

CCGS Samuel Risley

2021 DRYDOCK

Specification No. 896.18

Prepared by:
Marine Engineering
Integrated Technical Services
Canadian Coast Guard
520 Exmouth Street
Sarnia, ON
N7T 8B1

Date of issue: April 21, 2021

Table of Contents

G 1.0	GENERAL NOTES	5
G 1.1	Vessel Particulars.....	5
G 1.2	References	5
G 1.3	Abbreviations	9
G 1.4	Occupational Health and Safety.....	9
G 1.5	Access to Worksite	10
G 1.6	Workplace Hazardous Materials Information System (WHMIS)	10
G 1.7	Smoking in the Work Space	10
G 1.8	Clean and Hazard Free Worksite	10
G 1.9	Fire Protection.....	11
G 1.10	Touch-up / Disturbed Paint.....	11
G 1.11	CCG Employees and Others on the Vessel.....	12
G 1.12	Regulatory Inspections and/or Class Surveys.....	12
G 1.13	Test Results and Data Book.....	12
G 1.14	Contractor Supplied Materials and Tools	13
G 1.15	Restricted Areas	14
G 1.16	Contractor Inspections and Protection of Equipment and the Worksite.....	14
G 1.17	Recording of Work in Progress.....	14
G 1.18	List of Confined Spaces	14
G 1.19	Lead Paint and Paint Coatings	14
G 1.20	Asbestos Containing Materials	15
G 1.21	Work Aloft	16
G 1.22	Assembly of Components	16
G 1.23	Storage and Protection of Equipment	16
G 1.24	Halocarbon containing Systems.....	17
G 1.25	Hot Work	17
G 1.26	Welding Certification.....	17
G 1.27	Electrical Installations.....	18
G 1.28	Potable Water.....	18
G 1.29	Covid-19	20

G 1.30	Piping of up to 50mm diameter	20
S 1.0	SERVICES.....	21
S 1.1	General.....	21
S 1.2	Berthing.....	21
S 1.3	Mooring Lines.....	21
S 1.4	Gangways.....	21
S 1.5	Electrical Power	22
S 1.6	Potable Water Supply	22
S 1.7	Fire Main Charging Service.....	23
S 1.8	Vessel Security.....	23
S 1.9	Parking at Contractor's Facility	23
S 1.10	Project Facilities.....	24
S 1.11	Temporary Deck Coverings.....	24
S 1.12	BILGEs, Black and Grey Water Services.....	24
S 1.13	VESSEL GARBAGE REMOVAL.....	25
10.0	SAFETY AND SECURITY	26
10.1	DOCKING AND UNDOCKING	26
10.2	BILGE CLEANING	29
10.3	FIRE SYSTEM ANNUAL INSPECTION.....	32
11.0	HULL AND RELATED STRUCTURES	36
11.1	Underwater Hull Inspection and survey	36
11.2	Underwater Hull Painting (if required).....	41
11.3	UNDERWATER HULL ULTRASONIC TESTING.....	44
11.4	Chain Lockers, Anchor Chain and Anchors	48
11.5	SEA side and ballast VALVES.....	53
11.6	SEA INLETS	57
12.0	PROPULSION AND MANEUVERING	62
12.1	Rudders	62
12.2	GEARBOX AND CLUTCHES (SURVEY ITEM)	69
12.3	PROPULSION TAIL SHAFTS.....	73
12.4	12.4 CONTROLLABLE PITCH PROPELLER SYSTEM	81
12.5	BOW THRUSTER GEAR BOX OIL CHANGE AND 5 YEAR	87
12.6	STERN THRUSTER GEAR BOX OIL CHANGE.....	89

13.0	ELECTRICAL GENERATION	91
13.1	SHIP'S SERVICE GENERATORS SURVEY	91
14.0	POWER DISTRIBUTION SYSTEMS	97
14.1	MEGGER TESTING OF ELECTRICAL CIRCUITS	97
14.2	CIRCUIT BREAKERS (SURVEY ITEM)	99
15.0	AUXILIARY SYSTEMS	103
15.1	FUEL TANKS survey.....	103
15.2	BALLAST, SEWAGE AND VOID TANKS INSPECTION	106
15.3	PNEUMATIC PRESSURE TEST PROCEDURES	111
15.4	POTABLE WATER TANKS	113
16.0	DOMESTIC SYSTEMS	118
16.1	SEWAGE TREATMENT SYSTEM PUMP OUT AND CLEANING.....	118
16.2	THERMAL HEATERS REPLACEMENT	122
16.3	AXIAL FANS REPLACEMENT	124
17.0	DECK EQUIPMENT	128
17.1	MAIN MAST PAINTING.....	128
17.2	LIEBHERR Main Crane 5-year inspection	130
17.3	2 VHF ANTENNAS REFURBISHMENT.....	137
17.4	12-24VOLT SYSTEM REPLACEMENT.....	145
17.5	ELAC 4400 ECHO SOUNDER REPLACEMENT	178
	Appendix B – existing axial fans installations.....	184

G 1.0 **GENERAL NOTES**

G 1.1 **Vessel Particulars**

Name: CCGS Samuel Risley

Type: Type 1050 Medium Endurance Multitasked Vessel

TCMS Notation: Ice Class 1A Super/ Arctic Class 2

Propulsion: Twin rudder, direct drive diesel, twin screw, controllable- pitch shrouded propellers, Tunnel Type CPP Bow thruster and Tunnel Type CPP Stern thruster.

Year Built: 1984

Principal Dimensions:

Length overall 69.73 meters

Breadth overall: 13.7 meters

Loaded Draft: 5.817 meters

Gross Tonnage: 1967 tones

Net Tonnage: 649 tones

Port of Registry: Ottawa, On.

G 1.2 **References**

- G 1.2.1 The latest edition, at the time of contract signing, of all Acts, regulations, standards, publications, and procedures listed below are to be used as reference. The Contractor must ensure all work completed in the specification are done to all pertinent federal and territorial regulations and standards. CCG procedures are to be used as a guide if no other regulation takes precedence.

Publications	Title
CCG 5737	Fleet Safety Manual
TP 127 (05/2018)	Ships Electrical Standards
TP 1861E	Standards for Navigation Lights, Shapes, Sound Signal Appliances and Radar Reflectors (1991)
NFPA 306 2014	Standard for the Control of Gas Hazards on Vessels

Publications	Title
TP 3668 (1983)	Standards for Navigating Appliances and Equipment
TP 11469 (1993)	Guide to Structural Fire Protection
TP 14231	Marine Occupational Health and Safety Program
TP 14612 (2019)	Procedures for Approval of Life-saving Appliances and Fire Safety Systems, Equipment and Products
IEEE 45-2002	Institute of Electrical and Electronics Engineers, Recommended Practice for Electrical Installations on Shipboard
IEEE 45.6-2016	IEEE Recommended Practice for Electrical Installations on Shipboard – Electrical Testing
70-000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment
IEC 60533	Electrical and Electronic installations in ships – Electromagnetic Compatibility
IEC 60092-504: 2016 RLV	Electrical Installations in Ships – Part 504: Automation, control and instrumentation
EPS Report 1/RA/2	Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems - Environment Canada
NFPA 10 (2019)	Standard for portable fire extinguishers

Standards	Title
CCG	CCG CAD using AutoCAD http://intra.coast-guard.ca/folios/00922/docs/ccgststden.zip
CCG	G 1.2.1.1 Canadian Coast Guard Specification for Electronic Technical Data Deliverables G 1.2.1.2 CA-014-000-NU-TD-001
CCG	Color Coding Standard for Piping Systems 30-000-000-ES-TE-001

Standards	Title
CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures Division 2 Certification
CSA W47.2	Certification of Companies for Fusion Welding of Aluminum
CSA W59	Welded Steel Construction – Metal Arc Welding
CSA W59.2	Welded Aluminum Construction
CSA W178.2	Certification of Welding Inspectors
CSA C22.1-15	Canadian Electrical Code Part I Safety Standard for Electrical Installations
CSA C22.2 – No. 0-10 (2014)	General Requirements – Canadian Electrical Code Part II
ISO 9712:2005	International Standards for NDT
CAN/CSA-C22.2 No. 60529-2016	Degrees of protection provided by enclosures (IP Code) (Adopted IEC 60529:1989, edition 2:1989 consolidated with amendment 1:1999 and amendment 2:2013, with Canadian deviations)
CT-043-EQ-EG-001-E	Welding Specification, August 2017 http://intra.coast-guard.ca/folios/00922/docs/WeldingSpecification-eng.pdf
SSPC	The Society for Protective Coatings
ISO 8501-1:2007	Preparation of steel substrates before application of paints and related products
ISO 10816-1:1995	Mechanical vibration -- Evaluation of machine vibration by measurements on non-rotating parts -- Part 1: General guidelines
ISO 4406: 2021	Hydraulic fluid power -- Fluids -- Method for coding the level of contamination by solid particles
ISO 18413:2015	Hydraulic fluid power – Cleanliness of parts and components – Inspection document and principles related to containment extraction and analysis, and data reporting
ISO/TR 10949:2002	Hydraulic fluid power – Component cleanliness – Guidelines for achieving and controlling cleanliness of components from manufacture to installation

Standards	Title
ISO/TS 16431:2012	Hydraulic fluid power – System Clean-up Procedure and Verification of Cleanliness of Assembled Systems
ASME Y14.100	American Society of Mechanical Engineers Y14.100 - 2017 Engineering Drawing Practices - Nov. 14, 2017
SNZ AS/NZS 4361.1 (2017)	Guide to hazardous paint management Part 1: Lead and other hazardous metallic pigments in industrial applications
18-080-000-SG-003 (formerly DFO/5884 - TP 12445E)	Paints And Coatings Standard

Regulations	Title
MOHS	Maritime Occupational Health and Safety
CSA	Canada Shipping Act, 2001
SOR/90-264	Marine Machinery Regulations
SOR/2017-14	Vessel Fire Safety Regulations
C.R.C., c. 1422	Fire Detection and Extinguishing Equipment Regulations
C.R.C., c. 1432	Hull Inspection Regulations
SOR/2007-128	Cargo, Fumigation, and Tackle Regulations
Canada Labor Code	Canada Labour Code (R.S.C., 1985, c. L-2)
	Federal Halocarbon Regulations, 2003 (SOR/2003-289) and regulations amending the Federal Halocarbon Regulations, 2003 (SOR/2009-221)

G 1.2.2 Units of Measurements: International System of Units (SI) must be used for designing, constructing, and testing of hull, machinery and equipment – and for reporting – unless specifically stated in this Specification.

G 1.3 **Abbreviations**

ABS	American Bureau of Shipping
CA	Contract Authority (PSPC)
CCG	Canadian Coast Guard
CLC	Canada Labor Code
CSM	Contractor Supplied Material
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
DFO	Department of Fisheries and Oceans
FSM	Fleet Safety Manual (CCG)
FSR	Field Service Representative
GSM	Government Supplied Materials
HC	Health Canada
IA	Inspection Authority
IEEE	Institute of Electrical and Electronic Engineers
LOA	Length Over All
MOHS	Maritime Occupational Health and Safety
NDT	Non Destructive Testing
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
PSPC	Public Services and Procurement Canada
RO	Registered Organization as defined by Canada Shipping Act
SDS	Safety Data Sheet
SSMS	Safety & Security Management System
TBS	Treasury Board of Canada Secretariat
TA	Technical Authority – Owner's Representative (CCG)
WHMIS	Workplace Hazardous Material Information System

G 1.4 **Occupational Health and Safety**

- G 1.4.1 The Contractor and all sub-contractors must follow Occupational Health and Safety (OHS) procedures in accordance with applicable federal and provincial OHS regulations ensuring that Contractor activities are carried out in a safe manner and do not endanger safety of any personnel.
- G 1.4.2 The Contractor and Contractor's employees must not have access to the vessel's washrooms and crew mess facilities. The Contractor must provide necessary amenities for the Contractor's and sub-contractors employees, as required.

G 1.5 **Access to Worksite**

- G 1.5.1 The Contractor must ensure that the TA and CG staff have unrestricted access to the worksite at all times during the contract period.

G 1.6 **Workplace Hazardous Materials Information System (WHMIS)**

- G 1.6.1 The Contractor must provide TA with Safety Data Sheets (SDS) for all Contractor supplied WHMIS controlled products.
- G 1.6.2 The TA will provide the Contractor with access to SDS sheets for all controlled products on the ship for all specified work items.

G 1.7 **Smoking in the Work Space**

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

G 1.8 **Clean and Hazard Free Worksite**

- G 1.8.1 Before the Contractor starts any work on the vessel, the Contractor's Quality Assurance Representative and the TA must walk through each space and area onboard the vessel, where work is to take place, including access and removal routes and areas adjacent to those where the work is to be done as a result of this specification. The Contractor's Quality Assurance Representative must take digital pictures of each area showing the outfit therein and download the photos in JPG format onto a USB Drive. Each picture must be dated and labeled as to the location on the vessel. One USB Drive containing all pictures as per above, to be provided to the TA for reference purposes within 48 hours of the start of the contract.
- G 1.8.2 The Contractor, during the work period, must maintain those areas of the vessel which Contractor personnel use to access areas where work is to be undertaken, in a clean condition, free from debris and remove garbage daily.
- G 1.8.3 Areas that pose a hazard as a result of the specification work are to be secured and clearly identified by the Contractor with signage to advise and protect all personnel from the hazard in accordance with applicable Canada Labor Code requirements.
- G 1.8.4 The Contractor is responsible for removal of all garbage generated from the work of this specification and for returning the vessel to the state of cleanliness in which the vessel was at the start of the contract period. All above mentioned work must be completed prior to full crew joining the vessel.

G 1.8.5 Once all known work and final clean-up has been completed, the Contractor's QA Representative and the TA must perform a 'walk through' of the vessel to view all areas where work was performed by the Contractor. Any deficiencies or damage noted must be recorded and compared to the photos and if deemed to have been caused by the Contractor as a result of the work, the damage must be repaired by the Contractor at no cost to CG.

G 1.9 **Fire Protection**

G 1.9.1 The Contractor must ensure the isolation, removal and installation of fire detection and suppression systems or any components thereof, is performed by a qualified technician. When fire detection or fire suppression system is deactivated or disabled by the Contractor during the contract, the system(s) must be recertified by qualified technician as fully functional. A signed and dated original copy of the certificate must be delivered to the TA before the end of the contract.

G 1.9.2 The Contractor must notify the TA and obtain written approval from the TA prior to disturbing, removing, isolating, deactivating / disabling or locking out any part of the fire detection or suppression systems, including heat and smoke sensors.

G 1.9.3 The Contractor must ensure protection against fire at all times including when working on the ship's fire detection and / or suppression system(s). This may be accomplished as suggested below and only with the written permission of the TA:

- a) Disabling only one portion of a system at a time;
- b) By maintaining system function using spares while work is in progress;
- c) Other means acceptable to and approved by the TA.

G 1.9.4 The Contractor must note that failure to take the necessary precautions while performing work on the vessel's fire suppression system(s) could result in the accidental discharge of the fire suppression agent(s). The Contractor must recharge and certify at his cost, container(s) or systems that are discharged as a result of such work.

G 1.10 **Touch-up / Disturbed Paint**

G 1.10.1 Unless stated otherwise the Contractor must supply and apply two coats of marine primer compatible with the vessel's existing coating system to all new and/or disturbed metal surfaces.

G 1.10.2 The Contractor must prepare all new and disturbed steelwork to the paint manufacturer's standards prior to painting.

G 1.11 **CCG Employees and Others on the Vessel**

G 1.11.1 CCG/DFO employees and other personnel such as manufacturer's representatives and/or ABS or Class surveyors may carry-out other work including work items not included in this specification, onboard the vessel during this work period. Every effort will be made by the TA to ensure this work and the associated inspections and/or surveys do not interfere with the Contractor's work. The Contractor will not be responsible for coordinating the related inspections or payment of inspection fees for this work unless otherwise specified.

G 1.12 **Regulatory Inspections and/or Class Surveys**

G 1.12.1 The Contractor must contact, coordinate and schedule all regulatory inspections and/or class surveys by the applicable authority: i.e. ABS, Health Canada (HC), Environment Canada or others as required by the specification. The Contractor will not be responsible for cost/payment of inspection fees associated with inspections mentioned in this paragraph, unless re-inspection is required due to Contractor's failure to prepare for inspection or poor workmanship.

G 1.12.2 Any documentation generated by the above inspections and/or surveys to show that the inspections and/or surveys were conducted (i.e. original signed and dated certificates) must be provided to the TA.

G 1.12.3 The Contractor must not substitute inspection by the TA for the required regulatory inspections or class surveys.

G 1.12.4 The Contractor must provide timely advance notification (minimum of 24 hours) of scheduled regulatory inspections and/or class surveys to the TA so they may witness the inspection.

G 1.13 **Test Results and Data Book**

G 1.13.1 The Contractor must develop a Test and Trials Plan which must include as a minimum, all tests and trials stated in the specification. This plan must be provided for TA review one (1) week prior to the originally scheduled Tests and Trials commencement.

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

G 1.13.3 Recorded dimensions must be to a precision of three decimal places (unless otherwise stated) in the measuring system currently in use on the vessel.

G 1.13.4 The Contractor must provide to the TA current and valid calibration certificates for all instrumentation used in the Test and Trials Plan showing that the instruments have been calibrated in accordance with the manufacturer's instructions.

- G 1.13.5 Hard copy reports must be bound in standard 3-ring binders, type written on letter size paper and indexed by specification number. Electronic copies must be in unprotected Adobe PDF format and provided on USB Drive. The Contractor must provide 2 hard copies and 2 electronic copies of all reports.
- G 1.13.6 All documentation from the contract period must be inserted in a data book and delivered to the TA on completion of the contract.
- G 1.14 **Contractor Supplied Materials and Tools**
- G 1.14.1 The Contractor must ensure all materials are new.
- G 1.14.2 The Contractor must ensure replacement material such as jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings etc. are in accordance with the equipment manufacturer's drawings, manuals and/or instructions.
- G 1.14.3 Where no particular item is specified or where substitution must be made, the TA must approve the substituted, item in writing, before its use. The Contractor must provide information about materials used, certificate of grade and quality of various materials to the TA prior to use.
- G 1.14.4 The Contractor must provide all equipment, devices, tools and machinery such as crange, staging, scaffolding and rigging necessary for the completion of the work in this specification. All tools required and used must be calibrated and have valid certificates, where applicable.
- G 1.14.5 The Contractor must provide 50 (fifty) hours of crane usage for the ship's needs and requirements that may arise. Also, the Contractor must provide hourly unit rate for each additional crane usage, while the crane is already set up.
- G 1.14.6 The Contractor must provide 50 (Fifty) hours of machine shop time for the ship's needs and requirements that may arise, outside the scope of this specification. This work does not include repair work for damages caused by the Contractor or sub-contractors. Also, the Contractor must provide hourly unit rate for each additional Machin Shop time activity.
- G 1.14.7 The Contractor must provide waste disposal services for any oil, oily waste or other hazardous or controlled waste generated by the work of this specification. The Contractor must provide waste disposal certificates for all of the above generated waste and the disposal certificates must indicate that the disposal was in accordance with Federal, Provincial and Municipal regulations in effect.

G 1.15 **Restricted Areas**

G 1.15.1 The Contractor must not enter the following areas except to perform work as required by the specifications: all cabins, offices, workshops, Engineer's office, Wheelhouse, Control Room, all washrooms, Galley, Mess Rooms, Lounge areas and any other areas restricted by signage.

G 1.15.2 The Contractor must give the TA 24 hours advance notice prior to working in any accommodation areas or office spaces. This will allow CCG adequate time to move personnel and secure the areas.

G 1.16 **Contractor Inspections and Protection of Equipment and the Worksite**

G 1.16.1 The Contractor must coordinate an inspection with the TA on the condition and location of items to be removed prior to carrying out the specified work or to gain access to a location to carry out the work.

G 1.16.2 Any damage incurred as a result of the Contractor's work and that is attributable to the Contractor's work performance must be repaired by the Contractor at his expense. Materials used in any replacement or repairs must meet the criteria for Contractor supplied material noted above in section Contractor Supplied Materials and Tools.

G 1.16.3 The Contractor must protect all equipment and surrounding areas from damage. Work areas are to be protected from the ingress of water, welding and blasting grit etc. Temporary covers to work areas must be installed and later removed at no additional cost to CG.

G 1.17 **Recording of Work in Progress**

G 1.17.1 The TA may record any work in progress using various means including, but not limited to photography and video, digital or film.

G 1.18 **List of Confined Spaces**

G 1.18.1 The Contractor may request a list of the vessel's identified confined spaces at the Pre-Refit meeting.

G 1.19 **Lead Paint and Paint Coatings**

G 1.19.1 The Contractor must not use lead based paints.

G 1.19.2 CG ships have been painted with lead based paints in the past and as a result some of the Contractor's processes such as grinding, welding and burning may release this lead from the coatings. The Contractor must ensure that coatings in the affected work areas are tested for lead content and that the work is performed in accordance with applicable Federal and Provincial regulations.

- G 1.19.3 The Contractor must provide HC product approval for underwater hull surface paints controlled by HC and the Pest Management Regulatory Agency.
- G 1.19.4 The Contractor must demonstrate that lead paint work procedures are in place and have been approved by the workplace Occupational Health and Safety Committee and that these safe work procedures are in compliance with provincial regulations.
- G 1.19.5 The Contractor must demonstrate that supervisors and workers performing any lead abatement procedures have been trained and that records are available for inspection, proving that this training is current and has taken place. Training must at a minimum conform to section 6 of EACO Lead Guideline for Construction, Renovation, Maintenance or Repair, latest edition.
- G 1.19.6 The Contractor must demonstrate that his Quality Assurance department has the capacity to monitor on-site work progress, is capable of performing air quality monitoring on an ongoing basis as required by the Occupational Health and Safety Regulations and is able to assess the affected areas post abatement process.
- G 1.19.7 The Contractor must provide the TA with all records from lead abatement processes and the final disposal certificates for all materials generated from the abatement process.
- G 1.19.8 For safe removal of lead containing paints, CCG requires the Contractor to use a chemical gel type paint remover/stripper, where possible. Use of such a product minimizes the risk of liberating lead into the atmosphere and allows better control of the waste material generated.
- G 1.19.9 If required, the Contractor must provide the services of a trained and certified crew and materials to perform lead abatement procedures. The Contractor must include an allowance of \$10,000 to cover the cost of services to be provided by this FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

G 1.20 **Asbestos Containing Materials**

- G 1.20.1 The Contractor must not use any asbestos containing materials.

Handling of any asbestos containing materials must be performed by personnel trained and certified in the removal of asbestos in accordance with Federal, Provincial and Municipal regulations in effect and in accordance with the Fleet Safety and Security Manual. The Contractor must provide the TA with disposal certificates for all asbestos containing material removed from the vessel indicating that the disposal was in

accordance with Federal, Provincial and Municipal regulations in effect. Removed Materials and Equipment

G 1.20.2 All removed equipment as a result of this specification must remain the property of the Coast Guard unless otherwise instructed in the specification sections and must be loaded back on board upon completion of the Contract with no additional cost to CG.

G 1.21 **Work Aloft**

G 1.21.1 Any work aloft onboard the vessel during the maintenance/refit period must be conducted in accordance with the Safety Management System in effect. Radars must be locked out to prevent operation while personnel are working aloft on the mast or on the wheelhouse top.

G 1.22 **Assembly of Components**

G 1.22.1 The Contractor must ensure that during installation of specified equipment, that parts and assembled equipment are cleaned of smudges, spatter or excess solder, weld metal and metal chips or any other foreign material which might detract from the intended operation, function, or appearance of the equipment. (This would include any particles that could loosen or become dislodged during the normal expected life of the equipment). All corrosive material must be removed. This cleaning must take place before the parts are assembled into the equipment. All components must be assembled in accordance with original manufacturer's specifications and recommendations.

G 1.22.2 All items that have had coating/paint removed for the purpose of overhaul or repair, and survey must be re-coated at no cost to CCG. The Contractor must follow the specific coatings guidelines of the CCG for external items and reference original coatings for color and application as per original manufactures specifications.

G 1.22.3 Covers, cowlings and components damaged by the Contractor must be replaced with new CSM covers, cowlings, or components.

G 1.22.4 Where torque specifications are not provided by the manufacturer, the applicable SAE, ANSI, or BS1083 nut and bolt standard torque must be used.

G 1.23 **Storage and Protection of Equipment**

G 1.23.1 Equipment (i.e. covers, cowlings and other items that may need to be removed and stored) must be stored in accordance with the equipment manufacturer's or equipment vendor's specific storage instructions. The Contractor must make these instructions available to the TA upon request.

G 1.23.2 All equipment and items must be stored in such a manner so as to be easily accessible for inspection. No items are to be stored directly on the floors.

- G 1.23.3 The Contractor must take precautions to ensure that surfaces and components of equipment installed on the vessel are protected against damage, soiling, and contamination as a result of contracted work.
- G 1.23.4 The Contractor must protect all electrical and electronic equipment and components during the contract against physical damage, internal damage, and by the effects of adverse temperatures or other environmental conditions.
- G 1.23.5 The Contractor must protect equipment that could be damaged as a result of movement of materials and equipment nearby. The Contractor must also protect equipment from nearby sources of contamination including but not limited to burning, welding, media (sand) blasting, grinding and painting.
- G 1.23.6 Any damage to surfaces, equipment, furnishings or decor incurred prior to acceptance must be returned to As-Delivered condition by the Contractor.
- G 1.23.7 The Contractor must cover all openings in machinery and/or systems by fitted solid inserts or covers prior to connections being made.
- G 1.23.8 The Contractor must obtain and follow instructions from its sub-Contractors for any special protection required for their equipment during the project work. Such instructions must be made available to the TA.
- G 1.23.9 The Contractor must protect the vessel from the possibility of vermin infestation (insect/mammal/bird). If an infestation does occur during the contract period, the Contractor must bear all costs to ensure the vessel is made vermin free before the vessel's departure and contract completion.
- G 1.24 **Halocarbon containing Systems**
- G 1.24.1 All work conducted on Halocarbon containing systems, must be in accordance with the Federal Halocarbon Regulations, 2003 (SOR/2003-289) and regulations amending the Federal Halocarbon Regulations, 2003 (SOR/2009-221).
- G 1.25 **Hot Work**
- G 1.25.1 All hot work must be carried out in accordance with OHS, MOHS and the FSM
- G 1.26 **Welding Certification**
- G 1.26.1 For any work requiring the application of fusion welding for steel structures the Contractor and/or the sub-contractor welders must be certified by the Canadian Welding Bureau in accordance with CSA Standards W47.1-03, latest revision – Certification of Companies for Fusion Welding of Steel Division 2 Certification as a minimum. Current copies of certification (including those of the welders) must be provided to the TA.

G 1.27 **Electrical Installations**

G 1.27.1 All electrical installations and repairs must be carried out in accordance with the latest revisions of Transport Canada Marine Safety Electrical Standard TP127E and IEEE Standard 45 Recommended Practice for Electrical Installation on Ships.

G 1.28 **Potable Water**

G 1.28.1 Any time a Potable Water tank, fill or vent lines are opened, worked on, disconnected, exposed to workspaces, painted, cleaned, entered the following cleaning procedures must take place by the Contractor.

G 1.28.2 The Contractor must use CCG Standards for Potable Water Quality located in Section 7.F.12 of the FSM when commissioning all potable waters tanks affected by Contractor work.

G 1.28.3 The tank surfaces must be cleaned of all debris and sludge and wiped dry. All debris and sludge must be disposed of ashore by the Contractor. The Contractor must bid on removing one cubic meter of water/debris from the tanks.

G 1.28.4 The Contractor must coat all disturbed paint or paint renewal sections with Potable Water Tank paint Interline 925 using manufacturer's recommendations for preparation and application.

G 1.28.5 The potable water tanks must not be sealed and filled with any liquid until the coating cure time has elapsed. Failure of the Contractor to ensure that tank coatings have fully cured and are no longer off gassing remains the Contractor sole responsibility. Coating specifications from the manufacturer for mixing and application must be strictly adhered to. Any resulting contamination to the potable water system or damage to the existing tank coatings must be repaired by the Contractor at the Contractors expense.

G 1.28.6 The Contractor must replace all tank access cover gaskets with new 1/8 inch thick fiber reinforced neoprene gaskets suitable for potable water service.

G 1.28.7 Potable water tanks must be filled with hyper-chlorinated potable water for a period of 24 hours. The hyper-chlorinated water must have a free chlorine content of 50 ppm (part per million). The Contractor must certify to the TA that the water used for the disinfection meets these requirements. If the Contractor uses calcium hypochlorite to produce the hyper-chlorinated potable water, the water must be filtered to remove all calcium before it is introduced into the potable water tanks.

G 1.28.8 Following the 24 hour disinfection period, the Contractor must drain and flush the potable water tanks to attain the following readings for the potable water:

Free Chlorine	0.2 and 0.4 ppm;		
E. Coli	0 per 100ml	Nitrate/Nitrite	45 mg/L
Total coliform	0 per 100ml	Mercury	0.001 mg/L
Turbidity	1 NTU	Selenium	0.01 mg/L
Antimony	0.006 mg/L	Uranium	0.02 mg/L
Barium	1.0 mg/L	Benzene	0.005 mg/L
Boron	5.0 mg/L	Xylenes	0.3 mg/L
Cadmium	0.005 mg/L	Flouride	1.5 mg/L
Chromium	0.05 mg/L	Lead	0.01mg/L
Copper	1.0 mg/L	Sodium	200 mg/L
Iron	0.3 mg/L	Zinc	5 mg/L
Manganese	0.05 mg/L	Ethylbenzene	0.00024 mg/L
pH	6.5-8.5 pH units	Toluene	0.024 mg/L
Colour	15 TCU	Sulpahtes	500 mg/L
TDS	500 mg/L	Chloride	250 mg/L

- G 1.28.9 These readings must be verified by an independent laboratory that is provincially licensed to perform these tests on potable water. Copies of all final test results must be presented to the TA.
- G 1.28.10 The Contractor must flush the water tanks until the free chlorine content of the water in the tanks drops to an acceptable level of no more than a maximum of 5 PPM.
- G 1.28.11 The Contractor must dispose of all hyper-chlorinated water in accordance with Federal, Provincial, and Municipal Regulations in effect. All disposal certificates must be provided to the TA.
- G 1.28.12 The Contractor must re-fill all potable water tanks to their initial tank soundings prior to undocking the vessel using a certified potable water source.

G 1.29 **Covid-19**

G 1.29.1 Reference documents:

- 6102-511
- 6026-7c13
- 6102-514
- 6102-515

G 1.29.2 Due to the Covid-19 pandemic, the shipyard is required to comply with NSOP Directive 511 - Minimum Screening Process for Canadian Coast Guard Personnel Accessing a Contractors Facility during an infectious disease outbreak such as covid-19 to ensure the safety of CCG personnel.

G 1.29.3 When CCG has custody of the vessel, the Contractor must comply with Coast Guard Circular 13-2020 "COVID-19 - Health Screening Questionnaire for Canadian Coast Guard Personnel and Visitors Accessing Canadian Coast Guard Facilities and Vessels." This will be administered by CG personnel while the vessel is in the care and custody of the Coast Guard. Arrangements will be made with the successful Bidder to have the forms completed and process established.

G 1.29.4 Contractor essential service letters will be issued in accordance with procedure 6102 – 515 if required for both the prime and any named sub-contractors to facilitate travel and work.

G 1.30 **Piping of up to 50mm diameter**

G 1.30.1 The Contractor must supply and install all piping of less than 50mm diameter that may not have been included or identified in the provided drawings, 3D model, or any piping material list, that are necessary to complete installations and functional operation of the refurbished or replaced equipment.

S 1.0 SERVICES

S 1.1 GENERAL

- S 1.1.1 The Contractor must supply the following services to the vessel for the entire work period and disconnect upon completion of the work period. The Contractor is responsible for the re-establishment of services if the vessel is moved during the work period.
- S 1.1.2 The Contractor is responsible for supplying all materials, hoses, cables etc. and labor required to connect and disconnect the services to the vessel. Unless otherwise stated these services must be available 24 hours a day 7 days a week for the entire contract period.
- S 1.1.3 All staging, crantage, lifts, screens, lighting and any other support services, equipment and materials necessary to carry out the work identified in these specifications is Contractor supplied.

S 1.2 BERTHING

- S 1.2.1 The berthing and mooring facilities must be suitable for a vessel of this size in local weather / tide / sea conditions. Fenders must be supplied by the Contractor to prevent the vessel from contacting the wharf in local weather / tide / sea conditions.
- S 1.2.2 The length of the dock must be a minimum of 90% of the length of the vessel (LOA).
- S 1.2.3 During the contract period, when the ship is not in the dry dock, the ship must be berthed at the Contractor's wharf at a safe and secure location with a minimum clearance of 1 meters under the vessel at extreme low tide to ensure the vessel will not touch bottom.
- S 1.2.4 The Contractor is responsible for all movements of the vessel, including but not limited to berthing and mooring of the vessel for the contract period and arrangements and costs for line handlers, tugs and pilots.

S 1.3 MOORING LINES

- S 1.3.1 The Contractor is responsible for providing the necessary mooring lines and labor required to secure the vessel alongside the facilities. Ship's mooring lines are not to be used.

S 1.4 GANGWAYS

- S 1.4.1 Contractor must supply the labor and services required for the installation and removal of two gangways, complete with handrails, safety nets and lighting for the

duration of the contract. The Contractor is required to supply and maintain the gangways.

S 1.4.2 Any movement of the gangways required by the Contractor is at the expense of the Contractor.

S 1.4.3 Gangways must be at separate locations to facilitate fire evacuation.

S 1.5 ELECTRICAL POWER

S 1.5.1 The Contractor is responsible for supplying 600 Volt AC, 60 Hertz, 3 Phase, 200 Amp service electrical power for the duration of the contract.

S 1.5.2 The Contractor is responsible for supplying and connecting the necessary shore cable to the ship's shore power connection.

S 1.5.3 The Contractor is responsible for ensuring correct phase rotation on 3 – phase system is established prior to energizing the ship's distribution system. Any changes to the ship's power system to accommodate the Contractor supplied shore power connections must be returned to the original setup by the Contractor upon the disconnection of the Contractor supplied power cable and equipment. All work must be carried out by certified electricians.

S 1.5.4 The Contractor must supply all power to the vessel through Contractor supplied kilowatt-hour meters. The Contractor must read the kilowatt-hour meter at the following times in the presence of the TA/IA with mandatory pictures of the meter being taken at each mentioned below step:

- When the connection is first made;
- When the care and custody of the vessel becomes that of the Contractor;
- When the crew return and care and custody of the vessel becomes that of Coast Guard; and,
- When the vessel is disconnected from the Contractor's power supply.

S 1.5.5 The Contractor must provide a calibration certificate for the kilowatt-hour meter.

S 1.5.6 The Contractor must supply a price quote per kilowatt-hour for electrical power for the duration of the contract period.

S 1.5.7 Final price for this item must be determined at the end of the contract and crown will pay for the total power consumption using PSPC 1379 action.

S 1.6 POTABLE WATER SUPPLY

S 1.6.1 The Contractor must supply potable water to re-fill the vessel's potable water tanks and vessel's ballast tanks to the same soundings as when the vessel entered the dry

dock. Any extras requested by the ship will be dealt by using 1379 process. The Contractor must supply a price quote per cubic meter of potable water.

- S 1.6.2 The water must be supplied from an approved municipal drinking water supply system that has been certified safe for consumption. (Reference CCG FSM 7A12 Potable Water Quality) reference section G 1.28.

S 1.7 FIRE MAIN CHARGING SERVICE

- S 1.7.1 The Contractor must supply a separate and continuous uninterrupted water supply through isolation valves via a calibrated pressure regulator and calibrated flow meter to the ship's fire main system. Supply pressure must be at 80 to 110 psig. Pressure must be maintained at all times. In cases when any sections of the Fire Main have been disassembled for repairs, The Contractor must discuss firefighting arrangement with TA/IA prior and provide alternative water supply for firefighting purpose at no cost to CCG.

- S 1.7.2 The Contractor must read the water meter at the beginning of the contract period and again at the end. The readings must be taken in the presence of the TA/IA and must be used to calculate the total water usage from this connection. Pictures of the meter readings at the beginning and at the end of the contract to be taken and provided to TA with date stamp.

- S 1.7.3 Provisions must be made by the Contractor to ensure that the water supply does not freeze during cold weather. The Contractor must inform the TA and security staff of the location of shut-off valve(s).

- S 1.7.4 The Contractor must supply a price quote per cubic meter of water. Final price for this item must be determined at the end of the contract once the meter has been read.

S 1.8 VESSEL SECURITY

- S 1.8.1 This work is going to take place with the vessel "out of commission" and therefore in the care, control and custody of the Contractor. The Contractor must provide for the safety and security of the vessel while it is under contract. The Contractor remains liable for all damage and theft while the vessel is in its care and custody. There is no requirement to have personnel living aboard.

- S 1.8.2 The Contractor is responsible for provision of sufficient means of heating the Engine Room space, if weather conditions require so and/or requested by IA/TA.

S 1.9 PARKING AT CONTRACTOR'S FACILITY

- S 1.9.1 The Contractor must provide 3 parking spaces for the exclusive use of the TA and project team for the duration of the contract period.

S 1.10 PROJECT FACILITIES

- S 1.10.1 The Contractor must provide furnished, private and secure office space for use of the TA and CG personnel during the contract located adjacent to the dry dock and vessel. The Contractor must provide commercial quality furnishings with proper heating and air conditioning arrangements for three persons.
- S 1.10.2 The Contractor must supply and provide internet connections for three computers. The internet connections must be direct and not through the Contractor's security network.
- S 1.10.3 The Contractor must supply clean toilet and wash-up facilities for the use of the TA and CA within the same building or contiguous to the same building for the duration of the work period.

S 1.11 TEMPORARY DECK COVERINGS

- S 1.11.1 A temporary deck covering of new material must be installed as soon as possible and before the work begins on the vessel.
- S 1.11.2 To protect the alleyway flooring, the Contractor must supply and install 158 m² - 3 mm MDF or Masonite sheeting over all deck surfaces on the Main, Boat, Focsle and Bridge decks, including the Engine Control Room, the Mess room, Galley and Chief Engineer's office. The Wheelhouse carpet must be covered in 3mm MDF or Masonite sheet.
- S 1.11.3 All seams and edge joints must be taped to secure the coverings and prevent ingress of dirt.
- S 1.11.4 In the wheelhouse the sheet to sheet joints must be taped. The MDF must not be taped to the carpet.
- S 1.11.5 Upon completion of the dry-docking/refit, the Contractor must remove and dispose of all the protective coverings installed. Any tape residue must be removed from the decks by the Contractor.

S 1.12 BILGES, BLACK AND GREY WATER SERVICES

- S 1.12.1 The black and grey water system must be put out of service prior for the contract duration.
- S 1.12.2 The Contractor and Contractor's employees must not have access to the vessel's washrooms and crew mess facilities. The Contractor must provide the necessary amenities for the Contractor's and sub-Contractors employees as required.

- S 1.12.3 The Contractor, within 48 hour of docking, must pump ashore the contents of the black water treatment plant. Following the removal of the treatment plant content, the Contractor must open up the plant and hose down (with fresh water) and pump ashore residuals to leave the treatment plant free of any solids. The treatment plant holds approximately 6 cubic meters of black water. The treatment plant is a Hamworthy Supertrident ST4 and the Contractor must pump and flush all 3 chambers:
- main collection;
 - center hopper; and,
 - recirculation/discharge tanks.

S 1.13 VESSEL GARBAGE REMOVAL

- S 1.13.1 Upon arrival of the vessel, the Contractor must provide a garbage container or dumpster of 5 cubic meters to dispose of the ship's garbage for the first 4 days of the contract. The container must be located adjacent to the vessel. It is the responsibility of the Contractor to dispose of the garbage.

10.0 SAFETY AND SECURITY

10.1 DOCKING AND UNDOCKING

10.1.A Identification

10.1.A.1 The Contractor must dock the vessel, carry out the work identified in this specification and then undock the vessel. The Contractor must discuss with the TA any comments, concerns or observations they may have regarding the effect of work on the vessel's stability or carrying capacity. Additionally any work item that, in the opinion of the Contractor may pose a vessel structural integrity problem is to be brought to the attention of the TA. The Contractor must advise the TA/IA of the details of any major changes in the distribution of weights on the vessel, while the vessel is in dry-dock.

10.1.B References

10.1.B.1 Drawings:

Drawing Number	Drawing Title
S30102dp1	Docking Plan
161-237-1	Docking Plugs

10.1.B.2 Documentation:

- Samuel Risley Tank Sounding Tables
- Samuel Risley Intact Stability Book
- Samuel Risley Damaged Stability Book

10.1.C Statement of Work

10.1.C.1 The Contractor must supply all labor, materials, equipment, tug services and facilities to dock and undock the vessel.

10.1.C.2 The Contractor must provide labor and services for the handling of the vessel's mooring lines and tug assistance to perform the docking and undocking of the vessel and any other vessel movements required during the contract period.

10.1.C.3 **Docking**

- 10.1.C.3.1 The Contractor must prepare blocks and shoring to maintain the alignment of the vessel's hull and machinery throughout the docking period.
- 10.1.C.3.2 The Contractor must refer to the docking plan for dry docking of vessel.
- 10.1.C.3.3 The Contractor must record all tank soundings, draft, trim and list of the vessel, and perform the stability calculations for the docking of the vessel. Completed stability calculations must be forwarded to the TA two business days prior to docking the vessel.
- 10.1.C.3.4 The vessel must be docked so that all docking plugs, transducers, anodes and sea inlet grids and keel coolers are clear and accessible. A minimum clearance of 1.5 meters must be available below the keel. If any hull fittings are covered, the Contractor must provide all labor and materials and make alternative arrangements to drain tanks and/or move blocks to complete the specified work.
- 10.1.C.3.5 The Contractor must provide a ground cable between the vessel and the dock while the vessel is docked as per Ship Safety Bulletin 06/1989.

10.1.C.4 **Undocking**

- 10.1.C.4.1 The Contractor must ensure that all shipside openings, including valves, drain and docking plugs are secure before flooding the dry dock.
- 10.1.C.4.2 During the undocking of the vessel, the Contractor must have sufficient personnel on hand such that all ship side valves can be inspected for leaks. Once sufficient water depth has been obtained, all submerged valves must be opened, and verified that no bonnets, flanges or valve packing are leaking. Any leaks must be rectified by the Contractor at the Contractor's expense prior to the close of the contract.
- 10.1.C.4.3 The Contractor must ensure all tanks are filled to the soundings recorded prior to docking. The Contractor must perform the necessary stability calculations for undocking the vessel taking into account any weight distribution changes as a result of the work of these specifications. The calculations must be forwarded to the TA 24 hours prior to undocking.
- 10.1.C.4.4 The Contractor must ensure that ballast tanks are filled with Fresh Water (Portable water) only. No salt water or brackish water to be introduced into the ballast tanks.

- 10.1.C.4.5 Prior to undocking, the TA must be given the opportunity to transfer fuel from a double bottom tank to the Day tank and emergency generator tank using the shipboard system.
- 10.1.C.4.6 The Contractor must supply, install and remove upon completion, any necessary fittings and lugs required to carry out the work in this specification. Where lugs and/or fittings are installed and removed, the welds must be ground flush with the hull. Any damaged and/or disturbed paint work must be treated in accordance with the paint manufacturer's requirements.
- 10.1.C.4.7 The Contractor must supply all labor necessary to handle the ship's lines during the undocking process.
- 10.1.C.4.8 The Contractor is responsible for supplying the services of tugs to ensure that the vessel is undocked in a safe manner and not damaged during the procedure.

10.1.D Proof of Performance

- 10.1.D.1 The Contractor, in the presence of the TA/IA, must verify that all work on the hull is complete, all docking plugs and hull openings are secure and the vessel is ready to be undocked.
- 10.1.D.2 The Contractor must provide the initial tank soundings and stability calculations prior to the docking of the vessel.
- 10.1.D.3 The Contractor must provide the stability calculations and soundings prior to undocking the vessel.
- 10.1.D.4 The above requirements must be provided in accordance with Test and Trials Plan.

10.2 BILGE CLEANING

10.2.A Identification

10.2.A.1 The Contractor must pump-out-, clean and certify the bilges in the vessel's Main Engine Room safe for entry and safe for Hot Work, as required prior to commencing other work in these specifications that require the bilges to be certified for work.

10.2.B References

10.2.B.1 Equipment Data – Not Used

10.2.B.2 Drawings

10.2.B.2.1 The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE	Electronic File Number
	Bilge Spaces Risley.jpg	
161-100-01_01	General Arrangement	

10.2.B.3 Regulations and Standards

10.2.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed.

10.2.C Statement of Work

10.2.C.1 Bilge Cleaning

10.2.C.1.1 The Contractor must clean the following bilge wells:

- PORT ER bilges FWD & AFT
- STBD ER bilges FWD & AFT
- Transducer bay bilge well

10.2.C.1.2 The Contractor must clean the following bilges:

- Tank top in the ER space complete
- PORT & STBD shaft tunnels
- Steering gear tank top
- Bow and Stern thrusters tank tops

- 10.2.C.1.3 All specified bilges cleaning must be completed before any hot work commences, or any equipment is opened and exposed as per the following sections of this specification. The cleanliness of the bilges must be maintained for the duration of the work period. Any subsequent cleaning required due to Contractor work must be completed by the Contractor at the Contractor's expense and before the end of the Contract.
- 10.2.C.1.4 The Contractor must supply all materials and labour necessary to pump out, clean and certify the Engine Room bilges area for certification for hot work for the duration of the work period.
- 10.2.C.1.5 The Contractor must supply all materials and labour necessary to clean all internal surfaces of the bilge wells such that the internal structures and coatings can be inspected by the IA.
- 10.2.C.1.6 The Contractor must bid on the removal and disposal ashore of 600 liters of oily water from the bilges prior to the start of the cleaning operation.
- 10.2.C.1.7 The Contractor must bid on removal and disposal ashore of 50 liters of solid oily waste from ER bilge wells.
- 10.2.C.1.8 Gas free certificate from the Marine Chemist to be posted in the Engine Room and copy provided to TA upon completion of cleaning.
- 10.2.C.1.9 A volume manifest must be provided to the TA after the bilges have been pumped and prior to the commencement of the cleaning operation.

10.2.C.2 Disposal

- 10.2.C.2.1 All oily waste and debris removed from the vessel and all waste generated from the bilge cleaning must be disposed of in accordance with all Federal, Provincial and Municipal regulations in effect.
- 10.2.C.2.2 The Contractor must provide a cost per cubic meter for disposal of oily water and solid waste, which is to be used to prorate the total volume removed in sections 10.2.C.1.6 and 10.2.C.1.6.

10.2.D Proof of Performance

10.2.D.1 Inspection Points

- 10.2.D.1.1 The Contractor must notify the IA such that the IA may inspect the bilges and the bilge wells after completion of cleaning.

10.2.D.2 **Testing/Trials – Not Used**

10.2.D.3 **Certification – Not Used**

10.2.D.4 **Documentation**

- 10.2.D.4.1 The Contractor must provide the TA with 1 electronic copy and one paper copy of all waste oil manifests showing disposal of the materials removed from the vessel's bilges and wells.

10.3 FIRE SYSTEM ANNUAL INSPECTION

10.3.A Identification

10.3.A.1 The Contractor must provide the services of a Marine Fire Inspection Company certified by the RO under DSIP for the inspection and certification of all fire detection and prevention equipment onboard the vessel

10.3.B References

10.3.B.1 Equipment Data

10.3.B.1.1 Documentation:

- 2020 – Samuel Risley Fire Suppression Report
- 2020 – Samuel Risley Fire Detection Report

10.3.B.2 Drawings

10.3.B.2.1 The following Drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	DRAWING TITLE	Electronic File Number
S30191mi1	Fire Control Plan	

10.3.B.3 Regulations and Standards

10.3.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included In RFP Package
8.B.2	Fire Prevention and Detection	No
Publications		
FDR CCGS Risley.pdf FSR CCGS Risley.pdf	Risley Fire Inspection Reports 2020	Yes
TC SSB 04-2019	Hydrostatic testing of pressure containers under the Vessel Fire Safety Regulations (part 1 or part 2 vessels applies)	No
Regulations		
CSA 2001, SOR/2017-14	Vessel Fire Safety Regulations	No

10.3.C Statement of Work

10.3.C.1 General

- 10.3.C.1.1 The Contractor must provide the services of a Marine Fire Inspection Company certified by one of the RO's under DSIP for the inspection and certification of fire detection and fire prevention equipment onboard the vessel.
- 10.3.C.1.2 The Contractor must ensure that all inspections and maintenance are performed by technicians who are certified to work on the firefighting systems and equipment mentioned below. The Contractor must provide the certificate of qualification for the Marine Fire Inspector as well as proof of the company's certification by a RO prior to the start of any work on the fire system
- 10.3.C.1.3 The Contractor must give notice to the IA at least 24 hours in advance prior to working on the fire suppression system. The work must be completed in such manner as to ensure adequate protection of the ship in case of an emergency.
- 10.3.C.1.4 Upon completion of work, the Contractor must return all spaces affected by the work to their original functional state and cleanliness.

10.3.C.2 Fire Systems

- 10.3.C.2.1 The Contractor must provide the services of a certified Kidde and Notifier FSR and materials to perform the work in this section of the SOW. The Contractor must include an allowance of \$10,000 to cover the cost of services to be provided by the Kidde and Notifier FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.
- 10.3.C.2.2 The Contractor must inspect, test and certify the Notifier Fire Detection System.
- 10.3.C.2.3 The Contractor must inspect, test, and certify the CCGS Samuel Risley fixed FM200 Suppression systems.
- 10.3.C.2.4 Fire extinguishers removed from service for maintenance or recharging must be replaced by a fire extinguisher suitable for the type of hazard being protected and must be of at least equal rating.

10.3.C.2.5 The Contractor must have the following fire extinguishers hydrostatically tested:

Ext. #	Location	Description
3	Fire Station 1	20 lb ABC D.C.
5	Captain's cabin	20 lb ABC D.C.
15A	Bow thruster compartment	20 lb BC D.C.
18	Rigging locker	20 lb ABC D.C.
19C	Crane cabin	2.5 lb ABC D.C.
22	Deck workshop	20 lb ABC D.C.
23	MCR STBD AFT	20 lb BC D.C.
25	Port Engine room	20 lb BC D.C.
26	Aft Engine room	20 lb BC.D.C.
28	Cargo hold	20 lb BC D.C.
29	Steering gear	20 lb BC D.C.
30	Stbd Engine room	20 lb BC D.C.
31	MCR Port Aft	20 lb BC D.C.
45	Work barge	10 lb ABC D.C.

10.3.C.2.6 The Contractor must perform 5 year maintenance on the following extinguishers:

Ext. #	Location	Description
15	Bow thruster compartment	20 lb ABC D.C.
17	Fire station 6	20 lb ABC. D.C.
19A	Upper crane	20 lb ABC D.C.
20	Emergency Generator room	20 lb ABC D.C.

Ext. #	Location	Description
27	Compressor flat	20 lb BC.D.C.
42	Bosun stores	5 lb ABC D.C.
63	Emergency locker	5 lb ABC D.C.

10.3.D Proof of Performance

10.3.D.1 Inspection Points

- 10.3.D.1.1 The Contractor must demonstrate to the TA/IA that all work has been completed as describe above and that all systems have been returned to operation.
- 10.3.D.1.2 All inspected fire extinguishers and systems must have labels affixed showing the name of the Company who conducted the inspection/maintenance, the date and the initials of the person who performed the inspection.

10.3.D.2 Testing/Trials – Not Used

10.3.D.3 Certification

- 10.3.D.3.1 The Contractor must provide inspection certificates for all inspected systems onboard to the TA prior to undocking of the vessel.

10.3.D.4 Documentation

- 10.3.D.4.1 The Contractor must provide a copy of the certificate of qualification for the Marine Fire Inspector as well as proof of the Fire Company's certification by a RO prior to the start of any work on the fire systems.
- 10.3.D.4.2 The Contractor must provide the IA/TA with a written report detailing:
- The condition of each system or component following initial inspection. This must include all defects;
 - The test results of each system or component following testing;
 - The next due date for the inspection and testing of each system or component based on current regulations in effect;
 - All repairs made to any component or system.

11.0 HULL AND RELATED STRUCTURES

11.1 UNDERWATER HULL INSPECTION AND SURVEY

11.1.A Identification

- 11.1.A.1 The Contractor must clean the underwater hull area within 24 hour of docking the vessel and must do a preliminary survey of the shell plating with the TA and the attending ABS Surveyor within 72 hours of docking the vessel. This inspection must identify areas of the underwater and above water hull that must be grit blasted and have new hull coatings applied. The Contractor must repair any butt and seam welds identified during the hull inspection.

11.1.B References

11.1.B.1 Equipment Data

- 11.1.B.1.1 Hull plating Lloyd's Grade "E" steel

- 11.1.B.1.2 The Contractor must provide the services of a certified Coating Technical Service Representative. The Contractor must include an allowance of \$10,000 to cover the cost of services to be provided by the Akzo Nobel Coatings Ltd. (Canada) TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Robert Rouwen
Consultant - Marine Coatings
M 519-502-8366
Email robert.rouwen@akzonobel.com
Akzo Nobel Coatings Ltd. (Canada)
www.international-marine.com

- 11.1.B.1.3 Total underwater hull area of the vessel is appr.1650m², and:

- Area of both P&S rudders is 24.4m² in total
- Area of both P&S propeller nozzles is 70.4m² in total
- Area of both P&S rope guards is 15.8m² in total
- Area of Bow thruster tunnel is 47.2m²

11.1.B.1.4 Hull coating - Below Waterline : Single coat of Intershield 163-Inerta 160 Black with coating thickness of 20 mills DFT

11.1.B.1.5 Hull Coating – Above Waterline and Bulwarks tops: 2 coats of Intersheen 579 @ 1.5 mills DFT (RED – RAL 3000) each coat.

11.1.B.1.6 CCG Standard Paint Colours (from CCG/6016)

- CCG Red: RAL3000
- White: RAL9003
- Beige / Buff: RAL Design 070 7040
- Black: RAL9004
- Yellow: RAL1003

11.1.B.1.7 Tops of the Bulwarks : 2 coats of Interprime 198 @ 3 mills DFT (GREY-fist coat, RED- second coat CPA099)

11.1.B.1.8 Symbols and Lettering : 2 coats of Intersheen 579 white epoxy paint

11.1.B.1.9 White strips : 3 coats of Intersheen 579 @ 1.5 mills DFT (RAL 9003) each coat.

11.1.B.1.10 Black border stripe : 3 coats of Intersheen 579 @ 1.5 mills DFT (RAL 9004)

11.1.B.2 Drawings

Drawing Number	Drawing title
S30109mi (161-203-0)	Shell expansion Plan and Bulwark Details

11.1.B.3 Regulations and Standards

11.1.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included In RFP Package
7.B.3	Entry Into Confined Spaces	No
7.B.4	Hot work	No
7.B.5	Lockout Tag out	No
Publications		

FSM Procedures	Title	Included In RFP Package
IACS No. 47	Shipbuilding and Repair Quality Standard	No
ABS Publication #49	ABS Guidance Notes on The Application and Inspection of Marine Coating Systems https://ww2.eagle.org/en/rules-and-resources/rules-and-guides.html	No
Standards		
NACE No. 2 / SSPC-SP10	Near-White Metal Blast Cleaning	No
NACE_WJ-3/SSPC-SP_WJ-3	Waterjet Cleaning of Metals—Thorough Cleaning (WJ-3)	No
ISO 8501-1	Preparation of Steel Substrates before Application of paints and related products	No
ISO 8502-6	Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness — Part 6: Extraction of soluble contaminants for analysis — The Bresle method	No
ISO 11126 Parts 1 - 8	Preparation of steel substrates before application of paints and related products — Specifications for non-metallic blast-cleaning abrasives	No
CSA W47.1	Certification of Companies for Fusion Welding of Steel Structures - Division 1 or 2 Certification	No
CSA W59	Welded Steel Construction – Metal Arc Welding	No
CSA W178.2	Certification of Welding Inspectors Endorsement: Ships and Marine Structures; and Buildings and Industrial Structures	No
CAN/CGSB 48.9712	National Non Destructive Testing Certification Body of Natural Resources Canada	No
Regulations		
CSA 2001 C.R.C. c. 1432	Hull Inspection Regulations	No
CSA 2001, C.R.C., c. 1431	Hull Construction Regulations	No
CSA 2001, SOR/2017-14	Vessel Fire Safety Regulations	No

11.1.C Statement of Work

11.1.C.1 The Contractor must supply all necessary staging and man lifts for the work of this specification, including inspections by ABS Surveyor and the TA/IA.

11.1.C.2 Underwater Hull Cleaning

11.1.C.2.1 The Contractor must water blast the entire underwater hull surface of the vessel to the deep water load line within 24 hours of docking the vessel. The water blast pressure must be a minimum of 3000 psi / maximum 6000 psi. The Contractor must remove all marine growth, including slime, from the underwater hull surface of the vessel. The Contractor must submit a bid price per meter square for water blasting of the underwater hull surface. Pricing to be adjusted up or down by 1379.

11.1.C.3 Underwater Hull Inspection

11.1.C.3.1 The Contractor, together with the TA/IA and the attending ABS Surveyor, must inspect the cleaned underwater hull area of the vessel.

11.1.C.3.2 The Contractor must mark up a copy of the shell expansion plan with any identified areas of butts and seam welds requiring repair.

11.1.C.3.3 The Contractor and TA must agree to the area of the Hull below the ice belt that is being re-coated and the length of seam welding repairs to be performed. This inspection must also include draft marks, thruster symbols, Plimsoll marks, tanks and frame markings on the hull.

11.1.C.3.4 The Contractor must repair by gouging and re-welding the hull welds identified during the inspection. The Contractor must submit in the bid a price per meter cost for preparation and repair of the hull seams and butts welds (multiple passes) and must bid on a total of 40 meters. Pricing to be adjusted up or down by 1379.

11.1.C.3.5 The Contractor must grit blast any weld seam clear of all hull coatings to bare metal to a distance of 80 mm on either side of the weld. The Contractor must gouge the affected weld area to a depth of 6 mm and must re-weld the seam areas with multiple passes finishing the weld off with a cap pass. For the purpose of bidding, the Contractor must bid on a total of 40 meters, as well as price per liner length (in meter). Pricing to be adjusted up or down by 1379.

11.1.C.3.6 The Contractor must supply the welding procedure for the seams and butts welding 24 hours prior to welding being completed. Reference must be made to CCG Welding Specifications.

- 11.1.C.3.7 The finished weld profile must be between 2 mm to 3mm above the adjoining plate, but in no place more than 3 mm above.
- 11.1.C.3.8 The Contractor must supply the welding procedure for the seams and butts welding. The welding procedure must include flux core wire welding of appropriate grades for the hull plate. The hull plate in this region is Lloyd's Grade E, and varies between 36 mm and 38.5 mm.
- 11.1.C.3.9 Welds must be inspected for conformity by the attending ABS surveyor for acceptance prior to the application of the hull coatings.
- 11.1.C.3.10 All welds that fail to meet ABS approval must be re-welded by the Contractor at the Contractor's expense and are subject to final ABS approval.

11.1.D Proof of Performance

- 11.1.D.1 Prior to any hull coating, the Contractor must have the welding repairs inspected and approved by ABS.
- 11.1.D.2 The Contractor must provide a Quality Assurance (QA) report indicating that all areas as defined in this specification have been inspected by the Contractor's QA Department and all areas of defects established by this survey have been identified for remedial action. This report must be included in the Data Book reference section G 1.13.
- 11.1.D.3 The Contractor must include in the final report the details of the seam and butt welding that was completed. This report must detail the location and length of each weld, ABS Surveyor approval for each final weld and any testing results required in way of each weld. This report must be included in the Data Book reference section G 1.13.

11.2 UNDERWATER HULL PAINTING (IF REQUIRED)

11.2.A Identification

- 11.2.A.1 The Contractor must clean, grit blast and prepare underwater hull surfaces for recoating, based on hull inspection results. Contractor must paint the underwater surfaces with the CCG define coating system as per manufacturer's recommendations.
- 11.2.A.2 The Contractor must engage service of International Paint TSR to oversee the work in this Section.

11.2.B References

- 11.2.B.1 The total underwater hull area of the vessel is appr.1650m².

11.2.B.2 Drawings

Drawing Number	Drawing Title
S30109mi	Shell Expansion

11.2.B.3 Documentation:

- International Paint Technical Specification – CASL1-3BQP-PFR4/1

11.2.C Statement of Work

- 11.2.C.1 The Contractor must supply all necessary staging and man lifts for the work of this specification, including inspections by ABS Surveyor and the TA.
- 11.2.C.2 The Contractor must ensure that all items not being grit blasted or being painted are protected during the execution of this specification item.
- 11.2.C.3 All equipment protection must be removed at completion.
- 11.2.C.4 Where blasting grit and/or paint overspray damages equipment and/or other paint coatings, these defects must be rectified by the Contractor at the Contractor's expense prior to the completion of the contract.
- 11.2.C.5 The Contractor must ensure no ingress of blasting grit and/or overspray to the accommodation area of the vessel. All openings must be sealed or closed off to prevent the ingress of blasting grit and/or overspray.

- 11.2.C.6 The Contractor is responsible for the cleanup of all blasting grit, debris and overspray from the vessel's interior and exterior decks.
- 11.2.C.7 All overboard discharges must be plugged and protected from blasting grit and hull coating.
- 11.2.C.8 All scuttles, port holes and windows must be protected from blasting grit and paint/hull coating.
- 11.2.C.9 All deck machinery must be protected from blasting grit and the paint/hull coating.
- 11.2.C.10 The Contractor must dispose of all blasting grit and debris according to applicable Federal, Provincial, and Municipal regulations.
- 11.2.C.11 The Contractor must ensure that all coatings are applied within the allotted dry dock time period in order to allow for the full and proper curing of the coating to the vessel's hull prior to immersion.
- 11.2.C.12 Any application that results in an unacceptable coating to the FSR and TA must be redone (blasting included) by the Contractor at the Contractor's expense within the allotted dry dock time period.
- 11.2.C.13 **Underwater Hull Coating Renewal**
- 11.2.C.13.1 The Contractor must obtain the services of a qualified International FSR to supervise the surface preparation and hull coating application. The Contractor must include an allowance of \$10,000 to cover the cost of services to be provided by the Akzo Nobel Coatings Ltd. (Canada) FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.
- 11.2.C.13.2 The representative must be present during the entire process to verify conformity to the manufacturer's required procedures for the preparatory work, equipment, procedures, storage, environmental conditions and application of the hull coating.
- 11.2.C.13.3 The Contractor must re-coat as per the recommendation of the International FSR all disturbed areas after ABS has inspected and all identified welds have been repaired and approved.
- 11.2.C.13.4 For the purpose of bidding, the Contractor must submit, in the bid, a price per square meter and cost for grit blasting of 412 m² of the underwater hull to a SSPC SP-10

standard and coating the vessel with single coat of Intershiel 163 - Inerta 160 Black, with coating thickness of 20 mils DFT minimum.

11.2.C.13.5 Pricing to be adjusted up or down by 1379.

11.2.C.13.6 The Contractor must adhere to all coating system requirements for the application of the coating manufacturer's requirements and must be inspected during preparatory work, application and completion by TA and FSR.

11.2.C.14 Renewal of Symbols and Lettering (if required)

11.2.C.14.1 Upon completion of hull inspection, decision to be jointly made between Contractor and TA/IA on required renewal of draft marks, Plimsol marks and tank frame markings.

11.2.C.14.2 For bidding purpose, Contractor must quote on renewal of half of all hull markings listed below. This list shows the total quantity of markings.

- Total of 86 draft marks
- 2 Plimsoll marks
- Total of 20 tank frame markings with the existing hull coating system
- Thruster markings Fore and Aft

11.2.C.14.3 If markings renewal required, The Contractor must supply and apply 2 coats of Intersheen 579 white epoxy paint to outline and paint all identified markings and symbols.

11.2.D Proof of Performance

11.2.D.1 All work in this Section must be completed to the satisfaction of the TA/IA and FSR.

11.2.D.2 The Contractor must provide a 'coating application report' from the FSR to the TA that details all of the particulars of the coating application process as completed by the Contractor.

11.2.D.3 The report must include details of all environmental conditions at the time any hull coatings were applied and at which areas on the hull the coating was applied and include but not be limited to the dry and wet bulb temperatures, relative humidity, dew point and the times when painting was started and stopped as well as the temperature of the product at application time and wet and dry film thickness gauge readings.

11.2.D.4 This report must be included in the Data Book reference section G 1.13.

11.3 UNDERWATER HULL ULTRASONIC TESTING

11.3.A Identification

- 11.3.A.1 The Contractor must determine and record the hull thicknesses as detailed below, present the results to ABS and obtain survey credit for the readings.
- 11.3.A.2 The Contractor must gas-free, certify and maintain safe for hot work any tanks that will be affected by work described in this section. The Contractor must coordinate UT testing on the hull with inspections, certifications and coating of any such tank and other work performed in this Specification.

11.3.B Reference:

Drawing Number	Drawing Title
S30109mi (161-203-0)	Shell Expansion

11.3.C Technical

- 11.3.C.1 The Contractor must take ultrasonic readings on the underwater hull up to the design load line draft.
- 11.3.C.2 The Contractor must take no less than 4 readings from each hull panel and no less than 4 readings of each panel inside each sea chest, each sea bay, and 4 inside each pipe connection for shipside valves.
- 11.3.C.3 Contractor's bid must include removal and re-installation of grids/covers from the following:

Description	Location	Area
Stbd Sea Chest	Frames 25-27	50 m ²
Port Sea Chest	Frames 25-27	50 m ²
Sea Bay	Frames 25-27	120 m ²
Port fire monitor sea chest	Frames 16-18	10 m ²
Stbd fire monitor sea chest	Frames 16-18	10 m ²
Bow thruster sea chest	Frames 39-41	20m ²

11.3.C.4 The Contractor must include removal and re-installation of the manhole covers in order to gain access to the following stub ends:

Description	Location	Original Thickness
Grey water drain Stbd	Frames 40-41	7.6mm
Grey water drain Stbd	Frames 39-40	7.6mm
Grey water drain Port	Frames 39-40	7.6mm
Grey water drain Port	Frames 35-36	8.6mm
Grey water drain Stbd	Frames 22-23	8.6mm
Grey water/storm water drain Port	Frames 22-23	8.6mm
Storm drain Port	Frames 27-28	8.6mm
Storm drain Stbd	Frames 27-28	8.6mm
Sewage discharge	Frames 34-35	10.9mm
Reverse osmosis discharge	Frames 27-28	7.6mm
Port SSG raw water discharge	Frames 25-26	7.6mm
Stbd SSG raw water discharge	Frames 25-26	7.6mm
Main engine raw water discharge Port	Frames 24-25	10.9mm
Main engine raw water discharge Stbd	Frames 24-25	10.9mm
Bilge pump discharge	Frames 24-25	8.6mm
Oily water separator discharge	Frames 26-27	5.5mm
General service pump discharge	Frames 24-25	8.6mm
Air conditioning discharge	Frames 26-27	7.6mm
Bow thruster gearbox cooler discharge	Frames 39-40	4.5mm
Bow thruster gearbox cooler inlet	Frames 41-42	4.5mm
Emergency fire pump inlet	Frames 39-40	8.6mm
Aft Port sea chest vent	Frames 17-18	8.6mm
Aft Stbd sea chest inlet	Frames 17-18	8.6mm
Air to Aft ssea chest Port	Frames 17-18	4.5mm
Ait to Aft sea chest Stbd	Frames 17-18	4.5mm
Main sea chest valve Port	Frames 26-27	12.7mm
Main sea chest valve Stbd	Frames 26-27	12.7mm
Main seabay isolation valve Port	Frames 26-27	12.7mm
Main seabay isolation valve Stbd	Frames 25-26	12.7mm
Recirc to main sea chest Port	Frames 25-26	10.9mm
Recirc to main sea chest Stbd	Frames 25-26	10.9mm

Air to main sea chest Port	Frames 26-27	6.3mm
Air to main sea chest Stbd	Frames 26-27	4.5mm
Ait to seabay	Frames 26-27	4.5mm

- 11.3.C.5 The contractor must take readings as per the following on the stub ends : 2 sets of readings per each stub end at Top, Bottom, Aft and Fwd directions at 1/3 and 2/3 lengths of the stubs. Final table must contain original thickness, Class minimum thickness, gauged thickness, diminution in mm and %. Readings to be taken at the middle point of the pipe length.
- 11.3.C.6 Access to the bow thruster sea chest is through the bow thruster compartment access covers.
- 11.3.C.7 The Contractor's bid must include removal and re-installation of all manhole covers that required to be removed to access stub ends, as per list above.
- 11.3.C.8 The Contractor must re-install manhole covers with all new gasket material suitable for this application. IA/TA to be consulted on the material to be used prior to reinstallation.
- 11.3.C.9 The Contractor must re-install all shell plate access grids/covers for the sea chests with new securing bolts and nuts. All nuts must be re-secured and locked with welded keeper bars.
- 11.3.C.10 Particular attention must be paid to plating in way of hull openings and to areas of visible damage and corrosion.
- 11.3.C.11 The Contractor must provide personnel certified to Level II of CAN/CGSB 48.9712-2000 for the taking of the ultrasound readings. Proof of current certification of the ultrasound personnel must be provided to the IA / TA.

11.3.D Proof of Performance

11.3.D.1 **Inspection points – Not Used**

11.3.D.2 **Testing/ Trials – Not Used**

11.3.D.3 **Certification**

- 11.3.D.3.1 Detailed report must be prepared showing the exact location of each test point marked on an ANSI size E paper copy of DWG 161-203-0 Shell Expansion. The report must also include an MS-Excel spreadsheet table identifying the test points by strake and

plate number, original plate/pipe thickness, Class minimum thickness, steel thickness found, the corresponding original thickness and percent wastage.

- 11.3.D.3.2 A copy of this report must be submitted to ABS , as part of the hull inspection survey records, and survey credit obtained.
- 11.3.D.3.3 The Contractor must supply 1 paper copy of the drawing, 1 paper copy of the spreadsheet, and one electronic copy of both in PDF format.

11.4 CHAIN LOCKERS, ANCHOR CHAIN AND ANCHORS

11.4.A General

11.4.A.1 The Contractor must open the Port and Starboard chain lockers and certify for entry, clean and inspect all spaces; submit for certification to ABS, and coat the interior of the chain locker.

11.4.B References

11.4.B.1 List of Equipment

Description	Location	Particulars
Port Chain Locker	Frames 46-47	Total surface area-30m2 Locker capacity-13m3
Starboard Chain Locker	Frames 46-47	Total surface area-30 m2 Locker capacity-13m3

11.4.B.2 Drawings

11.4.B.2.1 The following drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Drawing Number	Drawing Title	Electronic File name
161-300-01_01	CCGS Samuel Risley General Arrangement	161-300-01_01 General arrangement. dwg

11.4.B.3 Regulations and Standards

11.4.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included In RFP Package
7.B.3	Entry into Confined Spaces	No
7.B.4	Lockout Tag-out	No
10.A.6	Paint and Other Coatings	No
Standards		
NACE No. 2/SSPC-SP10	Near-White Metal Blast Cleaning	No

CAN/CGSB 48.9712	National Non-Destructive Testing Certification Body of Natural Resources Canada	No
CSA 2001 CRC, c. 1432	Hull Inspection Regulations	No
ISO 8501-1	Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings	No
ISO 8501-2	Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness - Part 2: Preparation grades of previously coated steel substrates after localized removal of previous coatings	No

11.4.C Technical

ANCHORS

US NAVY Type, Cast steel anchors, stockless with a total weight of 1935kg, with 338 KN proof load with following dimensions:

- Width between fluke tips: 1333 mm
 - Length of flukes: 1225 mm
 - With and thickness of shank: 173 by 139 mm
 - Length of shank: 2397 mm
- Anchors are certified by Lloyd's Register of Shipping

CHAINS

16 shots (1460 feet or 445 meters) of steel stud link chain, of 38mm in diameter with U2 grade steel. Max. proof load of 580.6kN and breaking strength 812kN.

Chain and Kenter shackles are Lloyd's Register Certified.

11.4.C.1 Port and Starboard Anchors & Chain Locker cleaning

11.4.C.1.1 The Contractor must unship Port and Starboard anchors, lower them to the dock floor and pressure washed to remove all debris and markings from the anchor chains.

The Contractor must ring test all studs and links of the anchor chains. The chains and anchors must be submitted for inspection to the attending ABS surveyor for credit.

11.4.C.1.2 The Contractor must carry out NDT (dye pen) on both anchors to determine any presence of the cracks. Areas for testing to be: anchor's eye area, shackle, shackle pins and welded or bolted connections.

11.4.C.1.3 The Contractor must open up, ventilate and certify the chain lockers safe for entry. The Contractor must maintain the certification valid for the duration of the work of this section.

11.4.C.1.4 The Contractor must lift and secure the false bottoms. Mud boxes and strainers must be cleaned and proven clear

11.4.C.1.5 The Contractor must pressure wash both chain lockers with a minimum of 3500 psi pressure to remove all rust, scale and any other foreign deposits using fresh water for the cleaning.

11.4.C.1.6 The Contractor must scrape any visible rust and scale off the insides of the chain

11.4.C.1.7 The Contractor must quote on mechanically descaling 30% of the lockers interior surfaces as listed in 11.4.B.1. When adjustments are required, price will be adjusted up or down by means of 1379 process.

11.4.C.1.8 All water, mud, debris, scale, paint, and other loose material must be removed from the chain locker and disposed of ashore.

11.4.C.1.9 Upon completion of cleaning the Contractor must submit the chain lockers to the attending ABS surveyor for an internal inspection and obtain a credit.

11.4.C.2 **Chain Locker Coatings**

11.4.C.2.1 The bottom of the chain locker is coated with International Intertuf 16 .

11.4.C.2.2 The Contractor must repair any damaged coating with Contractor supplied Intershield 300 product, as per coating scheme below:

- Intershield 300 – Color Bronze – Full Coat @ 6 mil DFT
- Intershield 300 – Color Aluminium – 15% Stripe Coat
- Intershield 300 – Color Aluminium – Full Coat @ 6 mil DFT

11.4.C.2.3 The Contractor must bid on 15 m² of the chain locker to be coated. A unit price per square meter must be included in the pricing data sheet.

- 11.4.C.2.4 Any bare metal areas on the surfaces of the chain lockers are to be coated. The bare metal must be power tool cleaned to SSPC-SP3. Intact coating must have the edges feathered
- 11.4.C.2.5 The Contractor must install the false bottom as originally installed. All work must be inspected by the TA/IA prior to re-shipping of the anchor chains.
- 11.4.C.2.6 The Contractor must ship the anchor chains and flake them correctly in the chain lockers. The chains must be flaked manually from within the chain lockers.
- 11.4.C.2.7 The first shot of each anchor cable must be switched to the bitter end to allow the existing second shot to become the first shot. The anchors must be reconnected via a lug-less joining shackle 2 links above the swivel as per the existing arrangement. The IA/TA must be given an opportunity to witness the reconnection of the bitter ends of each anchor chain within the chain lockers.
- 11.4.C.2.8 The anchor chains must be marked to indicate each shot as follows:
- At the first shackle (15 fathoms), by a piece of heavy gauge SST seizing wire on the stud of the first link forward and abaft the joining shackle. At the second shackle (30 fathoms) by two seizing wires on the second studded link forward and abaft of the joining shackle, until all shots are marked;
 - All the marked links are to be painted white to provide identification of the number of shots when being run out. On the first shackle (15 fathoms), paint the first studded link forward and abaft of the joining shackle; at the second shackle (30 fathoms), paint the two studded links forward and abaft of the joining shackle, and so on.
 - Paint each joining shackle between the shots, fluorescent orange.
- 11.4.C.2.9 The Contractor must build up the Port and Stbd hawse pipe chafing rings at the anchor pockets with stainless steel weld to match the existing profile. All welds are to be ground smooth.

11.4.D Proof of performance

11.4.D.1 Inspection points

- 11.4.D.1.1 The Contractor provide the TA with a detailed written report of the chain locker condition after cleaning.

11.4.D.1.2 The Contractor must demonstrate to the TA that the coatings are applied under correct conditions and to correct wet film thicknesses.

11.4.D.2 **Testing/Trails – Not Used**

11.4.D.3 **Certification**

11.4.D.3.1 The Contractor must obtain a Division III credit for the Chain Locker, Chains and Anchors Inspections.

11.4.D.4 **Documentation**

11.4.D.4.1 The Contractor must provide a written report to the TA that details all of the particulars of the coating application process as completed by the Contractor.

11.5 SEA SIDE AND BALLAST VALVES

11.5.A Identification

11.5.A.1 The Contractor must isolate, open and dismantle the valves identified in the reference table and submit these for inspection by the attending ABS surveyor for a survey credit. The Contractor must then reassemble the valves and test all valves once the vessel is undocked.

11.5.A.2 All valves identified as “NEW” have been replaced in 2019 and must NOT require complete removal.

11.5.B Equipment Data

11.5.B.1 List of valves

Description	Type	Size (inch)	Frame Location
Grey Water Drain	S.D. Check	3	40-41 Stbd
Grey Water Drain	S.D. Check	3	39-40 Stbd
Grey Water Drain	S.D. Check	3	39-40 Port
Grey Water Drain	S.D. Check	4	33-34 Port
Grey Water Drain	S.D. Check	4	22-23 Stbd
Grey Water/Storm Drain	S.D. Check	4	22-23 Port
Storm Drain	S.D. Check	4	27-28 Port
Storm Drain	S.D. Check	4	27-28 Stbd
Sewage Discharge	S.D.N.R.	6	34-35 Port
Port S.S.G. Raw Water Discharge (New 2019)	S.D.N.R.	3	25-26 Port
STBD S.S.G. Raw Water Discharge (New 2019)	S.D.N.R.	3	25-26 Port
Main Engine Raw Water Discharge (New 2019)	S.D.N.R.	6	24-25 Port
Main Engine Raw Water Discharge (New 2019)	S.D.N.R.	6	24-25 Stbd
Bilge Pump Discharge (New 2019)	S.D.N.R.	4	24-25 Port
Oily Water Separator/Reverse Osmosis Discharge (New 2019)	S.D.N.R.	2	26-27 Stbd
General Service Pump Discharge (New 2019)	S.D.N.R.	4	24-25 Stbd
Air Conditioning Discharge (New 2019)	S.D.N.R.	3	26-27 Port
Sea Connections			
Emergency Fire Pump Inlet	Globe	4	39-40 Center
Aft Port Sea Chest Vent	Globe	4	17-18 Port

Description	Type	Size (inch)	Frame Location
Aft Stbd Sea Chest Vent	Globe	4	17-18 Stbd
Port Fire Monitor Inlet	Gate	12	17-18 Port
Stbd Fire Monitor Inlet	Gate	12	17-18 Stbd
Main Sea Chest Valve	Globe	16	26-27 Port
Main Sea Chest Valve	Globe	16	26-27 Stbd
Main Sea Bay Isolation Valve	Butterfly	16	26-27 Port
Main Sea Bay Isolation Valve	Butterfly	16	26-27 Stbd
Recirc. to Main Sea Chest (New 2019)	Globe	6	25-26 Port
Recirc. to Main Sea Chest (New 2019)	Globe	6	25-26 Stbd
Emergency Fire Pump to Main Sea Bay	Butterfly	4	39-40 Center

11.5.B.2 Regulation and Standards

FSM Procedures	Title	Included In RFP Package
7.B.3	Entry into Confined Spaces	No
7.B.4	Hot work	No
7.B.5	Lockout & Tag out	No
Regulations		
CSA 2001, C.R.C., c. 1431	Hull Construction Regulations	No
CSA 2001, C.R.C., c. 1432	Hull Inspection Regulations	No
CSA 2001, SOR/90-264	Marine Machinery Regulations	No

11.5.C Technical

11.5.C.1 Where skin valves are removed and hull blasting is underway, the Contractor must ensure that no blasting media or coating system overspray enter the system from which the skin valves have been removed. The Contractor must also ensure that no blasting media or overspray enter the machinery space as a result of work from Sections 11.1 and 11.2.

11.5.C.2 The Contractor must identify all valves and tag all valves and valve parts to ensure that items for a particular valve can be identified once the valve and parts have been removed from the vessel.

- 11.5.C.3 Valves identified as “NEW 2019” do not require their flanges to be disconnected and valves removed. Instead, the Contractor must open up bonnets to have clear access to the valve seats and valve discs for inspection. Spindle packing must be replaced and Contractor supplied.
- 11.5.C.4 The Contractor must disassemble and clean all valves and valve components. Valves must be laid out for inspection by the attending ABS surveyor. A survey credit must be obtained for all valves inspected.
- 11.5.C.5 Where required and identified by ABS/IA/TA, The Contractor must machine all valve discs and valve seats. Final lapping must be done to ensure the valve discs have full contact with the valve seat.
- 11.5.C.6 The Contractor must bid on providing 50 hours of machining for the work in this section. Unit price per hour machining must be included in quotation and final amount adjusted by PSPC 1379 action.
- 11.5.C.7 If any of the valve(s) is deemed damaged beyond repair upon completion of inspection, Contractor to inform TA/IA immediately and get the approval to supply and install identical valve(s). All extras to be dealt by means of PSPC 1379 process.
- 11.5.C.8 The Contractor must re-assemble all valves with new Contractor supplied gaskets and packing. All valves must be installed and left in their “CLOSED” position.

11.5.D Proof of Performance

11.5.D.1 Inspection points

- 11.5.D.1.1 All work must be completed to the approval of ABS inspector and TA/IA. Any defects must be repaired by the Contractor at the Contractor expense.
- 11.5.D.1.2 The Contractor must afford TA/IA the opportunity to examine all valves in their disassembled state.

11.5.D.2 Testing/Trials

- 11.5.D.2.1 All testing must be done in the presence of the TA/IA
- 11.5.D.2.2 After testing, the Contractor must demonstrate to the TA that all blanks or plugs have been removed.
- 11.5.D.2.3 During the undocking of the vessel, the Contractor must have sufficient personnel on hand such that all valves listed in this Section can be inspected for leaks. Once

sufficient water depth has been obtained, all closed valves must be opened and verified that no bonnets or valve packings are leaking. Any leaks must be rectified by the Contractor immediately at no cost to CCG.

11.5.D.3 **Certification**

11.5.D.3.1 The Contractor must obtain in writing a survey credit for the storm valve and sea connection inspections by the attending ABS surveyor. A written copy of this must be provided to the TA before the re-floating of the vessel.

11.5.D.4 **Documentation**

11.5.D.4.1 The Contractor must provide a report on the findings, work and final condition of the work of this Section in accordance with the Inspection, Test and Trials Plan.

11.5.D.4.2 The Contractor must provide detailed report on all work carried out to these valves. This must include details on the machining, replacement and/or repairs (if any) and on what valves it was performed on. Where valves were replaced the Contractor must supply valve certificates.

11.6 SEA INLETS

11.6.A Identification

- 11.6.A.1 The Contractor must open and clean all sea chests, sea bays and sea strainers on the vessel. This must include descaling, power washing, inspections, and new coating application.
- 11.6.A.2 The sea bays and sea chests to be inspected by the attending ABS Surveyor and credit obtained.
- 11.6.A.3 The Contractor must obtain the services of a qualified coating technical Service Representative (TSR) to supervise the coating application. The Contractor must include an allowance of \$5,000 to cover the cost of services to be provided by the Akzo Nobel Coatings Ltd. (Canada) TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Robert Rouwen
Consultant - Marine Coatings
M 519-502-8366
Email robert.rouwen@akzonobel.com
Akzo Nobel Coatings Ltd. (Canada)
www.international-marine.com

11.6.B References

- 11.6.B.1 List of Sea inlets:

- 11.6.B.1.1 The Contractor must remove the grids and/or covers from the following:

DESCRIPTION	LOCATION	AREA
Port Sea Chest	Frames 25-27	49.5 m ²
Stbd Sea Chest	Frames 25-27	49.5 m ²
FWD Sea Chest	Frame 39-41	22 m ²
Port fire monitor Sea Bay Aft	Frames 16-18	10.4 m ²

Stbd fire monitor Sea Bay Aft	Frames 16-18	10.4 m²
Sea Bay	Frames 25-27	115.8m²

11.6.B.2 Drawings:

Document Number	Document Title
Trim & Stability Book R1	Trim & Stability Book R1.pdf
S30112as1(161-293-1)	Samuel Risley Sea Chest grid FWD Frames 24-26 (P&S)
S30112as2 (161-293-2)	Samuel Risley Sea Chest Grid FWD Frames 39-41 (P&S)
S30112as3 (161-293-3)	Samuel Risley Sea Chest Grid Aft Frames 16-18 (P&S)

11.6.B.3 Regulation and Standards

11.6.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included In RFP Package
7.B.3	Entry Into Confined Spaces	No
7.B.4	Hot work	No
7.B.5	Lockout Tag-out	No
Regulations		
CSA 2001, C.RC. c. 1432	Hull Inspection Regulations	No

11.6.C Statement of Work

11.6.C.1 General

11.6.C.1.1 The Contractor must open and clean all sea chests, sea bays and sea strainers on the vessel; mechanically remove all scale, supply and apply primer and antifouling to all internal surfaces as per paint scheme below.

11.6.C.1.2 The Contractor must ensure that no grit blast or overspray of the sea bays enters the machinery spaces.

11.6.C.2 Sea Chests

- 11.6.C.2.1 The Contractor must remove the removable grids from sea chests and clean the sea chests of all debris.
- 11.6.C.2.2 The Contractor must grit blast all hull perforations and removable grids to SA2-1/2 / SSPC-SP10.
- 11.6.C.2.3 The internal surfaces of the sea chests must be high pressure water washed
- 11.6.C.2.4 The internal surfaces of the sea chests must be mechanically cleaned of all rust and scale to SA 2 / SSPC-SP6. Intact primer does not need to be removed. All rust, scale and debris must be removed and disposed of ashore. For bid purposes the Contractor must quote for mechanical cleaning of 50% of the internal surfaces of the sea chests. The internal surfaces, in square-meters, are listed in Table 11.6.B.1.1.
- 11.6.C.2.5 The Contractor must provide unit price per square-meter of mechanical cleaning of sea chests. Final amount to be adjusted based on actual area by means of PSPC 1379 action.
- 11.6.C.2.6 The cleaned sea chests must be submitted for inspection by the attending ABS surveyor and the TA/IA. ABS credit must be obtain.
- 11.6.C.2.7 The Contractor must renew the Inerta 160 coating on the exterior of the removable grids.
- 11.6.C.2.8 The Contractor must note current ship's coatings scheme, supply and apply products as per below:
- Intershield 300 – Bronze – Full coat @ 6mil DFT
 - Intershield 300 – Aluminium – 15% Stripe coat
 - Intershield 300 – Aluminium – Full coat @ 6 mils DFT
 - Interspeed 640 – Red – Full coat @ 4 mils DFT
 - Interspeed 640 – Red – 15% Stripe coat x 2 coats
- 11.6.C.2.9 For bid purposes, the Contractor must quote for coating on the internal surfaces subjected to mechanical cleaning as defined in 11.6.C.2.4 above (50% of total surface areas listed).
- 11.6.C.2.10 The Contractor must provide and install 60 new bolts for the purpose of replacement for sea chests and sea bays. Bolt size for reference 1" – 8 TPI x 3.5" 316 Stainless with a 3/4" hex socket head.

11.6.C.2.11 Aft Sea Chests have 16 bolts fitted each and the foreword sea chests have 14 bolt fitted each.

11.6.C.2.12 The Contractor must reinstall the removable grids using stainless steel nuts and tack welding the nuts in place. The Contractor must apply 1 coat of Inerta 160 to the welded nuts. The Contractor must present the secured grids to the TA.

11.6.C.3 Sea Bays

11.6.C.3.1 The Contractor must open and clean sea bays.

11.6.C.3.2 All internal surfaces of the sea bays must be high pressure water washed (3,500 psi)

11.6.C.3.3 All internal surfaces of the sea bays must be mechanically cleaned of all rust, scale to SA 2 / SSPC-SP6. Intact primer does not need to be removed. All rust, scale and debris must be removed and disposed of ashore. For bid purposes the Contractor must quote for mechanical cleaning of 50% of the internal surfaces of the sea bays. The internal surfaces, in square-meter, are listed in Table 11.6.B.1.1. The Contractor must also quote on unit price per square-meter of mechanical cleaning of sea bays. Final amount to be adjusted based on actual area by means of PSPC 1379 action.

11.6.C.3.4 For bid purposes the Contractor must quote on coating the internal surfaces subjected to mechanical cleaning as defined in 11.6.C.3.3 above.

11.6.C.3.5 Cleaned sea bays must be submitted for inspection by the attending ABS surveyor and the TA/IA. ABS credit must be obtain.

11.6.C.3.6 The Contractor must note current ship's coating scheme, supply and apply products as per below:

- Intershield 300 – Bronze – Full coat @ 6mil DFT
- Intershield 300 – Aluminium – 15% Stripe coat
- Intershield 300 – Aluminium – Full coat @ 6 mils DFT
- Interspeed 640 – Red – Full coat @ 4 mils DFT
- Interspeed 640 – Red – 15% Stripe coat x 2coats

11.6.C.3.7 The Contractor must reinstall the removable grids using stainless steel nuts and tack welding the nuts in place. The Contractor must apply 1 coat of Inerta 160 to the welded nuts. The Contractor must present the secured grids to the TA.

11.6.D Proof of Performance

11.6.D.1 Inspection Points

- 11.6.D.1.1 The Contactor must afford the Technical Authority and/or Inspection Authority the opportunity to visually inspect the grids, sea bays, sea chests after the areas have been cleaned and before the application of any surface coatings.
- 11.6.D.1.2 The Contactor must afford the TA/IA the opportunity to for a final visual inspection of the grids, sea bays, sea chests before closing up.
- 11.6.D.1.3 All work must be completed to the satisfaction of the TA and the attending ABS inspector.

11.6.D.2 Testing /Trials – Not Used

11.6.D.3 Certification

- 11.6.D.3.1 The Contractor must obtain a Division III credit for the following items:

- Internals of Sea Chests;
- Internals of Sea Bays.

11.6.D.4 Documentation

- 11.6.D.4.1 The Contractor must provide a 'coating application report' from the FSR to the TA that details all of the particulars of the coating application process as completed by the Contractor.
- 11.6.D.4.2 The report must include details of all environmental conditions at the time any hull coatings were applied and at which areas on the hull the coating was applied and include but not be limited to the dry and wet bulb temperatures, relative humidity, dew point and the times when painting was started and stopped as well as the temperature of the product at application time and wet and dry film thickness gauge readings. This report must be included in the Data Book reference section G 1.13.

12.0 PROPULSION AND MANEUVERING

12.1 RUDDERS

12.1.A Identification

- 12.1.A.1 The Contractor must remove the rudders and rudder's stock from the vessel for pressure testing, inspection of the pintles and inspection of the rudder stock to perform required regulatory inspections.
- 12.1.A.2 The Contractor to obtain ABS credit for the work in this Section.
- 12.1.A.3 The Contractor must provide the services of Thordon FSR or other certified Thordon service representative to oversee the work of this Section. The Contractor must include an allowance of \$5,000 to cover the cost of services to be provided Thordon FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

12.1.B Equipment Data

- 12.1.B.1 The Contractor must reference the JASTRAM Steering Gear Manual for details concerning the carrier bearings and the radial bearings.

12.1.B.2 Drawings

Drawing Number	Description
	Pintle Bushing Initially
	Rudder Pintle Gudgeon Details (Original)
	Thordon Bearing Installation.pdf
S30178de.pdf	Rudder & Stock Arrangement & Details
S30179de (161-000-0).tif	Ship Handling

12.1.C Technical

12.1.C.1 General

The Contractor must remove the Port and Starboard rudders and rudder stocks for inspection by the attending ABS surveyor for survey credit.

12.1.C.2 Pintles and Gudgeons

- 12.1.C.2.1 The Contractor must take and record the Port and Starboard “gudgeon to pintle” clearances and the Port and Stbd rudder stock lower end carrier bearing clearances. Copies of readings must be provided to the IA/TA within 24 hours of the rudders being removed from the vessel.
- 12.1.C.2.2 Readings taken by the Contractor must be used to determine if new pintle and gudgeon bearing sleeves need to be machined and/or installed.
- 12.1.C.2.3 If required, new Thordon bushing and stainless steel sleeve material must be Contractor supplied. For bidding purposes the SXL Thordon material is approx. 11” OD x 8” ID x 12” long and the 316 Stainless Steel pintle sleeve is approximately 8” OD x 7” ID x 12” Long
- 12.1.C.2.4 If removal and installation of new bushings is required, the Contractor must remove the existing gudgeon and pintle sleeves and install new sleeves under supervision of a certified Thordon FSR. Extra work will be dealt by means of PSPC 1379 process. The Contractor must include a unit bid price for removing one existing gudgeon and pintle sleeve and installing a new sleeve.
- 12.1.C.2.5 If required, The Contractor must rough and finish machine supplied sleeve and bearing material to Thordon FSR specification and clearances. This will be dealt by means of PSPC 1379 process. The Contractor must include a unit bid price for rough and finish machine supplied sleeve and bearing material.
- 12.1.C.2.6 Documentation with the final measured clearance for both Port and Stbd rudder bearings with reference to the Thordon Specified clearance must be presented to the ABS inspector and the IA/TA for an approval.
- 12.1.C.2.7 The machining and fitting of the Thordon material must comply with the specific material application guidelines. The Contractor must supply a Thordon FSR to witness and approve the machining and installation process.

12.1.C.2.8 It is The Contractor's responsibility to include in the bid supply of all materials necessary to machine and fit the pintle stainless steel sleeves and the Thordon bearing material.

12.1.C.3 Sleeve and Bearing Replacement (If required)

12.1.C.3.1 Pintle to gudgeon clearance specifications must be determined by the Thordon FSR. Documentation with the final measured clearance for both Port and STBD rudder bearings with reference to the Thordon specified clearance must be provided to the TA and to ABS for an approval.

12.1.C.3.2 Final measurements of the pintle outside diameter and gudgeon inside diameter must be taken and recorded in three places along the length of the bearing (Top, Center, and Bottom) in both the Port/Starboard and Fore/Aft directions. Final measurements must be presented to the IA/TA for an approval prior to fitting the Rudders

12.1.C.4 Rudders

12.1.C.4.1 Unshipping of the rudder stocks must include the removal of the rudder follow-up assemblies, disconnecting of the actuating rams from the rudder tiller arms, the rudder stock nuts and locking bars, and tiller heads. Any damage caused by the Contractor to the threads of the rudder stocks during the removal of the nuts, removal, storage or refitting of the rudders and rudder nuts or any other parts of equipment must be corrected by the Contractor, with no cost to CCG.

12.1.C.4.2 The Contractor must weld on lifting tabs to the rudders (Port and Stbd) for the purpose of supporting and moving the rudder during removal. All tabs must be gouged off after work is completed and area ground to original profile.

12.1.C.4.3 Jumping collars fitted to the hull above the rudder must have new bolts installed :16 in total: 8 per side. Prior to re-installation, bolt holes must be cleaned and threads chased with a tap. All bolts to have Loctite 242 applied to the threads with a torque of 150 FT/Lbs. New bolts are 5/8" – 11 TPI x 2" Long 316 Stainless cap screws. All bolts are Contractor supplied.

12.1.C.4.4 To facilitate removal of the rudders, the Contractor must break the rudders at the palm connection and remove the jumping collars. The Contractor must gouge off the locking tabs and locking plates from the 8 fitted bolts and nuts (4 of each per side of each rudder palm) in order to remove the nuts and drop the rudders from the palms. Total of 16 fitted bolts with nuts.

- 12.1.C.4.5 All bolts and nuts are to be marked for location and must be re-installed at the same location during re-assembly.
- 12.1.C.4.6 The Contractor must submit the palm bolts and nuts (16 in total of each) to visual examination and UT (Dye penetrant or equivalent) test for cracks. Attention must be paid to the threaded areas of the nuts and bolts. The Contractor to allow IA/TA an opportunity to verify the results of NDT. Report on UT test to be provided to TA.IA upon test completion.
- 12.1.C.4.7 The Contractor's bid to include material, fabrication and machining of 2 new fitted bolts and nuts of the proper dimension (Material is Aquamet 22).
- 12.1.C.4.8 The Contractor must remove and dispose all packing and grease from the rudder stock glands. The Contractor must supply and install new Chesterton Stern-Lon 329 Teflon impregnated flax type packing (3/4"), or equivalent.
- 12.1.C.4.9 The Contractor must remove the drain and vent plugs from each rudder and subject the forward and after sections of both rudders to an air pressure test, not in excess of 0.1 bar (1.5 psig). This test must be witnessed and approved by a ABS surveyor and the IA/TA.
- 12.1.C.4.10 After testing, the Contractor must float coat the interior sections of both rudders with Contractor supplied "VapCor SeaGuard A". Upon completion of float coating the rudders to be drained and all plugs reinstalled.
- 12.1.C.4.11 The Contractor must supply and install total of 8 new 316 Stainless Steel Hex- Socket plugs on both rudders (4 plugs per rudder). This work must be done prior to the installation of the rudders. All plugs must have Loctite®PTFE applied to the threads prior to installation.
- 12.1.C.4.12 The Contractor must blast to bare metal any weld pockets that are missing cement and re-fill these pockets. The area is to be made flush with the rudder body and allowed to fully cure.
- 12.1.C.4.13 The Contractor must perform MPI examinations of the rudder stock keyways and rudder stock threads. Results must be provided to IA/TA immediately after examination for further review.

12.1.C.5 Rudder Stocks

- 12.1.C.5.1 The Contractor must take and record the dimensions of the rudder stock liners in way of the lower guide bearings, at the top, middle and bottom of the liner in both the fore/aft and port/starboard directions for each position.
- 12.1.C.5.2 The Contractor must take and record the dimensions of the lower guide bearings at the corresponding positions on the liner and the clearances between the components.
- 12.1.C.5.3 The Contractor must take and record the dimensions of the rudder stock liners in way of the radial bearing at the top, middle and bottom of the liner in both the fore/aft and port/starboard directions for each position.
- 12.1.C.5.4 The Contractor must take and record the dimensions of the radial bearings at the corresponding positions on the liner and the clearances between the components.
- 12.1.C.5.5 The Contractor must submit the rudder stocks to NDT testing in way of the threads, landings, fitted bolt holes and radii. The Contractor must obtain and submit report to IA/TA and obtain ABS credit. The Contractor must ensure that any damage to the rudder stocks in way of the threaded areas is fully examined and documented. Any identified repairs or deficiencies in the rudder stocks to be covered by the 1379 process.

12.1.C.6 Installation and Set to Work

- 12.1.C.6.1 The Contractor must verify the initial fit of the taper connection between each rudder stock and the associated tiller head. Verification of initial fit must be by machinist bluing process. The acceptable minimum contact area between the rudder stock taper and tiller head is 80%. Final fit of the flanges and tapers must be witnessed by the attending ABS surveyor and the IA/TA. Contractor's bid must include as many fittings as required to achieve proper contact.
- 12.1.C.6.2 The Contractor must re-install the rudders, rudder tiller arms, rudder stock nuts, locking bars, hydraulic rams and rudder follow-up assemblies and set the rudders and steering gear to work.
- 12.1.C.6.3 The Contractor must take and record the fitted clearance between the fitted keys and keyways of the rudder stocks and tiller heads for both the Port and STBD rudders. Drawing indicating clearances must be provided to IA/TA upon completion of the Contract.

12.1.D Proof of Performance

12.1.D.1 Inspection points

- 12.1.D.1.1 The Contractor must have each rudder inspected by the attending ABS surveyor, obtain credit and provide the TA with proof of inspection.
- 12.1.D.1.2 The Contractor must provide a Quality Assurance report indicating that all parts of the rudder assembly have been inspected by the Contractor's Q.A. department for correct installation and fit.
- 12.1.D.1.3 The Contractor must ensure that rudders are installed in good order and that the rudder coupling bolts, lower gudgeon bolts, nuts and the jumping collars screws are locked to the satisfaction of the attending ABS surveyor and IA/TA.
- 12.1.D.1.4 The Contractor must touch up any damaged paint in this area at Contractor's expense.
- 12.1.D.1.5 Upon completion of the inspection and final installation of the rudders and rudder stock, the Contractor must perform operational tests on the rudders to ensure that the steering system performs as required. All operational tests must be witnessed by the IA/TA. The Contractor must test and verify the following items with regards to the steering system:
- The Contractor must verify the proper operation and indication of each rudder's angle indicator system. The Contractor must verify that all local and remote rudder angle indicators indicate the true deflection of the rudder as witnessed in the steering gear compartment. Where necessary, the Contractor must adjust the system to provide correct indication.
 - The Contractor must verify the hydraulic operation of each steering gear pump and that each rudder's hydraulic system operates in a smooth manner. Where air is entrapped in the system, the Contractor must bleed the hydraulic system until all entrapped air has been removed.
 - The Contractor must verify that each rudder has full travel from hard over to hard over when being steered by the hydraulic systems. The Contractor must adjust the hydraulic systems to prevent the rudders from contacting the mechanical stops on either side and to ensure that travel in both directions is equal.
 - The Contractor must verify that both rudders operate and respond to all local and remote steering station inputs.

12.1.D.2 **Certification**

- 12.1.D.2.1 All work performed by the Contractor must be to the satisfaction of the ABS Inspector resulting in ABS certifying the rudder and steering gear system for the TCMS five year continuous survey.
- 12.1.D.2.2 The Contractor must submit to the TA copies of all TCMS Division III Attestations for the rudder and assembly. Attestations must include the date of the survey, name and signature of the attending surveyor

12.1.D.3 **Documentation**

- 12.1.D.3.1 The Contractor must provide a report of the steering gear work done to the TA. This report must include all work performed, measurements, abnormalities, clearances, alignment readings, trial results, and any other pertinent information.
- 12.1.D.3.2 The report must include the names of the attending inspectors and copies of their relevant certifications.

12.2 GEARBOX AND CLUTCHES (SURVEY ITEM)

12.2.A Identification

12.2.A.1 CCG has a requirement to survey two propulsion gearboxes on the CCGS Samuel Risley and to obtain credit from ABS.

12.2.B References

12.2.B.1 Manuals

- Valmet Manual; Moventas Report; (Copy is on board)

Gearboxes: Valmet model M2HC-120+PC355=SC355

Serial No's: J23517 and J23518

12.2.B.2 Documents

Drawing Number	Description
8K036-3186	Valmet Gearbox Drawing (original)
6K036-3014 Rev C	Valmet Gearbox Drawing (modified)
5K036-2991	Valmet Gearbox Drawing General, Layout Drawing
	Valmet Navaid 1050, Vito 161 Manual
CMS30-122-AR Sh 1	Samuel Risley Machinery Layout, Drawing
CMS30-122-AR Sh 2	Samuel Risley Machinery Layout, Drawing

12.2.B.3 Technical Service Representative (TSR)

The Contractor must engage the services of a Moventas TSR for all work related in this Section. The Contractor must include an allowance of \$10,000 to cover the cost of service to be provided by Moventas TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and will be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Moventas LTD.

1615 Bishop Street North, Cambridge, Ontario, N1R 8C8

519 621-6390

12.2.C Technical

12.2.C.1 General

- 12.2.C.1.1 The Contractor must employ the services of Santasalo Moventas FSR to complete the work outlined in this Section.
- 12.2.C.1.2 The Contractor must perform the work that includes inspection of the gearboxes, disassembly, re-assembly, testing, and set to work. The Contractor is responsible for the provision of all tools, labour and equipment required to complete the work.
- 12.2.C.1.3 The Contractor is responsible for arranging of ABS surveyor for inspection of the work and obtaining credit
- 12.2.C.1.4 The Contractor is responsible for covering and protecting exposed portions of the gearbox and gearbox bearings, clutches, gears, and oil piping from contamination. The Contractor must exercise caution and diligence to prevent contamination from dust, dirt, debris, tools, and fluids. The Contractor is responsible for cleaning and flushing all such contamination from the gearbox and oil systems, if such takes place.

12.2.C.2 Preparation for Work

- 12.2.C.2.1 The Contractor must follow “lock out” and “tag out” procedures to isolate the propulsion gearbox systems in preparation for the overhaul. This includes all electrical power to motors and all field instrumentation wiring in the gearbox terminal boxes.
- 12.2.C.2.2 The Contractor must drain and dispose appr. 700L of EP100 oil from each gearbox.
- 12.2.C.2.3 The Contractor must clean the gearbox sump of all sludge, debris and oil and dispose of in accordance with all Municipal, Provincial and Federal regulations.
- 12.2.C.2.4 Upon completion, The Contractor is to refill each gearbox to operational levels with new oil supplied by CCG.

12.2.C.3 Gearbox Survey

- 12.2.C.3.1 Under FSR’s supervision and manufactures recommendations based on the work scope for 5 year survey, The Contractor must open up the gearbox to provide access to the gears, bearings and internals to complete the survey.
- 12.2.C.3.2 The Contractor to open two main clutches for inspection of the clutch discs.

- 12.2.C.3.3 It is Contractor's responsibility to supply the bridge gauge for measuring journal bearing clearances and provide the tool for removing of the thrust pads.
- 12.2.C.3.4 The Contractor must survey the condition of the gearbox internals, including interior alignment, journal and thrust bearing clearances, tooth contact wear patterns, tooth condition, condition of rolling element bearing housings, bearing condition, and clutch condition.
- 12.2.C.3.5 The Contractor must supply all hardware, sealants and gaskets, assembly lubricants, locking wires and locking plates required for the installation. All material must be new.
- 12.2.C.3.6 The Contractor must clean oil strainers and strainer assemblies, install new clutch filters, (Coast Guard supply), test and recharge hydraulic accumulators on each gearbox.
- 12.2.C.3.7 The gearbox oil coolers must be dismantled, cleaned and pressure tested by ABS approved contractor. Any tubes that fail the pressure test must be replaced according to the manufacturer's recommendations. Report of the test results to be supplied to ABS and the TA/IA. The Contractor must arrange for ABS presence while coolers have been pressure tested.
- 12.2.C.4 **Reassemble and Set to Work**
- 12.2.C.4.1 The Contractor must assemble the gearboxes and all internal components.
- 12.2.C.4.2 The Contractor must set the gearbox and clutch controls to correct operation.
- Check for and correct leaks in the oil systems;
 - Provide full set of measurements of gear backlash and alignment, bearing clearances, axial shaft movement;
 - Ensure correct and free operation of the turning gears.

12.2.D Proof of Performance

12.2.D.1 Inspections

- 12.2.D.1.1 During disassembly and reassembly, the Contractor must keep written and photographic records of the gearbox internals condition, including interior alignment, gear tooth meshing, gear tooth backlash, bearing clearances of rolling element and slide bearings, and rolling element bearing fits on shafts and housings.

12.2.D.1.2 The Contractor must provide sufficient notice to the attending ABS surveyor such that the surveyor can witness all inspection points required by ABS.

12.2.D.2 Tests and Trials

12.2.D.2.1 During the setting to work and trials of the reassembled gearboxes, the Contractor must demonstrate correct functioning of the gearboxes, hydraulic and lubricating oil systems and running in of the gears to the requirements of the Marine Machinery Regulations under the Canada Shipping Act 2001 in the presence of the attending ABS inspector, IA/TA.

12.2.D.3 Deliverables

12.2.D.3.1 The Contractor must submit a final report of the inspection. The report must contain narrative descriptions of the findings and work done supported by photographs, diagrams, and records of measurements taken.

12.2.D.3.2 The report must include the following information: report of the surveyed conditions of the gearbox internals, including interior alignment, journal and thrust bearing clearances, tooth contact wear patterns, tooth condition, condition of rolling element bearing housings, bearing condition, and clutch condition.

12.2.D.3.3 The Contractor must obtain ABS credit for all work performed in this section.

12.3 **PROPULSION TAIL SHAFTS**

12.3.A **Identification**

12.3.A.1 The Contractor must take the wear down readings of the tail shaft bearing, remove forward and aft stern tube seals, remove SKF couplings, withdraw and inspect tail shafts and stern tube bearings.

12.3.A.1.1 The Contractor must obtain credit from ABS surveyor.

12.3.A.1.2 The Contractor must engage the services of a Thordon FSR for all work related to the stern seals. The Contractor must include an allowance of \$10,000 to cover the cost of service to be provided by Thordon FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses

Thordon Bearings Inc.
Head Office
3225 Mainway
Burlington, ON L7M 1A6
Tel: 905.335.1440

12.3.A.1.3 The Contractor must engage the services of an SKF Limited Canada FSR for all work related to the shaft coupling. The Contractor must include an allowance of \$10,000 to cover the cost of service by the SKF FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

12.3.B **References**

12.3.B.1 Documents & Drawings

- Arrangement of Shafting.PDF
- SKF Manual.pdf
- Sternkeeper Installation Manual.PDF
- Sternkeeper Operation Manual.PDF
- Sternkeeper Parts List.pdf
- ThorCoat.pdf
- Thordon Compac AFT & FWD Stern tube Bearing – TG -19303.pdf

12.3.C Technical

- 12.3.C.1 The Contractor must co-ordinate the work in this specification item with that of Sections 11.1, 11.2 and 17.1. Should blasting be performed in the vicinity of the stern tubes, these must be covered to prevent ingress of any blasting media or coating system.
- 12.3.C.2 The Contractor must ensure that before oil is drained from the system, propeller blades must be left in full astern position to enable clearance for inner shaft piping disconnection.

Stern Tube Seal Service

- 12.3.C.3 Prior to disassembly, the Contractor must take and record the aft tail shaft bearing wear-down measurements for each of Port and Stbd shafts seals.
- 12.3.C.4 CCG will supply the Contractor with the wear down gauges for Port and Stbd shafts. The Contractor must promptly return these gauges back to TA/IA, following the taking of the readings.
- 12.3.C.5 For all shaft work covered in this specification, the Contractor must ensure that shafting remains supported during all phases of shafting and propeller work. Free shaft ends must not be allowed to drop, raise or bend so as to interfere with bearing removal or cause damage to the shafting or bearing surfaces. The Contractor is responsible for all damages to stern tube bearings, tail shafts, liners, tail shaft and stern tube coatings caused during disassembly and re-assembly.
- 12.3.C.6 For all Shaft Bearing and Shafting Seal work, contained in this specification, the Contractor must obtain services of an accredited Thordon FSR who is familiar with the Thordon shafting modifications on board the Samuel Risley and is trained in the proper function and installation of Stern Keeper Shaft Seals.
- 12.3.C.7 The Rope guards fitted to the Samuel Risley do not need to be removed in order to draw out the tail shafts.
- 12.3.C.8 The Contractor must disassemble the forward seals on both shaft lines. Seal parts are to be marked as to orientation and from which section they have been removed. The Contractor must refer to the Thordon FSR and the Sternkeeper manual.
- 12.3.C.9 The Contractor must replace dynamic rubber seals and inflatable emergency seals on both shafts: seals are CCG supply.
- 12.3.C.10 The Contractor must inspect coating condition on both shafts and provide TA with recommendations if coating requires repairs.

- 12.3.C.11 The Contractor must protect the surfaces of the shaft sleeves and the Thor-Coat shaft protection from mechanical damage during the entire removal of the shafting, transportation of shafting and re-installation of the shafting. Damage to the shafting/coating must be repaired by the Contractor at the Contractor's expense.
- 12.3.C.12 Upon completion of the shaft seal installations, the Contractor must fill Port and Stbd stern tubes with water and ensure that all air is purged from the systems. The Contractor must follow the Stern Keeper manuals on filling and setting the forward shaft seal to work. This includes bleeding the air off the seals to ensure that these seals will be properly lubricated. Seal plugs must be lock wired with stainless steel locking wire.
- 12.3.C.13 The Contractor must ensure that there is no leaks in the system. Any leaks must be repaired immediately.

SKF Coupling

- 12.3.C.14 The Contractor must release the SKF couplings on both shaft lines using Contractor supplied tools. No tools will be provided by CCG for the work in this section.
- 12.3.C.15 The Contractor must mark the location of all SKF coupling parts on the intermediate and tail shafts.
- 12.3.C.16 After completion of tail shafts removal, inspections and re-installation, the Contractor must re-assemble two SKF couplings, ensuring that all parts are returned to their marked location on the tail shafts and the intermediate shafts.
- 12.3.C.17 SKF Couplings must be cleaned free of any residual sealants and oils. Surfaces to be fully inspected for any burs, dents, cracks or any other surface flaws that would prevent proper re-installation. All threads to be cleaned and verified to be in good condition with holes free of any particles. SKF couplings inspection to be carried out jointly by Contractor and IA/TA.
- 12.3.C.18 The contractor must replace the sealing arrangements (Contractor supplied) on both PORT and STBD SKF couplings (DK290HB) with new seals.
- 12.3.C.19 Final tightening of the SKF coupling must be witnessed by the TA/IA.
- 12.3.C.20 Following assembly, and approval of the SKF coupling assembly by ABS, the Contractor must apply a continuous bead of silicon to both the couplings at the intersection between the coupling and the shaft. This silicon seal must be applied both forward and aft on the Coupling to prevent the ingress of water.

Tail Shaft Removal

- 12.3.C.21 The Contractor must remove Port and Stbd tail shafts once the SKF couplings have been released and the seals have been dismantled. The Contractor must exercise care to ensure that the Thor-Coat is not damaged on either shaft during removal. Any damage to the coating caused by the Contractor must be repaired by the Contractor at no cost to CCG.
- 12.3.C.22 The Contractor must power wash Port and Stbd stern tube spaces to allow for a complete inspection of the interior coating and forward and aft Thordon shaft bearings. Bearings must be protected from mechanical damage during cleaning.
- 12.3.C.23 The Contractor must take 3 sets of bearing measurements of each tail shaft bearing surface. Measurements must be equally spaced along the length of the bearing and must be in both the horizontal and vertical position. Readings must be recorded for forward and aft bearing surfaces of each tail shaft and provided to the TA/IA.
- 12.3.C.24 The Contractor must have the Thordon FSR inspect forward and after bearing retaining compound and report as to its condition. The Contractor must notify TA/IA of any issues that require correction.
- 12.3.C.25 The Contractor must take 3 sets of bearing measurements of each stern tube bearing surface. The measurements must be equally spaces along the length of the bearing and must be in both the horizontal and vertical position. Readings must be recorded for the forward and aft bearing surface in each stern tube. Readings must be provided to the TA/IA.
- 12.3.C.26 The Contractor must have attending ABS surveyor inspect the shafts and obtain survey credit for the inspections.
- 12.3.C.27 The Contractor must perform NDT testing of each tail shaft flange radius to the requirements of ABS. Results from this testing must be provided to the TA/IA.
- 12.3.C.28 Under supervision of the Thordon FSR, the Contractor must replace rotating seal rings with band and bolts (Items # 1.9.15), contractive seal rings (item # 5) and O-rings (item # 29) on both stern tube forward seals as per Stern Keeper manual. The Contractor must also allow for 10 hours of machining time to redress sealing plates.
- The Contractor must provide cost per hour for machining the sealing plates; final cost will be adjusted by means of 1379 process.

- 12.3.C.29 The Contractor must clean the interior of the stern tubes to allow for a proper bond with an application of Anti Fouling.
- 12.3.C.30 The Contractor must apply a coating of Amercoat ABC3 Black Antifouling at 6 mils DFT to the inner surfaces of the Port and Stbd stern tubes. The coating must be continuous from the forward bearings to the after bearings. Coating is Contractor supplied.
- 12.3.C.31 The Contractor must apply the Antifouling coating to the satisfaction of the FSR and the TA/IA. The coating must be fully cured prior to the re-installation of the tail shafts. Full cure must be based on the product application data sheet with respect to cure times over ambient conditions.
- 12.3.C.32 The Contractor must inspect both shafts ThorCoat protective coating. Any repairs required to the coating must be completed as per Thordon FSR recommendations. This will be dealt with by means of PSPC 1379 action.
- 12.3.C.33 Any damages to ThorCoat during shafts removal and installation must be repaired by Contractor at no cost to CCG.
- 12.3.C.34 The Contractor must take another set of wear-down measurements after the tail shafts have been re-installed and the SKF couplings secured.

Intermediate Shaft Bearing Inspection

- 12.3.C.35 The Contractor must drain and dispose of the Environ AW 68 oil from the sump of both intermediate shaft bearings. Sump capacity for each bearing is approximately 2 liters.
- 12.3.C.36 The Contractor must disassemble the Port and Stbd intermediate shaft bearings and remove the bearings from the pedestals for survey by ABS. When removing the bearing shells, particular attentions must be given to the proper removal of all remote and local temperature sensors from the bearing shells.
- 12.3.C.37 The Contractor must have the attending ABS surveyor to survey the bearings and provide the TA/IA with a survey credit for the inspection.
- 12.3.C.38 The Contractor's bid must include replacement of one (1) set of bearing shells; the bearing shells will be supplied by CCG. The Contractor must fit new intermediate bearing shells, supplied by CCG. New bearing shells will require fine machining. Machining of the bearing shells will be dealt by means of 1379 process. The bid must include an hourly rate of machining time as well.

- 12.3.C.39 The Contractor must perform a hydrostatic pressure test on the cooling circuit of the intermediate shaft bearings with test pressure of 1.5 bar.
- 12.3.C.40 The Contractor must re-connect cooling water piping flanges and supply and install new Contractor supplied fiber re-enforced neoprene gaskets.
- 12.3.C.41 The oil sump, bearing shell support surfaces and housing components must all be clean and free of debris prior to re-installation.
- 12.3.C.42 The Contractor must reassemble and set-to-work the two shaft bearings. Care must be exercised in the assembly of the bearings to ensure that all parts removed during disassembly of the bearings are returned to their original location. The Contractor must verify the run-out on the oil slinger rings to ensure that they are set at 90 degrees and do not rub on any part of the bearing housing. The Contractor must ensure the proper location of the rubber shaft lip seals.
- 12.3.C.43 The Contractor must fill the oil sumps of both intermediates shaft bearings to their working level with Coast Guard supplied oil.

12.3.D Proof of Performance

12.3.D.1 Inspection points

- 12.3.D.1.1 The Contractor must allow the TA/IA an opportunity to witness the taking of the bearing measurements for tail shafts and stern tube bearings.
- 12.3.D.1.2 Upon completion of the shaft seals installation, the Contractor must fill Port and Stbd stern tubes with water and ensure all air is purged from the systems. The Contractor must follow the Stern Keeper manuals on filling and setting the forward shaft seal to work. This includes bleeding the air off the seals to ensure that these seals are properly lubricated. Seal plugs must be lock wired with stainless steel locking wire.
- 12.3.D.1.3 The Contractor must test the shaft seals to ensure that there are no leaks prior to undocking the vessel. The Contractor must repair any leak prior to the completion of the contract at no charge to CCG.
- 12.3.D.1.4 The Contractor must ensure that there is clearance to avoid contact between the rope guards and the propeller hubs. The Contractor must verify the propeller hub clearance through one (1) full rotation of each of the shaft lines.
- 12.3.D.1.5 The Contractor must record the seal face and the intermediate shaft bearing oil temperatures, as well as the water quality package pressure for both shaft lines during the dock trials and sea trials for the vessel.

12.3.D.1.6 The Contractor must ensure that the intermediate shaft bearing oil supply rings and scrapers are working to supply oil to the top of the shaft bearings and that the shaft bearings are receiving proper lubrication.

12.3.D.2 Documentation

12.3.D.2.1 The Contractor must provide full report on the findings, work and final condition of the work in this Section in accordance with Inspection, Test and Trials Plan.

12.3.D.2.2 The Contractor must provide the following documentation to the TA prior to the completion of the contract:

- SKF Coupling measurements and pressure used to set the SKF coupling;
- Shafts protective coating condition report, including repairs carried out.
- Tail shaft bearing readings for the forward and aft bearings on each shaft;
- Stern tube bearing readings for the forward and aft bearings on each stern tube;
- Temperature readings of the forward seal during dock and sea trials;
- Intermediate shaft bearing oil temperatures;
- Results of all NDT testing performed on the Tail Shafts and securing fasteners;
- ABS survey credits for both shaft lines.

12.3.D.2.3 All work performed by the Contractor must be to the satisfaction of the ABS Surveyor resulting in ABS certifying the propulsion tail shafts for the TCMS five year continuous survey.

12.3.D.3 Testing/Trials

12.3.D.3.1 The Contractor must perform a dock trial of one (1) hour during which the shafts are rotated in both the ahead and astern direction for a period of 1/2 hour each.

12.3.D.3.2 During this trial the Contractor must verify that the shaft seals are sealing properly and that the run-out on the shaft seals is not excessive or increases as the seals start to work.

12.3.D.3.3 The Contractor must also verify that the oil slinger rings of the aft Plummer block bearings are working correctly and supplying oil to the top of the bearings and are running true without excessive axial wobble.

12.3.D.3.4 The Contractor must verify that the aft Plummer block bearing cooling coils are not leaking at any of the flange joints. Any noted deficiencies must be corrected by the Contractor before proceeding on sea trials.

-
- 12.3.D.3.5 The Contractor must verify that the oil temperature in the aft plummer blocks rises and then levels out and that there are no localized hot spots developing on the bearing housing. Temperature readings must be recorded at 15 minute intervals for several locations around the bearing housing using an infra-red thermometer.
- 12.3.D.3.6 The Contractor must verify that the shaft seals are working properly and no excessive leakage is present. The Contractor must monitor the shaft lines for any abnormalities and excessive vibration.
- 12.3.D.3.7 Any abnormalities that are noted during the sea trials and are a result of the Contractor's work must be rectified by the Contractor prior to the final completion of the work at no cost to CCG.
- 12.3.D.3.8 The Contractor must record and present to the TA the aft Plummer block temperatures as recorded on the sea trials and any other abnormalities noted and corrected.

12.4 12.4 CONTROLLABLE PITCH PROPELLER SYSTEM

12.4.A Identification

12.4.A.1.1 The Contractor must remove and disassemble CPP and prepare those for survey by the attending ABS surveyor and re-assemble the propellers after.

12.4.A.1.2 The Contractor to use all new parts for hubs reconditioning. Parts required are CCG supplied. See list of parts in Annex A.

12.4.B References

12.4.B.1 Equipment Data

PROPELLER DATA:

Type	LIPS 4C11SW
Propeller Diam.	3000 mm
Hub Diam.	1100 mm
Mass	3900 kg
Pitch	3837 mm
Mass of one blade	601 kg

12.4.B.2 Drawings

Drawing Number	Description
Arrangement of Shafting.pdf	CCGS Samuel Risley Arrangement of Shafting
S30123ar2	CCGS Samuel Risley Shafting
W003 101 363.pdf	LIPS propeller works blades

- Manual – 10.1.STI.013 LIPS NV Canada Limited

The Contractor must reference to the LIPS Instruction Manual for the Controllable Pitch Propeller Installation HO 2203/2204.

12.4.B.3 Technical Service Representative (TSR)

The Contractor must engage the services of a Wartsila FSR for all work related to the CPP system. The Contractor must include an allowance of \$10,000 to cover the cost services to be provided by Wartsila FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the

overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Accredited Wärtsilä Canada Field Service Representatives are available from:

Ian Brouwer
Sales Manager, Services
Wärtsilä Canada Inc. | 1771 Savage Road | Richmond, BC, V6V 1R1, Canada
Tel. +1 604 244 8181 | Mobile +1 514 970 8077
Email : ian.brouwer@wartsila.com

12.4.C Technical

12.4.C.1 CPP Oil System

- 12.4.C.1.1 The Contractor must provide all tools necessary to perform work in this section.
- 12.4.C.1.2 The Wartsila/Lipps FSR must be capable of calibrating the assembled system with respect to Pitch set up using the Wartsila PCS programming installed onboard the Samuel Risley.
- 12.4.C.1.3 The Contractor must drain the CPP Oil from both the Port and Stbd systems and dispose the oil in accordance with Federal, Provincial and Municipal regulations.
- 12.4.C.1.4 The Contractor must dispose appr.750 liters of oil from each CPP system for a total of 1500 liters of Hydrex MV 36 oil.
- 12.4.C.1.5 The Contractor must flush the CPP piping with clean oil, including the piping from the header tanks to the O/D box and include the remaining shaft line after the SKF coupling is removed.
- 12.4.C.1.6 The Contractor must re-fill both the Port and Stbd CPP oil systems with Coast Guard supplied oil at the completion of all work in Section 12.4.

12.4.C.2 CPP Propeller Blades

- 12.4.C.2.1 The Contractor must remove 4 Starboard and 4 Port propeller blades.
- 12.4.C.2.2 The Contractor must ensure the keeper bars fixed to the blade bolts are carefully removed to prevent damage to the bolt heads.
- 12.4.C.2.3 The Contractor must measure the blade palm thickness in way of the blade bolts. These measurements to be documented and presented to the TA for review.

- 12.4.C.2.4 The Contractor must also measure threaded blade bolt hole depth of each blade bolt into the hub to determine maximum length the blade bolts can be without bottoming in the bolt holes. Where machining of the ends of the blade bolts is required, it must be completed under the direction/supervision of the Wartsila/LIPPS FSR and will be dealt by means of 1379 process.
- 12.4.C.2.5 The Contractor must observe correct torque procedure for the hardening-up of all propeller blade hold-down bolts. These must be witnessed by ABS and TA/IA.
- 12.4.C.2.6 The Contractor must use Contractor supplied certified and calibrated hydraulic torque wrench.
- 12.4.C.2.7 Prior to welding of stainless steel locking strips, the Contractor must ensure that all blade bolt plugs are installed and secured.
- 12.4.C.2.8 The Contractor must supply and weld stainless steel locking strip across the propeller blade hold-down bolts in the following manner:
- 12.4.C.2.9 Each stainless strip must span two bolt heads;
- 12.4.C.2.10 On the three bolt side, a locking strip must be fitted from each outside bolt to the center bolt ensuring that the vent plugs within the heads of the bolts are not damaged.
- 12.4.C.2.11 On the four bolt side, a locking strip must be fitted from the outermost bolts to the next bolt closest to the center. The strips must only span two bolts, with the two center bolts not being connected by a locking strip.
- 12.4.C.3 CPP Propeller Hubs Overhaul**
- 12.4.C.3.1 The Contractor must carry out complete propeller hubs overhaul, as per LIPPS/Wartsila manual, using all new parts supplied by CCG.
- 12.4.C.3.2 Once Propeller hubs are disassembled, the Contractor to arrange ABS inspection and must obtain ABS survey credit.
- 12.4.C.3.3 The Contractor must fit and secure sufficient lifting arrangements on the port and starboard side of the hull of the vessel to remove the rope guards, propeller tail cones, propeller nuts, and propellers
- 12.4.C.3.4 All hub components that require replacement must be replaced by the Contractor with new parts provided by CCG, as directed by the FSR and in accordance with the service manual.

- 12.4.C.3.5 The Contractor must provide measurements for all CPP hub parts installed. Parts that are new must be measured as well and included in the report.
- 12.4.C.3.6 Once all items have been inspected and passed ABS inspection, the Contractor must re-assemble the hubs under the supervision of the FSR.
- 12.4.C.3.7 The hubs must be re-installed on their respective propeller shafts and all hold down bolts to be torqued in the presence of the TA/IA. All propeller bolts to be secured as originally fitted.
- 12.4.C.3.8 The Contractor must set all pitch references with regards to the OD boxes, CPP systems and the CPP propellers.

12.4.C.4 Oil Distribution Boxes

- 12.4.C.4.1 The Contractor, under Wartsila TSR direction, must remove and dismantle the Port and Stbd Oil Distribution (OD) Boxes fitted at the front of the gearboxes in the engine room.
- 12.4.C.4.2 The Contractor to disassemble the OD boxes such that all parts can be inspected for wear. All components must be inspected by the attending ABS surveyor and a survey credit to be obtained.
- 12.4.C.4.3 The Contractor, under the direction of the Wartsila/LIPS FSR must take all necessary measurements of the internal OD box components and present them to the TA/IA.
- 12.4.C.4.4 The Contractor must re-assemble both OD boxes using new parts and seal kits supplied by CCG.
- 12.4.C.4.5 The Contractor must re-install each OD box on its respective shaft line and must ensure that all alignment measurements and precautions outlined in the service manual are followed. Final measurements and readings must be recorded and presented to the TA/IA.
- 12.4.C.4.6 The Contractor must set all pitch references with regards to the OD boxes, CPP systems and the CPP propellers.

12.4.D Proof of Performance

12.4.D.1 Inspection points

- 12.4.D.1.1 The Contractor must develop and perform a set-to-work trials procedure to bring the CPP propeller system back to full operational status, taking into account ,as a minimum, the requirements outlined below:
- 12.4.D.1.2 The Contractor must ensure that propeller blades do not foul in the nozzles and must record blade tip to nozzle clearances in all three positions (full ahead, neutral and full astern pitch) for each of the blades within the nozzles.
- 12.4.D.1.3 The Contractor must designate one propeller blade as the master blade and verify and record the blade tip clearance of all propeller blades through one full revolution of the shaft in all three conditions of the blades mentioned above. Readings must be taken in 4 key positions around the circumference of the nozzle. All recorded propeller tip clearances must be provided to the TA.
- 12.4.D.1.4 The Contractor must test the Port and Stbd controllable pitch propeller systems as follows:
- All system pressures and temperatures to be recorded;
 - All propeller blades to be observed for leak - free from hydraulic. Any leaks must be corrected by the Contractor at no cost to CCG.
 - The blades must be rotated from full astern to full ahead and the pitch readings observed on the remote indicators must match the actual pitch reading of the propeller blades. Where pitch readings do not reflect the actual readings the Contractor must make necessary adjustments to ensure that all pitch readings are identical. This must be done for both the PORT and STBD systems.
- 12.4.D.1.5 The Contractor must ensure that the manual pitch control for each OD box is functional and that the pitch feedback system reads correctly.
- 12.4.D.1.6 The Contractor must set all propulsion control system pitch references with regards to the OD boxes, CPP systems and the CPP propellers.

12.4.D.2 **Testing/Trials**

- 12.4.D.2.1 The Contractor, upon completion of all propeller work, must rotate each propeller through one (1) full revolution as a minimum in both the ahead and astern directions to ascertain that the propellers are free of any obstructions. This must be performed before the vessel is re-floated and must be witnessed by the TA.

12.4.D.3 **Certification**

12.4.D.3.1 All work performed by the Contractor must be to the satisfaction of the ABS Surveyor resulting in ABS certifying the propellers for the TCMS five year continuous survey.

12.4.D.4 **Documentation**

12.4.D.4.1 The Contractor must provide complete report on the findings, work and final condition of the work in this Section in accordance with the Inspection, Test and Trials Plan.

12.4.D.4.2 The Contractor must provide the following documentation:

- Measurements for the Port and Stbd Propeller Hub internal components after overhaul and parts replacement
- Blade Tip clearances for each propeller blade in the ahead, astern and neutral position through 1 shaft revolution;
- Temperatures and pressures of the CPP Systems;
- Pitch feedback settings for actual pitch recorded on the blades, the OD box and the pitch readings in the control room and on the bridge readouts;
- ABS Survey credits for both controllable propeller systems.
- The Calibration certificate for the torque device used to tighten the hub bolts.
- Adjustments/measurement records for all components related to the operation of the CPP system covered under this specification

12.5 BOW THRUSTER GEAR BOX OIL CHANGE AND 5 YEAR

12.5.A Identification

- 12.5.A.1 The Contractor must engage services of Wartsila FSR to perform work/inspection on the bow thruster as per below.
- 12.5.A.2 The Contractors must drain and refill the bow thruster hub with oil, inspect the shaft seal, blade seals and blade condition, tunnel coating condition and hub exterior, and replace the tunnel sacrificial magnesium anodes as per Bow Thruster instruction manual work applicable for 5 year survey/inspection. In addition, upon removal of rope guard, Contractor to remove pieces of rope stuck between rope guard and shaft.
- 12.5.A.3 The Contractor must supply all tools, labour necessary to complete work in this section.

12.5.B Reference:

- Bow Thruster Instruction Manual

12.5.B.1 Technical Service Representative (TSR)

- 12.5.B.1.1 The Contractor is responsible for obtaining services of an accredited Wärtsilä Canada Inc. TSR to supervise the work undertaken in this Section. The TSR must be accredited by Wärtsilä Canada Inc. as being a competent person to perform this work. The Contractor must include an allowance of \$5,000 to cover the cost services to be provided by Wartsila TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Accredited Wärtsilä Canada Field Service Representatives are available from:

Ian Brouwer
Sales Manager, Services
Wärtsilä Canada Inc. | 1771 Savage Road, Richmond, BC, V6V 1R1, Canada
Tel. +1 604 244 8181 | Mobile +1 514 970 8077
[Email : ian.brouwer@wartsila.com](mailto:ian.brouwer@wartsila.com)

12.5.C **Technical**

- 12.5.C.1 The Contractor must remove and salvage the grids for the bow thruster tunnel.
- 12.5.C.2 The Contractor must remove the rope guards to inspect the shaft seals for oil leakage prior to disassembly. Any visible oil leaks must be reported to TA/IA immediately. The oil in the lower unit must be drained and disposed ashore (draining of the oil is through a drain plug in the hub). The IA/TA must be present for the draining of the bow thruster hub in order to obtain an oil sample for testing purposes.
- 12.5.C.3 The Contractor must dispose of appr.150 liters of waste oil from the thruster as per Federal, Provincial and Municipal regulations.
- 12.5.C.4 The Contractor must remove and dispose of one (1) oil filter from the bow thruster.
- 12.5.C.5 The Contractor must refill the unit with new Coast Guard supplied hydraulic oil.
- 12.5.C.6 The Contractor must install one (1) new Coast Guard supplied oil filter for the bow thruster. The installation of the drain plug and new gasket must be witnessed by the IA/TA.
- 12.5.C.7 The drain plug areas and the shaft seals must be surveyed for oil leaks after the unit has been refilled with new oil.
- 12.5.C.8 The Contractor must install the rope guards back with all new Contractor supplied hardware. For reference, the Contractor must record the blade tunnel clearances throughout one full revolution at the neutral, full port and full starboard positions of the blades. This test must be done without the thruster running.
- 12.5.C.9 The Contractor must remove three sacrificial anodes, supply and install same size replacement magnesium anodes in the bow thruster tunnel, and reinstall the grids and must touch up any damaged paint in this area with the hull coatings system paints.

12.5.D **Inspections, tests and trials**

- 12.5.D.1 All recorded propeller tip clearances, Wartsila FSR inspection report must be provided to the IA/TA in an MS-Excel spreadsheet format upon completion. One electronic copy in PDF format must be provided and included on USB media as a part of complete dry docking report.

12.6 STERN THRUSTER GEAR BOX OIL CHANGE

12.6.A Identification

- 12.6.A.1 The Contractors must drain and refill the stern thruster hub and shaft sealing with oil, inspect the shaft seal exterior, and replace the tunnel sacrificial magnesium anodes.

12.6.B Reference

- Ulstein Maritime Instruction Manual

12.6.B.1 Technical Service Representative (TSR)

- 12.6.B.1.1 The Contractor is responsible for obtaining services of an accredited Wärtsilä Canada Inc. TSR to oversee the work undertaken in this Section. The field service representative must be accredited by Wärtsilä Canada Inc. as being a competent person to perform this work. The Contractor must include an allowance of \$5,000 to cover the cost services to be provided by Wartsila TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Accredited Wärtsilä Canada Field Service Representatives are available from:

Ian Brouwer
Sales Manager, Services
Wärtsilä Canada Inc. | 1771 Savage Road, Richmond, BC, V6V 1R1, Canada
Tel. +1 604 244 8181 | Mobile +1 514 970 8077
Email : ian.brouwer@wartsila.com

12.6.C Technical

- 12.6.C.1 The Contractor must remove and salvage the grids for the stern thruster tunnel and remove the rope guards to inspect the shaft seals for oil leakage prior to disassembly. Any visible oil leaks must be reported to TA/IA immediately.
- 12.6.C.2 The oil in the lower unit must be drained and disposed ashore (draining of the oil is through a drain plug in the hub). The IA/TA must be present for the draining of the stern thruster hub in order to obtain an oil sample for testing purposes.

- 12.6.C.3 The Contractor must dispose of appr.150 liters of waste oil from the thruster as per Federal, Provincial and Municipal regulations.
- 12.6.C.4 The Contractor must remove and dispose of one (1) oil filter from the stern thruster piping in the stern thruster compartment.
- 12.6.C.5 The Contractor must refill the unit with new Coast Guard supplied hydraulic oil. The drain plug areas and the shaft seals must be surveyed for oil leaks after the unit has been refilled with new oil.
- 12.6.C.6 The Contractor must install one (1) new Coast Guard supplied oil filter for the stern thruster. The installation of the drain plug and new gasket must be witnessed by the IA/TA.
- 12.6.C.7 The Contractor must install the rope guards back with all new hardware.
- 12.6.C.8 For reference, the Contractor must record the blade tunnel clearances throughout one full revolution at the neutral, full port and full starboard positions of the blades. This test must be done without the thruster running.
- 12.6.C.9 The Contractor must remove three sacrificial anodes, supply and install same size replacement magnesium anodes in the stern thruster tunnel, and reinstall the grids and must touch up any damaged paint in this area with the hull coatings system paints.

12.6.D Inspections, tests and trials

- 12.6.D.1 All recorded propeller tip clearances must be provided to the IA/TA in an MS-Excel spreadsheet format upon completion. One electronic copy in PDF format must be provided and included on USB media as a part of complete dry docking report.

13.0 ELECTRICAL GENERATION

13.1 SHIP'S SERVICE GENERATORS SURVEY

13.1.A Identification

- 13.1.A.1 CCGS Samuel Risley has a requirement for a 5 year survey on the two CAT C18 ship service generators fitted to the vessel.
- 13.1.A.2 This work includes the in-frame overhaul and survey of ship service diesels #1 and #2.
- 13.1.A.3 The work also includes the bearing change and survey of the alternators of ship service generators #1, #2.
- 13.1.A.4 ABS credit must be obtained by the Contractor upon completion and inspection of work under this Section.

13.1.B References

13.1.B.1 Equipment Data

	CAT SSG #1	CAT SSG #2
Diesel Engine Model	C18	C18
Serial Number	GES00117	GES00118
Arr. No.	3284517	3284517
Rotation	CCW	CCW
Perf Spec	OK9616	OK9619
ECM Soft	3326651	3326651
Injector	2530618	2530618
Turbo	2420267	2420267
Power/Speed	624 BHP/1800 RPM	624 BHP/1800RPM
Alternator Model	SR4B	SR4B
Arr. No.	334-4380	334-4380
Year	2008	2008

	CAT SSG #1	CAT SSG #2
Serial Number	4SJ01827	4SJ01828
Voltage	600	600
Amps	511	511
Excitation	29V 5.1A	29V 5.1A
Phase/ Freq./P.F.	3/60/0.8	3/60/0.8
KVA	531	531
Kilowatts	425	425

13.1.B.2 Technical Service Representative (TSR)

13.1.B.2.1 The Contractor is responsible for obtaining services of an accredited Caterpillar Technical Service Representative required to oversee the work undertaken in Section. The TSR must be accredited by Caterpillar Inc. as being a competent person to perform this work. The Contractor must include an allowance of \$10,000 to cover the cost of services to be provided by this TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without overhead or profit. The \$10,000 allowance must form part of the overall bid and will be adjusted by PSPC 1379 action upon receipt of the final TSR invoice supported by copies of all related documentation to verify actual expenses.

13.1.C Technical

13.1.C.1 Diesel engines #1 & #2

13.1.C.1.1 The Contractor must perform complete in frame overhaul and inspect all components for wear in accordance with CAT C-18 service and overhaul manuals. Special attention to the CAT C-18 engine arrangement number fitted to the Samuel Risley must be taken into consideration for overhaul purposes.

13.1.C.1.2 The Contractor must supply all labor, specialty tools, equipment and materials (unless specified otherwise) to complete the required work and Regulatory inspections.

13.1.C.1.3 All parts for the in-frame overhaul must be new and Contractor supplied.

- 13.1.C.1.4 For bidding purposes the Contractor must submit quotations for the Work portion of the contract and the Materials Portion as a separate quotation. Material Quotation must include items identified for both the Engine (in 13.1.C.1) and Generator work (in 13.1.C.2).
- 13.1.C.1.5 Coast Guard will supply required quantities of grease and engine oil (Petro Canada Duron E 15w40) and filters for Fuel, Oil and Air systems.
- 13.1.C.1.6 The Contractor must supply the required quantity of CAT Extended Life Coolant for each engine, total of appr.100 Liters.
- 13.1.C.1.7 The Contractor, jointly with IA, must lock out equipment as needed and as per Coast Guard Fleet Safety Manual requirements.
- 13.1.C.1.8 Parts removed from the engines, to be changed out during the overhaul process (cores), must remain on board the ship until the Contractor is advised by CCG that they are no longer required for Survey purposes.
- 13.1.C.1.9 The Contractor must assemble the engines using all new parts, gaskets, sealants as required and indicated in section 13.1.D.5 (List of Parts Required for two CAT C-18 Overhauls). The Contractor must perform all electronic maintenance required for proper operation of the EMCP panels.
- 13.1.C.1.10 The Contractor must supervise the run up and break in of each diesel engine. The Contractor must perform and prove operational the following tests under the witness of TA/IA and ABS: Over Speed, High Jacket Water Temp Shut down and Low Lube oil Pressure Shut Down
- 13.1.C.2 Technical - Alternators**
- 13.1.C.2.1 The Contractor must supply all labor, equipment and materials to complete the required work.
- 13.1.C.2.2 The Contractor must carry out preliminary assessment of each machine. The assessment must include, but not be limited to, a visual inspection of all alternator components, electrical testing and data acquisition while in operation, insulation resistance assessment and the requirement for cleaning prior to being disassembled. The Contractor must report all observations to the IA/TA once preliminary assessment is completed.
- 13.1.C.2.3 The Contractor must disconnect electrically the alternator of each unit. All wiring is to be properly identified and recorded for reference for reassembly.

- 13.1.C.2.4 The Contractor must replace free end bearing on each alternator.
- 13.1.C.2.5 The Contractor must ensure the rotor is adequately and rigidly supported during performance of this work.
- 13.1.C.2.6 The Contractor must perform an alignment check and verification after the rotor bearing has been changed. The alignment readings must be presented to the IA prior to putting the unit in operation.
- 13.1.C.2.7 The Contractor must re-align the alternator to engine should the alignment fall outside of manufacturer's recommendation.
- 13.1.C.2.8 The Contractor must measure and record the "windings to rotor" clearances at 8 evenly spaced locations at the forward and after end of the generator.
- 13.1.C.2.9 The Contractor must reassemble the alternator in good order. All wiring and cables must be reconnected and tightened to manufacturer's recommendations. Any damage to windings or insulation must be repaired by the Contractor at no cost to CCG, using methods that are acceptable and approved by manufacturer. All repairs must be documented using digital photograph of the area before and after the repair.
- 13.1.C.2.10 The Contractor to arrange for ABS inspection of the alternators in conjunction with the engine overhaul procedure.

13.1.D Proof of Performance

13.1.D.1 Inspection Points

13.1.D.2 Test/Trials

- 13.1.D.2.1 The Contractor must supervise the run up of each ship service generator.
- 13.1.D.2.2 The Contractor must submit each generator to 2 hour load test using largest hotel load the ship can supply. All operating data must be recorded and included in the final report.

13.1.D.3 Certification

- 13.1.D.3.1 The Contractor must obtain ABS credit for each ship service generator.

13.1.D.4 Documentation (Reports/Drawings/Manuals)

- 13.1.D.4.1 The Contractor must submit detailed inspection report for each diesel engine and alternator.

13.1.D.4.2 The report must include all observations, data from initial inspection, record of work performed and data collected during the work, final commissioning data and a record of adjustments, repairs and measurements performed.

13.1.D.4.3 The Contractor must provide a record of all parts used.

13.1.D.5 List of Parts Required for two CAT C-18 Overhauls

Total QTY for both Engines	Part Number	Description
2	194-2450	PUMP GP AUX – SEA WATER
2	161-5719	PUMP GP WATER
2	242-0267	TURBO GP BAS
2	UNABLE TO IDENTIFY PART NOT LISTED	HEAD GP CYL
12	253-0618	INJECTOR FUEL
12	NEW PARTS REQUIRED	CYLINDER PACK
2	131-8270	PUMP GP FUEL TRANSFER
2	NEW PARTS REQUIRED	CORE AS-OIL
2	226-1191	PUMP GP-ENGINE OIL
12	224-3246	BEARING ROD
4	253-1752	PLATE-THRUST
14	317-8766	BEARING- MA
2	142-5868	SEAL GP-CSHF
2	142-5867	SEAL GP-CSHF
2	248-5513	REGULATOR - TEMP
2	3S-9643	SEAL
2	360-7480	KIT-GASKET
2	360-7481	KIT-GASKET
2	125-0434	SEAL

Total QTY for both Engines	Part Number	Description
2	126-4935	SEAL
2	167-4407	SEAL-O-RING
2	109-0077	SEAL-O-RING
2	2N-0475	SEAL-O-RING
2	9M-3786	SEAL-O-RING
4	8C-3073	SEAL-O-RING
12	8S-9191	BOLT
2	107-5769	SEAL-O-RING
2	033-6042	O-RING
2	8L-2786	O-RING
2	201-4233	GASKET
4	353-5065	GASKET-OIL PAN
2	5P-5846	SEAL-O-RING
2	5P-8068	SEAL
2	274-7913	ELEMENT AS C
2	122-3772	SEAL-O-RING

14.0 POWER DISTRIBUTION SYSTEMS

14.1 MEGGER TESTING OF ELECTRICAL CIRCUITS

14.1.A Identification

14.1.A.1 The Contractor must perform a complete Megger survey as per TCMS requirements for all electrical circuits onboard the vessel.

14.1.B References

14.1.B.1 Equipment Data – Not Used

14.1.B.2 Drawings

- Electrical One Line Diagram CCGS Samuel Risley –1 to 8

14.1.B.3 Regulation and Standards

14.1.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included in RFP Package
7.B.5	Lockout Tag out	No
7.B.6	Energized Electrical Conductors	No
	2020 Megger Report	Yes
TP 127E	Ships Electrical Standards	No

14.1.C Statement of Work

14.1.C.1.1 The Contractor must Megger test all electrical circuits on the vessel and must record the readings obtained. The Contractor must update the vessel's 2019 electronic copy of the Megger report file. This report must be provided at commencement of the work.

14.1.C.1.2 Testing must be from power leads to ground. All motor circuits must be tested from the main distribution panel to the motor starter and from the motor starter to the

motor. The test voltage required for the circuit must be as per the requirements of TP127E.

- 14.1.C.1.3 Power cables to sensitive electronics (navigation equipment, VFD) must be disconnected at the load so the cable run can be tested. The Contractor must ensure that sensitive electronics equipment is not subjected to any megger testing.
- 14.1.C.1.4 Any equipment that becomes non-functional as a result of this testing must be repaired by the Contractor at the Contractor's expense.
- 14.1.C.1.5 The Contractor must submit a copy of the updated Megger Report to the TA within 48 hours of completion of the work.

14.1.D Proof of Performance

14.1.D.1 Inspections Points – Not Used

14.1.D.2 Testing /Trials – Not Used

14.1.D.3 Certification

- 14.1.D.3.1 The Contractor must use the services of a ABS approved Marine Electrician to complete the Megger testing.

14.1.D.4 Documentation

- 14.1.D.4.1 The Contractor must provide the TA with updated copies of the ship's electronic Megger report in an electronic MS Excel format on USB key. The Contractor must also provide one (1) paper copies of the report on 8.5 by 11 inch paper.
- 14.1.D.4.2 The first page of the report must clearly identify all circuits which do not meet meggering requirements set in TP127E.

14.2 **CIRCUIT BREAKERS (SURVEY ITEM)**

14.2.A **Identification**

14.2.A.1 CCGS Samuel Risley has a requirement to inspect, clean, carry out primary injection test and certify breakers as per below.

14.2.A.2 The Contractor to obtain ABS credit for the work completed in this Section.

14.2.B **References**

14.2.B.1 List of breakers

Breaker #	Description	Identification	Type
1	Bow Thruster	C.B.13 MCC	Merlin Gerin Masterpack NW12-H1
2	Stern Thruster	C.B 14 MCC	1500 A
3	Shaft Generator #1 Port	C.B 12 MCC	Merlin Gerin Masterpack NW16-H1
4	Shaft Generator #2 STBD	C.B.9 MCC	Merlin Gerin Masterpack NW15-H1
5	Shaft Generator #1 Tie & Feed to Shaft Generator MCC	C.B.11	Merlin Gerin Masterpack NW12-H1
6	Shaft Generator #2 Tie & Feed to Shaft Generator MCC	C.B 10	Merlin Gerin Masterpack NW12-H1
7	Ship Service Generator #1	C.B. 6 MCC	Merlin Gerin Masterpack NW08-H1
8	Ship Service Generator #2 STBD	C.B.5 MCC	Merlin Gerin Masterpack NW08-H1
9	Emergency Generator	C.B.1 ESWBD	Merlin Gerin Masterpack NW08-H1

14.2.B.2 Drawings

14.2.B.2.1 The following drawings are to be considered as Guidance Drawings as defined in the Drawing section of General Notes

- Risley Coordinate Curves

14.2.B.3 Regulation and Standards

14.2.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included in RFP Package
7.B.5	Lockout Tag Out	No
7.B.6	Energized Electrical Conductors	No
TP 127 latest edition	Ships Electrical Standards	No
NEMA AB 4 – 2017	Guidelines for Inspection and Preventive Maintenance of Molded-Case Circuit Breakers Used in Commercial and Industrial Applications	No
CSA Z462	Workplace Electrical Safety	No
UL 1066	Standard for Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures	No

14.2.C Statement of Work

14.2.C.1 General Notes

- 14.2.C.1.1 The Contractor must use the services of qualified marine electricians and follow OEM recommendations for the cleaning, inspection, repair and testing of the circuit breakers. Marine Electricians must be ABS approved to carry out the work
- 14.2.C.1.2 All labour, equipment, rigging, crantage, transport and materials required to perform the work must be Contractor supplied.
- 14.2.C.1.3 The Contractor must inspect, test, and certify all removed circuit breakers.
- 14.2.C.1.4 The Contractor is responsible for removal/installation of the breakers from the vessel and transportation to/from the Contractor's test and repair facility.
- 14.2.C.1.5 The breakers must be protected from weather and damage prior to transport from the vessel and while in the care of the Contractor.

14.2.C.1.6 Any damage to the circuit breakers incurred while handling and transporting the breakers must be repaired by the Contractor at the Contractor's expense.

14.2.C.2 Details of Testing and Inspection

14.2.C.2.1 All aspects of the inspection, and testing of the circuit breaker must be recorded by the Contractor and summarized in a report to the TA.

14.2.C.2.2 All replacement parts must be Contractor supplied. Cost of parts required for repairs, if any, will be covered by PSPC 1379 process.

14.2.C.2.3 The Contractor must inspect the referenced circuit breakers for proper mechanical and electrical operation.

14.2.C.2.4 The Contractor must megger the control circuit insulation and measure the primary contact resistance.

14.2.C.2.5 The Contractor must inspect the circuit breakers and provide a report as to the physical condition of the circuit breakers.

14.2.C.2.6 The Contractor must test all circuit breaker control circuits for proper resistance and must verify proper main contact resistance. The circuit breaker must be meggered for proper insulation resistance.

14.2.C.2.7 The Contractor must test the circuit breaker for proper sequencing of all contacts, verify all interlocks and verify all visual indicators. The electronic trip unit must be verified for proper trip operation.

14.2.C.2.8 The Contractor must use primary injection to verify all circuit breaker operations and trip settings as per the trip curves.

14.2.C.2.9 The Contractor must perform the primary injection test in the presence of the TA/IA.

14.2.C.2.10 The Contractor must notify the TA within 24 hours of inspection, of any deficiencies found during the inspections and testing so that a repair plan can be agreed upon.

14.2.D Proof of Performance

14.2.D.1 Inspection Points

14.2.D.1.1 The Contractor must demonstrate Primary Injection test of each breaker to TA/IA

14.2.D.1.2 The Contractor must present the trip settings to the TA/IA for each breaker before it is installed for use.

14.2.D.2 **Testing/Trials – Not Used**

14.2.D.3 **Certification**

14.2.D.3.1 The Contractor to obtain ABS credit for breakers inspection.

14.2.D.4 **Documentation**

14.2.D.4.1 The Contractor must provide the TA copies of the inspection, test, and repair reports for each breaker. The reports must clearly identify the breaker by model and serial number.

15.0 AUXILIARY SYSTEMS

15.1 FUEL TANKS SURVEY

15.1.A Identification

15.1.A.1 The Contractor must open, clean and prepare the identified fuel tanks for ABS inspection and survey and obtain survey credit. The tanks must be visually inspected and then, be subjected to a pneumatic pressure test. Upon completion of the work, the tanks must be returned to a state of operational readiness.

15.1.B Reference

15.1.B.1 Drawings

Drawing Number	Description
CMS30-103-MI(161-100-0_01)	Tank & Capacity Plan & Deadweight Scale

15.1.B.2 Equipment Data

15.1.B.2.1 List of tanks

Description	Location	Surface area	Volume
No. 1 Fuel Tank Centre	Frame 32-39	220 m ²	190.9 m ³
No. 2 Fuel Tank, Port	Frame 17-25	116 m ²	73.0 m ³
No. 2 Fuel Tank, Stbd	Frame 17-25	116 m ²	73.0m ³
No. 3 Fuel Tank, Port	Frame 10-17	135 m ²	89.0 m ³
No. 3 Fuel Tank, Stbd	Frame 10-17	135m ²	88.0 m ³
No. 3 Fuel Tank, Center	Frame 10-17	124 m ²	74.0 m ³
No. 4 Fuel Tank, Port	Frame 5-10	110 m ²	60.9 m ³
No. 4 Fuel Tank, Stbd	Frame 5-10	110 m ²	60.9 m ³
Settling Tank	Frame 37-39	76 m ²	38.0 m ³
Day Tank	Frame 37-39	76 m ²	38.0 m ³

15.1.B.3 Regulation and Standards

15.1.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included in RFP Package
7.B.4	Hot work	No
7.B.3	Entry into Confined Spaces	No
7.B.5	Lockout and Tag out	No
CSA 2001, CRC c. 1432	Hull Inspection Regulations	No

15.1.C Technical

- 15.1.C.1 The Contractor, jointly with IA, must document all fuel tanks soundings onboard. The Contractor must remove the vessel's remaining fuel onboard, store the fuel and return it onboard after completion of the fuel tank inspections. The Contractor must bid on removing, storing, and returning to the vessel 120,000 liters of marine distillate diesel fuel. Final amount will be prorated on a cubic per meter unit pricing.
- 15.1.C.2 Upon completion of work, all fuel tanks must be returned to their sounding levels as they were upon arrival at the Contractor's facility.
- 15.1.C.3 The Contractor must open all tanks, ventilate and arrange Marine Chemist or other qualified person, to certify that each tank is "safe to enter" prior to the start of the cleaning operations and ready for Hot Work.
- 15.1.C.4 The Contractor must post "Safe for Entry/Safe for Hot Work" certificates at each tank opening in a clearly visible location as close to the entry as practical. These certificates must be signed by a Marine Chemist or other qualified person.
- 15.1.C.5 The Contractor must clean all tanks and submit them for inspection by the attending ABS surveyor for a survey credit. At the time of inspection, any missing primer coating to be identified and re-coated.
- 15.1.C.6 The Contractor must supply all materials and labor necessary to complete the scope of this Section.

- 15.1.C.7 The Contractor's bid must include removing and disposing of 10 cubic meters of sludge and debris combined from the fuel tanks. Final amount will be prorated on a cubic per meter unit pricing using PSPC 1379 action.
- 15.1.C.8 All sludge and debris from the tanks must be disposed in accordance with Federal, Provincial and Municipal regulations in effect.
- 15.1.C.9 Upon completion of the cleaning and ABS survey, The Contractor must close up all tanks, install back all drain plugs and use new fuel oil-proof fiber re-enforced gaskets on all man-hole covers. Gasket material required for this section to be Contractor supplied.

15.1.D Proof of Performance

15.1.D.1 Inspection points

- 15.1.D.1.1 The Contractor must allow the IA/TA the opportunity to examine all tank internals prior to closing each tank.
- 15.1.D.1.2 The Contractor must supply, fit and subsequently remove blank connections where required, for the pressure test of Section 15.3. Where blanks are available for use in the piping system, the Contractor must ensure these are returned to the open position and all gaskets replaced with new.
- 15.1.D.1.3 The Contractor must present all tanks for final inspection by the attending ABS surveyor and the TA.

15.1.D.2 Testing/Trials

- 15.1.D.2.1 The Contractor must provide all waste oil and oily water disposal certificates to the TA prior to the completion of the contract.

15.1.D.3 Documentation

- 15.1.D.3.1 The Contractor must provide ABS survey credit documentation for the work of this Section to TA.
- 15.1.D.3.2 The Contractor must provide a report of the findings, work and final condition of the work of this Section in accordance with the Inspection, Test and Trials Plan.

15.2 BALLAST, SEWAGE AND VOID TANKS INSPECTION

15.2.A Identification

15.2.A.1 The Contractor must remove docking plugs, open, fire hose wash, and remove debris from the ballast, void and sewage holding tanks to clean and prepare the identified tanks for ABS inspection, pressure test and then return them to operational conditions.

15.2.B Reference

15.2.B.1 Equipment Data

15.2.B.1.1 List of tanks

Description	Location	Volume	Surface Area
No. 1 Ballast Tank, Forward	frame 44-46	63.2 m ³	160.97m ²
No. 2 Ballast Tank, Port	frame 32-37	49.1 m ³	84.89m ²
No. 2 Ballast Tank, Stbd	frame 32-37	49.1 m ³	84.89m ²
No. 3 Ballast Tank, Port	frame 27-32	39.2 m ³	137.19m ²
No. 3 Ballast Tank, Stbd	frame 27-32	39.2 m ³	137.19m ²
No. 4 Ballast Tank, Port	frame 17-22	34.3 m ³	84.36m ²
No. 4 Ballast Tank, Stbd	frame 17-22	34.3 m ³	84.36m ²
No. 5 Ballast Tank, Port	frame 10-17	39.4 m ³	116.16m ²
No. 5 Ballast Tank, Stbd	frame 10-17	39.4 m ³	116.16m ²
No. 6 Ballast Tank, Port	frame 5-10	83.7 m ³	144.12m ²
No. 6 Ballast Tank, Stbd	frame 5-10	83.7 m ³	144.12m ²
Void Tank Aft	frames A-1	50 m ³	71.06m ²
Non-Watertight Void, Port	frame 27-32	10 m ³	15.77m ²
Non-Watertight Void, Stbd	frame 27-32	10 m ³	15.77m ²
Cofferdam, Center	frame 27-28	2 m ³	13.35m ²
Cofferdam, Port	frame 22-25	13.75 m ³	26.31m ²
Cofferdam, Stbd	frame 22-25	13.75 m ³	26.31m ²
Sewage Holding Tank, Port	frame 37-39	40 m ³	47.18m ²
Sewage Holding Tank, Stbd	frame 37-39	40 m ³	47.18m ²

15.2.B.2 Documents

Drawing Number	File Name
CMS30-103-MI(161-100-0_01)	Tank & Capacity Plan & Deadweight Scale

15.2.B.3 Regulations and Standards

15.2.B.4 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included in RFP Package
7.B.3	Entry into Confined Spaces	No
7.B.5	Lockout and Tag out	No
MOHS, SOR/2010-120	Marine Occupational Health & Safety	No
CSA 2001, C.R.C. c 1432	Hull Inspection Regulations	No

15.2.C Technical

15.2.C.1 General notes

- 15.2.C.1.1 The Contractor to bid on removing 0.5 cubic meters of solid debris from the listed 11 ballast tanks; extras to be adjusted by 1379 process. Price per cubic meter to be made available for adjustment purpose.
- 15.2.C.1.2 The Contractor to bid on removing 0.3 cubic meters of solid debris from the Void Tanks; extras to be adjusted by 1379 process. Price per cubic meter to be made available for adjustment purpose.
- 15.2.C.1.3 The Contractor to bid on removing 2,000 liters of sewage and sludge from each Sewage Holding Tank; extras to be adjusted up or down by 1379 process. Price per cubic meter to be made available for adjustment purpose.
- 15.2.C.1.4 The Contractor must remove, identify, and keep all docking plugs that have been removed from the vessel. Lost or damaged plugs must be replaced by the Contractor at the Contractor's expense.

- 15.2.C.1.5 Prior to commencing of cleaning, The Contractor must open all tanks, ventilate them and provide service of Marine Chemist to certify each tank is safe for entry and Hot Work.
- 15.2.C.1.6 The Contractor to post Safe for Entry/Safe for Hot work certificates at each tank opening in a clearly visible location as close to the entry as practical.
- 15.2.C.1.7 The Contractor must clean all tanks and inspect all sounding pipes. When washing the interior of the tanks, The Contractor must use Garden hose type pressure of 60-80 PSI. Any foreign materials from the sounding pipes must be removed. Sludge and debris from the tanks must be disposed of in accordance with Federal, Provincial and Municipal regulations in effect.
- 15.2.C.1.8 The Contractor must present all tanks and void spaces for inspection by the attending ABS surveyor for a survey credit. Upon completion of the inspection, the Contractor must close up all tanks using new 1/8 inch fiber reinforced neoprene gaskets suitable for sea water service on all man-hole covers.
- 15.2.C.1.9 The Contractor to install back all docking plugs using Contractor supplied rubber gaskets in the presence of the IA/TA.
- 15.2.C.1.10 The Contractor must pressure test each tank and void space to the requirements of Section 15.3, except the Non-Watertight Voids in the engine room. Pressure testing must be witnessed by ABS surveyor , IA and/or TA
- 15.2.C.1.11 The Contractor must refill all ballast tanks to the arrival condition level prior to undocking the vessel.
- 15.2.C.1.12 The Contractor to supply Fresh Water only from a Municipal water supply for refilling the ballast tanks.
- 15.2.C.2 Spot coating**
- 15.2.C.2.1 The surface preparation of the tanks and the application of the coating system must be carried out as per International FSR recommendations.
- 15.2.C.2.2 The Contractor, under coating FSR supervision and in conjunction with TA/IA must identify areas where spot coating is required. The contractor must include an allowance of \$ 5,000 to cover the cost of services provided by this FSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt

of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

15.2.C.2.3 All products required for coating the tanks must be Contractor supplied.

15.2.C.2.4 The Contractor must quote on surface steel preparation and spot coating in a unit price per square meter.

15.2.C.2.5 The Contractor must quote on surface steel preparation and spot coating of 20% of all tanks' surfaces listed in section 15.2.B.1.1.

15.2.C.3 Surface preparation

15.2.C.3.1 The Contractor must hand scrape and remove any coating that has failed.

15.2.C.3.2 Steel surfaces must be prepared to ST2 / SSPC-SP2 Hand Tool Cleaning standard. The Contractor must remove all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter by hand chipping, scraping, sanding, and wire brushing.

15.2.C.3.3 Large areas of exposed steel may be prepared by using a 3500 psi pressure washer to remove all rust, scale and any other foreign deposits from the tanks that could not be removed by hand.

15.2.C.4 Coating data and paint scheme

15.2.C.4.1 Current coating for ballast tanks is: one (1) coat of Intertuff JXA 110/JXA 105 Epoxy Aluminum 125-150 micron and one (1) coat of Intertuff JXA 110/JXA 106 Epoxy Aluminum 125-150 micron

15.2.C.4.2 All touch ups and to the current coating for Ballast tanks must adhere to the following paint application scheme:

- Intershield 300 – Color Bronze – Full Coat @ 6 mil DFT
- Intershield 300 – Color Aluminium – 15% Stripe Coat
- Intershield 300 – Color Aluminium – Full Coat @ 6 mil DFT

15.2.C.4.3 All touch ups to the coating in the Sewage holding tanks must adhere to the following paint application scheme:

- Interline 624 – Color Buff – Full Coat @ 6 mil DFT
- Interline 624 – Color White – 15% Stripe Coat
- Interline 624 – Color White – Full Coat @ 10 mil DFT

15.2.C.4.4 All touch ups to the coating in the Void spaces must adhere to the following paint application scheme:

- Intershield 300 – Color Bronze – Full Coat @ 6 mil DFT
- Intershield 300 – Color Aluminium – 15% Stripe Coat
- Intershield 300 – Color Aluminium – Full Coat @ 6 mil DFT

15.2.D Proof of Performance

15.2.D.1 Inspection points

15.2.D.1.1 The Contractor must allow the IA/TA the opportunity to examine all tank internals prior to closing each tank.

15.2.D.1.2 The Contractor must blank all connections to the tanks and is responsible for supplying, fitting and subsequent removal of blanks for the pressure test of Section 15.3.

15.2.D.1.3 The Contractor must submit the cleaned tanks to ABS and the IA for inspection. All work must be to the satisfaction of the ABS and any defects must be repaired by the Contractor.

15.2.D.2 Testing/trials

15.2.D.2.1 The Contractor must pneumatically pressure test tanks as per Section 15.3. Test must be witnessed by ABS surveyor, TA and/or IA

15.2.D.3 Certification

15.2.D.3.1 The Contractor must obtain in writing a TCMS Division III attestation for each tank and space pressure tested and witnessed by the attending ABS surveyor. A copy of this must be passed to the TA before the re-floating of the vessel

15.2.D.4 Documentation

15.2.D.4.1 The Contractor must have the attending coating FSR prepare and present a complete report on the coating applied to all of the ballast tanks. Copies of the report must be passed to the TA. The report must detail the surface preparation, amount of product applied, final film thickness of applied product and the environmental conditions at the time of product application, including but not limited to the following: Air temperature, dew point, metal temperature and relative humidity, type and size of equipment used for the coating application.

15.3 PNEUMATIC PRESSURE TEST PROCEDURES

15.3.A Identification

- 15.3.A.1 The Contractor must complete pressure test tanks and spaces according to this Section. The Contractor must provide in the bid price the cost for pneumatic testing of tanks and spaces named in sections 15.1.B.2.1, 15.2.B.1.1, and 15.4.B.1.

15.3.B References

15.3.B.1 Drawings

- Tanks Testing Plan – S30-234-ME (161-110-2)

15.3.C Technical

- 15.3.C.1 The Contractor must pressure test each tank after obtaining ABS survey credit for the inspection of each tank and space required in this Specification.

- 15.3.C.2 The Contractor must provide one total bid price, for performing the tasks detailed below, on each of the tanks and spaces named.

- Pneumatic pressure test of each tank/space;
- Cost for pneumatic test preparation;
- Cost of storage of clean fuel oil and lubricating oils if they need to be removed from the vessel;
- Restoration of the tank/space to service condition after the test including the removal of blanking flanges.

Named Tanks and Spaces:

- All fuel tanks – 10 total (identified in Section 15.1.B.2.1)
- All ballast tanks – 11 total (identified in section 15.2.B.1.1)
- All sewage holding tanks – 2 total (identified in section 15.2.B.1.1)
- All void tanks – 3 total (identified in section 15.2.B.1.1)
- All cofferdams – 3 total (identified in section 15.2.B.1.1)
- All portable water tanks – 2 total (identified in section 15.4.B.1)

- 15.3.C.3 The Contractor must prepare and submit the test procedure for the approval of ABS and the IA/TA at the planning meeting prior to testing.

The Contractor to supply a water column manometer for all pneumatic tank/space tests. The water column must be sized in comparison with the air supply flow rate to

prevent tank pressure greater than 1.5 psi. The air supply arrangement must include a regulated air supply with shut-off valve, two pressure gauges on the downstream side of the regulator and a manual vent valve. The manual vent valve must have a flow capacity greater than the air supply.

15.3.D Proof of Performance

15.3.D.1 Inspections

15.3.D.1.1 The Contractor must conduct the pressure tests in the presence of ABS and the IA/TA.

15.3.D.1.2 The Contractor must submit a written test procedure to the TA prior to testing.

15.3.D.2 Testing/Trials

15.3.D.2.1 Prior to final closing of each tank or space, the Contractor must demonstrate to the IA/TA that the tank or the space is ready to be returned to service condition. This includes the verification that all blanking devices have been removed, gaskets renewed, all connections restored, and that all spaces are clean, dry, and free of debris and any foreign object. The Contractor must perform the final closing of the tanks and spaces in the presence of the IA/TA.

15.3.D.3 Deliverables

15.3.D.3.1 The Contractor must provide complete report on the findings, work and final condition of the work this Section in the required formats and according to the Inspection, Tests and Trials Plan.

15.3.D.3.2 The Contractor must ensure that all tanks subjected to pressure tests have been credited by ABS surveyor.

15.4 POTABLE WATER TANKS

15.4.A Identification

- 15.4.A.1 The Contractor must open, clean and prepare identified potable water tanks for ABS inspection and survey. Tanks must be cleaned, visually inspected, repaired and must then be subjected to a pressure test and super chlorination. Upon completion of the work, the tanks must be returned to a state of operational readiness.
- 15.4.A.2 The Contractor to obtain ABS credit for tanks survey.
- 15.4.A.3 The Contractor to engage services of International Paint FSR for the work in this section. The Contractor must include an allowance of \$5,000 to cover the cost of services to be provided by the Akzo Nobel Coatings Ltd. (Canada) TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Robert Rouwen
Consultant - Marine Coatings
M 519-502-8366
Email: robert.rouwen@akzonobel.com
Akzo Nobel Coatings Ltd. (Canada)
www.international-marine.com

15.4.B References

15.4.B.1 Equipment Data

Tank	Location	Area	Volume
Port Pot. Water Tank	Frames 27 – 32	33.53 m ²	32.6 m ³
Stbd Pot. Water Tank	Frames 27 – 32	33.53 m ²	32.6 m ³

15.4.B.2 Documents

Drawing Number	File Name
CMS30-103-MI(161-100-0_01)	Tank & Capacity Plan & Deadweight Scale

15.4.B.3 Standards

15.4.B.3.1 The Contractor must ensure all work completed in this section complies with the following Standards and Regulations and must take into account other applicable Federal/Provincial Regulations and/or Standards not specifically listed:

FSM Procedures	Title	Included in RFP Package
7.A.12	Potable Water Quality	No
7.B.3	Entry into Confined Spaces	No
7.B.5	Lockout and Tag out	No
	Guidelines for Canadian Drinking Water Quality	No
NSF/ANSI/CAN 61	Drinking Water System Components	No
CSA 2001, CRC c. 1432	Canada Shipping Act, Hull Inspection Regulations	No

15.4.C Technical

- 15.4.C.1 The Contractor must open up, ventilate, certify for entry and work and clean all identified potable water tanks
- 15.4.C.2 Tanks must be scraped and wire brushed clean of any loose coating. All debris, mud and other loose material must be removed and taken ashore. Power tooling or pressure washing are not accepted
- 15.4.C.3 Portable Water tanks must be cleaned of all debris and sludge and wiped dry. All debris and sludge must be disposed by the Contractor as per Federal, Provincial and Municipal regulations.
- 15.4.C.4 The Contractor must have the work witnessed by the TA. After the work has been witnessed, the Contractor must reassemble the strainers and foot valves using new gaskets and after testing must re-install them in the respective tank from which they were removed.
- 15.4.C.5 The Contractor must bid on removing 25 cubic meter of water/debris from each of the two tanks (a total of 50 m³). Contractor to provide cost per cubic meter for further adjustments.

- 15.4.C.6 Tanks to be inspected by The Contractor, International FSR and the IA/TA and the total surface area for touch up and re-coating must be identified and agreed upon.
- 15.4.C.7 The Contractor must wire wheel prepare the identified surfaces in accordance with the application Data for the Potable Water Tank paint Interline 925. Coating is Contractor supplied.
- 15.4.C.8 The Contractor must include in their bid touch up and repair for 10 m2 of coating for each potable water tank (a total of 20 m2). The potable water tank coating is Interline 925.
- 15.4.C.9 The Contractor must adhere to the following coating scheme for Portable water tanks:
- Interline 975P – Color White – Full Coat @ 10 mil DFT
 - Interline 975P – Color White – Stripe Coat 15%
 - Interline 975P – Color White – Full Coat @ 10 mil DFT
- 15.4.C.10 The Contractor must supply a price quote for a unit price per square meter; extras to be adjusted by 1379 process.
- 15.4.C.11 The tanks coating must be applied after all welding has been completed to the tank brackets or other repairs required in the tanks.
- 15.4.C.12 The potable water tanks must not be sealed and/or filled with any liquid until the coating cure time has elapsed. Failure of the Contractor to ensure that tank coatings have fully cured and are no longer off gassing remains the Contractor's sole responsibility. Coating specifications from the manufacturer for mixing and application must be strictly adhered to. Any resulting contamination to the potable water system or damage to the existing tank coatings must be repaired by the Contractor at the Contractor's expense.
- 15.4.C.13 After cleaning, the Tanks must be inspected by the attending ABS surveyor and credit must be obtained.
- 15.4.C.14 The Contractor must close all tank access covers after final inspection by the attending ABS surveyor and IA/TA takes place. It is The Contractor responsibility to provide and replace all tank access cover gaskets with new 1/8 inch thick neoprene gaskets suitable for potable water service
- 15.4.C.15 The Contractor must conduct a pressure test of the potable water tanks according to the requirements of Section 15.3

15.4.C.16 Tank Disinfection

15.4.C.16.1 The Contractor must supply the disinfection media and disinfect the tanks according to the FSSM procedure 7F12, after successful completion of the hydrostatic pressure tests using the following procedure:

15.4.C.16.2 All potable water tanks must be filled with hyper-chlorinated potable water for a period of 24 hours. The hyper-chlorinated water must have a free chlorine content of 50 ppm (part per million). The Contractor must certify to the TA that the water used for the disinfection meets these requirements. If the Contractor uses calcium hypochlorite to produce the hyper-chlorinated potable water, the water must be filtered to remove all calcium before it is introduced into the potable water tanks.

15.4.C.16.3 Following the 24 hour disinfection period, the Contractor must drain and flush the potable water tanks to attain the following readings for the potable water:

Free Chlorine	0.2 and 0.4 ppm;		
E. Coli	0 per 100ml	Nitrate/Nitrite	45 mg/L
Total coliform	0 per 100ml	Mercury	0.001 mg/L
Turbidity	1 NTU	Selenium	0.01 mg/L
Antimony	0.006 mg/L	Uranium	0.02 mg/L
Barium	1.0 mg/L	Benzene	0.005 mg/L
Boron	5.0 mg/L	Xylenes	0.3 mg/L
Cadmium	0.005 mg/L	Flouride	1.5 mg/L
Chromium	0.05 mg/L	Lead	0.01mg/L
Copper	1.0 mg/L	Sodium	200 mg/L
Iron	0.3 mg/L	Zinc	5 mg/L
Manganese	0.05 mg/L	Ethylbenzene	0.00024 mg/L
Ph	6.5-8.5 pH units	Toluene	0.024 mg/L
Colour	15 TCU	Sulpahtes	500 mg/L
TDS	500 mg/L	Chloride	250 mg/L

- 15.4.C.16.4 The Contractor is responsible for total cost associated with sending water samples to an independent laboratory, **as many times as may be required**, that is provincially licensed to perform these tests on potable water. Copies of all final test results must be presented to the IA/TA.
- 15.4.C.16.5 The Contractor must flush the water tanks until the free chlorine content of the water in the tanks drops to an acceptable level of no more than a maximum of 5 PPM.
- 15.4.C.16.6 The Contractor must dispose of all hyper-chlorinated water in accordance with Federal, Provincial, and Municipal Regulations in effect.
- 15.4.C.16.7 The Contractor must re-fill both potable water tanks to their initial tank soundings prior to undocking the vessel using a certified potable water source.

15.4.D Proof of Performance

15.4.D.1 Inspection points

- 15.4.D.1.1 The Contractor must allow the IA/TA the opportunity to examine all tank internals prior to closing each tank.
- 15.4.D.1.2 The Contractor must ensure that all tanks to remaining open for inspection are certified for entry for the duration they are open for access.
- 15.4.D.1.3 The Contractor must blank all connections required to carry out pressure test. The Contractor is responsible for supplying, fitting and subsequent removal of blanks.

15.4.D.2 Documentation

- 15.4.D.2.1 The Contractor must provide a report of the findings, work and final condition of the work of this Section in accordance with the Inspection, Test and Trials Plan.
- 15.4.D.2.2 The Contractor to provide waste and hyper-chlorinated water disposal certificates to the IA/TA prior to the completion of the contract.
- 15.4.D.2.3 The Contractor must obtain ABS credit for tanks survey.

16.0 DOMESTIC SYSTEMS

16.1 SEWAGE TREATMENT SYSTEM PUMP OUT AND CLEANING

16.1.A Identification

- 16.1.A.1 The CCGS Samuel Risley has a requirement to remove and replace current tank coating, and to inspect the internal components of the sewage treatment plant Hamworthy ST-4. The Contractor must pump out and steam clean all internal components of the sewage
- 16.1.A.2 The Contractor must engage International paint FSR to oversee the work in this Section. The Contractor must include an allowance of \$5,000 to cover the cost of services to be provided by the Akzo Nobel Coatings Ltd. (Canada) TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$5,000 allowance must form part of the overall bid and must be adjusted by PSPC 1379 action upon receipt of the final FSR invoice supported by copies of all related documentation to verify actual expenses.

Robert Rouwen
Consultant - Marine Coatings
M 519-502-8366
Email: robert.rouwen@akzonobel.com
Akzo Nobel Coatings Ltd. (Canada)
www.international-marine.com

16.1.B References

16.1.B.1 Drawings

Drawing Number	Drawing Title	Electronic File Name
CFN-161-300-1	General Arrangement	S30113ga1 .dwg
Hamworthy Super Trident Sewage Treatment Units Manual		

16.1.B.2 Regulations and Standards

- TCMS - Vessel Pollution and Dangerous Chemicals Regulations (Latest version).

16.1.C **Technical**

- 16.1.C.1 The Contractor must pump out and dispose the content of the sewage treatment plant. The Contractor must bid on pumping and disposing 4000 liters of sewage. Disposal to be done in accordance with applicable Federal and Provincial Regulations. Contractor must provide price per unit of 1000 liters disposal cost. Final cost will be adjusted by PSPC 1379 action.
- 16.1.C.2 The expression sewage treatment plant includes all the mechanical and structural components of the ST-4 sewage treatment plant shell as shown on drawing D5232 of Hamworthy Super Trident Manual. This unit is not fitted with a macerator.
- 16.1.C.3 The Contractor must provide adequate ventilation from the sewage compartment to the outside of the ship. The Contractor must constantly monitor the air quality within the sewage plant and the sewage compartment space and certify it is safe for entry.
- 16.1.C.4 The Contractor must remove all access covers from the plant, remove all solids on the internal components and the bottom of the sewage plant and dispose of the solids in accordance with all applicable Federal and Provincial Regulations. The Contractor must thoroughly clean with water or Hamworthy approved septic safe cleaner the internal parts of the sewage plant.
- 16.1.C.5 The contractor must remove the mesh screen of the primary tank so all components and piping can be accessed during the cleaning. Screen must be installed back with new Contractor supplied stainless hardware.
- 16.1.C.6 The Contractor must remove existing sewage tank coating using SSPC - SP3 method to bare metal. Where internal hoses are used within the sewage plant, the Contractor must ensure those are protected from damage during the coating removal and cleaning process.
- 16.1.C.7 Upon completion of coating removal and the steam sterilization process, all internal components and piping must be jointly inspected by Contractor and TA/IA and any repairs needed and agreed to by the TA must be addressed through 1379 action. All repairs must be completed before application of new epoxy coating.
- 16.1.C.8 Current tank coating is Coal Tar Epoxy.
- 16.1.C.9 New sewage tank coating material must be supplied and applied by the Contractor. The Contractor to adhere to the following paint application scheme when re-coating the tank:

- Interline 624 – Color Buff – Full Coat @ 6 mil DFT
- Interline 624 – Color White – Stripe Coat 15%
- Interline 624 – Color White – Full Coat @ 10 mil DFT

16.1.C.10 The final cleaning stage must be a steam sterilization of all internal surfaces of the sewage treatment plant.

16.1.C.11 The Contractor to perform UT measurements on the tank top once cleaning has been completed. Bid to include 10 points UT readings which must be taken as per TA/IA directions and results to be provided to TA/IA immediately in order to determine if any repairs required. The Contractor's bid must include price for each additional package of 5 points UT readings, and unit cost per hour for repairs to the tank top material. Repairs to the tank top material, and additional UT readings will be dealt with using 1379 process.

16.1.C.12 Internal area of all tanks is approximately:

- 1st Stage: Total inside surface area = 21.4m²
- 2nd Stage: Total inside surface area = 7.2 m²
- 3rd Stage: Total inside surface area = 4.1 m²

Total: 32.7 m² approx.

16.1.C.13 All external effluent hoses between the different processing stages to be disconnected and thoroughly cleaned with water only or Hamworthy approved septic safe cleaner.

16.1.C.14 The Contractor is responsible for disposal of all cleaning fluids in accordance with all applicable Federal and Provincial Regulations.

16.1.C.15 The Contractor must replace all air diffusers with CCG supplied new ones.

16.1.C.16 The Contractor must allow the TA/IA the opportunity to inspect all internal components prior to closing of the sewage plant.

16.1.C.17 After completion of the inspection, the Contractor must re-install all hoses and access hatches. All access hatches must be fitted with new, Contractor supplied, solid 3 mm rubber gasket. Mesh reinforced gasket material is not acceptable.

16.1.C.18 Any defects must be corrected by the Contractor at no cost to CCG.

16.1.D Proof of Performance

16.1.D.1 The Contractor must conduct a survey of the condition of the sewage treatment plant and submit a report of the findings to the TA. The report must include a photographic

survey of all interior compartments, piping, hoses and components. All photographs to be labelled and to identify the parts shown.

16.1.D.2 The Contractor must fill the system with non-chlorinated or chemically treated water and test all hatches for leaks. All air lifts to be proven operational.

16.1.D.3 **Documentation**

16.1.D.3.1 The Contractor must provide the TA with a complete report of the condition survey of the sewage plant, including results of UT measurements, the condition of the internal coating, the condition of the various internal components and a list of all repairs completed.

16.1.D.3.2 The Contractor must provide an electronic copy of the report to TA/IA by email and include report into the final dry docking report as well.

16.2 THERMAL HEATERS REPLACEMENT

16.2.A Identification

16.2.A.1 CCG has a requirement to replace two (2) ER combustion air pre-heaters and one (1) MCR supply air pre-heater. Heaters will be supplied by CCG.

16.2.B Reference drawings

Drawings	Drawing name
ER pre-heaters	Risley coils.pdf
MCR pre-heater	Risley coils1.pdf

16.2.B.1 Regulations:

- Transport Canada TP127E – Ships Electrical Standard (Latest version)
- Canada Shipping Act – Marine Machinery Regulations (Latest version)

16.2.C Technical

- 16.2.C.1 The Contractor is responsible for providing all tools and labour necessary to complete work in this Section
- 16.2.C.2 Work to be carried out in conjunction with Section 16.3 of this Specification
- 16.2.C.3 The Contractor must use the reference drawings for size, tubing clearance and overall configuration.
- 16.2.C.4 The Contractor is responsible for electrical disconnect/connect on all heaters and draining/re-fill thermal fluid from/to the system under the IA directions.
- 16.2.C.5 The Contractor, under IA/TA directions, must lock out electrical power to the heaters and prove them safe to work on; and connect them back after completion of the work.
- 16.2.C.6 The Contractor, under IA/TA directions, to drain thermal fluid from the system and store it while the work is ongoing. There is approx. 1000 liters of thermal fluid in the system.
- 16.2.C.7 The Contractor to fill the system back with thermal fluid once the work is completed. Contractor to make sure that air has been bled out from the system and check for leaks. Any leak must be repaired by the Contractor at no cost to CCG.

- 16.2.C.8 It is the Contractor's responsibility to provide all tools, staging/scaffolding, lifting equipment etc., required to complete work in this Section.
- 16.2.C.9 All gasket material and hardware required to be new and identical to existing installed.
- 16.2.C.10 Old heaters are the CCG property and must be left on board.
- 16.2.C.11 The Contractor must notify IA/TA on any modifications required to the ducting (if any) in order to accommodate heaters installation and must not proceed without approval. All extras will be dealt by means of 1379 process.

16.2.D Proof of Performance

16.2.D.1 Inspection Points

- 16.2.D.1.1 Upon completion, system to be filled with thermal fluid and checked for leaks. All leaks to be eliminated at no cost to CCG.

16.2.D.2 Test/Trials

- 16.2.D.2.1 The Contractor, jointly with TA/IA, to check the system for proper operation upon heaters replacement.

16.2.D.3 Certification – Not Used

16.2.D.4 Documentation – Not Used

16.3 AXIAL FANS REPLACEMENT

16.3.A Identification

16.3.A.1 Canadian Coast Guard has a requirement to replace the 18 existing axial fans, currently installed on board the vessel, with 17 new axial fans to be supplied by CCG.

16.3.B References

16.3.B.1 Regulations and standards

FSM Procedures	Title	Included in RFP Package
7.B.4	Hot work	No
7.B.5	Lockout Tag-out	No

16.3.B.2 Drawings

16.3.B.2.1 Ductwork and systems' drawings

- 81066-1433-001 – Ductwork System WH & Focsle Deck.pdf
- 81066-1433-002 – Ductwork Boat & Main Deck.pdf
- 81066-1433-003 – Ductwork System Below Main Deck & Thruster Compartment. Pdf
- 81066-1433-004- Ductwork System Fan room.pdf

16.3.B.2.2 New Fans' drawings

- EF-2 [AID 150-G)-A150A10-J0939]
- EF-3.1 & EF-3.2 [AID 120-B0-A150A10-J0940]
- EF-4 [AID 190-F1-A150A10-J0941]
- EF6.1 & EF-6.2 [AID 120-B0-A150A10-J0958]
- EF-7 & EF-8 [AID 300-HI-A150A05-J0942]
- SF-1 [AID 150-C0-A150A10-J0943]
- SF-2 [AID 190-E0-A150A10-J0944]
- SF-3 {AID 190-F1-A150A10-J0959]
- SF-4 [AID 160-C0-A150A10-J0945]
- SF-5 & SF-6 [AID 300-J2-A350A06-J0946]
- SF-7 & SF-8 [AID 300-K3-A350A12-J0947]
- SF-9 [AID 190-E0-A150A10-J0948]

16.3.C Technical

16.3.C.1 The Contractor must replace the existing 18 axial fans installed in various spaces on board the vessel with 17 newly purchased axial ventilation fans. The new fans are custom built to provide the required operational performance, and fit within the existing installation envelope with minimum required modification. The table, below, provides some pertinent information on the existing and their new replacement fans. Furthermore, pictures of the existing axial fans, in their current installations, are included in Appendix B for reference.

Ventilation System	Location	Installation Picture	Data Description	Existing Fan	New Fan
Engine Room Supply Fan IDs: SF-7 & SF-8	Engine Room	Figure 16.1 Appendix B	No. of System Fans	2 (in series)	2 (in series)
			Diameter	30 inches	≈30 inches
			Length (each)	9 inches	28 inches
			Weight (each)	127 kg	245 kg
Engine Room Exhaust Fan IDs: EF-7 & EF-8	Engine Room	Figure 16.2 Appendix B	No. of System Fans	2 (in series)	2 (in series)
			Diameter	30 inches	≈30 inches
			Length (each)	9 inches	22 inches
			Weight (each)	88.5 kg	124 kg
Main Engine Supply Fan IDs: SF-5 & SF-6	Open Deck	Figure 16.3 Appendix B	No. of System Fans	1	1
			Diameter	30 inches	≈30 inches
			Length	26 inches	26 inches
			Weight	148 kg	188 kg
Main Deck Supply Fan ID: SF-3	Fan Room, Focsle Deck	Figure 16.4 Appendix B	No. of System Fans	1	1
			Diameter	19 inches	≈29 inches
			Length	15 inches	19 inches
			Weight	77 kg	94 kg
Boat Deck Supply Fan ID: SF-2	Fan Room, Focsle Deck	Figure 16.5 Appendix B	No. of System Fans	1	1
			Diameter	19 inches	≈19 inches
			Length	15 inches	15 inches
			Weight	77 kg	67
Emergency Generator Supply Fan ID: SF-9	Emerg. Gen. Room	Figure 16.6 Appendix B	No. of System Fans	1	1
			Diameter	19 inches	≈19 inches
			Length	15 inches	15 inches
			Weight	77 kg	53 kg

Ventilation System	Location	Installation Picture	Data Description	Existing Fan	New Fan
Focsle Deck Supply Fan ID: SF-1	Focsle Deck machinery	Figure 16.7 Appendix B	No. of System Fans	1	1
			Diameter	15 inches	≈15 inches
			Length with	21	21 inches
			Weight	35 kg	64 kg
Galley Exhaust Fan ID: EF-2	Main Deck, Outside	Figure 16.8 Appendix B	No. of System Fans	1	1
			Diameter	15 inches	≈15 inches
			Length with	21 inches	21 inches
			Weight	48 kg	58 kg
Deck Workshop Exhaust Fan ID: EF-6.1 & 6.2	Workshop	Figure 16.9 Appendix B	No. of System Fans	2	2
			Diameter	12 inches	≈12 inches
			Length (each)	15 inches	15 inches
			Weight (each)	53 kg	35.5 kg
MCR Supply Fan ID: SF-4	Machinery Room	Figure 16.10 Appendix B	No. of System Fans	1	1
			Diameter	12 inch	≈16 inch
			Length (each)	25.5 inch	30 inch
			Weight (each)	N/A	60 kg
Toilets Exhaust Fan ID: EF-4	Inside coaming to open deck	Figure 16.11 Appendix B	No. of System Fans	2	1
			Diameter	19 inch	≈19 inch
			Length (each)	15 inch	24 inch
			Weight (each)	77 kg	86.5 kg
Dry Store Exhaust Fan ID: EF-3.1 & 3.2	Inside coaming to open deck	Figure 16.12 Appendix B	No. of System Fans	2	2
			Diameter	12 inch	≈12 inch
			Length (each)	15 inch	15 inch
			Weight (each)	53 kg	33 kg

- 16.3.C.2 The Contractor must supply all necessary tools, lifting gear and staging/scaffolding, if and when required.
- 16.3.C.3 Electrical disconnect/connect of old and new fans to be done by the Contractor.
- 16.3.C.4 The Contractor, under IA/TA directions, to lock out power to respective fans and prove them safe to work on. Contractor to connect back the power to the fans once the work completed. Attention must be paid for the correct rotation of the fans.

- 16.3.C.5 The Contractor must provide all new hardware required for connecting fans flanges and ductwork including: sheet metal, flexible connections & sleeves (if required), and insulation (where required).
- 16.3.C.6 The Contractor must apply silicon based sealant, fire-rated for application within machinery areas, to the fans flanges to provide proper sealing and minimize air leaks.
- 16.3.C.7 There are 8 fans in total that require support brackets and anti-vibration mounts to be installed to accommodate and support the fans. Brackets are not pre-drilled, and will require some minor adjustments to fit them in place.
- 16.3.C.8 Any extra work required to modify ductwork, fans flanges, fans' foundations, or possibly some piping to accommodate installation of the new fans in place will be dealt by 1379 process and must be pre-approved by TA/IA. The Contractor must include hourly rate for general modification work in the bid.
- 16.3.C.9 Removed fans must remain CCG's property and to be left on board the ship at the location specified by TA/IA.

16.3.D Proof of Performance

16.3.D.1 Inspection Points

- 16.3.D.1.1 Upon work completion, Contractor, jointly with TA/IA, to inspect each fan visually for proper fans installation.

16.3.D.2 Test/Trials

- 16.3.D.2.1 The Contractor, jointly with TA/IA, to perform working test on each fan to ensure that all fans are operating correctly, all support brackets and vibration mounts are installed properly. Attention must be paid to vibration-free fans operation and proper fans support and rotation.

16.3.D.3 Certification – Not Used

16.3.D.4 Documentation – Not Used

17.0 DECK EQUIPMENT

17.1 MAIN MAST PAINTING

17.1.A Identification

- 17.1.A.1 CCG has a requirement to strip the existing main mast of old paint, grit blast the mast and then prime and recoat the mast with a new paint system. Paint must be supplied by the Contractor. Protection of the electronic equipment is necessary and essential, as well as preserving wires and cables from damage.

17.1.B Reference

17.1.B.1 Drawings

- 161-240-1 - Main Mast Layout

17.1.C Technical

- 17.1.C.1 The Contractor must grit blast the existing painted surfaces of the main mast to white metal, as per SSPC SP-10 standard. Surface roughness must be as per International Paint manufacturers requirements prior to applying primer coats.

- 17.1.C.2 Paint system for the mast has the following criteria:

- The primer: International – Interprime 198 colour: Red, Code CPA099.
- The paint for the main mast: International - Intersheen 579 colour: Beige (Buff) RAL 070 7040, code LA011.
- The primer requires two coats applied with a Wet Film Thickness (WFT) of 7.3, Dry Film Thickness (DFT) of 3 and should have 60 minutes between coats and 12 hours before being over coated with top coat paint.
- The top coat paint requires two coats with a WFT of 4.7, DFT of 1.6, and overcoat time of 4 hours.

- 17.1.C.3 The maple leaf emblem on the end of the flag staff must be painted red.

- 17.1.C.4 Overcoat times are based on 25°C and must be adjusted for surface temperature.

- 17.1.C.5 The Contractor must protect the following equipment from grit blasting:

- X-Band and S-Band radar antennas located on the first and second platforms from the deck. Extra care should be taken to ensure that no blasting media gets in the turning units.

- All electrical cables and wiring on all three platforms (above and below), and along the mast.
- The waveguides for the radars.
- All cable/ wire transits.
- The VHF radio antennas.
- MF/HF antenna cables.
- Navigation and other lights.
- VHF direction finder Adcock antenna on top of platform.
- Cellphone and GPS antennas.
- Wind anemometer on top platform.
- Guy wires on port and starboard sides.
- Flag mast and yardarm halyards and pulleys must be removed and reinstalled upon completion of painting.
- All junction boxes, electrical housings, and receptacles.
- The LAD-SAF fall protection system on the ladder including top and bottom connections, the cable, and the rubber cable guides along the ladder.
- Two searchlights on the wheelhouse top.
- Two Norselight searchlights on the TV dome platform.
- Rear-facing X band radar antenna between the stacks on the wheelhouse top.

17.1.C.6 All touch ups and overspray, any damage/repairs to equipment must be rectified by the Contractor at no additional cost to CCG.

17.1.C.7 The Contractor is responsible for coordination of this work with the other portions of the specification to ensure grit blasting and paint coating do not delay or affect other work performed on the vessel.

17.1.D Proof of performance

17.1.D.1 Inspection Points

17.1.D.1.1 The Contractor must remove all protective coverings, once paint has cured.

17.1.D.1.2 The Contractor must allow TA/IA to inspect the completed work.

17.1.D.2 Test/Trials – Not Used

17.1.D.3 Documents – Not Used

17.2 **LIEBHERR MAIN CRANE 5-YEAR INSPECTION**

17.2.A **Identification**

- 17.2.A.1 The Liebherr main buoy crane onboard the CCGS Samuel Risley is due for its 5 year survey inspection and certification . The Port crane auxiliary winch requires replacement with a new winch that will be supplied by CCG. This work must be carried out in accordance with Canada Shipping Act Cargo, Fumigation and Tackle Regulations requirements.
- 17.2.A.2 Signed and stamped Certificate, bearing the signature and stamp of the Liebherr Field Service Representative (FSR) attesting to the successful inspection and testing of the crane (T2 form) must be provided by the Contractor upon completion of survey.
- 17.2.A.3 The Contractor must secure the services of an Liebherr Canada TSR to oversee the inspection, Port crane auxiliary winch replacement and load testing. The Contractor must include an allowance of \$10,000 to cover the cost of services to be provided by the Liebherr TSR. Reasonable cost of travel, living expenses, and potential Covid-19 Quarantine related expenses must be billed at cost without added overhead or profit. The \$10,000 allowance must form part of the overall bid and will be adjusted by PSPC 1379 action upon receipt of the final TSR invoice supported by copies of all related documentation to verify actual expenses.

Warren Coombs

Service Supervisor

Liebherr-Canada Ltd. 49 Mews Place, Suite C St. John's, NL, A1B 4N2

Tel: 1 (709) 748-7829 / Mobile:1 (709) 730-5214

E-mail: warren.coombs@liebherr.com

17.2.B **References**

17.2.B.1 Drawings

- 17.2.B.1.1 The following drawings are to be considered as Guidance Drawings as defined in the Drawings section of the General Notes.

Document Name	Description
Liebherr Crane Operation Manual.pdf	Liebherr Crane operation Manual
Liebherr Hydraulic Schematics.pdf	Liebherr Hydraulic Schematics

Liebherr Whip Winches v2.pdf

Liebherr Whip winch v2

Main Crane Information:

Liebherr Deck Crane

Type: PBWS-15 (8.5) / 8(20)

Serial #: 01-26-787

SWL 15 tons main hoist, two 5 tons each auxiliary hoists.

17.2.C Technical

- 17.2.C.1 The Contractor must ensure that FSR is on-site during the entire period of the work while work is performed on this specification section.
- 17.2.C.2 The Contractor must obtain from FSR the certification required under section 312 of the Cargo, Fumigation, and Tackle Regulations, (SOR/2007-128) before the completion of the contract.
- 17.2.C.3 The Contractor must perform all work required for the:
- Inspection of the Main Crane and components;
 - Disassembly for inspection, and reassembly after inspection;
 - Functional tests and adjustments after inspection;
 - Proof Load Testing of the Main and Auxiliary Hoists
 - Set the crane to work at the completion of the work
- 17.2.C.4 The Contractor must prepare the crane for inspection and testing in accordance with the TSR's requirements, these specifications and section 303 (1) (c) of the Cargo, Fumigation and Tackle Regulations (SOR/2007-128).
- 17.2.C.5 The Contractor must perform the applicable inspections and tests of the Liebherr Pedestal Crane Certificate of Test and Examination – Annual and the procedures of the Liebherr Certificate of Test and Examination of Offshore Pedestal Cranes. The Contractor must obtain these documents from Liebherr Canada. The applicable portions and procedures must be as determined by Liebherr Canada.
- 17.2.C.6 The Contractor is responsible for draining and disposing of hydraulic fluids from all crane hydraulic systems, hoses and devices, and for recharging the hydraulic systems with CCG supplied hydraulic oil. The Contractor must filter the hydraulic oil charged into the system with Contractor supplied water and contaminant removing filter system to ISO 4406 grade 16/13/8.

-
- 17.2.C.7 The Contractor is responsible for sealing all opened hydraulic components, including hoses with plugs, seals and covers to prevent contamination of any part of the hydraulic system after disassembly.
- 17.2.C.8 The Contractor is responsible for cleanup of all hydraulic oil leakages and spillage during the course of the work of this specification section.
- 17.2.C.9 The Contractor is responsible for the disposal of oil and oily waste generated during the work of this specification section in accordance with applicable Federal, Provincial and Municipal rules.
- 17.2.C.10 After the inspection, reassembly of the crane and Proof Loading, the Contractor must set the crane to work and demonstrate the correct functionality of the crane and its safety systems to the IA/TA.
- 17.2.C.11 The Contractor is responsible for the electrical, mechanical, and hydraulic disconnection and reconnection of the crane components.
- 17.2.C.12 The Contractor must perform a 100% visual inspection of the base column (including supporting structure below the main deck), slewing column (i.e. the rotating platform) and the boom for corrosion, wastage, and coating system integrity.
- 17.2.C.13 The Contractor must generate an inspection report documenting the overall condition of the structure and the coating system with photographs and narrative description.
- 17.2.C.14 The Contractor must perform Ultrasonic (UT) inspection of the critical welds identified by the Liebherr FSR.
- 17.2.C.15 The Contractor must bid on the NDT examination of 150 meters linear length of weld; and must provide a price per meter for the NDT weld inspections. Final amounts to be dealt by means of 1379 process.
- 17.2.C.16 The Contractor must perform UT thickness measurements on steel plate identified by the FSR. The Contractor must bid on 50 point measurements; and must provide the price per point measurement for final adjustments by means of 1379 process.
- 17.2.C.17 The Contractor must provide NDT operators certified to CAN/CGSB-48.9712-latest edition, Qualification and Certification of Non-Destructive Testing Personnel Level II for the appropriate method. Copies of the operator's certificates must be provided to the TA.
- 17.2.C.18 The Contractor must remove 20% of the slewing ring bolts and nuts for UT examination.
-

17.2.C.19 The Contractor must reinstall the slewing ring bolts and nuts under the direct supervision of the FSR. The Contractor must test 100% of the main and auxiliary hoist winches fixing bolt pretension force.

17.2.C.20 The Contractor must prepare the structures and welds for examination, including the removal of coating systems and corrosion if required. Where the Contractor removes the coating system for the NDT examinations, the Contractor is required to apply two coats of primer and two coats of top coat paint as per Paint specifications. The Contractor must feather the paint edges to present a smooth appearance to the completed coating system. Coating system paints are CCG supply.

The Contractor's bid must include on 50 linear length (meter) of applying two coats of primer and two coats of top coat paint; and must provide the price per meter as well to be used for determining the final cost by means of 1379 process.

17.2.C.21 The Contractor must perform a function test of the main hoist, auxiliary hoist and slewing brakes.

Hydraulic Pumps, Motors, Aggregate Gearboxes, Slewing Ring

17.2.C.22 The Contractor must electrically, hydraulically and mechanically isolate the main aggregates prior to commencing work on the crane.

17.2.C.23 The Contractor must follow the requirements and perform the work required on the main crane hydraulic components in accordance with the FSR Inspection requirements. As the minimum, the Contractor must disconnect and remove the hydraulic pumps for the NDT examination of their spline drives.

17.2.C.24 Work must also include the slewing motors and examination of their drives and gearboxes.

17.2.C.25 Work must also involve the measurement of the slew bearing clearances and the inspection of this bearing.

Proof Load Test

17.2.C.26 Under the direction of the Liebherr Canada FSR, the Contractor is required to test the function of the movement limiting devices of the boom and hoist movement, and load test the function of the hoist and slewing brakes.

17.2.C.27 The Contractor is required to perform a 125% SWL proof load test on the main hoist and each of the auxiliary hoists of the crane under the direction of the Liebherr Canada

FSR. Load test must meet the requirements of Schedule 4 of the Cargo, Fumigation, and Tackle Regulations, (SOR/2007-128) regulations.

- 17.2.C.28 The test weight (dead load only) must be lifted and slewed for the full slewing range at minimum and maximum boom radii as is permitted by the vessel structure.
- 17.2.C.29 For the main hoist, The Contractor must provide load test weights of 18.75t at 8.0 meters radius and 10.625t at 20 meters radius and place the weights within reach of the crane, rigged and ready for hoisting. The Contractor must provide certified load cell for testing.
- 17.2.C.30 For the auxiliary hoists, the Contractor must provide load test weight of 6.25t at 8.0m/20m radius and place the weight within reach of the crane, rigged and ready for hoisting. CCG will be providing certified load cell.
- 17.2.C.31 The Contractor must rig test load weights and operate the crane under the supervision of the FSR.
- 17.2.C.32 The Contractor must provide 24 hour notice of the proof test to the vessel's Commanding Officer.
- 17.2.C.33 The Contractor must ensure the presence and witnessing of the proof test by ABS and IA/TA.

Subsequent NDT Examination of Structure and Welds

- 17.2.C.34 The Contractor must perform the post proof load NDT examinations of the crane structure and welds as required by the FSR.

Port Auxiliary winch replacement

- 17.2.C.35 The Contractor must replace the Port auxiliary winch with a new one supplied by CCG. The new winch is of the same model and direct replacement.
- 17.2.C.36 The Winch's model is ZHP 4.23
- 17.2.C.37 The old winch must be left on board and to remain CCG property.
- 17.2.C.38 The Contractor must remove wire cable from the winch drum and inspect the wire for damage. TA to be notified if any damage have been found.
- 17.2.C.39 The Contractor must disconnect hydraulic hoses from the winch as per drawings provided. Hoses must be properly protected and capped to avoid damage.

17.2.C.40 If any damage to the hoses occur, the Contractor must replace the damaged hoses with new ones at no cost to CCG.

17.2.C.41 The Contractor must remove the securing bolts for the winch and lift it out with the crane.

17.2.C.42 The Winch foundation must be properly cleaned and inspected. Once completed, the new winch must be positioned into place.

17.2.D Proof of performance

17.2.D.1 Inspection points

17.2.D.1.1 After completion of the work of sections above and its subsections, the Contractor must demonstrate to the IA/TA correct functionality of the crane and its systems. Upon verification that the hydraulic oil pressure circuits are oil tight, the Contractor must put to work the crane, main hoist and auxiliary hoists.

17.2.D.1.2 Tests must be conducted through a minimum of one hour and must include a varied range of lifting weights through a range of heights from the maximum upper and lower limit switches of the hoisting wire including the slow to stop limit switch settings. Tests must include hoisting the main block and auxiliary hoists in maximum load and unloaded conditions of the hoists.

17.2.D.1.3 The Contractor must provide load weights for the load tests.

17.2.D.1.4 Any leaks that develops during the testing must be rectified by the Contractor at no cost to CCG.

17.2.D.1.5 The Contractor must perform and adjust as required:

- 100% SWL test of the main hoist and auxiliary hoists;
- Functional tests of the main hoist brake, auxiliary hoists brakes, and slewing brakes at 0% and 100% SWL;
- Functional test of limit switches, and of the emergency stops;
- Demonstrate the correct functioning of the boom and hoist movement limit switches.

17.2.D.2 Certification

17.2.D.2.1 The Contractor must submit a report of the work undertaken in this specification section listing all test data and identifying all defects and repairs completed.

- 17.2.D.2.2 The report must include a drawing detailing the location of each slewing ring bolt subjected to NDT testing. The report must also include marked drawings showing the location of each NDT examination on the pedestal and slewing structures, and the main boom. The locations must be labeled and cross referenced with the table.
- 17.2.D.2.3 The report must include narrative summaries of work performed and the recorded measurements, and photographs showing the conditions of:
- Slew motor gearbox backlash
 - Aggregate gearbox backlash
 - Tilt test measurements
 - Axle pin and bush diameters
 - Condition of sheaves, axles pins, bushes, bearings, side plates, blocks,
 - Pedestal and boom welds and steel
 - Pump and motor drive splines;
 - Bill of Material for all new parts, and seals installed;
 - Disposal receipts for waste oil and oily waste.
- 17.2.D.2.4 The Contractor must provide to the IA/TA one original set of paper documents and reports meeting the requirements of ABS for the certification under section 312 of the Cargo, Fumigation, and Tackle Regulations, (SOR/2007-128) for inclusion in the ship's tackle register and bearing the signature and stamp of the Field Service Representative/Company upon completion of the contract.
- 17.2.D.2.5 The Contractor must provide one (1) electronic copy of all certificates, drawings, documents and reports in unprotected Adobe PDF format and include them as well into final Dry Docking report on USB media.
- 17.2.D.2.6 The Contractor must obtain from Liebherr signed and stamped T2 certificate
- 17.2.D.2.7 The Contractor must obtain survey credit from ABS for work completed in this Section.

17.3 **2 VHF ANTENNAS REFURBISHMENT**

17.3.A **Identification**

17.3.A.1 The scope of the refurbishment is limited to:

- Disconnection of antennae from transmission equipment.
- Removal of antennae from vessel
- Packaging and shipping of the antennae to manufacturer
- Re-installation of the antennae.

17.3.B **References**

17.3.B.1 Acts Regulations and Standards

17.3.B.1.1 All equipment and installation must conform to the latest edition of the following documents:

- All applicable regulations under the Canada Shipping Act;
- TP 127 Ship Safety Electrical Standards;
- DGTE-69 General Specification for Installation of Shipboard Electronic Equipment;
- IEEE 45 Recommended Practices for Electrical Installations on Shipboard.
- BS 1597: 1985 Electromagnetic Interference Standards;

17.3.B.1.2 The documents must be applied in their entirety, notwithstanding any references to particular paragraphs or sections. In the event of conflict between these project requirements and any of the listed documents, this document shall take precedence, except where legal and/or certification requirements is in question, in which case the most stringent requirement shall prevail.

17.3.B.2 Drawings and Manuals

Electronic File Number	Document
VTM-11-002-RevA.pdf	Technical Manual – V-132 Series 35-foot heavy duty whip antenna

17.3.C **Technical – removals**

17.3.C.1 Performance Requirements

17.3.C.1.1 Installation of wiring, cabling and waveguides must be carried out in accordance with the best standards practice of DGTE-69, TP127 and IEEE Publication No. 45. The

manufacturer's installation manuals and instructions must be the governing guides ensuring a satisfactory installation.

- 17.3.C.1.2 In determining the exact location of equipment, the TA/IA must be consulted.
- 17.3.C.1.3 All cable runs must be neat, properly clamped, follow existing runs and be hidden from view where possible.
- 17.3.C.1.4 All cables must be checked for continuity and insulation to ground by the Contractor. A list of resistance figure results must be provided to the TA/IA.
- 17.3.C.1.5 All nuts, bolts, screws, and hardware must be new and of stainless steel.
- 17.3.C.1.6 All cables must be identified with labels that are approved by the TA/IA. Any deviation from the specification is forbidden unless written approval is granted by the TA/IA.
- 17.3.C.1.7 Particular care must be exercised in the handling and transporting of Coast Guard supplied equipment. All damage must be brought to the attention of the TA/IA immediately before being handled or transported by the Contractor. If any scratches, disfiguration or other damage occurs past this stage, it must be deemed to be the result of Contractor handling. In case of damage caused by the Contractor, equipment must be repaired or replaced at the discretion of the TA/IA at no cost to the CCG or any of its agents or departments.
- 17.3.C.1.8 All work, structures and equipment related to this specification must meet with the approval of the Transport Canada, Ship Safety Branch.
- 17.3.C.1.9 If any cables installed within this specification are found to be damaged, shorted or opened as a result of the manner of installation, the subject cable must be replaced and installed by the Contractor at no cost to CCG.
- 17.3.C.1.10 All new and disturbed metal must be primed and painted to match existing.
- 17.3.C.2 **PORT VALCOM HF Antenna**
 - 17.3.C.2.1 The Contractor must ensure that all AC power sources have been de-energized, PANEL M4-12 BREAKER #12.
 - 17.3.C.2.2 The wheelhouse deck head panels must be removed directly below the PORT antenna location.

17.3.C.2.3 The output feed from the SAILOT 6384B antenna tuning unit must be shorted to ship's hull by means of a short jumper cable.

17.3.C.2.4 The antenna feed line must be removed from the base of the antenna and taped to prevent damage (Fig. 17.3-1).

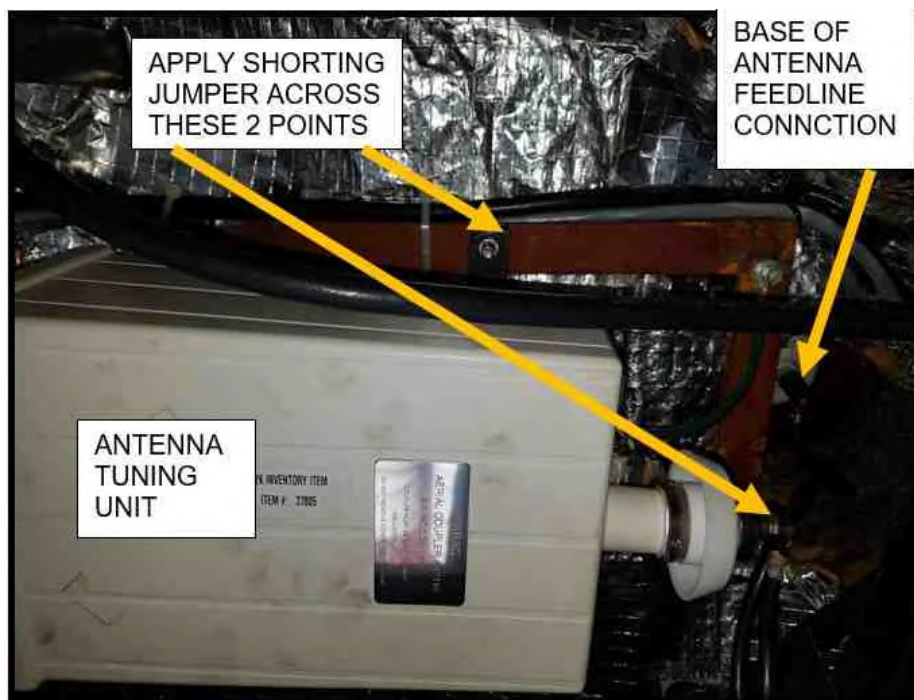


Figure 17.3-1: Port Antenna Tuning Unit

17.3.C.2.5 The PORT antenna must be then rigged for removal. The PORT antenna must be removed from the vessel and disassembled at the middle joint, by use of strap wrenches only.

17.3.C.2.6 The PORT antenna must be temporarily stored on site to avoid damage (Fig. 17.3-2 and Fig. 17.3-3).

17.3.C.2.7 The exposed hole in the wheelhouse top deck must be made water proof to avoid any ingress of debris or water.



Figure 17.3-2: Base of Port VALCOM antenna

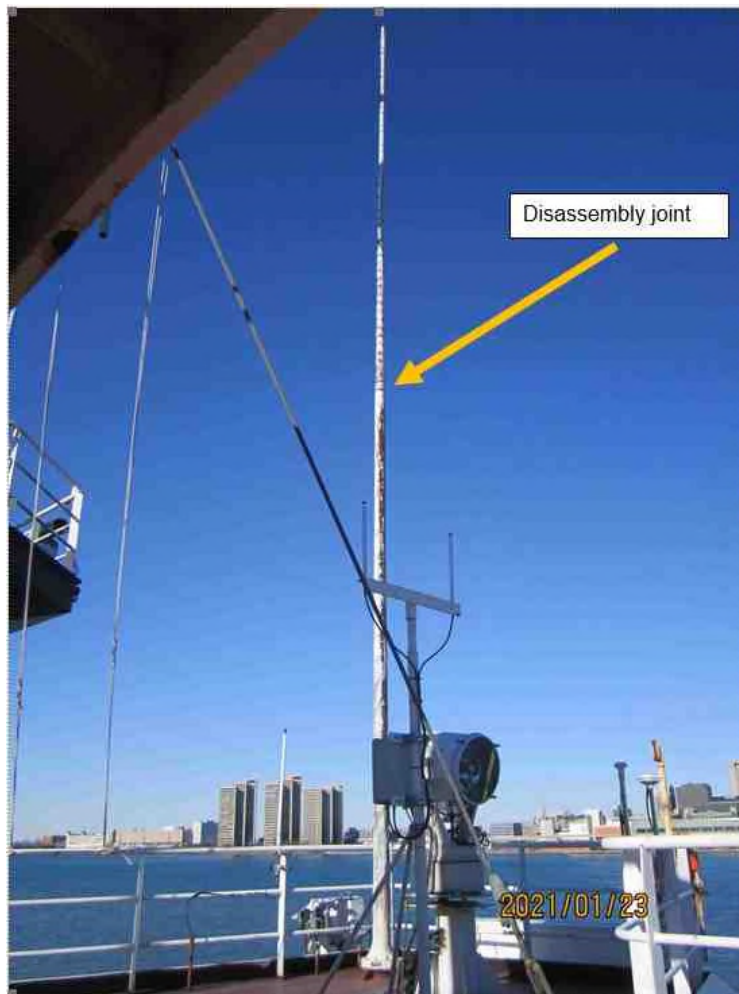


Figure 17.3-3: Port VALCOM antenna

17.3.C.3 STBD VALCOM HF Antenna

- 17.3.C.3.1 The Contractor must ensure that all AC power sources have been de-energized,
- 17.3.C.3.2 The wheelhouse deck head panels must be removed directly below the STBD antenna location.
- 17.3.C.3.3 The output feed from the SAILOR 6384B antenna tuning unit must be shorted to ship's hull, by means of a short jumper cable.
- 17.3.C.3.4 The antenna feed line must be removed from the base of the antenna and taped to prevent damage (Fig. 17.3-4).

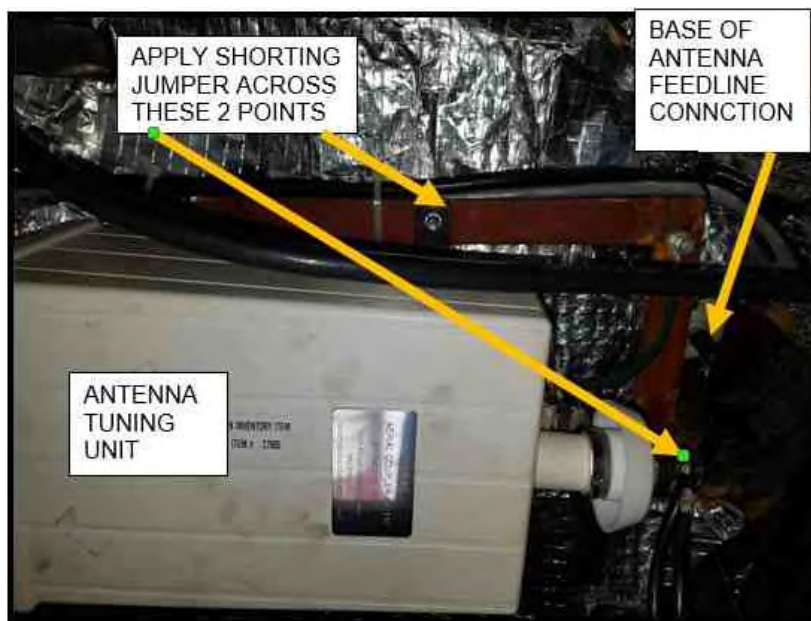


Figure 17.3-4: STBD antenna tuning unit

- 17.3.C.3.5 The STBD antenna must be then rigged for removal
- 17.3.C.3.6 The STBD antenna must be removed from the vessel and disassembled at the middle joint, by use of strap wrenches only.
- 17.3.C.3.7 The STBD antenna must be temporarily stored on site to avoid damage (Fig. 17.3-5).
- 17.3.C.3.8 The exposed hole in the wheelhouse top deck must be made water proof, to avoid any ingress of rain.
- 17.3.C.3.9 Fasteners and gaskets must be re-used for re-assembly.
- 17.3.C.3.10 STBD VALCOM antenna breaking joint is identical to PORT (Fig. 17.3-6).



Figure 17.3-5: Base of STBD VALCOM antenna

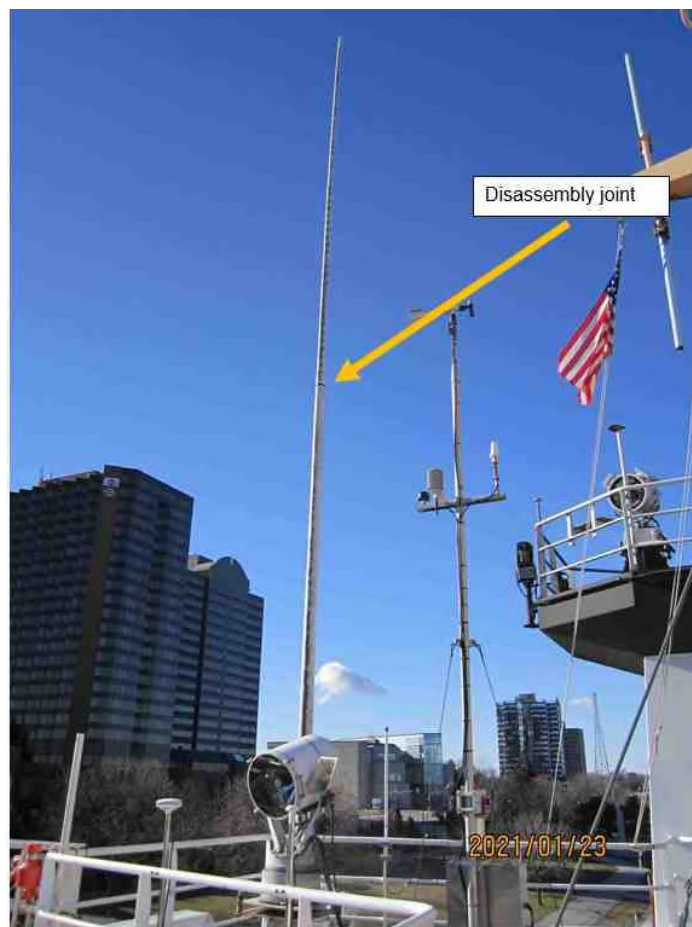


Figure 17.3-6: STBD VALCOM antenna

17.3.C.4 Packaging and Shipping

- 17.3.C.4.1 Contractor's bid to include wooden cradle that must be constructed, such that no parts of the antennae will come in contact with the ground or the transport vehicle.
- 17.3.C.4.2 The area of the antenna sections that contact the cradle must be protected from abrasion by means of plastic wrap or similar material.
- 17.3.C.4.3 The antennae sections must be strapped to the cradle such that they will not be subject to movement during loading or transportation.
- 17.3.C.4.4 The Contractor's bid to include the cost and to arrange for transportation of the two (2) antennas to the following location:
- VALCOM Manufacturing Group inc.
Hanlon Industrial Park
175 Southgate Drive Guelph, Ontario N1G 3M5
Attn.: Carmen Vlaicu
519-824-3220
- 17.3.C.4.5 The Canadian Coast Guard has made arrangements with VALCOM to accept the two antennae.
- 17.3.C.4.6 The antennae must be protected from damage during the transportation. Special care shall be taken to avoid damage to the disassembly joints.
- 17.3.C.4.7 The CCG TA/IA must be advised prior to shipping the units.

17.3.C.5 Installation

- 17.3.C.5.1 The manufacturer VALCOM will provide transportation of the refurbished antennae to the shipyard. The TA/IA will provide advance notice of the shipment date.
- 17.3.C.5.2 The Contractor must provide temporary storage of the antennae, until time of reassemble and reinstallation.
- 17.3.C.5.3 The following steps must be taken from the manufacturers manual VTM-11-002-RevA, Section 2.

2.0 INSTALLATION

2.1 Unpacking

Open the shipping crates and remove the antenna sections and any possible accessories purchased with it. Remove all packing material including the male ferrule protector on the antenna section.

The V-132 antenna, as shipped, consists of the items listed in Table 3.1. Check that all of the items are present and in good condition.

2.2 New Site Preparation

Check to see that the site is free of cables, debris and other obstructions.

2.3 Assembly and Installation of Antenna on the site

The antennae will be unpacked and reassembled on the dock prior to reinstallation.

The following steps should be followed to assemble the V-132 whip antenna.

(1) Obtain three to four saw horses or other supports that will hold the complete antenna horizontally at a convenient working height and place them in the assembly area. The assembly area must be a cleared working space approximately 40 feet long and 20 feet wide.

(2) Support the base section (item 1, Table 3.1) on two of the saw horses.

(3) Support the top section (item 2, Table 3.1) on the other two saw horses so that the two sections lie in the same straight line.

(4) Make sure the threads of the male ferrule on the base section are clear of foreign material and not damaged.

(5) Assemble the second antenna section onto the base section and tighten to align the arrows (if applied) at the joint using the strap wrench supplied (item 3, Table 3.1).

(6) Install the set screws at the joint and seal over with the sealant provided. A final torque between 65-85 in-lbs is acceptable for the set screws.

(7) The antenna is now ready to be raised to its final position. Possible options are to use a crane.

(8) Once the antenna is in the vertical position, secure the antenna with appropriate 5/8" hardware. A final torque between 90-100 ft-lbs is acceptable for the bolts. The antenna is in the vertical position, secure the antenna with appropriate 5/8" hardware.

3.0 PARTS LIST

3.1 General

A list of parts shipped with Valcom V-132 whip antenna appears in Table 3.1.

Table 3.1 – List of Parts for the V-132 Whip Antenna

Item No.	Part Number	Description	QTY	Notes
1		Base Section	1	
2		Top Section	1	
3		Strap Wrench	1 ea	
4		Silicone Sealant	1	
5		Setscrew Kit	1 set	
6		Technical Manual and Installation Instructions	1 set	

17.3.C.5.4 After the re-installation of both antennas, the antennae feedlines must be re-attached. The short jumper cables must be removed.

17.3.D Deliverables

- 17.3.D.1 Upon completion of the re-installation, the TA/IA must be advised. CCG will perform on-site testing of the units to make sure equipment is in good working condition.

17.4 12-24VOLT SYSTEM REPLACEMENT

17.4.A Identification

- 17.4.A.1 The scope of the electronics replacement is limited to:
- Removal of the old existing 12 V and 24V DC power supplies and associated wiring.
 - Installation of a new 12V and 24V DC distribution systems and associated wiring.
- 17.4.A.2 The equipment listed above mainly resides in the Wheelhouse compartment and the tween deck, with transmitting/receiving components located on the wheelhouse top.

17.4.B References

17.4.B.1 Acts Regulations and Standards

- 17.4.B.1.1 All equipment and installation must conform to the latest edition of the following documents:
- All applicable regulations under the Canada Shipping Act;
 - TP 127 Ship Safety Electrical Standards;
 - DGTE-69 General Specification for Installation of Shipboard Electronic Equipment;
 - IEEE 45 Recommended Practices for Electrical Installations on Shipboard.
 - BS 1597: 1985 Electromagnetic Interference Standards;
- 17.4.B.1.2 The documents must be applied in their entirety, notwithstanding any references to particular paragraphs or sections. In the event of conflict between these project requirements and any of the listed documents, this document must take precedence, except where legal and/or certification requirements is in question, in which case the most stringent requirement must prevail.

17.4.B.2 Drawings and Manuals

Electronic File Number	Document	Drawing Number
706700GA1.dwg	TWEEN DECK 12V AND 24V POWER SUPPLY ARRANGEMENT	CM706-0130BD1
706013BD1.dwg	SKIPPER ECHOSOUNDER BLOCK DIAGRAM	CM706013BD1
706013IN2.dwg	SKIPPER ECHO SOUNDER INTERCONNECTION	CM706013IN2
706013BD1_Update.dwg	SKIPPER ECHOSOUNDER BLOCK DIAG.	CM706013BD1_Update
706013IN2_Update.dwg	SKIPPER ECHO SOUNDER INTERCONNECTION	CM706013IN2_Update
706014IN1.dwg	VHF-Df INTERCONNECTION	CM706014IN1
706014IN1_Update.dwg	VHF-Df INTERCONNECTION	CM706014IN1_Update
706023BD1.dwg	SAILOR SC4000 SATELLITE PHONE	CM706023BD1
706023BD1_Update.dwg	SAILOR SC4000 SATELLITE PHONE	CM706023BD1_Update
706025WI1.dwg	INTERGRATED NAVIGATION SYSTEM – A	CM706025WI1.dwg
706025WI1_Update.dwg	INTERGRATED NAVIGATION SYSTEM – A	CM706025WI1_Update.dwg
706025WI2.dwg	INTERGRATED NAVIGATION SYSTEM – B	CM706025WI2.dwg
706025WI2_Update.dwg	INTERGRATED NAVIGATION SYSTEM – B	CM706025WI2_Update.dwg
706025WI3.dwg	INTERGRATED NAVIGATION SYSTEM – A	CM706025WI1.dwg
706025WI3_Update.dwg	INTERGRATED NAVIGATION SYSTEM – A	CM706025WI1_Update.dwg
706025WI4.dwg	INTERGRATED NAVIGATION SYSTEM – DISPLAY WIRING	CM706025WI4.dwg
706025WI4_Update.dwg	INTERGRATED NAVIGATION SYSTEM – DISPLAY WITRING	CM706025WI4_Update.dwg
706025WI5.dwg	INTERGRATED NAVIGATION SYSTEM – ELECTRONIC CHART SYSTEM	CM706025WI5.dwg
706025WI5_Update.dwg	INTERGRATED NAVIGATION SYSTEM – ELECTRONIC CHART SYSTEM	CM706025WI5_Update.dwg
706030WI1.dwg	DOPPLER SPEED LOG – NAVIKNOT 450D	CM706030WI1.dwg
706030WI1_Update.dwg	DOPPLER SPEED LOG – NAVIKNOT 450D	CM706030WI1_Update.dwg

Electronic File Number	Document	Drawing Number
3204 WIRING.pdf	Paneltronics 3204 Panel DC 18 Wiring	
3204.pdf	Paneltronics 3204 DC Panel Brochure	
PWS610_Manual_2017.pdf	Analytic Systems PWS 610 Manual	
RemoteMonitoring_2017.pdf	Analytic systems RPC Manual	
3001925(12V fuse holder).pdf	12 V fuse holder specifications	
3001936(24V fuse holder).pdf	24V fuse holder specifications	

17.4.B.3 Material Supply

17.4.B.3.1 Canadian Coast Guard Supplied Material

- Analytic Systems PWS610-110-24 QTY 2
- Paneltronics 3204 24V distribution panel QTY 1
- Analytic System RPC remote control panel QTY 4
- CGT4866 junction box and pre-assembled terminal strip

17.4.B.3.2 Contractor Supplied Material

- All interconnecting cable
- All cable glands and fittings
- All cable tags and labels
- Unistrut mounting rails
- All materials required to secure and terminate cables, equipment and complete work as outlined below.

17.4.C Technical – removals

17.4.C.1 Performance Requirements

17.4.C.1.1 The installation of wiring, cabling and waveguides must be carried out in accordance with the best standards practice of DGTE-69, TP127 and IEEE Publication No. 45. The manufacturer's installation manuals and instructions must be the governing guides ensuring a satisfactory installation.

17.4.C.1.2 In determining the exact location of equipment, the TA/IA must be consulted.

- 17.4.C.1.3 All cable runs must be neat, properly clamped, follow existing runs and be hidden from view where possible.
- 17.4.C.1.4 All cables must be checked for continuity and insulation to ground by the Contractor. A list of resistance figure results must be provided to the TA/IA.
- 17.4.C.1.5 All nuts, bolts, screws, and hardware must be new and of stainless steel.
- 17.4.C.1.6 All cables must be identified with labels that are approved by the TA/IA.
- 17.4.C.1.7 Any deviation from the specification is forbidden unless explicitly agreed to by the TA/IA.
- 17.4.C.1.8 Particular care is to be exercised in the handling and transporting of all CCG supplied equipment. All damage is to be brought to the attention of the TA/IA immediately before being handled or transported by the Contractor. If any scratches, disfiguration or other damage occurs past this stage, it must be deemed to be the result of Contractor handling and equipment must be repaired or replaced at the discretion of the TA/IA at no cost to CCG.
- 17.4.C.1.9 All work, structures and equipment related to this specification must meet with the approval of the ABS.
- 17.4.C.1.10 If any cables installed within this specification are found to be damaged, shorted or opened as a result of the manner of installation, the subject cable must be replaced and installed at no cost to CCG.
- 17.4.C.1.11 All new and disturbed metal must be primed and painted to match existing.
- 17.4.C.2 **12v and 24v power supplies**
 - 17.4.C.2.1 The following work is required to be completed for the removal of all non-essential power supplies.

STABYLEX 12CT

- 17.4.C.2.2 The installer must ensure that all AC power sources have been de-energized, PANEL E1-3 BREAKER #9.
- 17.4.C.2.3 The STABYLEX 12CT power supply must be disconnected from AC power and removed from its location.
- 17.4.C.2.4 The output cables from the supply must be pulled back to its terminal strip, and removed.

17.4.C.2.5 The terminal strip terminals must be marked and labeled as 12V (+) and 12V (-) for future reference.

17.4.C.2.6 A diagram of the power supply and its connected equipment have been provided in Figures 17.4-1 and 17.4-2. The terminal strip and fuse blocks will remain in place.

Analytic Systems PWS 310-110-24 – Chart table

17.4.C.2.7 This Analytic Systems PWS 310-110-24 power supply must be disconnected from AC power (UPS outlet), below.

17.4.C.2.8 The PWS 310-11-24 must be removed from its location. The output cables from the supply must be pulled back to the terminal strips below and removed. The terminals must be labeled as 24V(+) and 24V (-) for future reference.

17.4.C.2.9 A diagram of the attached equipment is shown in Figure 17.4-3.

17.4.C.2.10 The location of this power supply is detailed in Figure 17.4-4.

Analytic Systems PWS 310-110-24 – INS System A

17.4.C.2.11 This Analytic Systems PWS 310-110-24 power supply must be disconnected from AC power receptacle located directly below.

17.4.C.2.12 This Analytic Systems PWS 310-110-24 must be removed from its location.

17.4.C.2.13 The output cables from the supply must be removed back to their destination INS-A, J4N, K16, PIN 2 and 4, labeled as 24V(+) and 24V (-)

17.4.C.2.14 The location of this power supply is detailed in Fig. 17.4-5.



Figure 17.4-1: Stabylex Power Supply Location

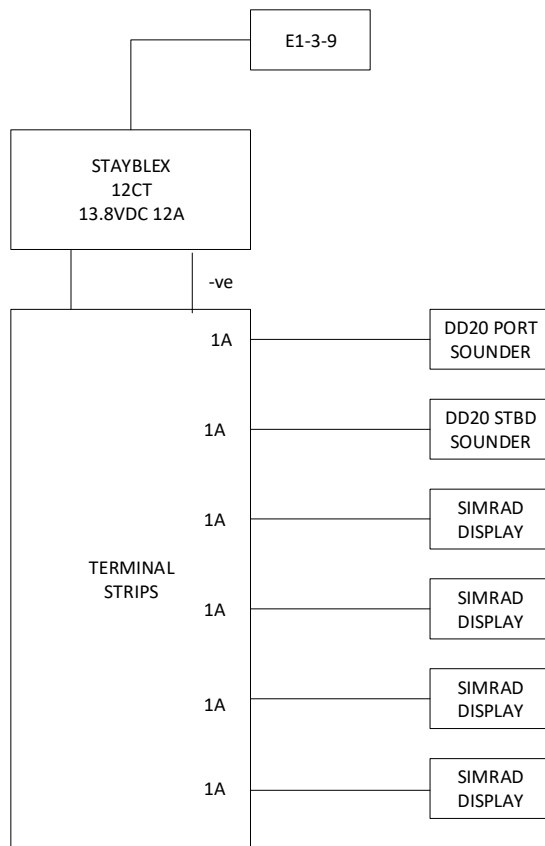


Figure 17.4-2: Current Stabylex Power Supply Connections

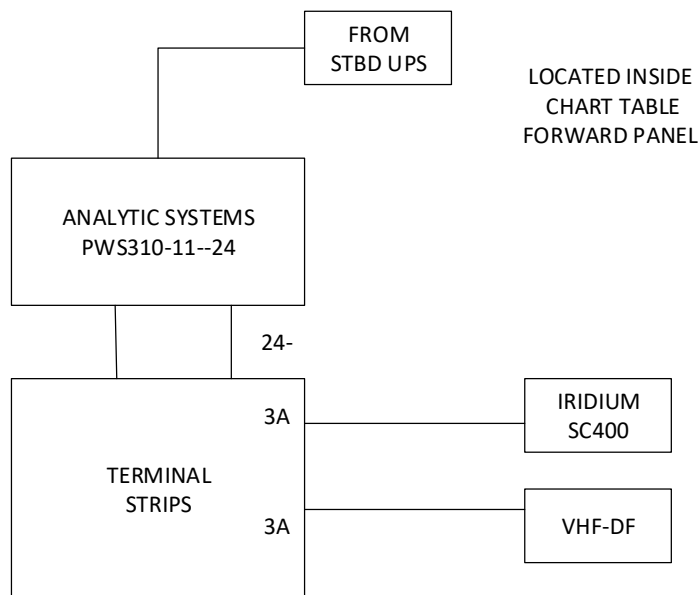


Figure 17.4-3: Current 24v Power Supply – Chart table



Figure 17.4-4: 24v Power Supply – Chart table

Analytic Systems PWS 310-110-24 – INS System B

- 17.4.C.2.15 This Analytic Systems PWS 310-110-24 power supply must be disconnected from AC power receptacle located directly below and must be removed from its location.
- 17.4.C.2.16 The output cables from the supply must be removed back to their destination INS-B, J4N, K16, PIN 2 and 4, labeled as 24V(+) and 24V (-). The location of this power supply is detailed in Fig. 17.4-5.

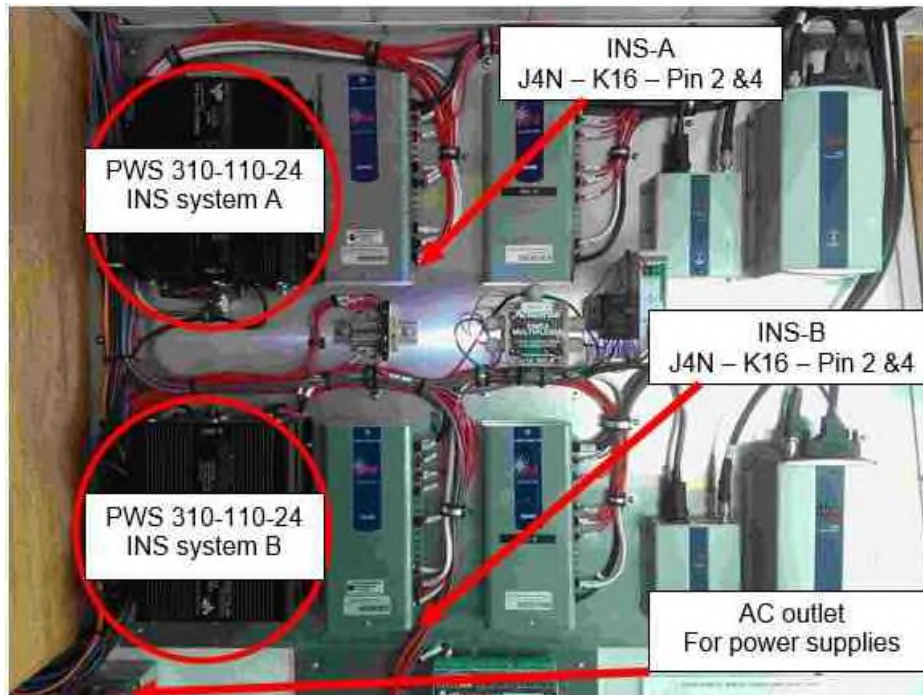


Figure 17.4-5: Current INS Power Supplies

INS System power distribution

17.4.C.2.17 All 24V power cables connected to the input of the DIODE TRIO from J4 and J4N units must be removed, refer to Fig. 17.4-6. The DIODE TRIO unit must be removed.

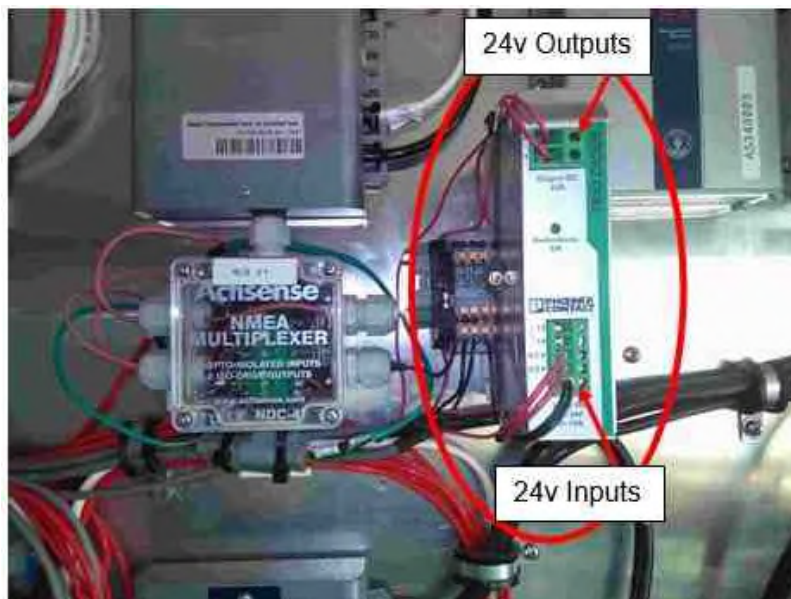


Figure 13.4-6: Current INS 24v power diode trio

- 17.4.C.2.18 The associated DIN rail fuse blocks must be removed, with the output cables labelled as 24V (+) and 24V (-), refer to Fig. 17.4-7.

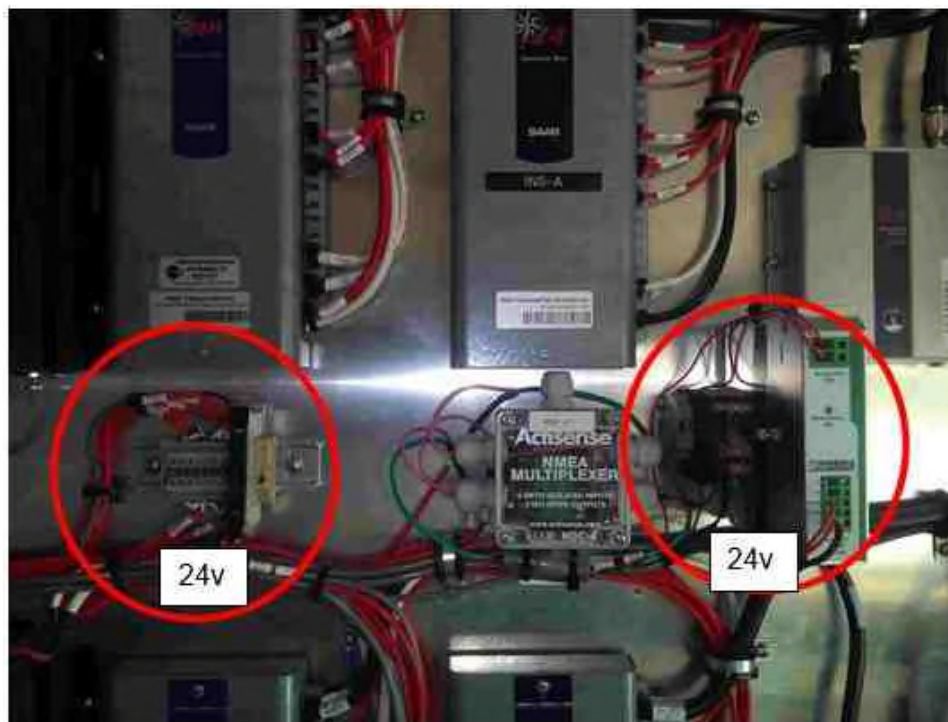


Figure 17.4-7: Current INS power and data distribution

- 17.4.C.2.19 The diagram shown in Fig. 17.4-8, depicts the current wiring of the INS A and INS B system power.

INS System power distribution – forward console.

- 17.4.C.2.20 The forward console DIODE TRIO must be removed.
- 17.4.C.2.21 The TWO (2) input cables must be removed.
- 17.4.C.2.22 The 24V output wires to the DIN rail terminal strips must be removed.
- 17.4.C.2.23 The inputs to the terminal strip must be labelled 24V (+) and 24V (-). Please refer to Figures 17.4-9A and 17.4-9B.
- 17.4.C.2.24 The 24v power cables feeding this module must be used later to pull new cables to the AFT console.

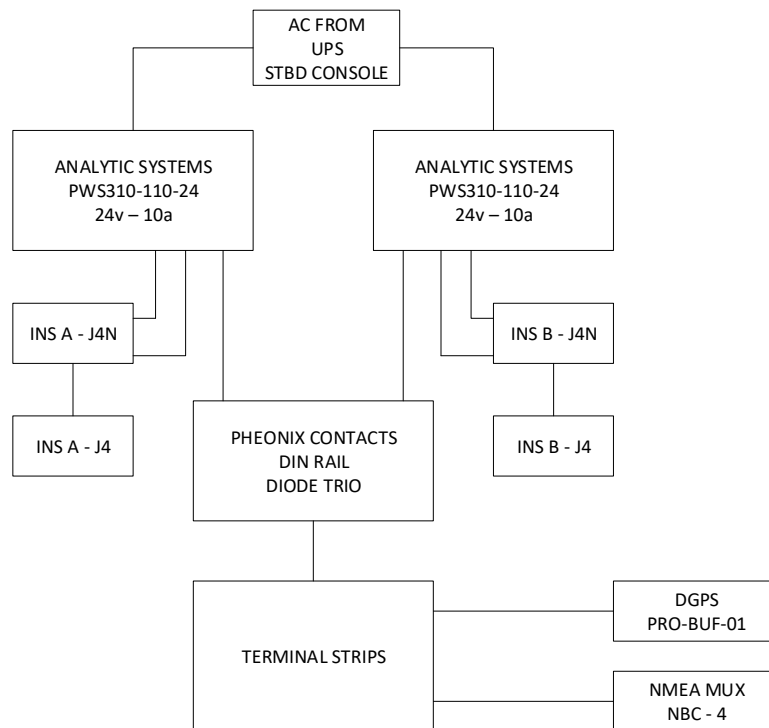


Figure 17.4-8: Current INS Power Supplies and distribution – AFT console

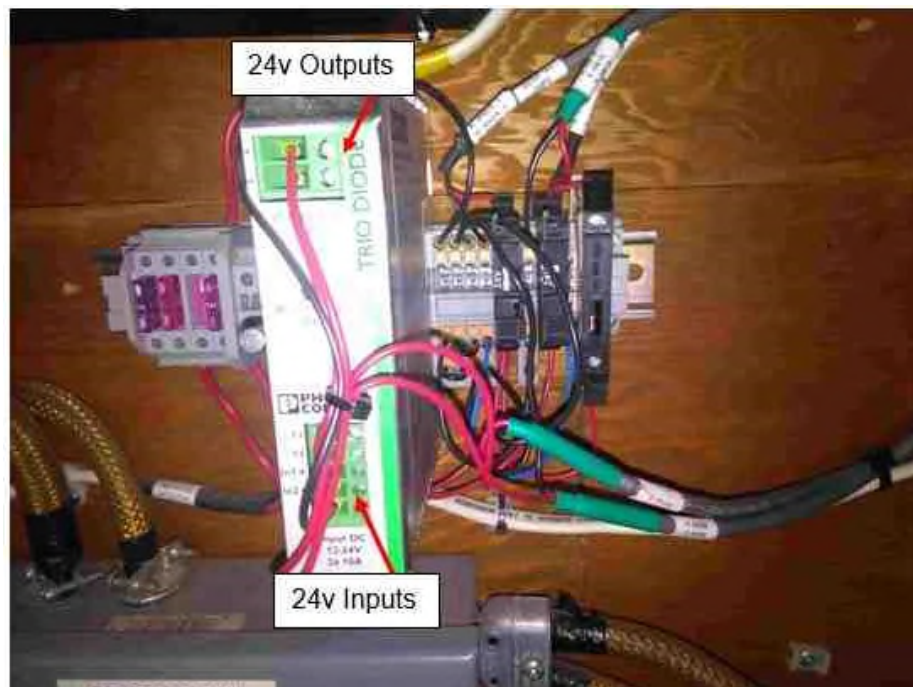


Figure 14.4-9A: Current 24v distribution DF and Iridium, and AIS

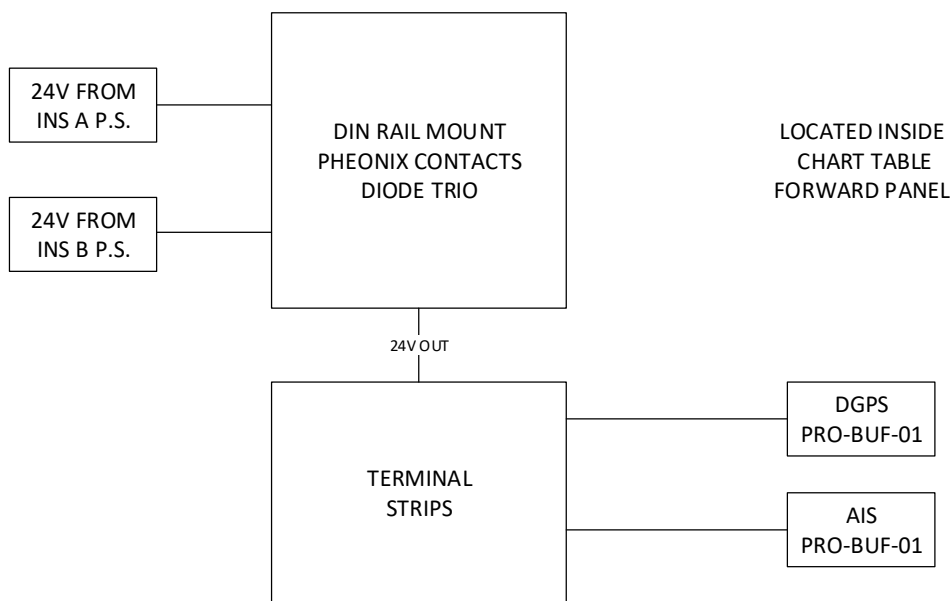


Figure 17.4-9B: Current 24v distribution- forward console DPGS/AIS

SEIMENS 24v Speed Log PS – forward console

- 17.4.C.2.25 Ensure AC power has been de-energized from STBD UPS AC power receptacle.
- 17.4.C.2.26 The SEIMENS 24V speed log power supply must be removed.
- 17.4.C.2.27 The AC input cable must be pulled back to the closest junction box and removed.
- 17.4.C.2.28 The 24V output cables must be removed back to terminal strips.
- 17.4.C.2.29 The terminal strip must be labelled as 24V (+) and 24V (-) for future reference. Please refer to Figures 17.4-10 and 17.4-11.
- 17.4.C.2.30 The AC input cable is hard-wired to this power supply. The AC feed wire is coming from a junction box , it must be pulled back and removed from that location.

FERRUPS UPS – STBD wing console

- 17.4.C.2.31 This Ferrups UPS located inside the STBD wing console must be turned off and removed from service. Ensure to label all output cables, as to their destination. The location of this power supply is detailed in Fig. 17.4-12. The four output cables are detailed in Fig. 17.4-13.

17.4.C.2.32 The outputs of the UPS go to 4 separate outlets, and are connected to the UPS via regular 15-5R NEMA plugs. The plugs must be removed from the cables as they will not be re-used. Refer to Figures 17.4-14 and 17.4-15.

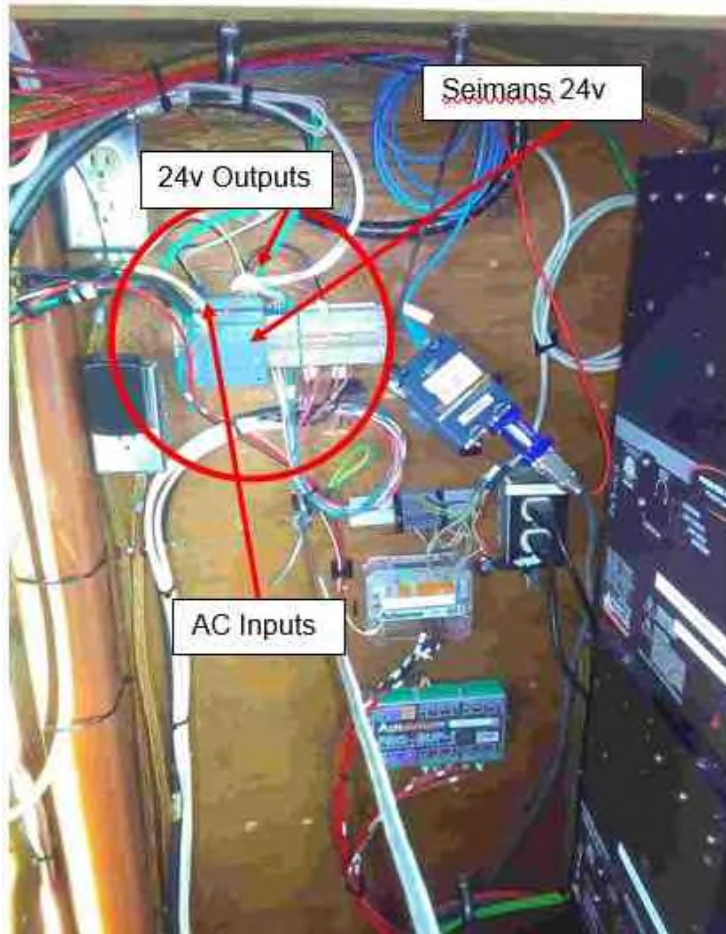


Figure 17.4-10: Speed log power distribution

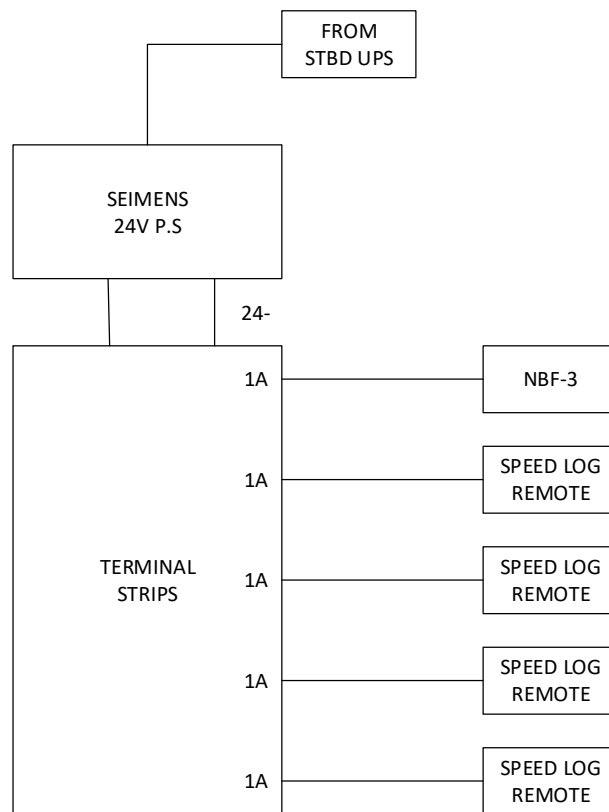


Figure 17.4-11: Current Speed log power distribution



Figure 17.4-12: UPS STBD Console



Figure 17.4-13: UPS output cables

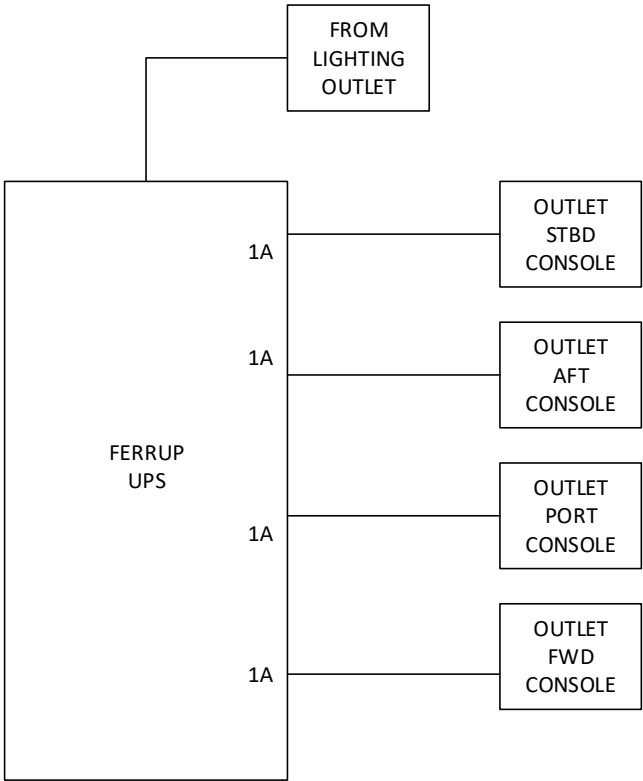


Figure 17.4-14: Current UPS input and output cables

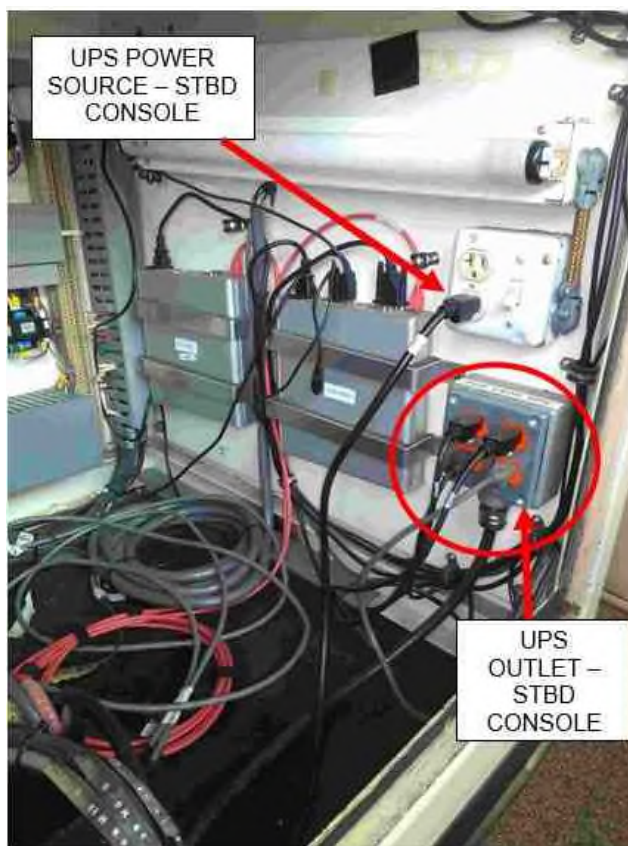


Figure 17.4-15: UPS Outlet

Analytic Systems PWS 610-110-12 – A & B

- 17.4.C.2.33 Both Analytic Systems PWS 610-110-12 power supplies must be disconnected from AC power outlet powered by panel E1-3 breaker 12.
- 17.4.C.2.34 Both Units must be removed from their location, refer to Fig. 17.4-16.
- 17.4.C.2.35 The output cables from the supplies must be removed as well as the isolator diodes.
- 17.4.C.2.36 Cables from the isolator diodes to the 12V distribution panel must also be remove.
- 17.4.C.2.37 The AC outlet for E1-3-12 must be removed and AC cable be removed back to its source.
- 17.4.C.2.38 The diagram in Fig. 17.4-17 shows the current connections to the 12v distribution panel.
- 17.4.C.2.39 Any cabling, either 12v or 24v that was not documented must be brought to the attention of the CCG TA.



Figure 17.4-16: Current 12V Power supplies location

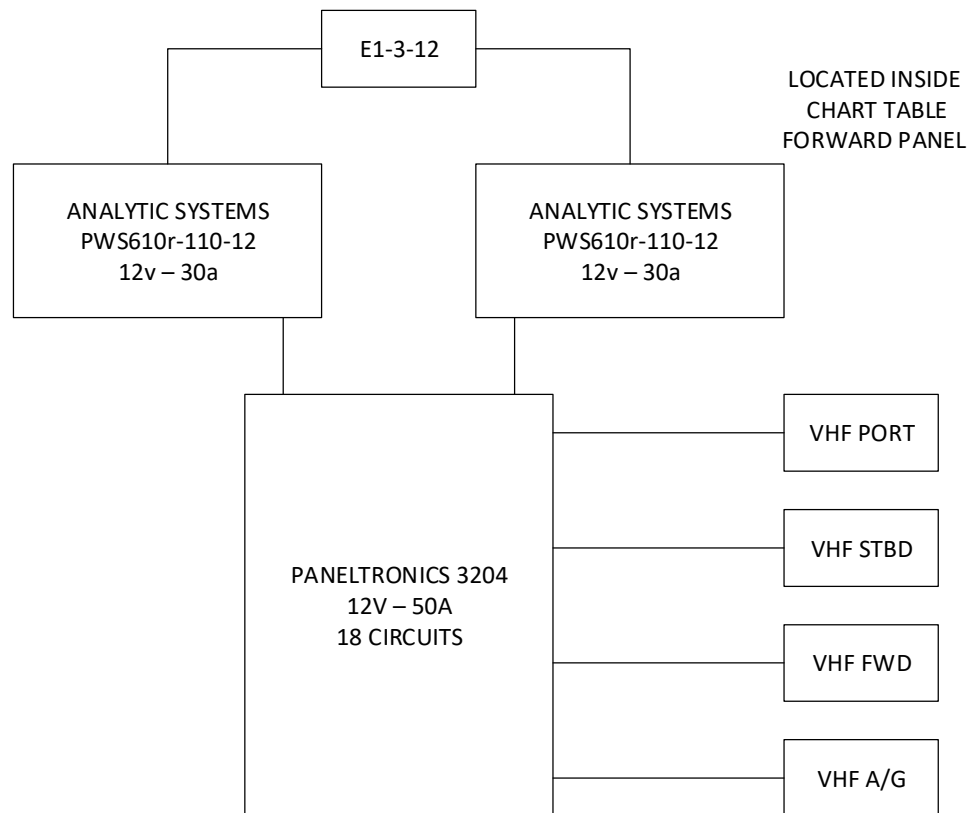


Figure 14.4-17: Current 12V Power supplies location

Old Cable from Speed Log

17.4.C.2.40 The retired cable shown below must be cut, taped and pulled down into the tween deck. The cable must be marked as EX-SRD331 (Fig. 17.4-18).

17.4.C.3 Technical - Equipment Installation

17.4.C.3.1 This Project will require the installation of various power systems, interfaces and ancillary components for the following system:

- Analytic System PWS610-110-12 (previously removed) QTY 2
- Analytic Systems PWS610-110-24 QTY 2
- Paneltronics 3204 24V distribution panel
- Paneltronics RCP remote control panel QTY 4
- CGT4866 junction box



Figure 17.4-18: Cable to remove

17.4.C.3.2 The following systems must be installed on the vessel, along with associated interconnecting cabling, power cabling and ancillary equipment. Note: All stranded cables used must be terminated with appropriately sized insulated ferrules, unless otherwise noted. ABB Ferrules and Installation tools (or equivalent) must be used. A list of the appropriate ABB ferrules and installation tool is attached in Appendix A.

Redundant 12 volt and 24 volt power supplies

17.4.C.3.3 The two (2) pre-existing 12v power supplies PWS610-110-12, and (2) two NEW 24v power supplies PWS610-110-24 must be installed in the tween deck as per guidance drawing *CM706-700-GA1.pdf* using lengths of unistrut, bolted to the vertical upright supports.

17.4.C.3.4 The unistrut and all the equipment must be mounted to the uprights, such that it is ALL on the INWARD facing side of the tween deck.

17.4.C.3.5 Figure 17.4-19 shows a rough depiction of the mounting area.



Figure 17.4-19: Tween deck power supply location

- 17.4.C.3.6 The 2 upper lengths of unitstrut must be used to mount the CGT4866 enclosure and strap cabling.
- 17.4.C.3.7 All AC and DC power connections must be made by use of appropriate DIN rail mounted terminals, housed in the enclosure.
- 17.4.C.3.8 The CGT4866 housing has been pre-constructed with all the necessary DIN rail mount components, and internal interconnections.
- 17.4.C.3.9 A guidance drawing *CM706-700-MII* has been included to detail the input/output connections.
- 17.4.C.3.10 Appropriate sized cable glands must be used for all cabling.
- 17.4.C.3.11 Ferrules must be used on smaller gauge cables, with conductors sized 14-18 AWG.
- 17.4.C.3.12 Crimp on ring terminals must be used on larger conductors sized 4-8 AWG.

17.4.C.3.13 Three AC power circuits must be run from their source to this location using 3C14 AWG shipboard certified cable.

- 1) From M4-2-14 to the tween deck junction box
- 2) From E1-3-12 to the tween deck junction box
- 3) From the UPS Power junction box in the STBD console to the tween deck junction box

17.4.C.3.14 Ensure that circuit M4-2-14 and E1-3-12 are de-energized, and lock/tagged out.

17.4.C.3.15 The new AC feed cables will enter the enclosure and be terminated on to terminals strips as per the guidance drawing.

17.4.C.3.16 The AC power cords of the power supplies must have their plug removed, and hardwired into the enclosure, on to the appropriate terminals. Power Supply output cables must be wired to their respective circuit breakers. The power supply output cables must be 2C6 AWG shipboard approved cable.

17.4.C.3.17 The DC output cables 2C6 AWG must be run from the output of the diode towers to the input of the respective distribution panel, as per the guidance drawing *CM706-702IN1*.

Power supply remote panels

17.4.C.3.18 EACH power supply must be fitted with a remote control/alarm panel (RCP) pictured in Fig. 17.4-20.



Figure 17.4-20: Remote Control Panel RPC-1

17.4.C.3.19 These units are supplied with a 50 foot pre-wired length of cable and a DB9 connector.

17.4.C.3.20 The 4 units must be mounted as depicted in Fig. 17.4-21.

17.4.C.3.21 The RCP units must be labelled to indicate which power supply they are attached to:

- RCP1 = 12V Main
- RCP2 = 12V B/U
- RCP3 = 24V Main
- RCP4 = 24V B/U

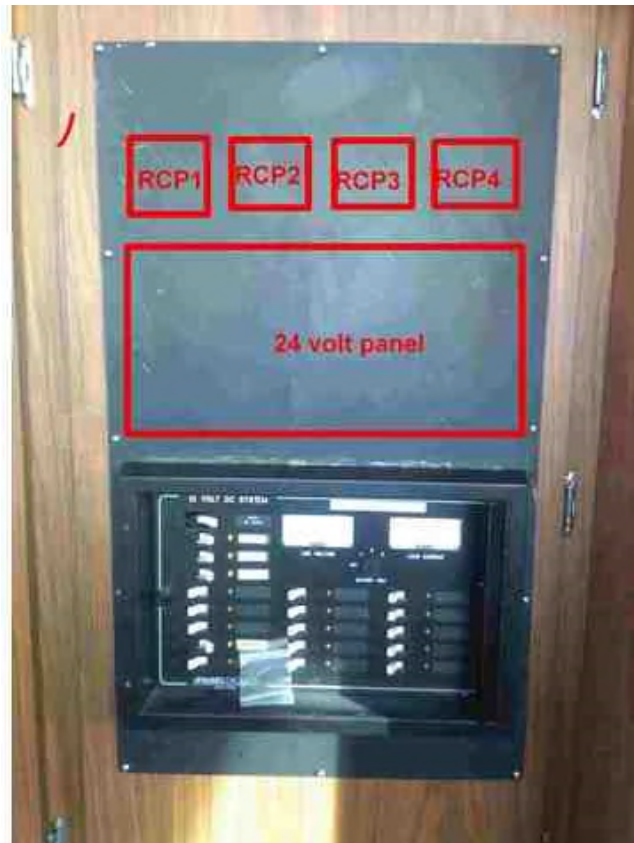


Figure 17.4-21: Proposed 24V Power distribution and RPC location

17.4.C.3.22 The RCP cables must have the DB9 end connected to the appropriate power supply, and ran to the above location. The RCP cables must be trimmed to length and terminated to the respective RCP unit.

24V Distribution panel

17.4.C.3.23 The Paneltronics 3204 - 24V distribution panel must be fitted in the location depicted in Figures 17.4-22 and 17.4-23.

- 17.4.C.3.24 Care must be taken when cutting the holes in the panel. Wrap the 12v distribution panel in plastic, and tape it to prevent metal filings from entering circuitry.
- 17.4.C.3.25 Upon completion of the installation of the distribution panel and RCP units, the high current DC feeder cables from the tween deck enclosure must be attached to both panels.
- 17.4.C.3.26 All cables to/from the panels must be routed such that the console door will open and close without damage to cable. Appropriately sized cable clamps must be permanently mounted to ensure no mechanical wear is created.



Figure 17.4-22: Proposed 24V Power distribution and RPC location



Figure 17.4-23: Rear view of 24V Power distribution and RPC location

24V power to INS system A and B

AFT CONSOLE – INS-A

- 17.4.C.3.27 The installer must run a 2C14 AWG cable from the 24v distribution panel to the aft console.
- 17.4.C.3.28 The cable must be terminated onto CB14 (10A circuit breaker) in the 24V distribution panel, and the breaker labelled, INS-A. The wiring diagram for the Paneltronics 3204 is attached. The cable must be labelled R-RN-15A.
- 17.4.C.3.29 At the AFT console, the cable above must be terminated on to INS-A, J4N, K-16, PIN 2 and 4 at the appropriate locations, where power was previously removed.

Refer to guidance drawing *CM706025W11*.

AFT CONSOLE – INS-B

- 17.4.C.3.30 The installer must run a 2C14 AWG cable from the 24v distribution panel to the aft console.
- 17.4.C.3.31 The cable must be terminated onto CB15 (10A circuit breaker) in the 24V distribution panel, and the breaker labelled, INS-B. The wiring diagram for the Paneltronics 3204 is attached. The cable must be labelled R-RN-15B.
- 17.4.C.3.32 At the AFT console the cable above must be terminated on to INS-B, J4N, K-16, PIN 2 and 4 at the appropriate locations, where power was previously removed.

Refer to guidance drawing *CM706025WI2*.

CHART TABLE - ANCILLARY

- 17.4.C.3.33 The installer must run a 2C14 AWG cable from the 24V distribution panel to Chart Table at the location indicated on the guidance drawing.
- 17.4.C.3.34 This cable must be terminated on to 5A circuit breaker CB3.
- 17.4.C.3.35 The cable must be labelled R-RN19-1.
- 17.4.C.3.36 The cable must be terminated to the DIN rail referenced in 1.3.7 figure 9A.
- 17.4.C.3.37 Existing fuse holders on the DIN rail must be replaced with Phoenix 300198 and terminal blocks.
- 17.4.C.3.38 Spare –ve terminal blocks (2) and fuse holders (2) must be wired for future expansion. Refer to guidance drawing *CM706025WI3*.

AFT CONSOLE - ANCILLARY

- 17.4.C.3.39 A 2C14 AWG cable must be run from the terminal strip referenced in 1.4.3.3 (common source side) to the AFT Console. The cable must be labelled R-RN19-2.
- 17.4.C.3.40 At the AFT console the cable must be terminated on to DIN rail terminal blocks and fuse blocks Phoenix 300198, and ganged together using the appropriate jumpers..
- 17.4.C.3.41 Any pre-existing fuse holders must be replaced with the Phoenix 300198,
- 17.4.C.3.42 Existing power cables R-RN18, R-RN39-3 must be re-terminated onto the new blocks.

17.4.C.3.43 Spare –ve terminal blocks (2) and fuse holders (2) must be wired for future expansion. . Refer to guidance drawing *CM706025WI2* .

ECS CONSOLE – ANCILLARY

17.4.C.3.44 A 2C14 AWG cable must be run from the terminal strip referenced in 1.4.3.3 (common source side) to the ECS Console. The cable must be labelled R-RN19-3

17.4.C.3.45 At the ECS console the cable must be terminated on to DIN rail terminal blocks and fuse blocks Phoenix 300198, and ganged together using the appropriate jumpers..

17.4.C.3.46 Existing power cables R-RN16-1, R-RN16-2 must be re-terminated onto the new blocks. The DUETSCH style connectors must be removed and devices wired directly to terminal strips

17.4.C.3.47 Spare –ve terminal blocks (2) and fuse holders (2) must be wired for future expansion. Refer to guidance drawing *CM706025WI5* .

17.4.C.3.48 Each of the systems must have their respective drawings updated to show new connections to power systems. For the purposes of this installation, the installer will simply made red line updates of original drawings, to reflect the exact installation that occurred in field.

24V power to Speed Log System

17.4.C.3.49 The installer must run a 2C14 AWG cable from the 24v distribution panel to the forward console, to the new terminal strip location indicated in Fig. 17.4-24.

17.4.C.3.50 The cable must be terminated on to a 5A circuit breaker in the 24V panel, breaker #5. The cable must be labelled DL-1

17.4.C.3.51 The installer will mount a DIN rail distribution block with 8 each jumpered fuse modules, and 8 each jumpered –ve terminals (6+2 spares).

17.4.C.3.52 The NBF-3 (DL-4) and the 3 remote speed displays (DL-12, DL-13, DL-14) must be rewired to this terminal strip, and each fused with 1 amp fuses.

17.4.C.3.53 The cable DL-3 to the Electronics unit must also be terminated , and fused with a 3A fuse. Refer to guidance drawing *CM706030WI1_update*.

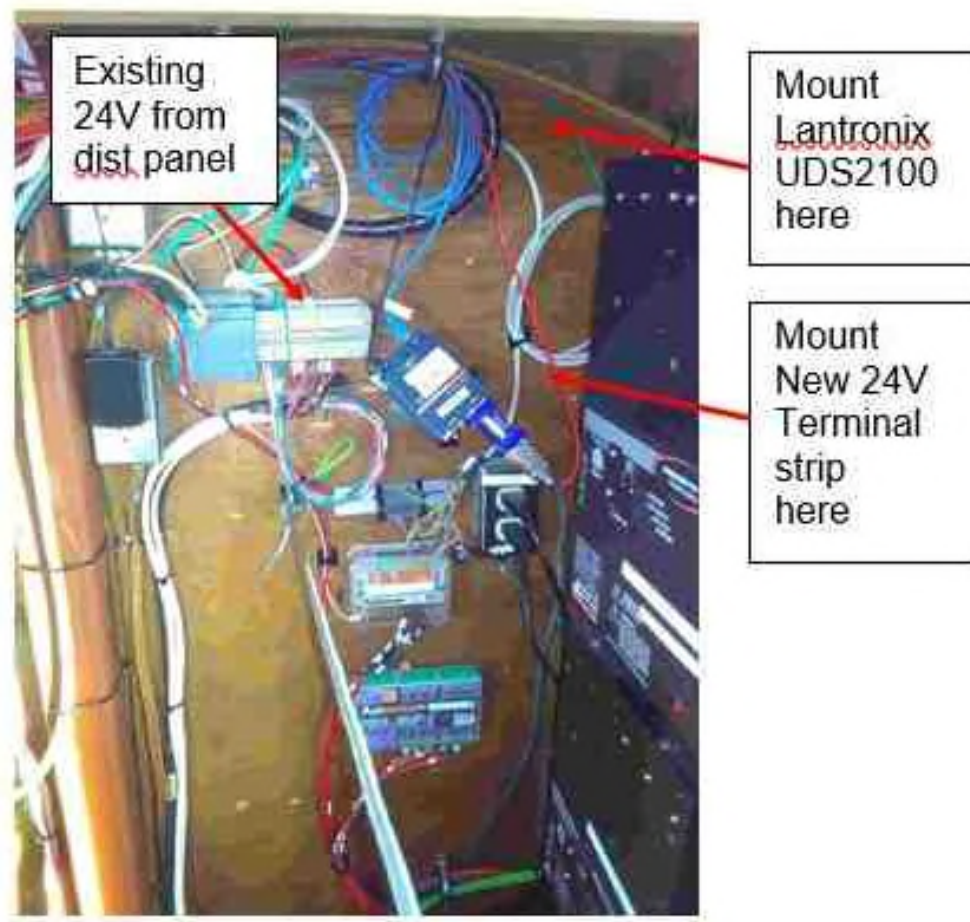


Figure 17.4-24: Proposed 24V Power distribution location for Speed Log

12V power to Iridium

- 17.4.C.3.54 The installer must run a 2C14 AWG cable from the 12V distribution panel to the AFT desk, to the location indicated below. The cable must be terminated on to a 5A circuit breaker in the 12V panel, breaker #6.
- 17.4.C.3.55 The breaker must be labelled IRIDIUM
- 17.4.C.3.56 At the location below the cable must be terminated on to DIN rail mounted terminal blocks. The cable must be labelled IRD-1
- 17.4.C.3.57 The existing power cable from the Iridium unit must be shortened, and connected to the terminal strip. Refer to Fig. 17.4-25, and drawing CM706023BD1_update.



Figure 17.4-25: Iridium transceiver

12V power to VHF-DF

17.4.C.3.58 The installer must run a 2C14 AWG cable from the 12v distribution panel to the deckhead above the forward console, to the location indicated on the guidance drawing. The cable must be terminated on to a 5A circuit breaker in the 12V panel, breaker #5. The cable must be labelled VHF-DF-1.

17.4.C.3.59 The cable must be terminated to a terminal strip above the deckhead, and the attached to the factory power cable. Refer to drawing *CM706014IN1_update* .

12V power to Echo Sounder data distribution

17.4.C.3.60 The installer must run a 2C14 AWG cable from the 12v distribution panel to the location of the terminal strips referenced in 1.3.2. The cable must be terminated on to a 5A circuit breaker in the 12V panel, breaker #7. The cable must be labelled EC-11.

17.4.C.3.61 The cable must be terminated to the terminal strip, referenced section 1.3.2 .

Refer to guidance drawing 706013BD1 and 706013IN2 (as installed), and 706013BD1_UPDATE and 706013IN2_UPDATE.

UPS Power

17.4.C.3.62 The installer must run a 3C14 AWG shipboard AC cable from the RADAR UPS electrical panel to the STBD console (fig 17.4-26).



Figure 17.4-26: Radar UPS Breaker

17.4.C.3.63 The new 3C14 cable must be connected to the breaker panel on the bottom unused breaker. The breaker must be labelled KVM Displays. This cable must be labelled UPS-6

17.4.C.3.64 The cable must run the STBD console, and terminated into a DIN rail terminal jumpered in sets of 3.

17.4.C.3.65 One output must be re-wired to the existing quad receptacle, and labelled UPS-6-1.

17.4.C.3.66 17.4.C.3.64 One output must be wired to the existing Port Console cable that was removed from the UPS and labelled UPS-6-2

- 17.4.C.3.67 One output must be wired to the existing Forward Console cable that was removed from the UP, and labelled UPS-6-3
- 17.4.C.3.68 The fourth cable (to the AFT console) will not be wired in as there is no requirement . This cables must be labelled UPD-6-4.
- 17.4.C.3.69 Before completion of The AC wiring, the TA/IA must inspect the wiring.
- 17.4.C.3.70 The ORANGE duplex outlet at the aft console must be labelled “not in use”. The cable must be labelled UPS-6-4. A guidance diagram *CM706704BD1* has been include.
- 17.4.C.3.71 All cables must be labelled on both the near end and the far end with appropriate tags, and labelled according to guidance drawings and this document. Care must be taken not to damage any equipment or enclosures during the installation process.

17.4.D Proof of Performance

The following tests are to be completed:

17.4.D.1 Functional Test #1 - Voltage Readings

Record the Following Voltages using a multi-meter.

TEST		Reading Location	Voltage Readings	
1	12V Main	Directly from +/- term on P.S		13.6 +/- 0.5
2	12V B/U	Directly from +/- term on P.S		13.6 +/- 0.5
3	24V Main	Directly from +/- term on P.S		27.2 +/- 0.5
4	24V B/U	Directly from +/- term on P.S		27.2 +/- 0.5
5	12V Main	Input to panel		Value from (1) – 3% max
6	12V B/U	Input to panel		Value from (2) – 3% max
7	24V Main	Input to panel		Value from (3) – 3% max
8	24V B/U	Input to panel		Value from (4) – 3% max
9	12V Main	Panel Meter		Tombstone data
10	12V B/U	Panel Meter		Tombstone data
11	24V Main	Panel Meter		Tombstone data
12	24V B/U	Panel Meter		Tombstone data

17.4.D.2 Functional Test #2 - Remote Control

Perform the following tests: with all P.S turned on.

Test	Procedure	Result
1	Turn OFF 12V Main using remote	Pass/Fail
2	Turn ON 12V Main using remote	Pass/Fail
3	Turn OFF 12V B/U using remote	Pass/Fail
4	Turn ON 12V B/U using remote	Pass/Fail
5	Turn OFF 24V Main using remote	Pass/Fail
6	Turn ON 24V Main using remote	Pass/Fail
7	Turn OFF 24V B/U using remote	Pass/Fail
8	Turn ON 24V B/U using remote	Pass/Fail

17.4.D.3 Functional Test #3 - Redundancy

Perform the following tests: with all power supplies turned ON.

Test	Procedure	Result
1	Turn OFF Main breaker M4-2-14 12V and 24V = ON	Pass/Fail
2	Turn OFF Emergency buss breaker E1-3-12 12V = OFF, 24V = ON	Pass/Fail
3	UPS NOT Running	Pass/Fail
4	Turn OFF Emergency buss breaker E1-7-18 UPS Running	Pass/Fail
5	Turn ON Emergency breaker E1-7-18 12V and 24V = ON	Pass/Fail
6	UPS Stops running 12V and 24V = ON	Pass/Fail
7	Turn ON Main breaker M4-2-14 12V and 24V = ON	Pass/Fail
8	UPS Stops running	Pass/Fail

17.4.D.4 Functional Test #4 – Equipment Power Up

Perform the following tests: with all power supplies turned ON.

Turn on Individual breakers, verify power to individual units.

	Equipment – Power Up 12Volt Panel	
1	VHF- FM 1	PASS/FAIL
2	VHF- FM 2	PASS/FAIL
3	VHF- FM 3	PASS/FAIL
4	VHF - AM	PASS/FAIL
5	VHF-DF	PASS/FAIL
6	IRIDIUM	PASS/FAIL
7	PORT Echo sounder DD20	PASS/FAIL
8	STBD Echo Sounder DD20	PASS/FAIL
9	SIMRAD remote display x (3)	PASS/FAIL

	Equipment – Power Up 24Volt Panel	
1	INS-A	PASS/FAIL
2	INS-B	PASS/FAIL
3	INS-ANC	PASS/FAIL
4	SPEEDLOG	PASS/FAIL

APPENDIX A - FERRULE AND INSTALLATION TOOL

Wire Size – AWG	ABB Ferrule	Installation Tool
22	XUSD01831	XUS001589
20	XUSD01838	
18	XUSD01848	
16	XUSD01598	
14	XUS001869	
12	XUS001874	
10	XUSG01879	

17.5 ELAC 4400 ECHO SOUNDER REPLACEMENT

17.5.A Identification

17.5.A.1 The scope of the replacement is limited to:

- Disconnection of existing equipment.
- Construction of new housing for new ELAC ES5200 units
- Installation of the 2 ES5200 units

17.5.A.2 Performance Requirements

17.5.A.2.1 Installation of wiring, cabling and waveguides must be carried out in accordance with the best standards practice of DGTE-69, TP127 and IEEE Publication No. 45. The manufacturer's installation manuals and instructions must be the governing guides ensuring a satisfactory installation.

17.5.A.2.2 In determining the exact location of equipment, the TA/IA must be consulted.

17.5.A.2.3 All cable runs must be neat, properly clamped, follow existing runs and be hidden from view where possible.

17.5.A.2.4 All cables must be checked for continuity and insulation to ground by the Contractor. A list of resistance figure results is to be provided to TA.

17.5.A.2.5 All nuts, bolts, screws, and hardware must be new and of stainless steel.

17.5.A.2.6 All cables must be identified with labels that are approved by the TA.

17.5.A.2.7 Any deviation from the specification is forbidden unless explicitly agreed to by the TA.

17.5.A.2.8 Particular care must be exercised in the handling and transporting of all CCG supplied equipment. All damage is to be brought to the attention of the TA before being handled or transported by the Contractor. If any scratches, disfiguration or other damage occurs past this stage will be deemed to be the result of Contractor handling. The equipment damaged by the Contractor must be repaired or replaced at the discretion of the Technical Authority representative at no cost to CCG.

17.5.A.2.9 All work, structures and equipment related to this specification must meet the approval of the Transport Canada, Ship Safety Branch.

17.5.A.2.10 If any cables installed within this specification are found to be damaged, shorted or opened as a result of the manner of installation, the subject cable must be replaced and installed by The Contractor at no cost to CCG.

17.5.A.2.11 All new and disturbed metal must be primed and painted to match existing.

17.5.B References

17.5.B.1 Acts Regulations and Standards

All equipment and installation must conform to the latest edition of the following documents:

- All applicable regulations under the Canada Shipping Act;
- TP 127 Ship Safety Electrical Standards;
- DGTE-69 General Specification for Installation of Shipboard Electronic Equipment;
- IEEE 45 Recommended Practices for Electrical Installations on Shipboard.
- BS 1597: 1985 Electromagnetic Interference Standards;

17.5.B.1.1 The documents must be applied in their entirety, notwithstanding any references to particular paragraphs or sections. In the event of conflict between these project requirements and any of the listed documents, these documents shall take precedence, except where legal and/or certification requirements is in question, in which case the most stringent requirement shall prevail.

17.5.B.2 Drawings and Manuals

Electronic File Number	Document	Drawing Number
706013BD1.dwg	Skipper Echo Sounder Block Diagram	CM706-013-BD1
706013IN2.dwg	Skipper Echo Sounder Interconnection	CM706-013-IN2
706013BD1_laz5200.dwg	LAZ5200 Echo Sounder Block Diagram	CM706-013-BD1_laz5200
706013IN2_laz5200.dwg	LAZ5200 Echo Sounder Interconnection	CM706-013-IN2_laz5200
Laz5200_drawings_english.pdf	EZ 52 614 8001	LAZ 5200-01

17.5.B.3 Material Supply

- Government of Canada : Quantity 2 – ELAC LAZ5200 Echo Sounder.

17.5.C **Technical - removals**

17.5.C.1 **PORT Skipper GDS101**

- 17.5.C.1.1 The installer must ensure that all AC power sources have been de-energized, PANEL E1-3 BREAKER #9.
- 17.5.C.1.2 All cables must be removed from PORT GDS 101
- 17.5.C.1.3 The cables must be labelled according to guidance drawing CM706013IN2, if not already labelled.
- 17.5.C.1.4 The GDS101 and housing must be removed from the swivel mount (Fig. 17.5-1).
- 17.5.C.1.5 The top section of the swivel mount must be removed from the housing. The removed GDS101 and housing must be left on the vessel as CCG property.

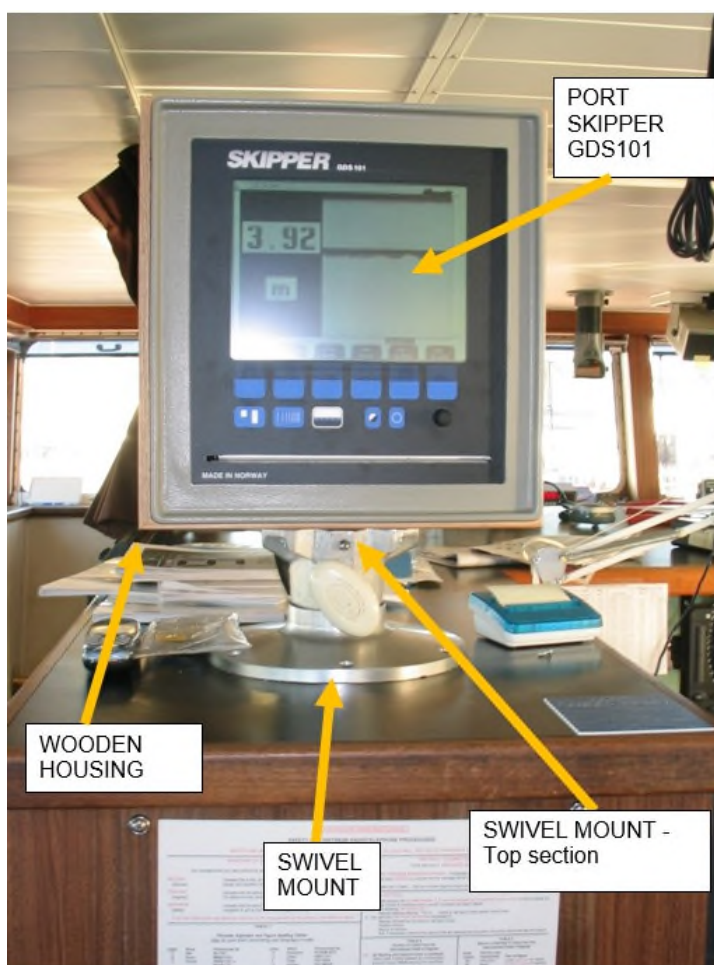


Figure 17.5-1: Port Skipper GDS101 Echo sounder unit

17.5.C.2 STBD GDS101 Echo sounder

- 17.5.C.2.1 The installer must ensure that all AC power sources have been de-energized, PANEL M4-2 BREAKER #5.
- 17.5.C.2.2 All cables must be removed from Starboard GDS 101
- 17.5.C.2.3 The cables must be labelled according to guidance drawing CM706013IN2, if not already labelled.
- 17.5.C.2.4 The GDS101 and housing must be removed from the swivel mount (Fig. 17.5-2).
- 17.5.C.2.5 The top section of the swivel mount must be removed from the housing. The removed GDS101 and housing must be left on the vessel as CCG property.



Figure 17.5-2: STBD antenna tuning unit

17.5.C.3 **Installation**

17.5.C.3.1 **Housings**

- a) The contractor must construct two new wooden housings for the new LAZ7200 Echo sounder units as per the following:
 - The housing shall have outside dimensions of 16" wide x 16" high x 6" deep
 - The top and sides of the housing shall be 3/4 inch oak veneer plywood
 - The front and back shall be 1/2 inch oak veneer plywood
 - The bottom shall have a 2 inch diameter hole to allow for cable passage
 - The housings shall be finished with a clear Varathane coating
- b) The front panel must have a cut-out removed, as per PAGE 1 of the guidance file LAZ5000_drawings_english.pdf
- c) The cut-out must be within 1in of the top edge of the front panel. This will allow room for cable entry in the bottom.
- d) The back panel must be removable, by means of screws, for maintenance purposes.
- e) The top section of the swivel mount must be attached to the centerlines of the bottom of the housing.

17.5.C.3.2 **STBD LAZ5200 Echo sounder**

- a) The starboard LAZ5200 Echo sounder must be fitted into one of the wooden housings (section 17.5.C.3.1).
- b) The housing must be mounted to the swivel mount.
- c) Existing cables shall be connected to the unit as per guidance drawing CM706013IN2_laz5200

17.5.C.3.3 **Port LAZ5200 Echo sounder**

- a) PORT LAZ5200 Echo sounder must be fitted into one of the wooden housings (section 17.5.C.3.1).
- b) The housing must be mounted to the swivel mount.
- c) Existing cables must be connected to the unit as per guidance drawing CM706013IN2_laz5200.

17.5.D **Proof pf performance**

17.5.D.1 **Inspection points**

17.5.D.1.1 The TA/IA must be advised upon installation completion in order to check the installation in general.

17.5.D.2 **Testing/Trials**

17.5.D.2.1 The TA/IA must be advised upon installation completion. CCG will perform on-site testing of the units prior to vessel hand-over.

APPENDIX B – EXISTING AXIAL FANS INSTALLATIONS

This Appendix contains seven (7) pages, excluding this page.



Figure 16.3-1: Photograph of in-situ engine room Supply Fan (SF-7 or SF-8)



Figure 16.3-2: Photograph of in-situ engine room exhaust axial fan (EF-7 or EF-8)



Figure 16.3-3: Photograph of in-situ engine room Supply Fan (SF-5 or SF-6)



Figure 16.3-4: Photograph of in-situ main deck supply axial fan (SF-3)

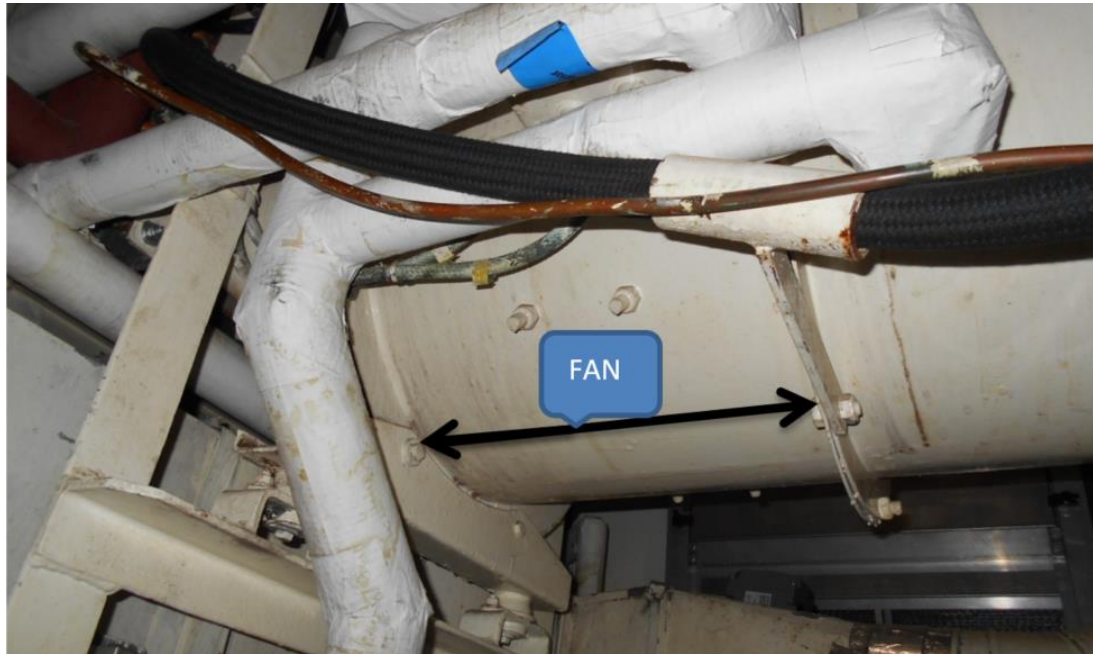


Figure 16.3-5: Photograph of in-situ Boat Deck supply axial fan (SF-2)



Figure 16.3-6: Photograph of in-situ Emergency Generator supply axial fan (SF-9)



Figure 16.7: Photograph of in-situ Focsule Deck supply axial fan (SF-1)



Figure 16.3-8: Photograph of in-situ Galley exhaust axial fan (EF-2), installed on open deck



Figure 16.3-9: Photograph of in-situ Deck Workshop supply axial fans (SF-6.1 & SF-6.2)



Figure 16.3-10: Photograph of in-situ MCR supply axial fan (SF-4)



Figure 16.3-11: Photograph of in-situ toilet Exhaust axial fans (EF-4)



Figure 16.3-12: Photograph of in-situ Deck Workshop supply axial fans (EF-3.1 & 3.2)