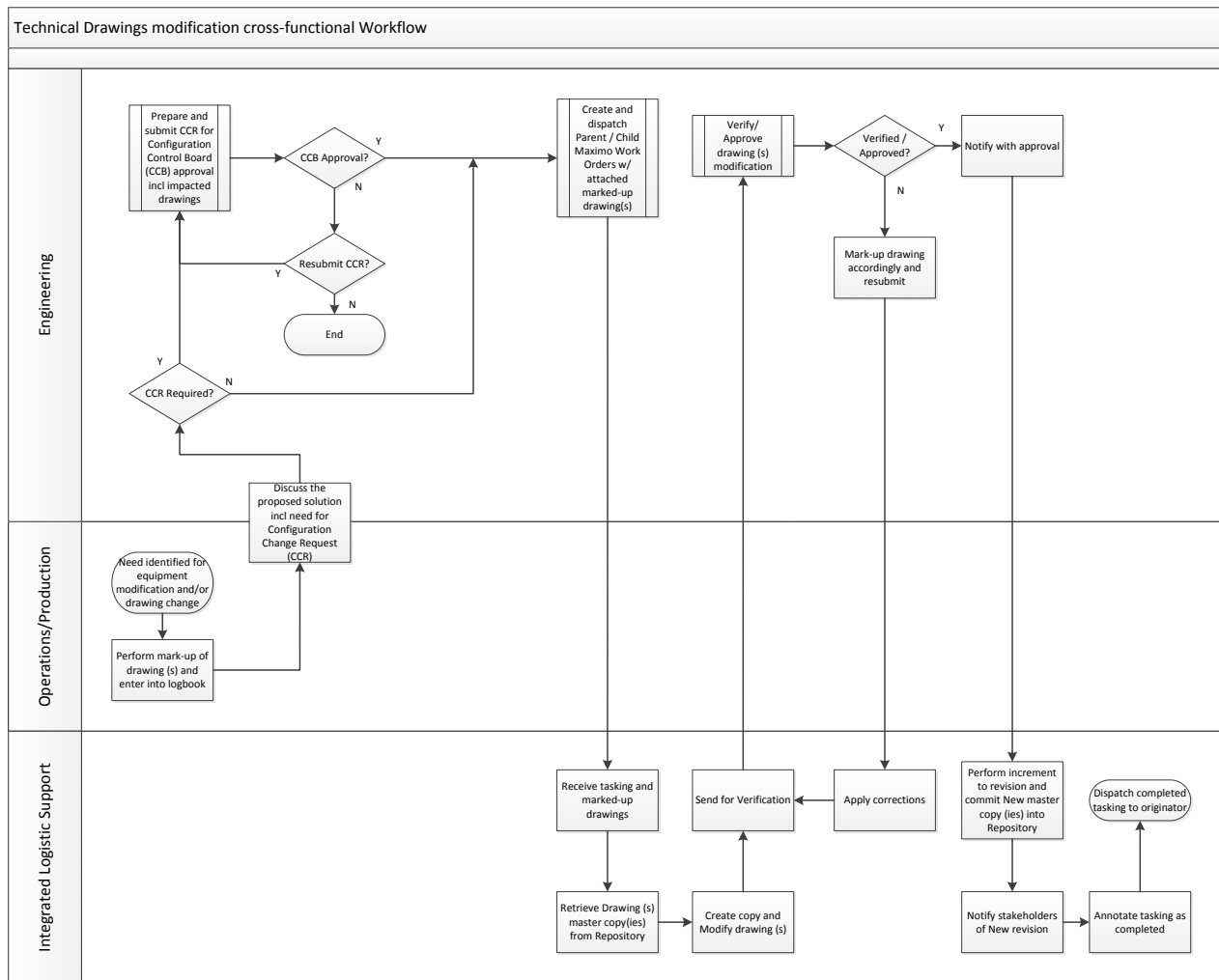


Figure 8 Technical Drawings Modification workflow

2.2 REMOTE SITES AND DEPLOYED VESSELS' RECORDING / TRACKING OF TD CHANGES ROUTED TO ENGINEERING

A mechanism will exist to keep track of any submitted changes to uncontrolled Technical Data that may reside at remote sites or deployed vessels and that have subsequently been conveyed to Technical Management via the Engineering Office. An instrument such as a logbook will be created and maintained, and reside at the remote site or vessel.

2.2.1 TD Change Logbook

For several reasons such as limited or no access to DFO network (and as a result no access to tools such as Maximo Asset Management System (AMS), Meridian Technical Data Management System (TDMS), or for those locations where a paper based Technical Data Package resides, there may be a requirement to track the status of changes dispatched to Engineering for action as part of the workflow described in Figure 8.

In such as case, a logbook will exist on premises (remote site and/or deployed Vessel) to keep a record of TD that has been marked-up and dispatched to the TM CMTDM Officer via the Engineering Office, and when the resultant file has been actioned and the revised TD approved and officially released. The logbook will consist of the following information regarding Marked-Up Technical Data:

- a. Drawing title;
- b. Drawing number;
- c. Current Revision number;
- d. Current Revision date;
- e. Date sent to Engineering or TM;
- f. New Revision Number;
- g. New Revision Date; and
- h. Date Received from Engineering or TM.

2.3 CONFIGURATION CHANGE REQUEST (CCR) AND MAXIMO WORK ORDER

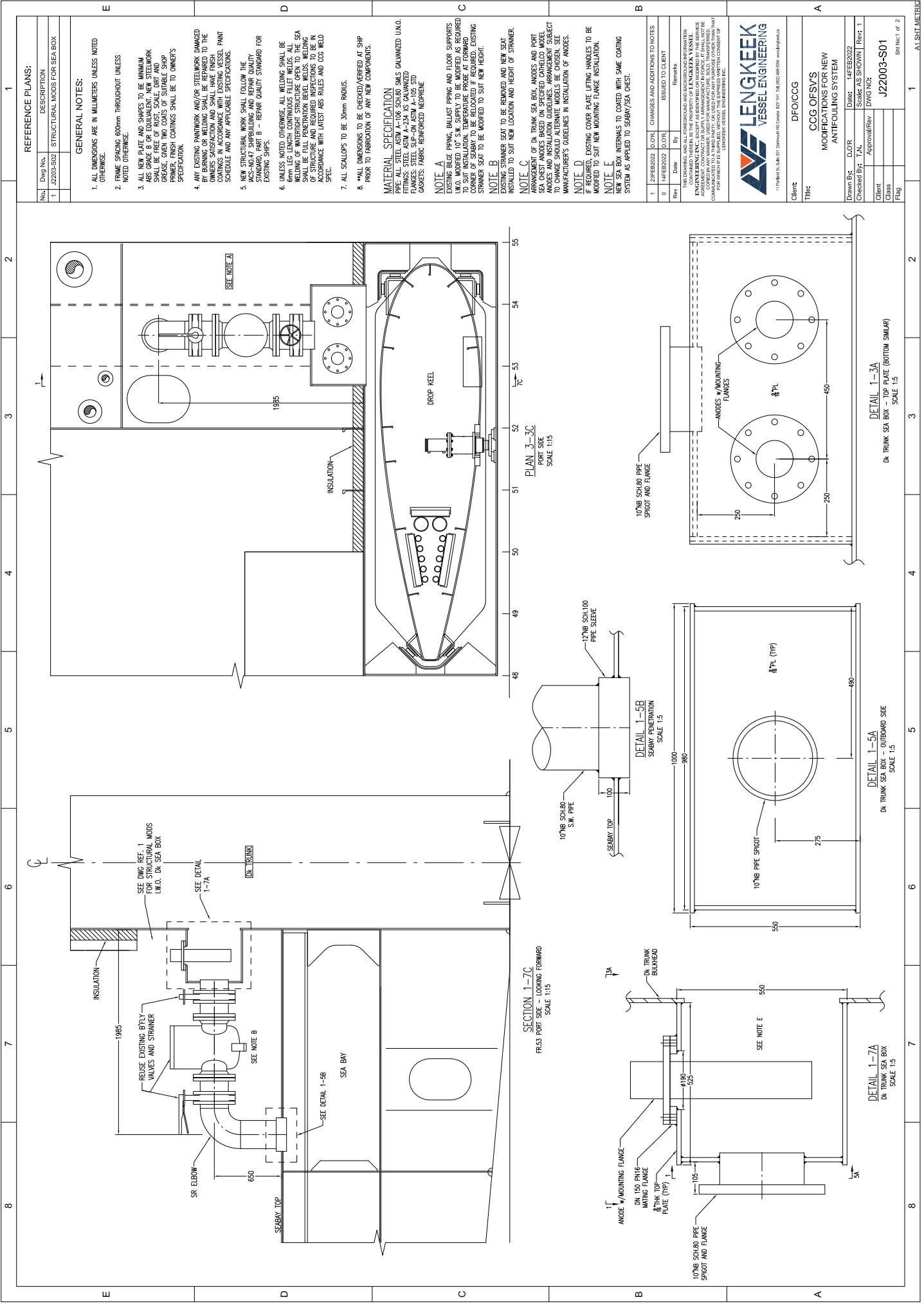
A change to Technical Data is generally required as a result of the Configuration Change Request Process impact assessment (see Configuration Change Request (CCR) Standard Operating Procedure (SOP) CT-013-000-EO-CM-001, Revision no.2 Dated 12/03/2018 (EKME #2335721)), which, if approved for implementation, normally would result in a Maximo Work Order. The change is usually identified by the end user, and managed by the Engineering Stream responsible as Technical Authority associated with the Asset undergoing change.

Section 3 REFERENCES

3.1 REFERENCED DOCUMENTATION

The following references are cited in this document:

- a. American Society of Mechanical Engineers (ASME) Y14.35M-1997 (reaffirmed 2003) document entitled “Revision of Engineering Drawings and Associated Documents”;
- b. ITS Standard for Computer Aided Design using AutoCAD CT-014-000-TD-ES-001 (EKME #263153);
- c. Technical Data Management Standard CA-014-000-NS-TD-001 (EKME #719352); and
- d. Configuration Change Request Standard Operating Procedure (CCR SOP) CT-013-000-EO-CM-001, Revision no.2 Dated 12/03/2018 (EKME #2335721).



REFERENCE PLANS:

No.	Dwg No.	DESCRIPTION
1.	J2203-S02	STRUCTURAL MODS FOR SEA BOX

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. FRAME SPACING 600mm THROUGHOUT UNLESS NOTED OTHERWISE.
3. ALL NEW PLATE AND SHAPES TO BE MINIMUM AISI GRADE B OR EQUIVALENT NEW STEELWORK SHALL BE FREE OF RUST, SCALE, DIRT AND OIL. SURFACES SHALL BE PREPARED BY GRINDING OR POWER FINISH COATINGS SHALL BE TO OWNER'S SPECIFICATION.
4. ANY EXISTING PAINTWORK AND/OR STEELWORK DAMAGED BY CORROSION OR OTHER MEANS SHALL BE REPAIRED TO THE ORIGINAL CONDITION. COATINGS IN ACCORDANCE WITH EXISTING VESSEL PAINT SCHEDULE AND ANY APPLICABLE SPECIFICATIONS.
5. NEW STRUCTURAL WORK SHALL FOLLOW THE IACS-NC47 SHIPBUILDING AND REPAIR QUALITY STANDARD, PART B - REPAIR QUALITY STANDARD FOR EXISTING SHIPS.
6. UNLESS NOTED OTHERWISE, ALL WELDING SHALL BE 6mm LEG LENGTH CONTINUOUS FILLET WELDS. ALL WELDING SHALL BE FULL PENETRATION BEVEL WELDS. WELDING OF STRUCTURE AND REQUIRED INSPECTIONS TO BE IN ACCORDANCE WITH LATEST AISI RULES AND CCS WELD SPEC.
7. ALL SCALLOPS TO BE 30mm RADII.
8. *ALL DIMENSIONS TO BE CHECKED AGAINST AS SHIP PRIOR TO FABRICATION OF ANY NEW COMPONENTS.

MATERIAL SPECIFICATION

PIPE: ALL STEEL ASTM A-106 SCH.40, SMLS GALVANIZED UNO.
FITTINGS: STEEL ASTM A-234 XS GALVANIZED
FLANGES: STEEL SUP-ON ASTM A-105 STD
GASKETS: FABRIC REINFORCED AS REQUIRED

NOTE A

EXISTING BULGE PIPING, BALLAST PIPING AND FLOOR SUPPORTS I.M.O. MODIFIED 10" S.W. SUPPLY TO BE MODIFIED AS REQUIRED TO SUIT INSTALLATION. TEMPERATURE PROBE AT FORWARD END OF EXISTING BULGE PIPING TO BE MODIFIED TO SUIT NEW HEIGHT.

NOTE B

EXISTING STRAINER SEAT TO BE REMOVED AND NEW SEAT INSTALLED TO SUIT NEW LOCATION AND HEIGHT OF STRAINER.

NOTE C

ARRANGEMENT OF DA TRUNK SEA BOX ANODES AND PORT ANODES AND INSTALLATION GUIDELINES. ARRANGEMENT SUBJECT TO CHANGE SHOULD ALTERNATE MODELS BE CHOSEN. SEE MANUFACTURER'S GUIDELINES IN INSTALLATION OF ANODES.

NOTE D

IF REQUIRED, EXISTING COVER PLATE LIFTING HANDLES TO BE MODIFIED TO SUIT NEW MOUNTING FLANGE INSTALLATION.

NOTE E

NEW SEA BOX INTERNALS TO COATED WITH SAME COATING SYSTEM AS APPLIED TO SEABAY/SEA CHEST.

Rev	Date	By	Remarks
1	20FEB2022	[Signature]	CHANGES AND ADDITIONS TO NOTES
0	14FEB2022	[Signature]	ISSUED TO CLIENT

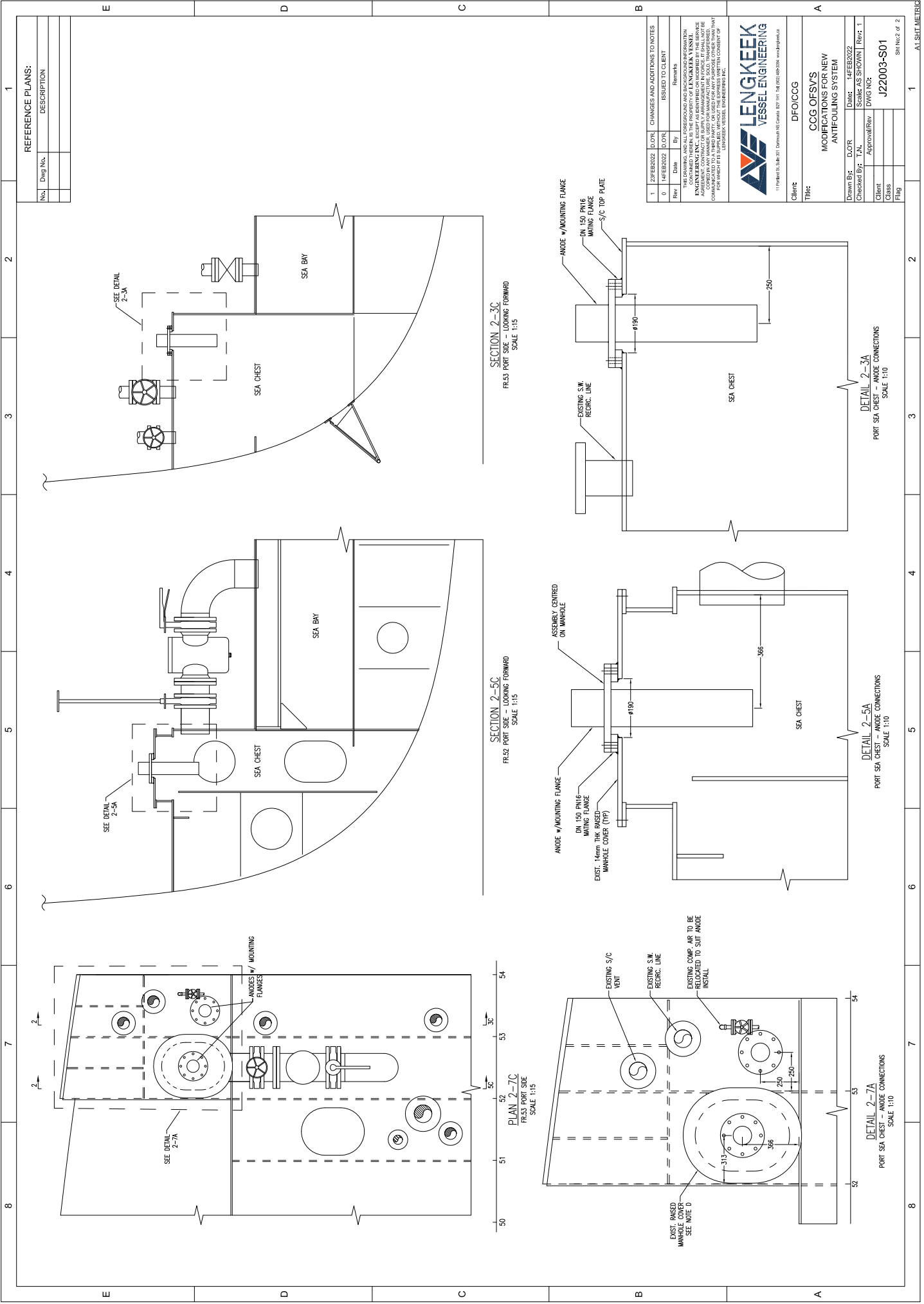
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Client: DFO/CCG
Title: CCG OFS/V'S MODIFICATIONS FOR NEW ANTIFOULING SYSTEM

Drawn By: D.O.R. Date: 14FEB2022
Checked By: T.A.N. Scale: AS SHOWN Rev: 1
Approval/Rev: DWG NO: J22003-S01

Client: Class: Project: Ship No: 2



REFERENCE PLANS:	
No.	Description

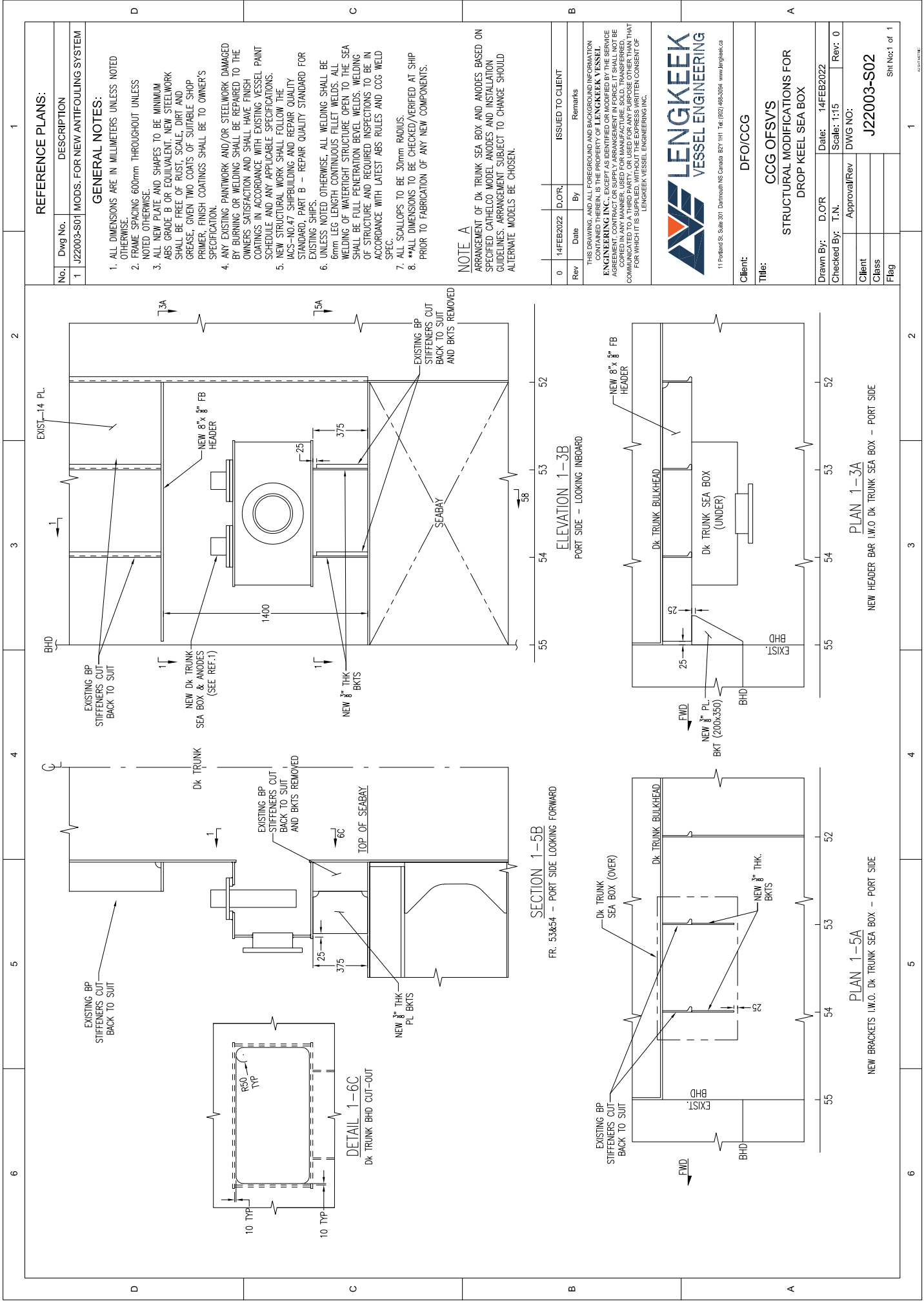
1	20FEB2022	D.O.R.	CHANGES AND ADDITIONS TO NOTES
0	14FEB2022	D.O.R.	ISSUED TO CLIENT
Rev	Date	By	Remarks

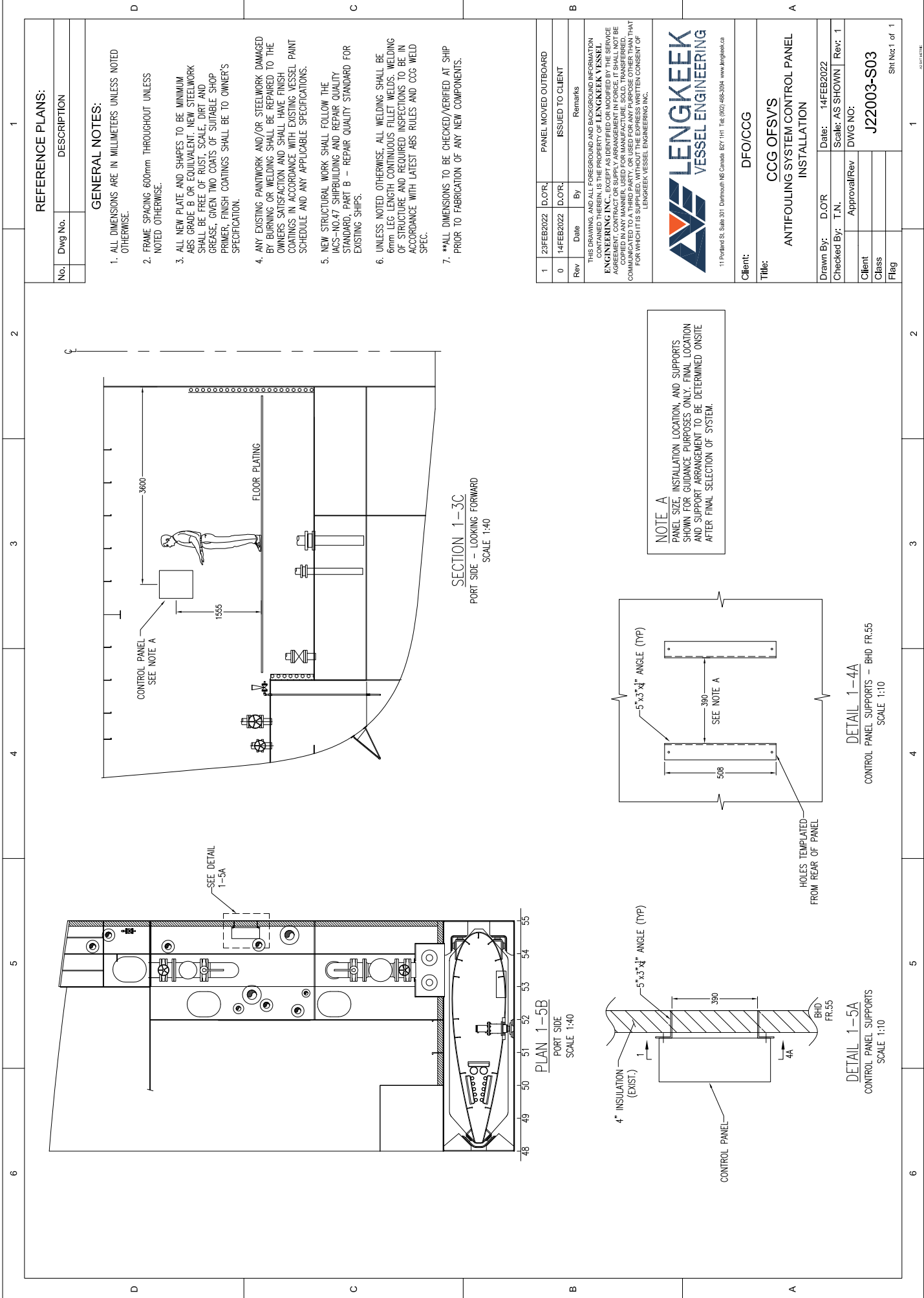
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Client: DFO/CCG
Title: CCG OFSV'S
MODIFICATIONS FOR NEW
ANTI-FOULING SYSTEM

Drawn By: D.O.R.	Date: 14FEB2022
Checked By: T.A.N.	Scale: AS SHOWN Rev: 1
Approval/Rev:	DWG NO: J22003-S01
Client:	Class:
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REFERENCE PLANS:	
No.	Dwg No.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. FRAME SPACING 600mm THROUGHOUT UNLESS NOTED OTHERWISE.
3. ALL NEW PLATE AND SHAPES TO BE MINIMUM ABS GRADE B OR EQUIVALENT. NEW STEELWORK SHALL BE FREE OF RUST, SCALE, DIRT AND GREASE. GIVEN TWO COATS OF SUITABLE SHOP PRIMER. FINISH COATINGS SHALL BE TO OWNER'S SPECIFICATION.
4. ANY EXISTING PAINTWORK AND/OR STEELWORK DAMAGED BY BURNING OR WELDING SHALL BE REPAIRED TO THE OWNER'S SATISFACTION AND SHALL HAVE FINISH COATINGS IN ACCORDANCE WITH EXISTING VESSEL PAINT SCHEDULE AND ANY APPLICABLE SPECIFICATIONS.
5. NEW STRUCTURAL WORK SHALL FOLLOW THE IACS-NQ.47 SHIPBUILDING AND REPAIR QUALITY STANDARD, PART B - REPAIR QUALITY STANDARD FOR EXISTING SHIPS.
6. UNLESS NOTED OTHERWISE, ALL WELDING SHALL BE 6mm LEG LENGTH CONTINUOUS FILLET WELDS. WELDING OF STRUCTURE AND REQUIRED INSPECTIONS TO BE IN ACCORDANCE WITH LATEST ABS RULES AND CCG WELD SPEC.
7. **ALL DIMENSIONS TO BE CHECKED/VERIFIED AT SHIP PRIOR TO FABRICATION OF ANY NEW COMPONENTS.

1	23FEB2022	D.O.R.	PANEL MOVED OUTBOARD
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Client:	DFO/CCG
Title:	CCG OFSV'S ANTIFOULING SYSTEM CONTROL PANEL INSTALLATION

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Checked By:	T.N.	Scale:	AS SHOWN
Approval/Rev		DWG NO:	J22003-S03
Client			
Class			
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Welding Specification



Canadian Coast Guard

August 2017

Published under the Authority of:

Integrated Technical Services Directorate
 Fisheries and Oceans Canada
 Canadian Coast Guard
 Ottawa, Ontario
 K1A 0E6

Disponible en français : **Norme de soudage des métaux ferreux** First Edition – - March 2014

Available on CCG Intranet site at: <http://ccg-gcc.ncr.dfo-mpo.gc.ca>

Record of Amendments

#	Date	Description	Initials
1	April 2014	approved by DG.	
2	January 2016	Corrections made to some of the references herein, to section 5	CG
3	August 2017	CWB and NDT audit requirements, Clauses 5.6.1 and 5.6.2 Quantity of NDT required for New Construction, Clause 5.6.5.2 Undercut Acceptance Criterion, Clauses 5.6.9.2 and 5.6.10.2 Third Party Weld Inspection Requirement, Clause 5.6	L.P

Approvals

Office of Primary Interest (OPI)	Tracey Clarke	Approved:	2014-APRIL-10
		Date:	
Manager, Engineering and Maintenance Hull/ Mechanical/ Electrical	Anne Marie Sekerka	Approved:	2014-APRIL-10
		Date:	
Director, Marine Engineering Services (ITS)	Gary Ivany	Approved:	2014-APRIL-10
		Date:	
Clifford Harvey Director, Marine Engineering	Approval for amendment number 3, made in August 2017 August 23, 2017		
Director General, Integrated Technical Services	Michel Cecire	Approved: Amendments	2014-APRIL-11
Sam Ryan, Director General, Integrated Technical Services	Approval for amendment number 3, made in August 2017 August 23, 2017		

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DO NOT MODIFY

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Foreword

This Specification has been prepared by Marine Engineering, Integrated Technical Services (ITS), Canadian Coast Guard, Fisheries and Oceans Canada, Ottawa.

The purpose of this Specification is stated in Chapter 1.0, Scope.

When, this Specification is used other than as stated in the Scope, it shall remain the responsibility of the user to judge its suitability for their particular purpose.

Section 1 SCOPE

This Specification establishes the requirements of Marine Engineering, Integrated Technical Services, Canadian Coast Guard, Fisheries and Oceans Canada, Ottawa.

This Specification shall be followed whenever required by contract.

This Specification details the requirements for welding and non-destructive inspection of welds for structural steel, aluminum and stainless steel and the wide variety of other materials used for installation of pressure piping, pressure vessels and pressure containment systems and, shipboard equipment.

This Specification is intended as an Owner's requirement. In addition to this Specification, the Contractor shall meet all regulations and rules required by Transport Canada Marine Safety and Security and, the governing Classification Society as applicable.

When the above mentioned rules exceed the requirements specified herein, the more stringent requirement shall take precedence.

Section 2 DEFINITIONS & ABBREVIATIONS

The following definitions and abbreviations apply in this Specification:

Approved (approval)	means reviewed and accepted by the Delegated Representative of the Director, Marine Engineering, unless otherwise specified.
Contractor	means the company to which a contract has been awarded by the Owner.
CWB	means the Canadian Welding Bureau.
Delegated Representative	means the individual that has been assigned the authority to represent the Director, Marine Engineering regarding matters related to the requirements of this Specification, as applied to a specific contract.
Engineer (in the referenced standards)	means the Delegated Representative.
Examination, Inspection, Testing	the act of looking at something closely, by either destructive or non-destructive methods, in order to learn more about it, to determine acceptance or rejection to a defined criterion, to locate problems.
Owner	means, in the context of this Specification as applied to a given contract, Marine Engineering, Integrated Technical Services (ITS), Canadian Coast Guard, Fisheries and Oceans Canada, Ottawa.
Pressure Piping	means any piping used to convey a fluid at a pressure above atmospheric pressure, unless otherwise stated.
Provincial Pressure Vessel Authority	means the organizations legislated by the Provinces of Canada to provide oversight for welding pressure piping, pressure vessels and pressure containment systems.
Structure (s) or Structural	means primary hull structure and secondary structure.
Structure, Primary Hull	means that part of the vessel hull structure which makes up the primary hull girder, including structure to resist ice loadings. It consists of strength decks, platforms and shell plating and their supporting framing, tank top, vertical keel, longitudinal and main transverse bulkheads. In addition to the primary hull girder, water, oil and gas tight bulkheads shall be considered part of the primary hull structure.
Structure, Secondary	means all of the vessel structure which is not included in the definition for primary hull structure.
Sub-Contractor	means the company to which a contract has been awarded by the Contractor.

Section 3 APPLICABLE DOCUMENTS

The Contractor or Sub-Contractor performing welding or inspection of welds shall be familiar with the applicable Codes, Standards, Rules and Publications referred to within this Specification (See Annex "A").

Use of the above-mentioned references shall be the latest edition approved by the organization issuing the publication specified at the time of contract award.

Except as noted in Chapter 1, when the requirements of other publications are in conflict with the requirements specified herein, the Delegated Representative shall be requested to establish precedence.

Section 4 ADMINISTRATION

This Specification shall be administered by the Director, Marine Engineering, Integrated Technical Services, Canadian Coast Guard, Fisheries and Oceans Canada, Ottawa.

For the purpose of administration, the Director, Marine Engineering shall delegate representatives that shall be responsible for measuring the Contractor's performance and ability to meet the requirements specified herein.

The Contractor shall allow the Delegated Representatives access to the facilities, files and records relative to the requirements of this Specification for the duration of the contract and warranty period.

The documentation that is to be made available to the Delegated Representatives shall include, but not necessarily be limited to, personnel qualification records, welding specifications and weld procedure data sheets, certification records, visual and non-destructive inspection results, quality control and quality assurance manuals and reports, and other associated documents.

Section 5 WELDING STRUCTURES

5.1 CONTRACTOR REQUIREMENTS

5.1.1 Steel Structures

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

5.1.2 Aluminum Structures

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

5.1.3 Welding Procedures

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

5.1.4 Welding Personnel

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

5.1.5 Performance and Qualification Testing

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

5.1.6 Limitations Prior to Commencing Welding Work

All Contractors shall submit their welding personnel qualification records and approved welding procedures to the Delegated Representative prior to commencing any welding work.

All welding procedures, including welding procedure specifications and welding procedure data sheets, shall include an indication of acceptance by the Contractor (by signature, seal or other appropriate means) and a stamp of acceptance by the CWB.

5.1.7 Governing Standards for Welding

For structural steels ≥ 3 mm in thickness, welding shall meet the requirements of CSA Standards W47.1 and W59, except as modified by this Specification.

For structural aluminum ≥ 3 mm in thickness, welding shall meet the requirements of CSA Standards W47.2 and W59.2, except as modified by this Specification.

5.2 WELD DESIGN

Weld design shall be to the Rules of a Classification Society that is an approved Recognized Organization by Transport Canada Marine Safety and Security. Unless otherwise approved by the Delegated Representative, the following conditions shall be met:

- all groove welds in butt joints shall be full penetration; and,
- all corner joints shall be full penetration groove welds combined with single continuous fillet weld

A weld design schedule shall be submitted to the Delegated Representative in drawing form for review prior to commencing any welding work.

5.3 SYMBOLS FOR WELDING

Design drawings shall include weld requirement symbols and construction drawings shall include welding symbols following the requirements of CSA Standards W59 and W59.2. For fillet welds, the drawings shall indicate if the weld dimension shown in the symbol is throat size or leg length.

5.4 WELDING CONSUMABLES

This Section provides contractors means to quickly finding the information required to match welding consumables to the various grades of steel and aluminum materials used for shipbuilding and repair. For steel, cross reference is made between CSA welding consumable and shipbuilding material designations.

This Section also guides the contractor in the selection of corrosion resistant welding consumables for ships built of atmospheric corrosion resistant steels and for welds located in the external shell envelope of ice transiting ships. For welding processes other than those listed herein, consult the governing standards referenced in Chapter 5.1, Section 5.1.7 of this specification.

5.4.1 Steel

5.4.1.1 Electrode and Consumable Selection

Electrodes and consumables for welding processes shall be selected on the basis of retained hydrogen, mechanical properties (UTS, YS, elongation and toughness) and resistance to corrosion in sea water.

Generally, the requirements of Tables 5.1- 5.5 inclusive shall apply involving use of steels having a yield stress below 360 MPa (N/mm²) and charpy-v-notch toughness requirements at test temperatures above -45°C.

For other materials or conditions, welding electrodes and consumables shall be selected in accordance with the requirements of the following Sections of this Specification:

- Section 5.4.1.8 for higher strength notch tough steels;
- Section 5.4.1.9 for atmospheric corrosion resistant steels;
- Section 5.4.1.10 for Shell Butts & Seams – Ice Transiting Steel Ships

Welding electrodes and consumables for welding steel shall be certified by the CWB to the requirements of CSA Standard W48 or the applicable AWS A5 series of standards.

When two different grades of material of the same tensile strength properties are being joined by welding and corrosion resistance is not a consideration, electrodes and consumables for the lower grade is generally acceptable. Similarly, when joining materials with differing tensile strength properties, electrodes and consumables are to be suitable for the tensile strength of the component on which the weld size (e.g. fillet weld) has been determined.

Care shall be taken not to overmatch weld metal mechanical properties.

5.4.1.2 Storage and Handling

Storage and handling of welding consumables, electrodes and fluxes shall be in accordance with the requirements of CSA Standard W59.

5.4.1.3 Low or Controlled Hydrogen Electrode Requirements

In addition to other factors that must be considered for matching weld metal deposits to various grades of base materials, welding processes and their respective welding electrodes and consumables produce varying amounts of hydrogen gas which may be retained in the deposited weld metal.

Although the amount of retained hydrogen may be reduced by increasing preheat temperatures, low and controlled hydrogen electrodes and consumables shall be required in accordance with Table 5.1.

Table 5.1 Selection of Low or Controlled Hydrogen Electrodes

Mandatory Use of Low & Controlled Hydrogen Electrodes		Other than Low Hydrogen Electrodes (1)	
Material Grade	Material Thickness	Material Grade	Material Thickness
Gr. A Gr. E Gr. AH 32, 34 36 Gr. DH 32, 34, 36 Gr. EH 32, 34, 36 Gr. FH 32, 36, 40 Gr. FH 42 - 69	(t) ≥ 19 mm All Thicknesses	Gr. A	(t) ≤ 19 mm
Where (t) is the thickest member		Where (t) is the thickest member	

Note: (1) Independent of the material grade specified, when the carbon equivalent (CE) of the material exceeds 0.40 where the carbon equivalent is calculated from the ladle analysis as follows:

$$CE = \frac{Mn}{6} + \frac{Cr}{5} + \frac{Mo}{5} + \frac{V}{15} + \frac{Ni}{15} + \frac{Cu}{15}$$

Basic or controlled hydrogen electrodes are required.

When the grades of base metals requiring low or controlled hydrogen electrodes and consumables are produced using thermo-mechanical controlled rolling practice, the Contractor may apply to the Delegated Representative for exemption from mandatory requirements listed in Table 5.1. Exemption will only be granted after due consideration of susceptibility to hydrogen assisted or induced cold cracking.

5.4.1.4 Shielded Metal Arc Welding (SMAW)

Welding electrodes for shielded metal arc welding normal and higher strength shipbuilding grade steels shall be selected following the requirements of Table 5.2.

Table 5.2 Selection of Welding Electrodes for Shielded Metal Arc Welding

Material Grade	CSA W48 Electrode
Grade A	E4300, 10, 11, 13, 27 (2) E4914, 24 (2) E4918, 28, 48 (1)
Grade E	E4918-1 (1)
Grades AH32, 34, 36 DH32, 34, 36	E4918, 28, 48 (1)
Grades EH32, 34, 36	E4918-1 (1)
Grades EH40 FH-XX XX-40-69	See Section 5.4.1.8 herein

NOTE: (1) As required in Table 5.1; (2) Restricted use as detailed in Table 5.1

5.4.1.5 Submerged Arc Welding (SAW)

Wire electrode-flux combinations for submerged arc welding normal and higher strength shipbuilding grade steels shall be selected following the requirements of Table 5.3.

Table 5.3 Selection of Wire Electrodes and Flux for Submerged Arc Welding

Base Material	CSA W48	
Grade	Flux (1)	Electrodes
Grade A	F43A1-XXXX F49A1-XXXX	XXXX-EL12 XXXX-EM12K
Grades E	F49A4-XXXX F49A5-XXXX	XXXX-EM12K XXXX-EM13K
Grades AH32, 34, 36 DH32, 34, 36	F49A1-XXXX F49A2-XXXX	XXXX-EM12K XXXX-EM13K
Grades EH32, 34, 36	F49A4-XXXX F49A5-XXXX	XXXX-EM12K XXXX-EM13K
Grades EH40 FH-XX XX-40-69	See Section 5.4.1.8 herein.	See Section 5.4.1.8 herein.

Note: (1) Neutral flux only for shell plate groove welds.

5.4.1.6 Flux Cored and Metal Cored Arc Welding (FCAW & MCAW)

Wire electrodes for flux cored arc welding and metal cored arc welding normal and higher strength shipbuilding grade steels shall be selected following the requirements of Table 5.4. Shielding gas type shall be in accordance with approved weld procedure data sheets for the wire electrode selected.

Table 5.4 Selection of Wire Electrodes for Flux Cored and Metal Cored Arc Welding

Base Materials	Wire Electrode					
Grade	CSA W48					
Grade A	E49X See Note #2	T	-1 (M) -5 (M) -6 (M) -8 -9 (M) -12 (M)	E490X See Note #2	T	-G (1) GS (1) -4 (1) -7 (1) -10 (1) -11(1)
	E49X See Note #2	C	-3 (M) -6 (M)	E49X See Note #2	C	-G (1)
Grades AH 32, 36 DH 32, 36	E49X See Note #3	T	-1 (M) -5 (M) -6	E49X See Note #3	T	-8 -9 (M) -12 (M)
	E49X See Note #3	C	-3 (M) -6 (M)	E49X See Note #3	C	-G1
Grades E EH 32, 36	E49X-T-X(X)-J, E49X-C-X(X)-J See Notes #3 & 4 E49X-T-X(X)-J, E49X-C-X(X)-J See Notes #3 & 4 E55X-T-X(X)-J, E55X-C-X(X)-J See Notes #3 & 4					
EH40 FH-XX XX-40-69	No pre-approved consumables. See Section 5.3.2.8 herein. Qualification Tests are required using the shielding gas type planned for production.					

1. Submit for approval;
2. H16 designation for the thicknesses required by Table 5.1
3. H16 designation for all thicknesses.
4. Must carry "J" designation, average impact energy of 27 j @ -40

5.4.1.7 Gas Metal Arc Welding (GMAW)

Wire electrodes for gas metal arc welding normal and higher strength shipbuilding grade steels shall be selected following the requirements of Table 5.5. Shielding gas type shall be in accordance with the approved weld procedure data sheets for the wire electrode selected.

Table 5.5 Selection of Wire Electrodes for Gas Metal Arc Welding

Base Materials	Wire Electrodes
Marine Grade	CSA W48:06 CAN/ISO 14341:06
Grade A t ≤ 19 mm.....	ISO 14341-B-G-49A-X-X-XX
t > 19 mm.....	ISO 14341-B-G-49A-2-X-XX ISO 14341-B-G-49A-3-X-XX
Grade E	ISO 14341-B-G-49A-4-X-XX ISO 14341-B-G-49A-5-X-XX ISO 14341-B-G-49A-6-X-XX
Grades AH 32, 36 & DH 32, 36	ISO 14341-B-G-49A-2-X-XX ISO 14341-B-G-49A-3-X-XX
EH 32, 36	ISO 14341-B-G-49A-4-X-XX ISO 14341-B-G-49A-5-X-XX ISO 14341-B-G-49A-6-X-XX ISO 14341-B-G-55A-4-X-XX ISO 14341-B-G-55A-5-X-XX ISO 14341-B-G-55A-6-X-XX
Grades : EH40 FH-XX XX-40-69	No pre-approved consumables. Section 5.4.1.8 herein. Qualification Tests are required using the shielding gas type planned for production

Wire electrodes approved by the yield strength and average impact values of 47 J, the “A” suffix method, shall be submitted to the Delegated Representative for review and acceptance. Weld procedure qualification testing is required.

5.4.1.8 Electrodes for Higher Strength Notch Tough Steels

Welding electrodes and consumables for joining normal and high strength shipbuilding grade steels that have been manufactured using the thermo-mechanical controlled rolling practice method shall be approved by a series of weld procedure qualification tests.

Welding electrodes and consumables for joining shipbuilding steel grades FH-XX and XX-40 through XX-69 inclusive shall also be approved by a series of weld procedure qualification tests.

As a minimum, welding electrodes and consumables shall match the base metal strength (UTS, YS and elongation) and notch toughness properties at the base metal test temperature.

To qualify welding electrodes and consumables, a series of weld procedure qualification tests shall be performed in each position of welding using joint configurations typical of that intended for production. For each of the test conditions, two welds shall be made; one test each at the minimum and maximum anticipated heat inputs (kJ/mm) planned for production welding.

Assemblages, type of tests and specimens shall be in accordance with CSA Standard W47.1. Each procedure qualification test shall be supplemented with 15 charpy-v-notch specimens; 5 specimens with the "v" notch located at the centre of the joint, 5 specimens with the "v" notch intersecting the line of fusion and 5 specimens with the "v" notch located 5 mm from the fusion line (HAZ). Charpy-v-

notch specimens shall be tested in accordance with the requirements of CSA Standard W47.1 at test temperatures equivalent to that of the base metal classification (ie. E & EH @ -40°C, FH @ -60°C, etc). The minimum acceptance requirements for each test method shall be those requirements of the test specification under which the base metal was qualified.

5.4.1.9 Electrodes for Atmospheric Corrosion Resistant Steels

Welding electrodes and consumables for joining atmospheric corrosion resistant steels such as CSA Standard G40.21 grades 350A, 350AT, 400A and 400AT including ASTM grades A242 and A588 steels shall be carefully selected to match the copper and nickel content of the base plate and the ultimate and yield strength, elongation and toughness properties. Close attention shall be paid to matching all of the chemical elements that prevent corrosion in sea water.

Butts and seams in the shell, weather decks and all welds in uncoated ballast tanks shall be performed with welding electrodes and consumables that are proven to be resistant to weld zone (weld deposit and HAZ) corrosion in accordance with the requirements of Section 5.4.1.10 herein. These requirements also apply to weld repair of scars in shell plating caused by removal of temporary attachments and permanent markings made by welding. There are no pre-approved corrosion resistant weld metal deposits for welding atmospheric corrosion resistant steels. For welds in other locations of primary and secondary structure, electrodes and consumables may be selected and matched in accordance with the requirements of CSA Standard W59.

5.4.1.10 Shell Butts & Seams – Ice Transiting Steel Ships

The finishing layers of shell butts and seams located on the sea water side of ice-transiting ships shall be performed with welding electrodes and consumables that are proven to be resistant to weld zone (weld deposit and HAZ) corrosion in accordance with the requirements of this Section.

For shielded metal arc welding, E5518-C3 is approved for use without testing. There are no other pre-approved corrosion resistant consumables for any welding process.

Once the Contractor has matched a welding electrode and consumable to the minimum base plate mechanical property requirements of this Specification; coupons shall be prepared, welded and tested for corrosion resistance in sea water by conducting anodic dissolution tests as outlined in Annex “B” of this Specification. Two weld coupons shall be made for each weld metal/base metal combination; one test each at the anticipated minimum and maximum heat inputs (kj/mm) planned for production welding. Welding bead sequence for these tests must employ a stringer temper bead technique as illustrated in Annex B of this Specification. No weaving is permitted.

The target acceptance criterion sought is near equivalent loss of the base plate, heat affected zone and weld metal deposit. Since this may not always be accomplished for all grades of base metal, slight loss of weld metal is desired over any loss in the heat affected zone. Anodic dissolution test results shall be tabulated and submitted to the Delegated Representative for approval.

For finishing layers of welds located on the external shell plating of ice transiting ships, a temper bead approach shall be employed similar to what is illustrated in Figure 5.1.

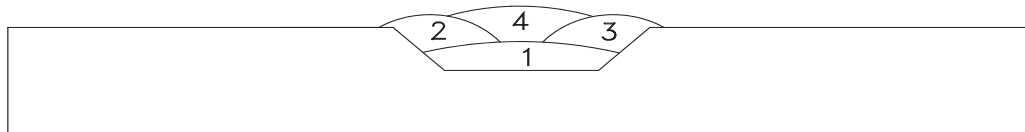


Figure 5.1 Temper Bead Approach for Finishing Layers in Shell Plating

The first layer of corrosion resistance weld metal shall be deposited 5 mm below the plate surface.

5.4.2 Aluminum

5.4.2.1 Electrode and Consumable Selection

Welding electrodes, rods and consumables shall be matched to the base metal in accordance with the requirements of CSA Standard W59.2. All welding electrodes, rods and consumables shall be certified by the CWB to the requirements of AWS A5.10.

5.4.2.2 Storage and Handling

Storage and handling of welding electrodes, rods and consumables shall be in accordance with the requirements of CSA Standard W59.2.

5.5 WORKMANSHIP

5.5.1 Environment

The work being welded shall be adequately protected against the direct effects of wind, rain and snow throughout the welding operation.

Welding steel at ambient temperatures below -18°C requires approval in accordance with CSA Standard W59. Aluminum welding shall not be carried out when the work surfaces are damp or wet or at ambient temperatures below 0°C.

Welding with processes that utilize externally supplied shielding gas shall not be performed in a draught or wind unless the weld zone is protected from loss of shielding gas as required by CSA Standards W59 and W59.2 for steel and aluminum, respectively.

5.5.2 Preheat and Interpass Temperatures

Preheating and interpass temperatures for welding steel and aluminum shall follow the requirements of CSA Standards W59 and W59.2, respectively.

5.5.3 Plate Forming

Heat line bending by the application of oxy-fuel gas torches for creating curvatures in steel plates is permitted for certain shipbuilding grade steels, providing the requirements of this Section are met.

Heat line bending of aluminum requires special consideration and approval. Annex "C" of this Specification offers guidance notes on hot and cold forming practices for aluminum.

5.5.3.1 Personnel

Personnel performing heat line bending shall be trained and qualified prior to forming plates for production or repair of distortion. A list of qualified personnel shall be submitted to the Delegated Representative prior to any heat line bending operations.

5.5.3.2 Materials

Heat line bending is permitted on shipbuilding grade materials "A"-"EH36" providing the material has not been produced by the thermo-mechanical controlled rolling practice method. All other grades of steel including "FH-XX" and "XX-40 through XX-69" inclusive, shall require special consideration and approval by the Delegated Representative. Heat line bending is not permitted on quench and tempered steels.

5.5.3.3 Procedures

For those pre-approved shipbuilding grades of steel listed in Section 5.5.3.2 herein, forming is not to be performed between 205° C and 425° C. If the forming temperature exceeds 650° C for as-rolled, controlled rolled or normalized steels, mechanical tests are to be made to assure that these temperatures have not adversely affected the mechanical properties of the steel. Water quenching should not occur at temperatures above 550° C.

For applications where toughness is of particular concern, when the steel is formed below 650° C beyond 3% strain on the outer fibre, charpy-v-notch impact tests shall be performed to the satisfaction of the Delegated Representative to demonstrate impact properties meet material specification minimum requirements. The percent strain on the outer fibre shall be calculated by; 65 times the plate thickness divided by the outer radius.

For those materials not pre-approved, heat line bending procedures shall be submitted to the Delegated Representative for consideration. The submission shall contain results of metallurgical, physical and corrosion tests.

5.5.3.4 Controls

During plate forming, controls shall be in place to check maximum plate and water or air quenching temperatures. On material grades having notch toughness properties, direct supervision and monitoring is required.

5.5.4 Weld Size and Dimensions

The size and length of welds shall not be less than, nor shall they be substantially in excess of, those specified by the design requirement.

For tee joints in the skewed condition, the deposited leg length of fillet welds shall be adjusted based on the fitted angle and gap as required by CSA Standards W59 and W59.2 for steel and aluminum, respectively. Gaps shall not exceed 5 mm and the dihedral angle shall not exceed 135°.

5.5.5 Adjacent Weld Spacing

The minimum dimension between adjacent groove welds that do not appear on approved drawings or form part of an insert located in shell plating shall be 300 mm minimum.

The minimum dimension between a groove weld in a table member and a fillet weld to the same table member that do not appear on approved drawings shall be 30 mm minimum.

The minimum dimension between fillet welds attaching an abutting member to a table member and a groove weld in the same abutting member that do not appear on approved drawings shall be 300 mm minimum.

5.5.6 Inserts and Doublers

Where local increase in plate thickness is required, insert plates shall be used instead of doubler plates.

When an insert is to be located within the shell envelope the minimum dimension shall be 1000 mm x 1000 mm. When an insert is to be located in other locations the minimum dimension shall be 300 mm x 300 mm. Welds should be connected to existing butts and seams whenever possible. The minimum corner radius used for all insert plates independent of location shall be 5 (t), 75 mm minimum.

For shell and weather deck plating, the rolling direction of an insert plate shall be fitted to match the rolling direction of the surrounding base plates.

Welding sequences shall be carefully developed in order that shrinkage stress is balanced and restraint cracking does not occur.

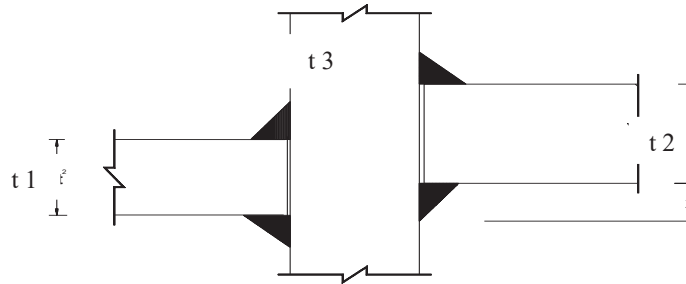
5.5.7 Edge Preparation and Fitted Tolerances

The edge preparation is to be accurate and uniform and the parts to be welded are to be fitted in accordance with the approved joint detail. Means are to be provided for maintaining the parts to be welded in correct position and alignment during the welding operation.

Occasional misalignment of joints fitted for welding shall not exceed dimensional tolerances detailed in CSA Standards W59 and W59.2 for steel and aluminum, respectively, and this Specification.

5.5.8 Intercostals

The occasional misalignment of intercostals for steel structures shall not exceed the limitations illustrated in Figure 5.2.



(X) = misalignment measured on the heel line; Where t 3 is less than t 1, then t 3 should be substituted for t 1		
For Strength Members:	- When $(X) \leq t^1/3$	Increase Fillet Leg Size Equal to Offset
	- When $(X) > t^1/3$	Release and Re-Align
For Other Members:	- When $(X) \leq t^1/2$	Increase Fillet Leg Size Equal to Offset
	- When $(X) > t^1/2$	Release and Re-Align

Figure 5.2 Intercostals

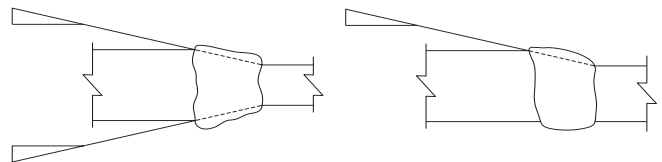
Misalignment of intercostals is not permitted in aluminum structures.

5.5.9 Dissimilar Plate Thickness

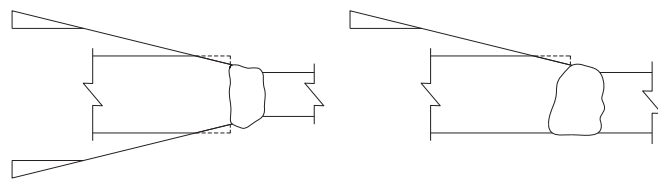
Plates of different thicknesses that are groove welded require a transition as follows:

- Exterior Shell Plating of Ice Transiting Steel Ships, 1 in 4
- Other, 1 in 3

When the difference in thickness is less than or equal to 5 mm and 3 mm for steel and aluminum, respectively, the transition may be created by welding as illustrated in Figure 5.3

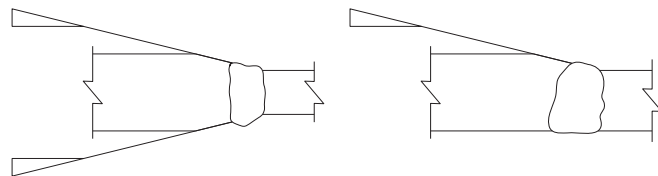


TRANSITION BY SLOPING WELD SURFACE
Figure 5.3 Sloping Weld



TRANSITION BY SLOPING WELD SURFACE AND CHAMFERING AFTER WELDING

When the difference in thickness exceeds 5 mm and 3 mm for steel and aluminum, respectively, the transition may be achieved by chamfering or a combination of chamfering and welding as illustrated in Figure 5.4.



TRANSITION BY CHAMFERING THICKER PART PRIOR TO WELDING

Figure 5.4 Chamfering

5.5.10 Flush Tolerance

Surfaces of welds required to be flush shall meet requirements of CSA Standards W59 and W59.2 for steel and aluminum, respectively. In addition, for aluminum the weld shall be finished so as not to reduce the cross section below the base metal's mill tolerance set by the material's compliance standard.

5.5.11 Smooth Tolerance

Surfaces of groove welds required to be smooth shall be finished so as to ensure that the weld reinforcement does not exceed 1.5 mm. There shall be no valleys or grooves between individual weld beads and weld toes shall blend smoothly into the base metal without undercut or overlap.

5.5.12 Preparation of Welds for the Application of Coatings or Paints

Completed welds shall be prepared to the requirements of the coating and/or paint manufacturer prior to the materials being applied.

5.5.13 Distortion and Residual Stress

Welding of structures, sub-assemblies and parts shall progress symmetrically to minimize distortion. Members should remain unrestrained during welding to minimize stresses. Welds shall be deposited in a sequence that shall balance the heat applied throughout the welding process. Welds shall progress from points where the parts are relatively fixed in position towards points where they have relatively greater freedom of movement.

It should be noted, plain carbon steels are more forgiving than aluminum. The thermal expansion coefficient of aluminum is about twice that of steel. The total amount of thermal expansion varies inversely with the welding speed. As a result, fixtures should be designed so plate alignment will accommodate twice the dimensional change normally expected for welding a similar steel component.

Unlike steel, restrictions apply to correcting distortions in aluminum caused by welding. In addition, as-deposited weld metal elongation properties are 5 - 7% on average rendering weld deposits more prone to cracking under restraint.

Weld sizes shall be kept to a minimum. Excessive weld cross sections and over welding shall be avoided. Joints anticipated to cause significant shrinkage shall be welded first.

5.5.13.1 Submission of Welding Sequence

All Contractors shall submit a welding sequence to the Delegated Representative prior to performing any welding work. Welding sequences shall be developed for the method of construction (block or frame and plate) and for insert plates.

For block construction, a sequence for assembling blocks and erecting and welding blocks to each other at the berth is required.

For frame and plate construction, a sequence for welding shell butts and seams, frames and bulkheads to shell plating, tank top to inner bottom framing and "A" frames and stern tubes and other critical components is required.

5.5.13.2 Restrained Joints

When welding joints that are restrained and/or where significant shrinkage is anticipated, welding shall be carried out continuously or to a point that shall ensure freedom from cracking after the joint has cooled below the interpass temperature. Root passes shall be of adequate size to withstand shrinkage stress. Block welding or cascade welding techniques should be used wherever practicable.

5.5.13.3 Jigs and Fixtures

Jigs, fixtures, clamping and strong backs shall be used in such a manner as to avoid restraint during welding. Strong backs welded on one side of the joint and wedged on the other are preferred. When removing strong backs, care shall be taken not to scar the material to which they are welded. Repair of scars to base plates shall be in accordance with approved procedures.

5.5.13.4 Progression

Frames, stiffeners or intercostals should be welded to each other before they are welded to the plating. When joining sub-assemblies to each other, joints connecting plating should be welded prior to welding the butt joints of the sub-assembly framing.

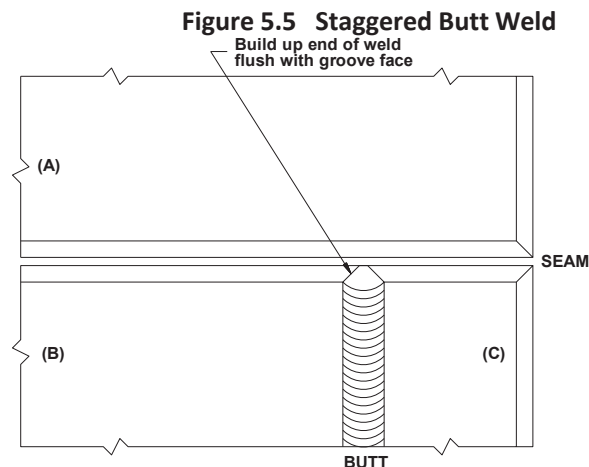
Welding should be started in the centre of the ship and progress outward, forward and aft. Sub-assemblies should be welded in the same manner starting in the centre, progressing outward.

Transverse butts in plating should be welded prior to longitudinal seams.

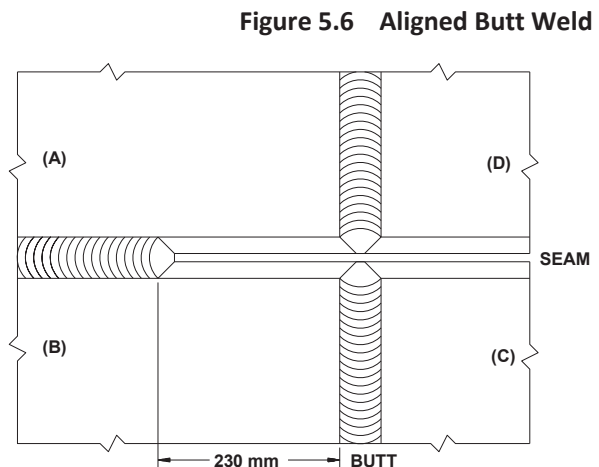
5.5.13.5 Intersections and Release Distance

Care shall be taken when welding intersecting butts and seams. The techniques illustrated in Figure 5.5 and Figure 5.6 shall be followed.

1. Weld the butt between (B) and (C) and then the weld seam between (A) and (B).



- 1) Weld seam between (A) and (B) to within 230 mm of butt.
- 2) Weld butt between (B) and (C).
- 3) Weld butt between (A) and (D).
- 4) Complete welding seam to within 230 mm of next butt.



Stiffeners fillet welded to plating that traverse butts or seams shall be released and remain unwelded for a distance of at least 230 mm in each direction until butts or seams they traverse have been fully welded. For plates ≥ 19 mm in thickness, release distance shall be increased to 300 mm minimum.

5.5.14 Repair of Distortion

When distortion of plating between stiffeners exceeds the limits detailed in Table 6.10 of IACS No. 47, Shipbuilding and Repair Quality Standard as reproduced below, straightening shall be required.

Members distorted by welding shall be straightened by carefully following the procedures approved by the Delegated Representative following the methods and controls offered in CSA Standards W59 and W59.2 for steel and aluminum, respectively, and this Specification.

Item	Standard	Limit	Item	Standard	Limit
Shell plate			Forecastle & Poop deck		
• Parallel part (side & bottom shell)	4 mm	8 mm	• Bare part	4 mm	8 mm
• Fore and aft part	5 mm	8 mm	• Covered part	6 mm	9 mm
Tank top plate	4 mm	8 mm	Super structure deck		
			• Bare part	4 mm	6 mm
			• Covered part	7 mm	9 mm
Bulkhead			House wall		
• Longl. Bulkhead			• Outside wall	4 mm	6 mm
• Trans. Bulkhead	6 mm	8 mm	• Inside wall	6 mm	8 mm
• Swash Bulkhead			• Covered part	7 mm	9 mm
Strength deck			Interior member (web of girder, etc.)	5 mm	7 mm
• Parallel part	4 mm	8 mm			
• Covered part	6 mm	9 mm			
• Fore and aft part	7 mm	9 mm			
Second deck			Floor and girder in double bottom	5 mm	8 mm
• Bare part	6 mm	8 mm			
• Covered part	7 mm	9 mm			

5.5.15 Temporary Welds and Lug Removal

5.5.15.1 Temporary Welds

Temporary welds shall not be located on a welded butt or seam.
Temporary welds shall only be made using approved weld procedures.

5.5.15.2 Lug and Temporary Attachments

For the hull exterior, exposed bulkheads, decks, panels, superstructure, walkways, bulwarks, fairleads, bollards, and any other zone deemed necessary to avoid operational hazards and to provide a good cosmetic appearance to the vessel, all lugs, temporary fairing aids, studs, etc., shall be removed to render a flush and smooth surface.

5.5.15.3 Removal of Temporary Welds, Lugs and Attachments

Temporary welds shall be removed and the surface restored flush with the original surface.
Hammering or other mechanical means that will result in scars to base material shall be avoided.
Scars in plate surfaces shall be repaired by welding with approved procedures.

Welding electrodes and consumables for repairing scars in exterior shell plating shall be corrosion resistant in sea water and completed welds shall meet the acceptance criterion of this Specification.

Repair welds shall be ground flush or smooth as required by the Delegated Representative.

5.5.16 Arc Strikes

Arc strikes outside the area of welds should be avoided following the requirements of CSA Standards W59 and W59.2 for steel and aluminum, respectively, and of this Specification.

When an arc strike occurs in a location deemed critical by the Delegated Representative, the surface shall be lightly ground and inspected with the appropriate non-destructive inspection methods.

Repair of arc strikes shall be to the satisfaction of the Delegated Representative.

5.6 WELD INSPECTION REQUIREMENTS

All non-destructive inspections required in this Specification shall be considered the minimum requirements of the Owner and performed by a qualified third party retained by the contractor. The method and location of inspections shall be determined by the Delegated Representative. Inspection test results shall be returned to the Delegated Representative within requested time frame. No interpretation report or radiograph shall be destroyed or discarded.

The minimum number of locations ordered for examination at one time shall be a combination of any method cumulatively totalling 10, unless otherwise agreed to by the Delegated Representative.

Contractors desiring to use ultrasonic inspection in lieu of radiographic inspection to examine welds located in steel structures shall submit a detailed proposal to the Delegated Representative to consider. At the Delegated Representatives' discretion, ultrasonic inspection may be accepted in lieu of radiographic inspection if the length of inspection is as required for ultrasonic inspection in Table 5.7 herein and the ultrasonic inspection procedures and techniques are proven accurate and repeatable by 30% spot radiography of the first fifteen locations examined by ultrasonic methods. Substitute inspection methods are not permitted for examining welds located in aluminum structures.

5.6.1 Facility Welding Audits

In addition to the CWB biannual audits required to maintain certification to CSA Standards W47.1 and W47.2, at its own expense, the Owner shall retain the services of the CWB to perform audits of the contractor at a frequency deemed necessary by the Owner. The Owner's CWB auditor will not be the Certification Services Representative performing the contractor's biannual certification audits. The Owner's CWB audits shall measure the contractor's compliance with the requirements of this Specification and include as a minimum a pre-weld, weld, post weld and contractor third party inspection documentation review and check.

5.6.2 Non Destructive Inspection Audits

The Owner reserves the right to retain the services of the National Non Destructive Testing Certification Body of Natural Resources Canada (NRCAN) or another organization acceptable to the Owner to perform review and audits of NDT personnel qualifications, procedures, inspection activities and reported results. Audits shall measure the contractor's compliance with the requirements of this Specification.

5.6.3 Selection of Non Destructive Inspection Methods

The method of inspection shall be appropriate to depict discontinuities dependent on the material, joint and weld type, the orientation of potential discontinuities within the weld cross section and access to the part in need of inspection. All welds shall be examined by visual inspection.

Full penetration welds shall be selectively sampled by radiographic and ultrasonic inspection methods. Radiographic inspection shall be used for full penetration groove welds in butt joints. Ultrasonic inspection shall be used for full penetration groove welds in tee and corner joints.

Fillet welds in steel structures shall be selectively sampled by liquid penetrant and magnetic particle inspection. Fillet welds in aluminum structures shall be selectively sampled by liquid penetrant inspection.

5.6.4 Locations Subjected to Inspection

Welds subjected to non-destructive inspection shall include, but will not necessarily be limited to, the following locations:

Table 5.6 Locations Subjected to Inspection

Strength members	<ul style="list-style-type: none"> ○ Flat and vertical keel; ○ Tank margin plates; ○ Sheer strake; ○ Bilge strake; ○ Deck stringer plates.
Shell plating:	<ul style="list-style-type: none"> ○ Intersection of butts and seams; ○ Transverse butts; ○ Longitudinal seams.
Other:	<ul style="list-style-type: none"> ○ Inserts and closure plates; ○ Cruciform welds; ○ Terminal welds.

The exact position of inspections shall be determined by the Delegated Representative

5.6.5 Extent of Inspections

5.6.5.1 Visual Inspection:

All welds shall be visually inspected their entire length.

5.6.5.2 NDE Methods – New Construction

For new construction, in addition to the requirements of Section 5.6.5.1 herein, the number of locations inspected by liquid penetrant, magnetic particle, radiographic and ultrasonic test methods shall be in accordance with the calculated requirements of Table 5.7a or Table 5.7b herein.

Table 5.7a Quantity of Inspections – New Construction Vessels ≥ 12 m LOA

Inspection Method	Formula for Determining the Number Required	
	Steel Vessels	Aluminum Vessels
UT Inspections	$= 0.25 \times (L+B+D)$	= N/A
MT or PT Inspections	$= 0.50 \times (L+B+D)$	= N/A for MT = $0.75 \times (L+B+D)$ for PT
RT Inspections	$= 0.75 \times (L+B+D)$	= $1.25 \times (L+B+D)$
Where: PT= Penetrant Inspections, MT= Magnetic Particle Inspections, RT= Radiographic Inspections, UT= Ultrasonic Inspections and L= Overall Length in meters, B= Greatest Moulded Breadth in meters and D= Moulded Depth at Side, in meters, measured at L/2.		

For example following the requirements of Table 5.7a: A lifeboat 15 meters in length having a breadth of 4.5 meters and a moulded depth of 2 meters will require:

Inspection Method	Formula for Determining the Number Required	
	Steel Vessels	Aluminum Vessels
UT Inspections - 1000 mm – butts or seams - 500 mm x 500 mm– intersecting butts & seams	= 6	= N/A
MT or PT Inspections - 1000 mm	= 11	= N/A for MT = 16 for PT
RT Inspections - 440 mm – butts or seams - 300 mm x 300 mm – intersecting butts & seams	= 16	= 26

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Table 5.7b Quantity of Inspections – New Construction Vessels <12 m LOA

Inspection Method	Formula for Determining the Number Required	
	Steel Vessels	Aluminum Vessels
UT Inspections - 1000 mm – butts or seams - 500 mm x 500 mm– intersecting butts & seams	= $0.25 \times (L+B+D)$	= N/A
MT or PT Inspections - 1000 mm	= $0.50 \times (L+B+D)$	= N/A for MT = $0.50 \times (L+B+D)$ for PT
RT Inspections - 440 mm – butts or seams - 300 mm x 300 mm – intersecting butts & seams	= $0.75 \times (L+B+D)$	= $1.00 \times (L+B+D)$
Where: PT= Penetrant Inspections, MT= Magnetic Particle Inspections, RT= Radiographic Inspections, UT= Ultrasonic Inspections and L= Overall Length in meters, B= Greatest Moulded Breadth in meters and D= Moulded Depth at Side, in meters, measured at L/2.		

For example following the requirements of Table 5.7b: A service craft 10 meters in length having a breadth of 3.0 meters and a moulded depth of 1.00 meter will require:

Inspection Method	Formula for Determining the Number Required	
	Steel Vessels	Aluminum Vessels
UT Inspections	= 4	= N/A
MT or PT Inspections	= 8	= N/A for MT = 8 for PT
RT Inspections	= 10	= 14

When access does not permit the use of 300 mm by 300 mm film size at intersecting butts and seams, a series of films shall be positioned to offer examination of 150 mm of weld in all directions.

5.6.5.3 NDE Methods - Other

For work packages other than new construction, in addition to the requirements of Section 5.5.6.1 herein, the number of locations inspected by liquid penetrant, magnetic particle, radiographic and ultrasonic test methods shall be in accordance with the requirements of Table 5.8 herein.

Table 5.8 Quantity of Inspections – Other

Item	Method	Number
Entire Plate Renewal – Butts & Seams (shell, decks, bulkheads, tanktop etc)	RT	6 per plate
Entire Plate Renewal – Butts & Seams (secondary structure)	RT	2 per plate
Partial Plate Renewal – Butts & Seams (primary & secondary structure)	RT	See inserts herein
Insert – Butt & Groove Welds (shell, decks, bulkheads, tanktop etc.)	RT	4 per insert
Insert – Groove Welds (other primary structure)	RT	2 per insert
Insert – Groove Welds (secondary structure)	RT	1 per insert
Hull Penetration – Pipe or Plate to Shell Plate Opening (below waterline)	UT	Entire Weld Length
Pressure Pipe Girth Welds	RT	1 of each 5 welds Full Circumference

5.6.6 Surface Preparation Prior to Inspection

Prior to inspection by any method, welds and adjacent areas shall be cleaned so as to be free from all rust, scale, primer, paint, weld spatter and other foreign matter to enable accurate interpretation of the area of interest (weld zone). Staging and lighting shall be provided to permit safe access for inspection.

For liquid penetrant, magnetic particle and radiographic inspections weld profiles and contours shall be sufficiently smooth to ensure that geometric conditions do not cause false indications.

For ultrasonic inspection, the contact surfaces shall be smooth to the extent that the finish does not interfere with the inspection. Tests performed on rough surfaces shall require special calibration procedures.

5.6.7 Delayed Inspection

When testing welds subject to high restraint and/or when the steel yield strength is greater than 360 MPa, tests shall be delayed at least 48 hours after weld completion.

5.6.8 Inspection Personnel Qualifications and Certificates

5.6.8.1 Visual Inspection

Individuals performing and interpreting visual inspection shall be currently certified by the CWB in accordance with CSA Standard W178.2, Certification of Welding Inspectors. The individual shall be Level 2 or Level 3 and shall maintain the following Code endorsement categories: Ships and Marine Structures; and Buildings and Industrial Structures. Level 1 personnel may only observe and/or assist Level 2 and Level 3 personnel perform the inspections.

5.6.8.2 Other Inspection Methods

Individuals performing and interpreting liquid penetrant, magnetic particle, radiographic and ultrasonic inspections shall be currently qualified by the National Non Destructive Testing Certification Body of Natural Resources Canada (NRCAN) to CAN/CGSB 48.9712 Level 2 or Level 3. Level 1 personnel may only observe and/or assist Level 2 and Level 3 personnel perform the inspections.

5.6.8.3 Certificates

For each inspection method, a copy of the examining individual's current year qualification certificate shall be attached to the initial interpretation or verification report supplied to the Delegated Representative. If a new validation year is entered or if a different individual is used, new qualification certificates shall be supplied with any subsequent interpretation report being submitted.

5.6.9 Steel Structures

5.6.9.1 Inspection Procedures

Inspection procedures and techniques are to be prepared by Level 3 personnel for each inspection method required by this Specification and submitted to the Delegated Representative prior to performing any inspections of completed work. Procedures for visual inspection shall follow the requirements of Clause 7 of CSA Standard W59 and ASME Section V. Procedures for liquid penetrant and magnetic particle inspections shall follow the requirements of Clause 7 of CSA Standard W59. Procedures for radiographic and ultrasonic inspections shall follow the requirements of Clauses 7 and 8 of CSA Standard W59.

5.6.9.2 Acceptance Criterion

Visual and liquid penetrant inspection acceptance criterion shall be in accordance with Clause 12.5.4.1 of CSA Standard W59, except as modified by this Specification and the following:

- For welds in material thicknesses less than 5 mm, undercut must not exceed 0.5 mm.
- For welds in material thicknesses greater than or equal to 5 mm, undercut must not exceed 1.0 mm
- Pores open to the surface are not permitted in any weld of the primary structure as well as any weld of the secondary structure exposed to weather elements and fluids of any type.

The magnetic particle inspection acceptance criterion shall be in accordance with Clause 12.5.4.1 or 12.5.4.3 of CSA Standard W59. The radiographic inspection acceptance criterion shall be in accordance with Clause 12.5.4.3 of CSA Standard W59. The ultrasonic inspection acceptance criterion shall be in accordance with Clause 12.5.4.4 of CSA Standard W59.

5.6.9.3 Radiographic Inspection

5.6.9.3.1 Source of Radiation

Radiographs shall be made by either x-ray or gamma ray as follows:

- x-ray shall be used for material less than 6 mm in thickness.
- the minimum material thickness inspected by gamma ray shall be 6 mm.
- the maximum material thickness inspected by gamma ray shall be 50 mm. Material thicknesses greater than 50 mm shall be examined by ultrasonic methods.
- for gamma ray applications, the source of radiation shall be Iridium 192.

5.6.9.3.2 Radiographic Film

The class of film is dependent on material thickness, source of radiation and required sensitivity. The following shall apply:

- for x-ray on material thickness less than 6 mm, class II film may be used providing the 2-2(t) hole is clearly visible on the radiograph. Otherwise, class I film shall be used;
- when the material thickness is greater than or equal to 6 mm and less than 12 mm, class I film and iridium 192 gamma radiation shall be used;
- when the material thickness is greater than or equal to 12 mm, class I or class II film and iridium 192 gamma radiation may be used.

5.6.9.3.3 Display of Information and IQI Essential Holes

The exposed radiograph shall show the outline of the "Hole Type" Image Quality Indicator (IQI), shims, IQI identification number, essential hole, radiograph identification number, location markers, date it was taken, reference to the contract number or vessel identification and radiographer's initials.

- When x-ray is used on materials thicknesses < 6 mm, the image of the 2-2(t) hole shall appear clearly on the radiograph.
- When iridium 192 gamma radiation is used on material thicknesses ≥ 6 mm but < 12 mm where class 1 film is required, the image of the 2-2(t) hole shall appear clearly on the radiograph.
- When iridium 192 gamma radiation is used on material thicknesses ≥ 12 mm but ≤ 30 mm, the image of the 2-4(t) hole shall appear clearly on the radiograph.
- When iridium 192 gamma radiation is used on material thicknesses greater than 30 mm, the image of the 2-2(t) hole shall appear clearly on the radiograph.

5.6.9.3.4 Intensification Screens

Intensification screens shall not be used. If adequate contrast cannot be achieved with a single film when examining unequal thicknesses, a dual exposure technique shall be used.

5.6.10 Aluminum Structures

5.6.10.1.1 Inspection Procedures

Inspection procedures and techniques are to be prepared by Level 3 personnel for each inspection method required by this Specification and submitted to the Delegated Representative for approval prior to use.

Procedures for visual inspection shall follow the requirements of Clause 7 of CSA Standard W59.2 and ASME Section V. Procedures for liquid penetrant, radiographic and ultrasonic inspections shall follow the requirements of Clause 7 of CSA Standard W59.2, and of this Specification.

5.6.10.2 Acceptance Criterion

The visual, liquid penetrant, radiographic and ultrasonic inspection acceptance criterion shall be in accordance with Clause 6 of CSA Standard W59.2, except as modified by this Specification and the following:

- For welds in material thicknesses less than 5 mm, no undercut is permitted.
- For welds in material thicknesses greater than or equal to 5 mm, undercut must not exceed 0.5 mm.
- Pores open to the surface are not permitted in any weld of the primary structure as well as any weld of the secondary structure exposed to weather elements and fluids of any type.

If visual inspection reveals melt-through or suck-back, the affected weld metal or material shall be dressed by mechanical methods, repair welded if required and examined by liquid penetrant inspection its entire length.

5.6.10.3 Radiographic Inspection

5.6.10.3.1 Source of Radiation

Radiographs shall be made by x-ray. The maximum permissible kilovoltages shall be as shown in Table 5.9

Table 5.9 Thickness vs. Maximum Kilovoltage

Thickness	Max Kilovolts
Up to 6 mm	80
6 mm to 13 mm	80 to 120
13 mm to 19 mm	120 to 130
19 mm to 25 mm	130 to 150
Greater than 25 mm	170 maximum

5.6.10.3.2 Radiographic Film

All radiographic film shall be class I only.

5.6.10.3.3 Display of Information and IQI Essential Holes

The exposed radiograph shall show the outline of the "Hole Type" Image Quality Indicator (IQI), shims, IQI identification number, essential hole, radiograph identification number, location markers, the date it was taken, reference to the contract number or vessel identification and the radiographer's initials.

For material thickness less than 5 mm the 2-1 (t) essential hole shall appear clearly on the radiograph. For material thickness 5 mm and over, the image of the 2-2 (t) essential hole shall appear clearly on the radiograph.

5.6.10.3.4 Intensification Screens

Intensification screens shall not be used. If adequate contrast cannot be achieved with a single film when examining unequal thicknesses, a dual exposure technique shall be used.

5.6.11 Double Loaded Film Requirement

All radiographic inspection shall be taken with a double loaded film technique so that two film negatives are obtained for each inspection. One film negative shall be sent to the Director, Marine Engineering and the other film negative shall remain at the work site in the possession of the onsite Delegated Representative. At contract completion, the film negatives stored at the work site shall be sent to the Director, Marine Engineering.

5.6.12 Radiographic Film Viewer

The Contractor shall have a professional radiographic film high intensity viewer capable of penetrating film densities of 1.5 to 4.5. The viewer shall be kept at the work site and available for use by the Contractor and Delegated Representatives for the entire duration of the contract and warranty period.

5.6.13 Inspection Reports

Inspection reports shall record the date of inspection, builder/Contractor's name, vessel type and hull number, Owner's name, inspection organizations name, inspection procedure number, interpretation report number, item, location, all discontinuities including single and accumulated indications, weld acceptance criteria, location of discontinuities and the name, qualification, level and signature of the individuals performing the inspection and interpretation. Inspection reports shall reference material type, thickness, joint type and geometry.

When a portion of a weld is to be inspected by liquid penetrant, magnetic particle, radiographic or ultrasonic methods, the location shall be subjected to visual inspection in advance of the other inspection method. Interpretation reports are required for both inspection methods.

5.6.13.1 Visual Inspection

For block assembly new construction methods, a visual inspection verification report is required for each fabricated block and joining of blocks to each other.

For frame and plate new construction methods or work packages other than new construction, a verification report is required for each fabricated compartment (e.g. between two adjacent bulkheads/engine room compartment).

The verification report shall be a statement signed off by the Contractor's qualified inspector which states all welds have been inspected and they conform to requirements of this Specification. Verification reports shall be presented to the Delegated Representative prior to the Owner's scheduled audit date.

5.6.13.2 Radiographic Inspection

In addition to the requirements of Sections 5.6.13 and 5.6.13.1, radiographic interpretation reports shall reference IQI design and identification number, source of radiation, source to film distance, angle of incident radiation, film type and intensification screen design (if permitted) and, material type, thickness, joint type and geometry.

Each interpretation report shall contain a report number. The report number shall include the Contractor's hull number (i.e. #1-218, etc.) and/or ship's name. Each location listed on the report shall be identified with an Inspection number (i.e., location #50 port is Inspection #3).

For radiographs, each film and its duplicate shall be submitted in a paper protective folder. The identification to appear on each folder shall be Inspection #, Report # and Hull # as illustrated below.

<u>Inspection #</u>		<u>Report #</u>		<u>Hull #</u>
3	-	1	-	218

Each repaired location shall reference the original report of the rejected location, for example:

Location #50	-	Port R1	-	See 3-1-218
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5.6.13.3 Inspection Arrangement Drawings

The Contractor shall prepare an adequate number of non-destructive inspection arrangement drawings and sketches that accurately document the location of the inspections.

The inspection method, weld identification number and abbreviations for each inspection shall be accurately recorded on a progressive basis (e.g. UT #75-R1, RT # 150 - adjacent - aft, etc). A legend detailing the identification symbols used by the Contractor shall appear on each arrangement drawing.

The Contractor shall supply updated arrangement drawings to the Delegated Representative on a regular basis throughout the contract period. Three copies of the final drawings shall be supplied to the Delegated Representative at contract completion.

5.6.14 Overlapping Inspection

When a discontinuity extends to either or both ends of a location being inspected, additional overlapping inspection shall be required. The overlapping inspection shall show a portion of the original end.

When an overlapping inspection displays unacceptable discontinuities at either or both ends, the entire weld length shall be considered unacceptable unless proven otherwise by the Contractor. Under this condition, welds shall be repaired to the extent required by the Delegated Representative.

All overlapping inspections shall be taken prior to repair of the originally rejected location. If repair has occurred prior to overlapping inspections and the entire weld length has not been repaired, the overlapping inspections shall be placed to overlap the start and finish of the repair.

The Contractor shall be responsible for all costs associated with performing overlapping inspections.

5.6.15 Rejected Weld or Part

When a portion of a weld contains discontinuities not meeting the acceptance criteria of this Specification, corrective action may be taken providing the Delegated Representative has reviewed the extent of unacceptable discontinuities and is in agreement with the repair procedure.

The repaired area shall be inspected by at least the same non-destructive inspection method used for the original inspection. Care shall be taken to ensure that the inspection of the repaired area is accurately located so that it measures the original location that was rejected.

For each failed location, one new location shall be examined. All new locations shall be selected by the Delegated Representative. Each new location shall be considered in addition to the requirements of this Section. All costs associated with performing the additional inspections shall be at the Contractor's expense.

When an entire weld, base material, entire part or entire section contains unacceptable discontinuities as specified herein, no corrective action shall be taken until the repair procedure has been approved by the Delegated Representative and other interested parties.

Section 6 WELDING STRUCTURAL STAINLESS STEEL

6.1 SCOPE

The requirements of this Section shall apply to welding and inspection of all structural stainless steels.

6.2 DESIGN AND DRAWINGS

Weld design shall be to the Rules of a Classification Society that is an approved Recognized Organization by Transport Canada Marine Safety and Security.

Unless to the otherwise approved by the Delegated Representative, the following conditions shall be met:

- all groove welds in butt joints shall be full penetration; and,
- all corner joints shall be full penetration groove welds combined with a single continuous fillet weld.

A weld design schedule shall be submitted to the Delegated Representative in drawing form for review prior to commencing any welding work.

6.3 CERTIFICATION

Contractors undertaking the welding of stainless steel within the scope of this Specification shall be certified by the CWB to the requirements of CSA Standard W47.1 Division 1 or 2.

Welders, welding operators and welding procedures shall meet the requirements of CSA Standard W47.1, and of AWS D1.6 as permitted by CSA Standard W47.1.

6.4 WELDING ELECTRODES AND CONSUMABLES

Welding electrodes and consumables shall be selected following the requirements of AWS D1.6.

Welding electrodes and consumables for welding of stainless steel shall be certified by the CWB to the requirements of CSA Standard W48 or the applicable AWS A5 series of standards.

6.5 WORKMANSHIP

Welding shall meet the requirements of CSA Standard W47.1 and AWS D1.6, and of this Specification.

6.6 INSPECTION

All examination and inspection of structural stainless steel shall comply with the requirements of AWS D1.6

6.6.1 Personnel

All inspection personnel shall meet the requirements of Chapter 5.0, Section 5.6.8 of this Specification.

6.6.2 Inspections

All welds shall be visually examined along 100% of their length for correct size, profile and the presence of visible defects. Unacceptable conditions or defects shall be repaired to the satisfaction of the Delegated Representative.

Full penetration welds shall be selectively sampled. Radiographic inspection shall be used for full penetration groove welds in butt joints. Ultrasonic inspection shall be used for full penetration groove welds in tee and corner joints.

Fillet welds shall be selectively sampled by liquid penetrant and/or magnetic particle inspection.

All of the requirements of Section 5.5 of this Specification shall be met unless otherwise specified in this Chapter.

6.6.3 Acceptance Criterion

The visual inspection acceptance criterion shall be in accordance with Clauses 5.11 and 6.29.1 of AWS D1.6.

The liquid penetrant inspection acceptance criterion shall be in accordance with Clauses 6.7.6 and 6.29.4 of AWS D1.6.

The magnetic particle inspection acceptance criterion shall be in accordance with Clauses 6.7.7 and 6.29.2 of AWS D1.6.

The radiographic inspection acceptance criterion shall be in accordance with Clauses 6.9, 6.10 and 6.29.2 of AWS D1.6.

The ultrasonic inspection acceptance criterion shall be in accordance with Clause 6, Part "C" and Clause 6.29.3 of AWS D1.6.

Section 7 OTHER STRUCTURAL MATERIALS

7.1 SCOPE

The requirements of this Section shall apply to welding and inspection of all structural materials other than those included in the scope of CSA Standards W47.1, W59, W47.2 and W59.2 and AWS D1.6.

7.2 DESIGN AND DRAWINGS

Weld design shall be to the Rules of a Classification Society that is an approved Recognized Organization by Transport Canada Marine Safety and Security.

Unless otherwise approved by the Delegated Representative, the following conditions shall be met:

- all groove welds in butt joints shall be full penetration; and,
- all corner joints shall be full penetration groove welds combined with a single continuous fillet weld.

A weld design schedule shall be submitted to the Delegated Representative in drawing form for review prior to commencing any welding work.

7.3 CERTIFICATION

Welders, welding operators and welding procedures shall meet the requirements of ASME Section IX or other suitable standard(s) approved for use by the Designated Representative and the CWB.

All tests shall be fully witnessed and documented by the CWB.

7.4 WELDING ELECTRODES AND CONSUMABLES

Welding electrodes and consumables shall be selected following the requirements of ASME Section IX or other suitable standard(s) approved for use by the Designated Representative and the CWB.

Welding electrodes and consumables shall conform to the requirements of ASME Section IX and the applicable AWS A5 series of standards or other suitable standard(s) approved for use by the Designated Representative and the CWB.

7.5 WORKMANSHIP

Welding shall meet the requirements of CSA Standard W59, and of this Specification.

7.6 INSPECTION

7.6.1 Personnel

All inspection personnel shall meet the requirements of Chapter 5.0, Section 5.6.8 of this Specification.

7.6.2 Inspections

All welds shall be visually examined along 100% of their length for correct size, profile and the presence of visible defects. Unacceptable conditions or defects shall be repaired to the satisfaction of the Delegated Representative.

Full penetration welds shall be selectively sampled. Radiographic inspection shall be used for full penetration groove welds in butt joints. Ultrasonic inspection shall be used for full penetration groove welds in tee and corner joints.

Fillet welds shall be selectively sampled by liquid penetrant and/or magnetic particle inspection.

All of the requirements of Section 5.5 of this Specification shall be met unless otherwise specified in this Chapter.

7.6.3 Acceptance Criterion

The visual and liquid penetrant inspection acceptance criterion shall be in accordance with Clause 12.5.4.1 of CSA Standard W59.

The magnetic particle inspection acceptance criterion shall be in accordance with Clause 12.5.4.1 or 12.5.4.3 of CSA Standard W59.

The radiographic inspection acceptance criterion shall be in accordance with Clause 12.5.4.3 of CSA Standard W59.

The ultrasonic inspection acceptance criterion shall be in accordance with Clause 12.5.4.4 of CSA Standard W59.

Section 8 PRESSURE PIPE WELDING

8.1 SCOPE

The requirements of this Chapter shall apply to welding and inspection of all pressure piping in the absence of Classification Society oversight.

8.2 DESIGN AND DRAWINGS

Weld design for pressure piping shall be in accordance with ASME Code B31.1 - Power Piping. A weld design schedule for pressure piping shall be submitted to the Delegated Representative in drawing form for review prior to commencing any welding work.

8.3 WELDING ELECTRODES AND CONSUMABLES

All welding electrodes and consumables shall comply with ASME IX and ASME B31.1. Electrodes and consumables not covered by ASME Section IX may be used provided a weld procedure qualification test is successfully completed prior to performing any work. Tests shall reflect the requirements of ASME Section IX.

8.4 PERSONNEL QUALIFICATIONS

Qualification of welders and welding operators shall comply with the requirements of ASME Section IX and ASME B31.1. Testing and approval shall be administered by the local Provincial Pressure Vessel Authority. Personnel qualification records shall be forwarded to the Delegated Representative prior to welding.

8.5 QUALIFICATION OF WELD PROCEDURES

Welding procedures shall be qualified in accordance with ASME Section IX and ASME B31.1. Testing and approval shall be administered by the local Provincial Pressure Vessel Authority. Weld procedure qualification records shall be forwarded to the Delegated Representative prior to welding.

8.6 WORKMANSHIP

All workmanship shall be in accordance with the requirements of ASME B31.1.

8.7 INSPECTION

All examination and inspection of pressure piping, pressure vessels and pressure containment systems shall comply with the requirements of ASME B31.1.

8.7.1 Personnel

All inspection personnel shall meet the requirements of Chapter 5.0, Section 5.6.8 of this Specification.

8.7.2 Inspections

All welds in pressure piping and pressure containment systems shall be visually examined along 100% of their length for correct size, profile and the presence of visible defects. Unacceptable conditions or defects shall be repaired to the satisfaction of the Delegated Representative.

Full penetration groove welds shall be sampled by spot radiography at a frequency of one in every five welds produced by each welder. Welders shall be assigned a unique identification number that shall be stamped on each full penetration connection welded. If a radiograph reveals gross defects, one additional joint shall be inspected by radiography. If the new radiograph reveals gross defects, the remaining three welds shall be radiographed

Repair of defects shall be performed following procedures accepted by the Delegated Representative. Second repair attempts shall not be permitted without due consideration of the conditions and agreed to by the Delegated Representative.

8.7.3 Acceptance Criterion

For all inspection methods, welds shall be evaluated in accordance with the acceptance standards of ASME B31.1.

Annex A REFERENCED CODES, PUBLICATIONS AND STANDARDS

A.1 LIST OF CODES, PUBLICATIONS AND STANDARDS

ASME	B31.1	Power Piping
	Section V	Boiler and Pressure Vessel Code, Non-destructive Examination
	Section IX	Boiler and Pressure Vessel Code, Welding and Brazing Qualifications
AWS	A5 Series	Specifications for Filler Metals and Consumables
	A5.10	Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods
	D1.6	Structural Welding Code – Stainless Steel
CAN/CGSB	48.9712	Qualification and Certification of Non-Destructive Testing Personnel
CAN/ISO	14341:XX	Welding consumables – Wire electrodes and deposits for gas shielded metal arc welding of non-alloy and fine grain steels - Classification
CSA	G40.21	Structural Quality Steel
	W47.1	Certification of Companies for Fusion Welding of Steel
	W47.2	Certification of Companies for Fusion Welding of Aluminum
	W48	Filler Metals and Allied Materials for Metal Arc Welding
	W59	Welded Steel Construction (Metal Arc Welding)
	W59.2	Welded Aluminum Construction
	W178.2	Certification of Welding Inspectors

Annex B TESTS FOR RATING CORROSION RESISTANCE OF CARBON STEEL WELD METALS IN SEA WATER

B.1 SCOPE

When required by Section 5.4.1.9 and 5.4.1.10 of this Specification, weld metals shall be tested for corrosion resistance in sea water following the procedures detailed herein. This Annex specifies the requirements for welding and testing plate assemblages. Organizations performing machining, mechanical testing of welds and corrosion tests shall be approved by the Delegated Representative in advance of any tests. Welding of test assemblies shall be fully witnessed and documented by the CWB.

B.2 TEST ASSEMBLY

Test assemblies shall be made in accordance with the requirements of Figure B1 herein.

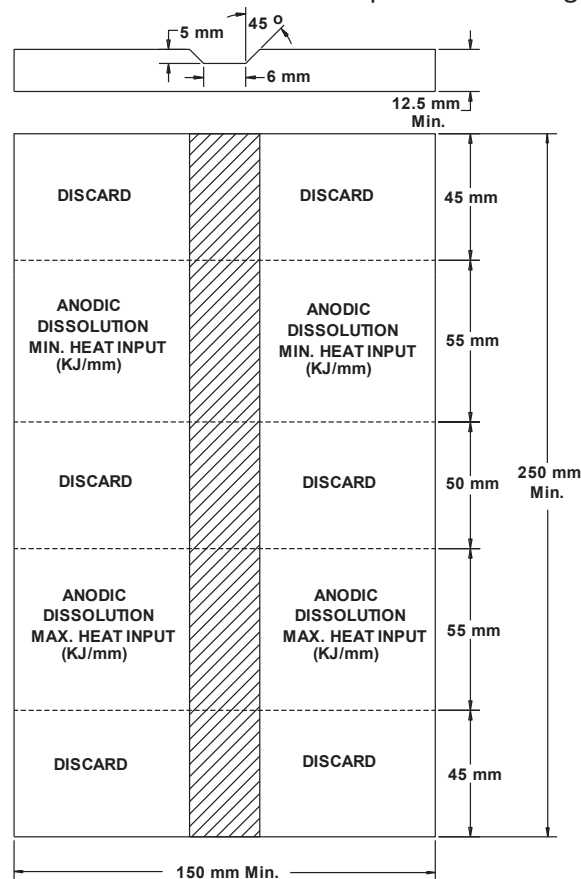


Figure B1 Anodic Dissolution Test Plate Assembly

Welds shall be deposited following a stringer temper bead sequence at the lowest and highest heat input (kj/mm) planned for production as illustrated in Fig. B2 herein. The centre 50 mm discard portion of the test assembly shall be used as a transition between low and high heat input welds (stop/starts).

For automatic welding using the submerged arc welding process, two test assemblies may be used; one for high heat input and the other for low heat input welds. Bead and layer sequences shall be adjusted to offer split layer finish to the weld.

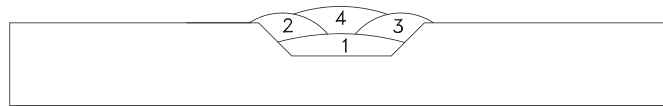


Figure B2 Bead Sequence

B.3 ANODIC DISSOLUTION TESTING

Specimens removed from the test assemblages detailed in Section B2.0 of this Annex shall be prepared by machining as illustrated in Figure B3 herein.

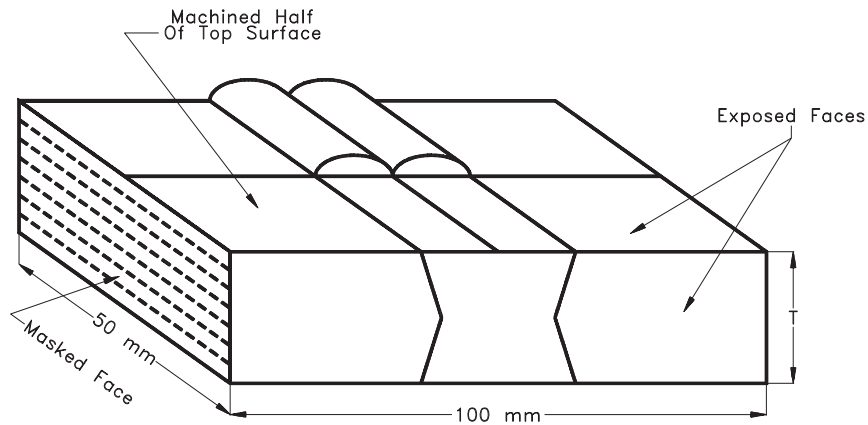


Figure B3 Anodic Dissolution Test Specimen

Each of the specimens shall be corroded at room temperature at a nominal current density of 0.88 mA/cm² for a period of 15 days. The test solution shall be 3.5% NaCl. Intermixing of the anolyte and catholyte shall be prevented by placing a membrane over the opening to the cathode compartment. The test system shall be as illustrated in Figure B4 herein.

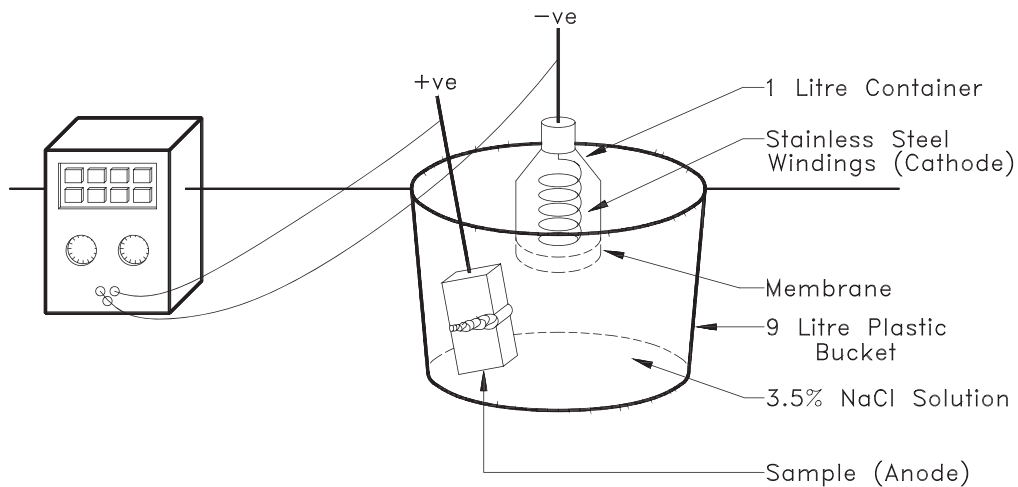


Figure B4 Anodic Dissolution Test System

Anolyte and catholyte pH shall be monitored daily to ensure the membrane is not leaking. Anolyte pH should be in the range of 6 to 8.5 units and anode potentials should be in the range of -600 to -560 mV vs. SCE which are potentials typical of unprotected steel in sea water. When the potential is > -600 mV vs. SCE, daily stirring shall occur to avoid pH stratification of the anolyte.

B.4 REPORTING TEST RESULTS

Mechanical test results, base plate and weld metal chemistries shall be recorded on weld procedure qualification record forms.

Corrosion test results shall be accurately documented and supported by colour photographs and black and white macro examination photo records at 5X magnification.

Corrosion loss shall be quantified by taking a series of profile measurements across the weld zone using a profilometer system having resolution in the "Z" direction of ± 0.0125 mm. The depth of attack shall be well documented for each area of interest in the weld zone; unaffected base plate, heat affected zone and weld metal.

Three copies of the test result reports shall be provided to the Delegated Representative for review and approval of the optimum corrosion resistant weld metal.

Annex C FORMING & THERMAL REQUIREMENTS - ALUMINUM

C.1 HOT FORMING

All hot forming procedures shall be approved by the Delegated Representative in advance of hot forming operations.

The majority of aluminum sections can be formed cold. For severe forming, heat may be used. Maximum holding times for the forming of aluminum alloys at various temperatures are given in Table C1.

Hot forming of 5000 series aluminum alloys is generally conducted at temperatures between 260°C and 425°C. Appropriate temperature control methods are to be used in all hot forming and stress relieving operations. In hot forming or stress relieving, exposure of the 5000 Series alloys to the 65°C to 200°C temperature range is to be minimized by the use of appropriate cooling techniques.

Table C1 Maximum Heat Exposure Time at Temperature Preparatory to Forming Aluminum Alloys

Holding Temperature (Note 1) 0°C	6061-T4, T5 6061-T5, 6063-T5, 356.0-T4, (Note 2)	5454 (Note 3)	5083, 5086, 5154, 5254, 5456
430	NR(4)	50 Hours	50 Hours
260	NR(4)	50 Hours	50 Hours
230	5 Minutes	50 Hours	50 Hours
220	15 Minutes	50 Hours	50 Hours
205	30 Minutes	50 Hours	50 Hours
190	1-2 Hours	50 Hours	NR(4)
175	8-10 Hours	50 Hours	NR(4)
120-165	50 Hours	50 Hours	NR(4)

NOTES:

- Equal formability may be obtained with shorter periods of heating at correspondingly higher temperatures. Time at temperature for clad alloys should be kept at a minimum to prevent diffusion of the cladding into the core alloy. Heating should be as rapid as possible, particularly for temperatures 205°C and above. Excessive time to approach the desired temperatures can have deleterious effects similar to those resulting from excess time at temperature.*
- Losses in strength for these alloys in the T6 temper will not exceed about 5% when heated at the temperature and for the periods shown. Strength of the T4 temper alloys will increase.*
- These alloys will be annealed at 345°C and above.*
- NR = Not Recommended*

C.2 COLD FORMING

Cold forming of 5000 series aluminum alloys is to be conducted at temperatures below 50°C, except for the 5454 alloy, where the maximum temperature may be 150°C. When the extent of cold forming is such that base plate properties are changed beyond acceptable limits, appropriate re-heat or stress relief treatments are to be used to re-establish acceptable properties.