

CCG HERO CLASS VESSELS - FIRE SUPPRESSION SYSTEM PIPING REPLACEMENT

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TABLE OF CONTENTS

G 1.0	<i>General notes</i>	5
G 1.1	Identification	5
G 1.2	References.....	5
G 1.3	Health and safety at work	8
G 1.4	Pre-work safety assessment.	8
G 1.5	Access to the workplace.....	9
G 1.6	Workplace Hazardous Materials Information System (WHMIS)	9
G 1.7	Smoking in the workplace	9
G 1.8	Clean and safe workplace.....	9
G 1.9	Fire protection	10
G 1.10	Touch-up/painting affected.....	10
G 1.11	CCG employees and others on the vessel.....	10
G 1.12	Regulatory inspections and/or classification reviews	11
G 1.13	Test results and data collection	11
G 1.14	Tools and materials provided by the Contractor.....	11
G 1.15	Tools and materials provided by the government	12
G 1.16	Familiarization with Contractors.....	12
G 1.17	Restricted areas	12
G 1.18	Contractor Inspections and Workplace and Equipment Protection	13
G 1.19	Recording of work in progress	13
G 1.20	List of enclosed spaces	13
G 1.21	Lead-based paints and paint coatings	13
G 1.22	Materials containing asbestos	13
G 1.23	Material and equipment removed.....	14
G 1.24	Welding certification.....	14
G 1.25	Electrical installations	14
G 1.26	Electricity supply.....	14
G 2.0	<i>Vessel characteristics</i>	15
G 3.0	<i>Ratio of weight added and removed from the vessel.</i>	15
G 3.1	Scope	15
G 3.2	Technical Description	15
G 3.3	Deliverable	15
G 4.0	<i>Miscellaneous provisions</i>	15

G 4.1	COVID-19.....	15
1	<i>Introduction</i>	17
2	<i>Abbreviations.....</i>	17
3	<i>Statement of work.....</i>	18
3.1	Scope	18
3.2	General.....	18
3.3	Valves and fasteners	18
3.4	Pumps and strainers	19
3.5	Fittings and bushings	19
3.6	Disassembly.....	19
3.7	Piping in the premises.....	20
3.8	Piping in bow thruster compartment.....	20
3.9	Piping on the starboard breezeway	20
3.10	Installation of the fire extinguishing system.....	21
3.11	Extension of the fire suppression system along the covered walkway.....	21
3.12	<i>Valve relocation V555008.....</i>	22
3.13	Addition of fire hydrant V555030 and fire hose cabinet E555013.....	22
3.14	Ammunition locker piping.....	22
3.15	Fire hydrant connection modification V555007.....	22
3.16	Piping in the main engine room.....	23
3.17	Piping in the auxiliary machine room.....	23
3.18	Connection to existing stainless steel piping in the machine room.....	23
3.19	Addition of additional disassembly joints	23
3.20	Replacement of globe valves with butterfly valves.....	23
3.21	Fire fighting plan.....	23
4	<i>Other.....</i>	24
4.1	Quality of execution.....	24
4.2	Materials	24
4.3	Welding.....	25
4.4	Painting and indications on the pipes	25
4.5	Pipe supports.....	26
4.6	Insulation	26
4.7	Posters, labels and nameplates	26
4.8	Cleaning and rinsing.....	26

5	<i>Quality program</i>	26
5.1	General.....	26
5.2	Inspection.....	27
5.3	Testing.....	27
5.4	Acceptance testing and trials.....	27
5.5	Technical modifications.....	28
5.6	CCGS Corporal Kaeble	28
5.7	CCGS A. Leblanc	28
Annex i	<i>CuNi-Welding standard for cupronickel pipes</i>	29
Annex ii	<i>Test and inspection plan</i>	31
Annex iii	<i>Material provided by the Contractor</i>	33
Annex iv	<i>Materials provided by the Contractor</i>	34
Annex v	<i>Specifications</i>	35

List of tables

Table 1	Abbreviations : Abbreviations.....	17
Table 2	1: Contractor supplied flange insulation kits must be installed between dissimilar metals for prevention of galvanic corrosion.	33
Table 3	MFE attachment materials for fire main in breezeway and bow thruster	35
Table 4	MFE of valves for the fire main in the breezeway and bow thruster	35
Table 5	MFEs for the fire main in the machine rooms	36
Table 6	Washing MFE for the fire main in the machine rooms.....	36

List of figures

Figure 1	Color code for drawing annotations	20
Figure 2	Location of water intake V555007 outside the machine control room.....	22

G 1.0 GENERAL NOTES

G 1.1 Identification

G 1.1.1 These general notes specify the CCG requirements that apply to all the technical specifications that follow.

G 1.2 References

G 1.2.1 Laws, regulations, standards, publications and procedures.

G 1.2.1.1 The latest version in effect at the time of contract signing of the laws, regulations, standards, publications and procedures listed below must be used for reference. The Contractor must ensure that all work performed in the specifications is performed in accordance with all federal and territorial standards and regulations. CCG procedures must be used as a guide if no other regulations take precedence.

FSM Procedures	Title	Included Yes/No
DFO/5737	Fleet Safety Manual (Latest Edition)	Yes
7.A.1	Assessing Risk	Included CCG/5737
7.A.10	Handling and Containing Asbestos Materials	Included CCG/5737
7.A.12	Potable Water Quality	Included CCG/5737
7.B.1	Diving Operations	Included CCG/5737
7.B.2	Fall Protection	Included CCG/5737
7.B.3	Entry Into Confined Spaces	Included CCG/5737
7.B.4	Hotwork	Included CCG/5737
7.B.5	Lockout and Tagout	Included CCG/5737
7.B.6	Electrical Safety – Working on Energized Electrical Conductors or Circuit Parts	Included CCG/5737
7.E.5	Handling, Storage, and Disposal of Hazardous Materials	Included CCG/5737
7.E.8	Use of Halocarbons	Included CCG/5737
10.A.6	Paint and Other Coatings	Included CCG/5737
10.A.7	Contractor Safety and Security	Included CCG/5737
5323-2020-26	COVID-19 - Health Screening Questionnaire for Canadian Coast Guard Personnel and Visitors Accessing Canadian Coast Guard Facilities and Vessels	Yes

Specification
F3065-210339

5404-2020-08	COVID-19 - Information Concerning the Use of Non-medical Masks at Work	Yes
6102-515	Issuance of Contractor Designation Letters during the COVID-19 pandemic	Yes
Publications		
TP 3177	Standard for the Control of Gas Hazards in Vessels to be repaired or altered	No
TP 127 E	Ships Electrical Standards (2018)	No
NFPA 306 2014	Standard for the Control of Gas Hazards on Vessels	No
TP 14231	Marine Occupational Health and Safety Program	No
TP 14612	Procedures for Approval of Life-saving Appliances and Fire Safety Systems, Equipment and Products	No
IEEE45	Institute of Electrical and Electronics Engineers, Recommended Practice for Electrical Installations on Shipboard	No
70-000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment	Available at: CCG/ITS
Report EPS 1/RA/2	Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems	No
NFPA 10	Standard for Portable Fire Extinguishers	No
18-080-000-SG-003	Paints and Coatings Standard (formerly DFO/5884 – TP 12445F)	No
Circular 1206	Measures to Prevent Accidents with Lifeboats (IMO/MSC)	No
Standards		
CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures Division 2 Certification	No
CSA W47.2	Certification of Companies for Fusion Welding of Aluminum	No
CSA W59	Welded Steel Construction – Metal Arc Welding	No
CSA W59.2	Welded Aluminum Construction	No
ISO 9712:2005	International Standards for NDT	No
CT-043-EQ-EG-001-E	Welding Specification	Yes
ISO 8501-1:2007	Preparation of steel substrates before application of paints and related products	No

Specification
F3065-210339

3049715v3A eng	Welding Specification	Yes
Acts (Laws)		
S.C. 2001, c. 26	Canada Shipping Act	No
R.S.C., 1985, c. L-2	Canada Labour Code	No
Regulations		
SOR/2010-120	Maritime Occupational Health and Safety Regulations	No
SOR/90-264	Marine Machinery Regulations	No
SOR/2017-14	Vessel Fire Safety Regulations	No
C.R.C., c. 1432	Hull Inspection Regulations	No
SOR/2003-289	Federal Halocarbon Regulations, 2003	No
SOR/87-183	Marine Occupational Safety and Health Regulations	No
IMO Circ. 1432	Revised guidelines for the maintenance and inspection of fire protection systems and appliances	No

G 1.2.2 Reference drawings

G 1.2.2.1 The drawings below are provided as a guide:

Disassembly	
6094-P1102-200-1-001 Sheet 6/32 Rev 2	PIPING CONFIGURATION PLAN IN THE MAIN ENGINE ROOM
6094-P1103-500-2-001 Sheet 10/17 Rev 1	CONFIGURATION PLAN OF THE PIPING IN THE LIVING SPACE
6094-P1104-500-2-001 Sheet 9/11 Rev 4	PIPING ARRANGEMENT DRAWING UNIT 110-4
6094-P1201-500-1-001 Sheet 8/8 Rev 8	PIPING ARRANGEMENT UNIT 120-1
6094-P1202-500-3-001 Sheet 5/7 Rev 7	PIPING ARRANGEMENT DRAWING - UNIT 120-2
AF6095-20	Fire Fighting Plan (Corporal Kaebler V.C.)
AF6097-55500-04	Fire Fighting Plan (Constable Carrière)
AF6101-20	Fire fighting plan (A. Leblanc)
Installation	
13-68Q-555-03-01 Rev 0	FIRE MAIN SYSTEM - SYSTEM DIAGRAM
13-68Q-555-05 Rev 0	FIRE MAIN SYSTEM PIPE SPOOLS
oSupplemented by 13-68Q-555-04	

G 1.3 Health and safety at work

G 1.3.1 The Contractor and all subcontractors must follow occupational health and safety (OHS) procedures in accordance with federal and provincial OHS regulations to ensure that the Contractor's activities are conducted in a safe manner and do not compromise the safety of any personnel.

G 1.3.2 The Contractor and the Contractor's employees, including all subcontractors, must attend a vessel safety orientation prior to the commencement of any work to familiarize the Contractor's employees with the vessel's specific hazards and its permit systems for work protocols as well as procedures for safety, hazard prevention, hazard response and pre-work safety assessments. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.

G 1.3.3 The Contractor must comply with the Fleet Safety and Security Manual, DFO/5737 , and the Shipboard Work Instructions, in addition to the relevant requirements of the Canada Labour Code when performing work involving the following:

- a) Hot work;
- b) Work at height;
- c) Entry into enclosed spaces;
- d) Degassing before entering confined spaces and for hot work;
- e) Locking and identification;

G 1.4 Pre-work safety assessment.

G 1.4.1 For the purposes of the Lockout/Tagout procedure, the Contractor must provide locks and locking devices for the Contractor's employees in addition to those provided by the Chief Engineer for the ship's crew.

G 1.4.2 The Contractor and its employees will not have access to restrooms or crew lounges. The Contractor must provide the necessary customary facilities for its employees and subcontractors as required.

G 1.4.3 The Contractor must take digital images of the area to be worked on so that the area can be compared after the work is completed. These images must be provided to the TA in digital form prior to the start of the work.

G 1.5 Access to the workplace

G 1.5.1 The Contractor must ensure that TA and CCG personnel have unrestricted access to the work site at all times during the contract period.

G 1.6 Workplace Hazardous Materials Information System (WHMIS)

G 1.6.1 The Contractor must provide the TA with Material Safety Data Sheets (MSDS) for any WHMIS controlled products supplied by the Contractor.

G 1.6.2 The TA will provide the Contractor with access to MSDSs for all controlled products on board the vessel that could be used for any work item in the specification.

G 1.7 Smoking in the workplace

G 1.7.1 The Contractor must ensure compliance with the Non-Smokers' Health Act. The Contractor must ensure that any employer, or any person acting on behalf of such an employer, ensures that all persons refrain from smoking in any work area under the control of the employer. The Contractor must ensure that there is absolutely no smoking on the vessel.

G 1.8 Clean and safe workplace

G 1.8.1 During the work period, the Contractor must maintain the work area in a clean and debris-free condition. Parts of the vessel used by the Contractor's personnel must be kept clean and the Contractor must dispose of waste daily.

G 1.8.2 Areas that present a hazard due to the work being performed to the specification must be secured and clearly identified by the Contractor, including signage to warn and protect all personnel of the hazard in accordance with the applicable requirements of the Canada Labour Code.

G 1.8.3 At the end of the contract, the Contractor must clear the vessel of any waste created by the performance of the work and restore the vessel to a condition of cleanliness equal to that which existed at the beginning of the contract period.

G 1.8.4 Once all pre-determined work has been completed and a final cleanup has been done, the Contractor's QM representative and the TA will jointly conduct an inspection tour of the vessel to visit all areas where work has been performed by the Contractor. Any deficiencies or damage noted will be recorded and compared to the previously captured digital images. Any damage or deficiencies attributable to the Contractor as a result of the contract work undertaken by the Contractor must be corrected in full at the Contractor's expense.

G 1.9 Fire protection

G 1.9.1 The Contractor must ensure that the isolation, removal and installation of fire detection and suppression systems, or any components of such systems, are done by a qualified technician. When a fire detection or suppression system is deactivated by the Contractor during the contract, it must then be recertified as fully functional by a qualified technician. A copy of the original certificate, signed and dated, must be delivered to the Technical Authority (TA) and Inspection Authority (IA) prior to the end of the contract.

G 1.9.2 The Contractor must notify the TA and IA and obtain written approval from the TA prior to disturbing, isolating, disabling, interrupting, or excluding any part of the fire detection and/or suppression systems, including smoke and heat detectors.

G 1.9.3 The Contractor must provide fire protection at all times, including when anyone is working on the vessel's fire detection and/or suppression systems. This can be accomplished as suggested below and only with written authorization from the TA by disabling only one part of a system at a time;

G 1.9.4 The Contractor should note that failure to take proper precautions while performing work on or near the vessel's fire extinguishing systems could result in an accidental discharge of the extinguishing agent. The Contractor must, at his own expense, have the containers or systems so emptied during such work filled and recertified.

G 1.9.5 The Contractor must ensure that there is a method of reaching all compartments with a charged hose. This must be done with a pump provided by the Contractor. The Contractor must plan for the water on the dock to be shut off for the duration of the work.

G 1.10 Touch-up/painting affected

G 1.10.1 Unless otherwise specified, all new and/or affected steel must receive two coats of marine primer, compatible with the vessel's paint schedule AF 6095-63100-01.

G 1.10.2 Contractor must prepare any new or affected steel to the paint manufacturer's standards prior to painting.

G 1.11 CCG employees and others on the vessel

G 1.11.1 CCG or DFO employees and other workers such as manufacturers' agents and/or ABS or classification society surveyors may perform work other than that included in these statements of work on board the vessel during the term of this contract. The TA will ensure that such work and/or resulting inspections/tests do not interfere with the Contractor's work. The Contractor must not be responsible for coordinating or paying for any related inspections unless otherwise specified.

G 1.12 Regulatory inspections and/or classification reviews

G 1.12.1The Contractor must call and schedule any regulatory inspection and/or classification visit by the responsible authority: i.e. ABS, Health Canada (HC), Environment Canada or other persons required by the specifications.

G 1.12.2Any documentation generated by the above inspections/visits that demonstrates that they did occur (i.e., original, signed and dated certificates) must be provided to the TA with copies to the IA.

G 1.12.3The Contractor must not substitute regulatory inspections or classification visits with inspections by the TA or IA.

G 1.12.4The Contractor must provide timely notice (minimum 24 hours) of regulatory inspections/classification visits to the TA and IA so that they may attend the inspection/visit.

G 1.13 Test results and data collection

G 1.13.1The Contractor must develop a test and trial plan which must include, at a minimum, all tests and trials set forth in the specifications. This plan must be offered to the TA and IA for their approval one week prior to the start of the originally scheduled tests and trials.

G 1.13.2All tests, measurements, calibrations, and readings must be recorded, signed by the person taking the measurements, dated, and provided in a report format in electronic and hard copy - to TA, IA, and ABS.

G 1.13.3The dimensions entered in the register must be accurate to three (3) decimal places (unless otherwise specified) in the system of measurement in common use on board the vessel.

G 1.13.4The Contractor must provide the TA and IA with current and recent calibration certificates for all instrumentation used in the test and trial plan, demonstrating that the relevant measuring instruments have been calibrated in accordance with the manufacturer's instructions.

G 1.13.5Printed reports will be bound in standard three-ring binders, typed on letterhead, and indexed according to the numbering in the specification. Electronic copies will be stored in "Adobe PDF" format without locking and provided in electronic form. The Contractor will provide three hard copies and one electronic copy of each report.

G 1.13.6All documentation from the contract period must be incorporated into a data collection that will be provided to TA and IA, in digital format, at the end of the contract period.

G 1.14 Tools and materials provided by the Contractor

G 1.14.1The Contractor must ensure that all materials are in new condition and have never been used.

G 1.14.2The Contractor must ensure that spare materials such as gaskets, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings, etc., are in accordance with the equipment manufacturer's drawings, guides or instructions.

G 1.14.3Where no particular material is specified, or where a substitution is to be made, the TA must approve the substituted material in writing. The Contractor must provide information on the materials used - certificate of grade and quality of various materials - to the TA prior to use.

G 1.14.4The Contractor must provide all equipment, machinery, materials, and tools such as cranes, scaffolds, platforms, and rigging necessary to complete the work identified in this Statement of Work (SOW).

G 1.14.5The Contractor must provide waste disposal service for any oil, oily waste, other hazardous materials, or trash subject to control that results from the work required by this specification. He must also provide certificates of disposal for any of the above mentioned wastes and such certificates must demonstrate that the disposal has been done in accordance with current federal, provincial and municipal guidelines.

G 1.15 Tools and materials provided by the government

G 1.15.1All tools will be provided by the Contractor unless otherwise specified in the SOW.

G 1.15.2Where tools are provided by the TA, they will be returned by the Contractor in the same condition as when borrowed. Borrowed tools must be inventoried and the Contractor must sign an acknowledgement of the fact and return them to the TA.

G 1.15.3All Government Furnished Equipment (GFE) must be received by the Contractor and stored in a secure warehouse or store with a controlled environment well suited to the equipment according to the manufacturer's instructions.

G 1.16 Familiarization with Contractors

G 1.16.1All personnel working on the Canadian Coast Guard Base Sorel must complete a familiarization session and sign form 10.A.7. There will be two familiarization sessions. The first session will be held on the day of the start-up meeting and the second session will be held two weeks later. The familiarization sessions will be conducted by a Canadian Coast Guard employee. Each session will be 2 hours in length.

G 1.17 Restricted areas

G 1.17.1Other than for safety or for the purpose of work required by the specifications, the Contractor must not enter the following areas: all cabins, offices, workshops, engineers' office, wheelhouse, control room, all washrooms, galley, mess halls, lounges and any other area

where access is restricted by signage.

G 1.17.2The Contractor must notify the TA at least 24 hours in advance before beginning work in inhabited spaces or offices. These delays will provide CCG with the time necessary to evacuate its personnel and ensure safety in these spaces.

G 1.18 Contractor Inspections and Workplace and Equipment Protection

G 1.18.1The Contractor must coordinate an inspection of the condition and location of the items to be removed with the TA and IA prior to performing the specified work or accessing a location to perform the work.

G 1.18.2The Contractor must repair, at his own expense, any damage that results from his actions in the performance of his work and that can be attributed to his performance. Any material used in a replacement or repair must meet the criteria for Contractor furnished material as stated above in the Contractor Furnished Tools and Equipment section.

G 1.18.3The Contractor must protect all equipment and surrounding areas from damage. Work areas must be protected from flooding and water leaks, debris from sanding, welding, etc. Temporary protective tarps must be placed over work areas.

G 1.19 Recording of work in progress

G 1.19.1The TA and IA may record work in progress using a variety of means including, but not limited to, photography and video.

G 1.20 List of enclosed spaces

G 1.20.1The Contractor may request a list of the vessel's confined spaces at the meeting prior to the refit.

G 1.21 Lead-based paints and paint coatings

G 1.21.1The Contractor will not use lead-based paints.

G 1.21.2CCG vessels have been coated with lead-based paints in the past and therefore it is possible that some work done by the Contractor such as grinding, soldering or hot work may extract lead from these paints. The Contractor must ensure that coatings in affected work areas are examined for lead content and ensure that the work is performed in accordance with applicable federal and provincial regulations.

G 1.21.3The Contractor must show proof of product approval by Health Canada for hull paints controlled by Health Canada and the Pest Management Regulatory Agency.

G 1.22 Materials containing asbestos

G 1.22.1The Contractor will not use any material that contains asbestos. There is no asbestos on board.

G 1.23 Material and equipment removed

G 1.23.1All materials removed as a result of this SOW remain the property of the CCG.

G 1.24 Welding certification

G 1.24.1For any work requiring the application of fusion welding to steel construction, the Contractor and/or subcontractor welders must be certified by the Canadian Welding Bureau in accordance with CSA W47.1, latest revision - Certification of Companies for Fusion Welding of Steel, Division Level 2 Certification as a minimum. Copies of certifications (including welders) will be provided to the TA and IA. All welding activities will be done in accordance with the Canadian Coast Guard Welding Document

G 1.25 Electrical installations

G 1.25.1All electrical installations and repairs must be performed in accordance with the latest revisions of Transport Canada Marine Safety TP127E - Electrical Standards for Ships and IEEE Standard 45 - Recommended Practice for electrical installation on ships.

G 1.26 Electricity supply

G 1.26.1The CCG must allow the Contractor the use of a limited number of 115 VAC, 1 phase, 15 amp electrical outlets for the duration of the contract based on system capacity.

G 2.0 VESSEL CHARACTERISTICS

Name: NGCC Constable Carrière
Type: Twin propeller mid-shore patrol boat
Class: Navigation near the coastline class I
Year of construction: 2013
Main dimensions:
Gross tonnage : 253 tons
Net tonnage : 75 tons
Fabrication : Steel
Length of the vessel : 42.8 meters
Width of the ship : 7 meters
Depth of the hollow on keel : 3,80 meters

Class Notations

Hull Notation: +100A1 SSC PATROL, MONO, HSC, G4, EP.

Propulsion: Two variable pitch propellers, MTU series 4000 M93L 12V engine

G 3.0 RATIO OF WEIGHT ADDED AND REMOVED FROM THE VESSEL.

G 3.1 Scope

G 3.1.1 MSPV type vessels are sensitive to weight additions. Materials added should be noted as well as items removed

G 3.2 Technical Description

G 3.2.1 The Contractor must weigh all material being removed and added to the CCGS Constable Carrière vessel for each item in the specifications. The Contractor must also weigh all items that are removed from the vessel.

G 3.3 Deliverable

G 3.3.1 A report must indicate the weight of the items that have been removed and added, and must be delivered to the technical authority.

G 4.0 MISCELLANEOUS PROVISIONS

G 4.1 COVID-19

G 4.1.1 All Contractors and their subcontractors must be double vaccinated as per the notice. [Notice to Federal Government Contractors - BuyingandSelling.gc.ca](#)

G 4.1.1.2 Reference documents:

5323-2020-26	COVID-19 - Health Screening Questionnaire for Canadian Coast Guard Personnel and Visitors to Canadian Coast Guard Facilities and Vessels
5404-2020-08	COVID-19 - Information on the use of non-medical masks in the workplace
6102-515	Issuance of Contractor Designation Letters during the pandemic COVID-19

- G 4.1.1.3 Due to the Covid-19 pandemic, the Contractor must comply with CCC 12-2020 "COVID-19 Health Screening Questionnaire for Coast Guard Personnel and Visitors Accessing Coast Guard Facilities and Vessels" during an outbreak of an infectious disease such as COVID-19.
- G 4.1.1.4 The Contractor must ensure that all employees and subcontractors wear non-medical masks while on board the vessel. The Contractor must provide these masks to its employees and subcontractors. The Contractor must also provide hand sanitizer for use by its employees and subcontractors.
- G 4.1.1.5 Contractor Essential Service Letters will be issued in accordance with Procedure 515 if required for the prime Contractor and any named subcontractors to facilitate travel and work.

1 Introduction

These specifications, along with the reference drawings and attachments, describe the technical requirements for the removal and replacement of the fire suppression system for the Hero Class vessels, in this case the CCGS Constable Carrière. The new fire extinguishing piping must be made of 90-10 cupronickel alloy. A piping inspection is to be conducted on both Hero Class vessels; CCGS A. Leblanc and CCGS Caporal Kaeble.

2 Abbreviations

Table 1 Abbreviations : Abbreviations

ABS: American Bureau of Shipping	ABS: American Bureau of Shipping
IA: Inspection Authority - CCG Delegate	TI: Technical Inspector - CCG delegated
TA: Technical Authority - Superintendent Naval Engineering, CCG, Central Region, or delegated representative	TA: Technical Authority -CCG Superintendent, Marine Engineering Central Region, or her delegated Representative
BCS: Canadian Welding Bureau	CWB: Canadian Welding Bureau
CLC: Canada Labour Code	CLC: Canada Labour Code
CNESST: Commission des normes, de l'équité, de la santé et de la sécurité du travail	WCB: Workers' Compensation Board
CSA: Canadian Standards Association	CSA - Canadian Standards Association
EEN: Examination of the condition of a vessel	VCS : Vessel Condition Survey
NDT : Non Destructive Testing	NDT : Non Destructive Testing
OEF : Original Equipment Manufacturer	OEM: Original Equipment Manufacturer
MSDS: Material Safety Data Sheet	MSDS: Material Safety Data Sheet
IEEE: Institute of Electrical and Electronics Engineers	IEEE: The Institute of Electrical & Electronic Engineers Inc.
ACM: Asbestos-containing materials	ACM: Asbestos Containing Material
MFE: Contractor Furnished Equipment	CFM: Contractor Furnished Material and/or Equipment
MFG: Government Furnished Equipment	GSM : Government Supplied Material and/or Equipment
DFO/CCG: Fisheries and Oceans Canada, Canadian Coast Guard	DFO/CCG: Department of Fisheries and Oceans, Canadian Coast Guard
MSF: Fleet Safety Manual	FSM: Fleet Safety Manual
RO: Recognized Organization under the Canada Shipping Act	RO: Recognized Organization as defined by Canada Shipping Act.
PVN: Vessel Life Extension	VLE : Vessel Life Extension
RSF: Manufacturer's Service Representative	FSR: Manufacturer's Field Service Representative
HC: Health Canada	HC: Health Canada
TBS: Treasury Board of Canada Secretariat	TBS: Treasury Board of Canada Secretariat
SSMS: Safety and Security Management System	SSMS: Safety and Security Management System
WHMIS: Workplace Hazardous Materials Information System	WHMIS: Workplace Hazardous Materials Information System
TCMS: Transport Canada Marine Safety	TCMS: Transport Canada Marine Safety
OHS: Occupational Health and Safety	OHS: Occupational Health and Safety
PWGSC: Public Works and Government Services Canada	PWGSC: Public Works and Government Services Canada

3 Statement of work

3.1 Scope

- 3.1.1 The work includes removal of existing stainless steel pipe from the fire suppression system to predefined locations, installation of the new fire suppression system, including assembly of all equipment removed or modified as part of these specifications.

3.2 General

- 3.2.1 Piping and flanges for the fire suppression system must be 90/10 cupronickel.
- 3.2.2 The installation of the fire suppression system must include all pumps, piping, valves, hydrants, flanges, fittings, pressure gauges and all other ancillary components necessary for the safe operation (approved by ABS for ABS regulations and the *Canada Shipping Act*) and proper functioning of the systems in accordance with the documentation in this SOW.
- 3.2.3 The Contractor must install drain valves at low points. The Contractor must update the section drawings with the location of the drain valves.
- 3.2.4 The Contractor must furnish and install all materials, equipment and components required for the performance of the work and ensure that the fire suppression system is suitable for the intended use and function to the satisfaction of the CCG TA, or his representative, and the ABS inspector on site.
- 3.2.5 The methods of execution used must be in accordance with Section 4.1 Quality of execution_ section below.
- 3.2.6 Materials used must be in accordance with Schedules iii and iv.
- 3.2.7 All welds must be in accordance with the Canadian Coast Guard Welding Specification, CT-043-EQ-EG-001, and Section 4.3 - Welding_ below.
- 3.2.8 The Contractor must review the test and inspection plan detailed in the 0 prior to commencement of work. All inspections and hold points must be met for the work to be accepted by the CCG TA.

3.3 Valves and fasteners

- 3.3.1 Valves must be installed in locations accessible to personnel. Valve stems and/or handles must not be obstructed by obstacles that would prevent them from opening or closing. Manual lever valves must be installed so that the lever, in the open position, is facing the water flow.
- 3.3.2 Existing copper alloy valve bodies may be reused if deemed to be in good condition and with the express consent of the CCG TA. The Contractor must ensure that all reused valves connect properly to the flanges on the new pipe he provides.
- 3.3.3 Valves and fasteners detailed in 0 must be provided by the Contractor in the MFE. All materials provided by the Contractor must be approved by ABS.

3.3.4 The Contractor must use new fasteners throughout the installation of the fire suppression system:

3.3.5 Aluminum fasteners should be used for all aluminum pipe supports.

3.3.6 410 stainless steel fasteners must be used for all connections between cupronickel and copper alloy pipe, flanges and valve bodies.

3.3.7 Galvanized steel fasteners must be used for all hot-dipped galvanized steel pipe fittings.

3.4 Pumps and strainers

3.4.1 The existing fire suppression system pump located in the bow thruster compartment must be reused and a new strainer must be provided by the Contractor in the CSM (Contractor Furnished Materials) (refer to 0).

3.5 Fittings and bushings

3.5.1 Connections in the fire suppression system must be of the welded flange type. Disassembly joints must be installed to permit removal of equipment obstructed by installed pipe and removal of all connected equipment.

3.5.2 Fire hydrants and piping above the deck must be removable by means of a connecting flange located as close to the deck as possible.

3.5.3 The Contractor must remove and reinstall the bushings to the original design and ensure that they match the diameter of the pipe passing through them. All penetrations must conform to the requirements of the ABS inspector on site.

3.5.4 Bolted bulkhead penetrations must be used. Welded bulkhead penetrations may be used only with permission of the CCG TA.

3.5.5 All unused penetration openings must be closed and sealed in accordance with the ABS inspector's instructions.

3.5.6 It is important to separate dissimilar metals using insulation kits provided by the Contractor to prevent galvanic corrosion where these metals touch (refer to 0).

3.6 Disassembly

3.6.1 The Contractor must protect or, if necessary, remove all furniture, trim, ceilings, electrical, HVAC, piping, insulation, and other components or equipment, as applicable, from the areas where the Work is to be performed. All items removed must be securely stored and protected from damage. All items removed must be replaced as originally installed.

3.6.2 The Contractor must remove the existing stainless steel piping and components of the fire suppression system as described below (Section 3.7). All section numbers that are to be disassembled are existing numbers in accordance with the drawings in Section G 1.2.2.1-disassembly.

3.6.3 Fire hydrants and valves that are part of the disassembled sections should only be reused if the

valve body material is bronze and the valve was not damaged during the work.

- 3.6.4 All removed system components must be weighed and their weights recorded as described in section G 3.0.
- 3.7 Piping in the premises
- 3.7.1 Fire suppression piping in accommodation spaces must be removed and disposed of in accordance with Visual Disassembly Aid Drawing 6094-P1103-500-2-001, Sheet 10/17, Rev 1. Bulkhead penetrations through members 25 and 31 must be drained, carefully dried, and sealed with welded sheet metal.
- 3.8 Piping in bow thruster compartment
- 3.8.1 Refer to drawing 6094-P1104-500-2-001, sheet 9/11, revision 4. All sections that are to be disassembled are identified (in orange) in the legend Figure 1: Color code for drawing annotations below, for the fire main, must be removed and disposed of.

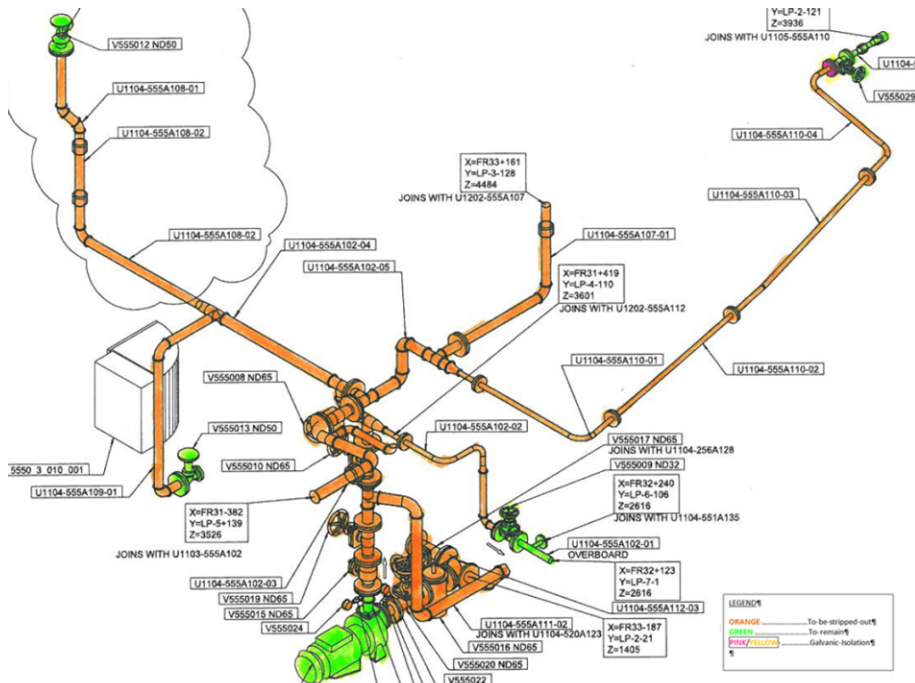


Figure 1 Color code for drawing annotations

- 3.9 Piping on the starboard breezeway
- 3.9.1 The fire main, starboard exterior side of the breezeway, shown on Drawings 6094-P1201-500-1-001, Sheet 8/8, Revision 8 and 6094-P1202-500-3-001, Sheet 5/7, Revision 7 must be removed and disposed of. The interior fire main shown on this drawing, including downstream of section U1201-555A113-01, must be removed and the passenger compartment crossing must be sealed in a watertight manner as directed by the ABS inspector on site.
- 3.9.2 The section of hose U1202-555A107-01 connected to starboard intake V555011 must be

removed and disposed of in accordance with 6094-P1202-500-3-001, sheet 5/7, rev 7. The hose supplying port intake V555012, which passes through the bow thruster compartment deck below (see drawing 6094-P1104-500-2-001, sheet 9/11, revision 4) must be removed and disposed of.

3.9.3 Pumps, filters, hydrants, valves, and other ancillary components of the fire suppression system that do not need to be removed to replace piping must remain in place.

3.9.4 All insulation that must be removed for hot work must be replaced with new insulation. The specifications of this insulation must be approved by ABS.

3.9.5 All design elements that must remain in place in the space during construction must be protected.

3.9.6 Debris should be disposed of in accordance with applicable local laws and regulations.

3.9.7 Components or old piping that will not be used for fire suppression system renewal must be disposed of in consultation with the CCG TA.

3.9.8 All components removed must be weighed and their weight recorded in a logbook to be delivered to the CCG upon completion of the work.

3.10 Installation of the fire extinguishing system

3.10.1 The Contractor must replace the dismantled stainless steel fire suppression system (see section 3.5.6 -

3.10.2 Disassembly) with copper-nickel piping and fittings. All equipment and ancillary components that were removed during the disassembly phase must be reinstalled to match the original use and function of the system. All fire suppression system hose fasteners removed during disassembly must be replaced with new fasteners and installed with anti-seize compound, if applicable.

3.10.3 When connecting new pipe flanges to existing valves, flanges or equipment, the Contractor must ensure that the flanges are fitted without tension.

3.10.4 All system components added or removed must be weighed and their weight recorded in a logbook to be submitted to the CCG at the end of the work (see Section G3.0).

3.11 Extension of the fire suppression system along the covered walkway

3.11.1 To restore the function of piping in living spaces that has been removed in accordance with Section 3.5.6 -

3.11.2 Disassembly the new fire extinguishing system piping must be extended along the starboard exterior breezeway on the main deck, and through the bow thruster compartment using the existing penetrations, in accordance with the drawings in section G 1.2.2.1.

Relocation of Fire Hydrant V555018

3.11.3 *The V555018 fire hydrant and fire hose housing (E555007) must be removed from the living spaces and relocated to the starboard outboard side of the breezeway as shown on the reference drawings in Section G 1.2.2.1. All piping in the emergency generator room must be removed, weighed and its weight recorded. Bulkhead penetrations must be watertight subject to the approval of the ABS marine surveyor.*

3.12 Valve relocation V555008

3.12.1 *Valve V555008 must be relocated to the new fire main on the starboard side breezeway as shown in the reference drawings in Section G 1.2.2.1*

3.13 Addition of fire hydrant V555030 and fire hose cabinet E555013

3.13.1 A new water intake (V555030) must be installed on the bridge deck, starboard side forward, as shown in the reference drawings in Section G 1.2.2.1.

3.14 Ammunition locker piping

3.14.1 The existing stainless steel piping and valves V555025 and V555026 must remain intact; the deck penetration between the bow thruster compartment and the ammunition locker must be installed in accordance with ABS standards for watertight bulkhead penetration with liner steel plate, a drawing must be provided by the Contractor prior to the work being performed and must be accepted by ABS. The Contractor must connect the cupronickel pipe section to the V555031 valve (new stainless steel valve) located in the bow thruster compartment as shown on drawing 13-68Q-555-04-03, sheet 6. A galvanic isolator must be installed at the connection of the cupronickel pipe and the V555031 stainless steel ball valve.

3.15 Fire hydrant connection modification V555007

3.15.1 Intake V555007 must remain in the same location in the corridor outside the CCGS *Constable Carrière* engine control room.



Figure 2 Location of water intake V555007 outside the machine control room

3.16 Piping in the main engine room

3.16.1 The Contractor must connect intake V555002 (main engine room forepeak) to intake V555004 (aft main deck) using cupronickel piping as shown on drawing 13-68Q-555-04-02. The Contractor must design and construct the connection from section U1102-520A02-01 to pipe 520-109-65SS (bilge drainage system) as shown on drawing 13-68Q-555-04-02, sheet 5. Similarly, the Contractor must design and construct the connection from section U1102-555A115-01 to valve V555027 leading to the bilge system as shown on reference drawing 13-68Q-555-04-02 on page 7. Galvanic isolation kits must be installed on the flange of the U1102-520A02-01 section and at the V555027 valve.

3.17 Piping in the auxiliary machine room

3.17.1 The Contractor must connect the V555001 hydrant to the 520-109-65SS pipe (bilge drainage system) as shown on reference drawing 13-68Q-555-04-01. Galvanic isolators must be installed at the cupronickel (new fire suppression system) and carbon steel or stainless steel (existing bilge drainage system) piping connections.

3.18 Connection to existing stainless steel piping in the machine room

3.18.1 The fire suppression system connection downstream of V555004 to the fire suppression system piping in the main engine room must be field tested by the Contractor. The V555004 connection valve must be insulated to prevent galvanic corrosion. The ceiling penetration must be reused. The Contractor must complete the connection of the main engine room cupronickel piping section to the aft deck piping as shown on drawing 13-68Q-555-04-02, sheet 6.

3.19 Addition of additional disassembly joints

3.19.1 Additional disassembly joints must be added to allow removal of the fire main. These disassembly joints are shown on drawings 13-68Q-555-05 . The Contractor must ensure proper placement of the disassembly joints prior to fabrication to allow for maintenance of the system.

3.20 Replacement of globe valves with butterfly valves

3.20.1 Globe valves V555004 (size DN 65 fwd of frame 31), V555008 (size DN 65 fwd of frame 31), V555010 (size DN 65 FIRE MAIN / EMERG FI-FI PUMP ISOLATION), V555017 (size DN 65 emergency suction fire pump) and V555020 (size DN 65 emergency fire pump suction) must be replaced with butterfly valves. The new valves must be in accordance with Section G 1.2.2.1 and reference drawing 13-68Q-555-03-01.

3.21 Fire fighting plan

The Contractor must modify, produce, supply and install the fire plan referred to in Section G 1.2.2
- Reference Drawings

4 Other

4.1 Quality of execution

- 4.1.1 Where pipe is not detailed on the sectional drawings in Section G 1.2.2.1 The Contractor must ensure that the piping is routed as directly as possible with a minimum number of bends and joints. Piping diagrams must be used for fabrication and installation only; all dimensions must be verified by the Contractor.
- 4.1.2 The Contractor must ensure that piping or flange joints do not pass over electrical components.
- 4.1.3 Care must be taken to ensure that the installation of piping does not obstruct free passage along aisles, on ladders, or through doors, hatches and openings. Piping must not interfere with maintenance or obstruct the removal of existing equipment and components of the vessel's system.
- 4.1.4 The pipes must be installed without tension, and be deburred and clean.
- 4.1.5 The Contractor must protect all machinery, equipment, and completed work from environmental deterioration and from all mechanical or hot work damage due to abrasive or foreign materials or negligent workmanship.
- 4.1.6 The Contractor must provide adequate fire protection and take all feasible precautions against the outbreak of fire on or around the vessel.
- 4.1.7 All temporarily removed items must be reinstalled by the Contractor and work areas must be returned to the condition in which they were found.
- 4.1.8 Care should be taken when removing paint and insulation from the vessel.
- 4.1.9 Modifications to the vessel, including the installation of all required materials, must take into account shipbuilding regulations throughout the work, and must be performed to the satisfaction of the CCG TA and the ABS inspector on site.

4.2 Materials

- 4.2.1 All materials supplied by the Contractor must be in full compliance with ABS regulatory requirements and must be accompanied by an approved material certification (mil test) which must be provided to the TA prior to acceptance for use of such materials.
- 4.2.2 The materials to be supplied by the Contractor are detailed in 0. All materials supplied by the Contractor must be approved by ABS, unless otherwise specified in the tables in the Appendix.0.

4.3 Welding

4.3.1 Cupronickel

4.3.2 Welding procedures, including electrode quality, must conform to CCG CT-043-EQ-EG-001 and the welding standard specific to copper-nickel pipe described in Annex i of these specifications.

4.4 Painting and indications on the pipes

4.4.1 New materials and welded areas should be painted prior to the installation of the insulation.

4.4.2 All paint must be marine grade epoxy and must be provided by the Contractor. The original paint schedule must be adhered to. The paint specification must be confirmed with the CCG TA prior to application. AF6095-63100-01 Paint Schedule

4.4.3 Contractor must apply primers to bare metal surfaces in accordance with manufacturer's specifications. Primer must be uniform, free of pitting and compatible with the selected coating system.

4.4.4 Application and all work must be performed in strict accordance with the manufacturer's instructions and as described herein.

4.4.5 All light fixtures and adjacent surfaces must be properly protected during painting operations.

4.4.6 All new surfaces must be thoroughly clean, dry and free of grease or oil before painting begins. All plates or profiles used in construction, and all surfaces to be repainted, must be surface prepared in accordance with the paint manufacturer's specifications to completely remove scale, rust and other surface contaminants. Surface preparation must be to SSPC-SP1 standard.

4.4.7 Contractor must apply strip coating by brush touch-up, edges, welds, crevices, bolt heads, transitions, backs of stiffeners, holes, ladders, ramps and other irregular surfaces during application of primer and intermediate coat when surface is cleaned to bare metal. Brush strip can be applied to surfaces with a gun if the coating is immediately and thoroughly worked into the areas with a brush.

4.4.8 If the application is done with brushes and rollers, the Contractor must apply several coats to achieve the proper wet film thickness.

4.4.9 All areas damaged by welding or burning must be restored in accordance with the specifications. Removal and disposal of all hazardous paint wastes (residues) must be in accordance with provincial and local environmental regulations.

4.4.10 Piping systems must be identified and marked in accordance with CCG Standard 30-000-000-ES-TE-001 regarding color coding for piping.

4.5 Pipe supports

- 4.5.1 The Contractor must install pipe supports to properly support all new pipe. Existing supports may be reused where piping is to be replaced. Existing pipe supports that are rusted and damaged and deemed inadequate by the TA must be replaced with new ones with Form 1379. Pipe supports must be fabricated in accordance with ASTM F708 and must be attached to the vessel by welding.
- 4.5.2 Pipe supports and connection saddles must be lined with a suitable material (galvanic insulation kit) to prevent corrosion and abrasion caused by friction and vibration.
- 4.5.3 The Contractor must ensure that existing and new pipe supports are properly spaced to support the weight of the pipe and its liquid, as well as the dynamic load imposed by the vessel's movements.
- 4.5.4 Brackets and piping should be installed to prevent damage from thermal expansion and vessel vibration.

4.6 Insulation

- 4.6.1 The Contractor must use a Contractor experienced in the installation of marine piping insulation (rock insulation with aluminum 'cladding'). The design, materials and installation must be performed to the satisfaction of the CCG TA and ABS. Piping materials in heated spaces must be insulated with a minimum of 350 mm between penetrations to unheated spaces and above deck . It is the Contractor's responsibility to determine a suitable power source and the exact routing of the heating cables to the satisfaction of the CCG TA.

4.7 Posters, labels and nameplates

- 4.7.1 The Contractor must produce signs for fire hydrants and valves that have been added and relocated. Signs must be bilingual and in the format of the original design.

4.8 Cleaning and rinsing

- 4.8.1 All piping and associated equipment must be thoroughly cleaned after fabrication. The fire suppression system must be flushed to clean all debris using the system pumps and sea water.

5 **Quality program**

5.1 General

- 5.1.1 No later than 15 days after the effective date of the contract, the Contractor must submit to the CCG TA and ABS for acceptance a quality plan prepared in accordance with the latest version (as of the date of the contract) of ISO 10005:2005 "Quality Management Systems - Guidelines for Quality Plans".
- 5.1.2 This plan must describe how the Contractor must comply with the quality requirements prescribed in the contract and specify how the required quality related activities will be performed, including quality assurance of all subcontractors. The Contractor must include a traceability matrix from the elements of the quality requirements prescribed in the corresponding paragraphs in the quality plan. Documents referencing the Quality Plan must be

made available to Canada when requested by the CCG TA and ABS.

- 5.1.3 Once the CCG TA and ABS have approved the quality plan, the Contractor must implement it. The Contractor must make appropriate changes to the quality plan during the life of the contract to reflect current and anticipated quality activities. Modifications to the Quality Plan must be accepted by the CCG TA and ABS.

5.2 Inspection

- 5.2.1 The Contractor must arrange for inspections and reviews (prior to acceptance of the work by the CCG), by qualified third parties (Level 2 welding inspector), of all welds made under the requirements of these specifications.
- 5.2.2 The Contractor must arrange for the local ABS inspector to attend inspections. The Contractor must provide the CCG TA with a minimum of 48 hours notice to be available to attend all inspections performed by the ABS inspector.

5.3 Testing

- 5.3.1 Testing must be performed in accordance with these specifications and the reference drawings in Section G 1.2.2.1.
- 5.3.2 All welds must be 100% visually inspected in accordance with the welding and inspection requirements of the Canadian Coast Guard CCG CT-043-EQ-EG-001.
- 5.3.3 A Contractor for the CCG TA will be hired by the CCG to inspect and verify the welding processes prior to the start of the welding work, during and after the welding work, and after inspections of the welding work by a third party Contractor.
- 5.3.4 The inspection and testing plan at 0 must be followed.
- 5.3.5 Acceptance of all piping reinstallation work is based on successful completion of functional and leakage tests to the satisfaction of the CCG TA and the ABS inspector.

5.4 Acceptance testing and trials

- 5.4.1 The Contractor must test the fire suppression system to determine if there are any leaks, if all components are strong and rigid, if they are properly tightened, and if the system is suitable for its intended use. He must also ensure that all fixed and moving parts are properly placed and aligned. Acceptance of these tests and trials must be determined by the CCG TA and ABS.
- 5.4.2 Prior to testing, the Contractor must perform an inspection to ensure that all modifications to the steel are properly made, and that the equipment, fittings, valves, and all other ancillary components are properly installed and secured prior to the start of commissioning. In addition, and prior to commissioning, the Contractor must perform a hydrostatic pressure test on the fire suppression system to the satisfaction of the ABS inspector on site.
- 5.4.3 The Contractor must provide the CCG TA with a minimum of two weeks written notice prior to the commencement of testing or trial runs. A commissioning procedure must be developed by the Contractor and submitted to the CCG TA for approval three weeks prior to testing.

5.5 Technical modifications

- 5.5.1 If changes are to be made to the vessel that are beyond the scope of the drawings provided by the CCG, an Engineering Change Request form must first be filed with the CCG TA. This form must be approved prior to the start of work.
- 5.5.2 Report Deliverables
- 5.5.3 One (1) hard copy and one (1) PDF copy of the ABS approval documents or manufacturer's statement of compliance must be provided with the washers, valves and pumps.
- 5.5.4 All information and documents delivered to the CCG must be considered the property of the CCG, and all ownership rights must be transferred to the CCG.

PIPING INSPECTION

5.6 CCGS Corporal Kaeble

- 5.6.1 For the vessels Corporal Kaeble V.C. A fire system and seawater hose inspection selected by the Chief Engineer. 15 lengths of hose designated by the Chief Engineer will be inspected by camera, interference and/or additional hoses will be addressed by 1379. A report of this inspection, including photographic documentation is required. Any sections of pipe requiring replacement will be negotiated by 1379.

5.7 CCGS A. Leblanc

- 5.7.1 For the vessel A.Leblanc, an inspection of the fire systems and the seawater hoses chosen by the chief engineer. 15 lengths of hoses designated by the chief engineer will be inspected by camera, interference and/or additional hoses will be treated by 1379. A report of this inspection, including photographic documentation is required. Any sections of pipe requiring replacement will be negotiated by 1379.

Annex i CuNi-Welding standard for cupronickel pipes

- i.1.1 All welds of 90/10 cupronickel pipe must be made in accordance with Section 8 of the CCG *Welding Specification*-CCT-043-EQ-EG-001 and the ABS Special Craft Classification Regulations, 2020 Edition.
- i.1.2 All perimeter butt welds of pipe must be full penetration. Pipes that are not butt welded all the way around, but only joined by angle welded sleeves to seal the connections are prohibited and must not be used.
- i.1.3 All perimeter butt welds on the pipe must be made by the GTAW (tungsten electrode welding) process, and must be gas-shielded near the common root inside the pipe during welding and until completion.
- i.1.4 The welds that connect the pipes to the flanges can be made by GTAW, SMAW (shielded metal arc welding), or GMAW (gas metal arc welding).
- i.1.5 All welding electrodes, welding rods and consumables for welded joints must be Cu-30% Ni.
- i.1.6 Base metals may not be joined by fusion without the addition of filler metal of the required grade. Filler metal of the required grade must be used for all types of joints.
- i.1.7 Qualified welders and welding process specifications must be approved by the provincial authority in accordance with the requirements of ASME Section IX.
- i.1.8 Only approved welders and welding process specifications will be permitted to perform welding work.
- i.1.9 The manufacturing process must be carried out in an area dedicated exclusively to cupronickel alloys.
- i.1.10 Materials should remain in their packaging until used, and should be separated by protective materials to prevent abrasion.
- i.1.11 The use of stainless steel brushes is mandatory, and tools such as brushes and abrasive discs should not be used on cupronickel and other materials in turn.
- i.1.12 Bending, forming and cutting tools must be designed and used in such a way as not to affect the corrosion resistance properties of the base metals.
- i.1.13 Grease and paint should be kept away from the surface, especially near the weld preparation edges. Pencil marks should be removed before welding the joints.
- i.1.14 Dirt of any kind must be removed, as well as residual oil and grease.
- i.1.15 Particular attention should be paid to the source of items that can cause cracks or microcracks in the weld, such as identification marks made with pencil or paint, or other contaminants.
- i.1.16 Fittings made of other alloys such as industrial bronze - a copper-tin-zinc alloy - are also a source of harmful elements and should not be welded to cupronickel alloys.
- i.1.17 The joint surface must be thoroughly cleaned before welding is undertaken. Particular attention should be paid to the weld preparation; an adjacent surface at least 10 mm wide, or preferably wider, on each side of the preparation should be degreased with an uncontaminated organic solvent, applied with a thin abrasive pad or clean rag. The surface should be dried with clean cloths. The appearance after use is an indicator of cleanliness: the surface should be free of any residue.
- i.1.18 It is important to make spot welds to maintain uniform spacing and alignment between the parts being welded.
- i.1.19 Spot welds should be wire brushed or ground to clean metal where they are to be incorporated into the final weld.
- i.1.20 The minimum temperature between passes must be maintained at less than 150 C.

- i.1.21 The misalignment of the inner wall of the pipe should not exceed 1 mm.
- i.1.22 Installed edge preparation and root gaps must be in accordance with approved welding process specifications.
- i.1.23 Inspection
- i.1.24 All welds must be visually inspected 100% of their length inside and outside the pipe.
- i.1.25 Inspection procedures and personnel must fully comply with the CCG Welding Standard - EKME#3049715V3A (CT-043-EQ-EG-001-E).
- i.1.26 Mirrors and high-resolution flexible endoscopes or videoscopes should be used for internal inspection of pipe welds.
- i.1.27 The convexity of the weld on the outside of the pipe must not exceed 3 mm.
- i.1.28 The convexity of the weld inside the pipe must not exceed 2 mm.
- i.1.29 External or internal pipe welds that have a concavity are not acceptable
- i.1.30 Weld seams must blend smoothly into the base metal at the edges of the weld, with no gutters or overlaps.
- i.1.31 There must be no visible porosity, lack of fusion, incomplete penetration or cracks.
- i.1.32 All welds must be chemically uncontaminated (Cu - 30% Ni) and corrosion resistant by positive material identification.
- i.1.33 After acceptance of the work following a visual inspection, the completed pipe sections must be tested for leaks by hydrostatic testing at a pressure determined by the classification society inspector.
- i.1.34 The classification society inspector must witness all hydrostatic tests.
- i.1.35 Only clean drinking water may be used for all hydrostatic tests.
- i.1.36 Pipe sections must be hot air dried at the time of acceptance, immediately after hydrostatic testing.
- i.1.37 Pipe and fitting openings should be protected at the end of fabrication to prevent the ingress of dirt or other contaminants prior to installation.

H=Hold point, W=Witness point, M=Control/monitoring, I=Inspection point, D=Document review, A=Acceptance												
ABS Registry												A report is required:
Coast Guard Technical Authority (CCG TA):												
Canadian Welding Bureau (CWB)												
Contractor Quality Control Inspection (CQCI)												
N o	Activity	Task No:º	Inspection procedures									

Annex ii Test and inspection plan

1.	Inspections of supplied materials			H	--	--	--	--	--	--	--	<input checked="" type="checkbox"/>
	a. Checks of condition, type, quantities, dimensions, checks of the conformity of the documentation by ABS, etc.	Section 4.2, Annex iii and Annex iv		I	--	--	--	M	--	--	--	<input type="checkbox"/>
	b. ABS acceptance of Contractor supplied materials (CSM)	Section 4.2		H	--	--	--	M	A	D	A	<input checked="" type="checkbox"/>
2.	Removal of existing piping in the premises	Section 3.7		H	--	--	--	--	--	--	--	<input type="checkbox"/>
	a. Assess and record the value of the piping removed			I	--	--	--	D	--	--	--	<input checked="" type="checkbox"/>
	b. Maintain and inspect materials that are to be reused (ensure proper storage and record the weight of what is reused)			I	--	--	--	M	--	--	--	<input checked="" type="checkbox"/>
3.	Closing of crossings			H	--	--	--	--	--	--	--	<input type="checkbox"/>
	a. Audit and inspection			I	--	--	--	M	A	--	--	<input type="checkbox"/>
	i. Emergency generator room on starboard side of main deck	Section 3.12		I	--	--	--	M	--	I	A	<input type="checkbox"/>
	ii. Central part of the partition (member 25)	Section 3.7		I	--	--	--	M	--	I	A	<input type="checkbox"/>
	iii. Bow thruster bulkhead (frame 31)	Section 3.7		I	--	--	--	M	--	I	A	<input type="checkbox"/>
4.	Verification of the documentation before welding	Section 4.3		H	--	--	--	--	--	--	--	<input type="checkbox"/>

H=Hold point, W=Witness point, M=Control/monitoring, I=Inspection point, D=Document review, A=Acceptance												
ABS Registry												A report is required:
Coast Guard Technical Authority (CCG TA):												
Canadian Welding Bureau (CWB)												
Contractor Quality Control Inspection (CQCI)												
N o	Activity	Task No:º	Inspection procedures									
	a. Verification of approved welding procedures and documentation of welder performance qualifications			I	--	D	A	M	--	--	--	☒
5.	Installing a fire extinguishing system	Section 3.10		I	--	--	--	--	--	--	--	☐
	a. Assess and record the value of the piping removed			I	--	--	--	D	--	--	--	☒
	b. Internal and external visual inspection of the welds of the cupronickel pipe sections before installation	Section 4.3.1		H	--	I	A	M	--	--	--	☒
	c. Assess and record the value of the piping to be installed			I	--	--	--	D	--	--	--	☒
	d. Install insulation kits at dissimilar metal connections that have different galvanic potentials			I	--	--	--	W	--	--	--	☐
	e. Inspection of the welds of the piping and the installed cupronickel feedthrough sleeves	Section 4.3.1		H	--	I	A	M	--	I	A	☒
6.	Checks after welding	Section 4.3		H	--	--	--	--	--	--	--	☐
	a. Review Contractor Quality Control Inspection (CQCI) reports			I	--	D	--	M	--	--	--	☒
	b. Review third party inspection reports			I	--	D	--	M	--	--	--	☒
	a. Review and acceptance of inspection report findings			H	--	D	A	D	A	D	A	☒
7.	ABS leak detection testing requirements			H	--	--	--	M	A	W	A	☐
8.	Installation of insulation and heating cables			I	--	--	--	M	A	--	--	☐
9.	Paint touch-ups.			I	--	--	--	M	A	--	--	☐

Annex iii Material provided by the Contractor

Table 2 : Contractor supplied flange insulation kits must be installed between dissimilar metals for prevention of galvanic corrosion.

Flange diameter	Quantity	Location
DN65 PN16	Three kits per ship	Starboard side bow thruster and main deck penetration/ SMP and aft main deck penetration
DN50 PN16	Three kits per ship	Fire hydrant V555007/ hydrant junction for SMP piping
DN32 PN16	One kit per ship	Valve V555009
2 1/2 in. 150 lbs.	Two kits per ship	Valve V555010
1 1/2 in. 150 lbs.	One kit per ship	Valve V555031

Note: All galvanic isolation kits required for the work described in this specification **are not** supplied as MFG. The Contractor is required to purchase all insulation kits.

Annex iv Materials provided by the Contractor

i.1.38 Abbreviations

Al-Brz - Aluminium-bronze
DN - Nominal diameter
Fi-Fi - Fire hydrant
HF - Anti-wear refill
NBR - Nitrile rubber (also known as Buna-N)
NPS - Nominal Pipe Size
PTFE - Polytetrafluoroethylene
RPTFE - Reinforced Polytetrafluoroethylene
Stainless steel. - Stainless steel
Qty - Quantity

i.1.39 Scope

The Contractor must provide all fasteners, washers, valves, pumps and strainers for the completion of the work.
All materials provided by the Contractor must meet the specifications outlined in the SOW.

All fastening materials provided by the Contractor must be designed, fabricated and tested to comply with the engineering standards that are specified in the SOW.

Washers supplied by the Contractor to perform the work must be made from ABS approved materials.

Valves and pumps supplied by the Contractor to perform the work must be from certified ABS manufacturers.

The Contractor must provide ABS approval documents or statement of compliance for all washers, valves and pumps supplied for the work.

Annex v Specifications

i.1.40 Fire extinguishing system (breezeway and bow thruster) - Material specifications

The Contractor must provide the following materials to perform the work of installing the fire suppression system in the bow thruster compartment and starboard side breezeway under the contract on one (1) vessel.

Table 3 MFE attachment materials for fire main in breezeway and bow thruster

Characteristics of fastening materials				
Element	Description	Dimensions	Materials/brands	Qty/ship
3.1.1	Bolt	1/2" x 2 3/4	ASTM A193, category B8M, class 2A, ANSI B18.2.1	8
3.1.2		1/2 in. x 3 in.		4
3.1.3		5/8" x 3 1/4		48
3.1.4		5/8" x 3 1/2		32
3.1.5		5/8" x 5 1/4		12
3.1.6		M16 x 45 mm		16
3.1.7	Nut	1/2 in.	ASTM A194, category 8M, class 2A, ANSI B18.2.2	12
3.1.8		5/8 in.		92

Table 4 MFE of valves for the fire main in the breezeway and bow thruster

Valve material characteristics							
Element	PSN	DN (nominal diameter)	Valve type	Connection /comments	Materials		Qty/shi p
					Body	Internal bodies	
3.1.14	2 in.	50	Fi-Fi Valve - Straight valve, globe valve	Flanged/Sto rz	Bronze ASTM B61 or B62, 150 lbs	NBR disc and sealing ring, brass stem	1
3.1.15	2 ½ in.	65	Butterfly	Flanged	Bronze ASTM B61 or B62, 150 lbs, lugged	Al-Brz discs, fire resistant seats, lever operated with 10 notched positions	5
3.1.16	1 ½ in.	40	Straight ball valve	Flanged	316 stainless steel,	316 stainless steel ball valve,	1

Specification
F3065-210339

					ASME B16.10 and B16.5	PTFE seal and seat	
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1.1. Fire extinguishing system (machine rooms) - Material characteristics

The Contractor must provide the following materials to perform the installation of the fire suppression system in the main and auxiliary engine room compartment under the contract on one (1) vessel.

Table 5 MFEs for the fire main in the machine rooms

Characteristics of fastening materials				
Element	Description	Dimensions	Materials/brands	Qty/ship
3.3.1	Bolt	1/2" x 2 3/4	ASTM A193, category B8M, class 2A, ANSI B18.2.1	8
3.3.2		5/8" x 3 1/4		40
3.3.3		5/8" x 3 1/2		12
3.3.4	Nut	1/2 in.	ASTM A194, category 8M, class 2A, ANSI B18.2.2	8
3.3.5		5/8 in.		52

Table 6 Washing MFE for the fire main in the machine rooms

Characteristics of washing materials				
Element	Description	Dimensions	Materials/brands	Qty/ship
3.3.6	Flat washer	1/2 in.	ANSI B18.21.1, AISI 410 stainless steel	16
3.3.7		5/8 in.		104
3.3.8	Spring washer	1/2 in.		8
3.3.9		5/8 in.		52