

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

Griffon Windlass Drive Replacement and Installation

Specification No: Spec #844.17

Date: 2017-07-17

Revision No: Final

Prepared by Marine Engineering
520 Exmouth Street
Sarnia, ON
N7T 8B1

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
1.0 GENERAL NOTES.....	5
1.1 IDENTIFICATION.....	5
1.2 MILESTONES AND WORK PERIODS	5
1.3 OFFICIAL LANGUAGE OF DOCUMENTATION	5
1.4 REFERENCES	5
1.5 OCCUPATIONAL HEALTH AND SAFETY	7
1.6 ACCESS TO WORKSITE.....	8
1.7 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHIMS)	9
1.8 SMOKING IN THE WORK SPACE.....	9
1.9 CLEAN AND HAZARD FREE WORKSITE	9
1.10 FIRE PROTECTION.....	10
1.11 TOUCH-UP / DISTURBED PAINT	10
1.12 CCG EMPLOYEES AND OTHERS ON THE VESSEL.....	10
1.13 REGULATORY INSPECTIONS AND/OR CLASS SURVEYS	11
1.14 TEST RESULTS AND DATA BOOK.....	11
1.15 CONTRACTOR SUPPLIED MATERIALS AND TOOLS	12
1.16 GOVERNMENT SUPPLIED MATERIALS & TOOLS	13
1.17 RESTRICTED AREAS	13
1.18 CONTRACTOR INSPECTIONS AND PROTECTION OF EQUIPMENT AND THE WORKSITE	13
1.19 RECORDING OF WORK IN PROGRESS	14
1.20 LIST OF CONFINED SPACES	14
1.21 LEAD PAINT AND PAINT COATINGS	14
1.22 ASBESTOS CONTAINING MATERIALS.....	14
1.23 REMOVED MATERIALS AND EQUIPMENT	14
1.24 WELDING CERTIFICATION.....	15
1.25 ELECTRICAL INSTALLATIONS	15
2.0 GENERAL PARTICULARS OF EXISTING VESSEL	16

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

3.0 PERFORMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM 17

3.1	IDENTIFICATION.....	17
3.2	EXISTING SYSTEM CHARACTERISTICS	17
3.3	ENVIRONMENTAL CONDITIONS	18
3.4	ACCESS LIMITS	18
3.5	SHIP SERVICE GENERATORS INFORMATION:	18
3.6	REFERENCES	18
3.6.1	Drawings	18
3.6.2	Standards	18
3.7	ENGINEERING	18
3.8	ELECTRICAL COMPONENTS	19
3.9	MECHANICAL AND STRUCTURAL COMPONENTS:	22
3.10	PROOF OF PERFORMANCE	24
3.10.1	Certification	24

4.0 WINDLASS DRIVE REPLACEMENT 25

4.1	IDENTIFICATION.....	25
4.2	REFERENCES	25
4.2.1	Drawings	25
4.2.2	Regulations	25
4.2.3	Standards	25
4.3	TECHNICAL	26
4.3.1	General	26
4.3.2	Removals.....	26
4.3.2.2	<i>Electrical components.....</i>	26
4.3.2.3	<i>Mechanical and Structural Components:</i>	27
4.3.3	Installation.....	27
4.3.3.4	<i>Mechanical and Structural Components</i>	28
4.3.3.5	<i>Electrical Components</i>	29
4.3.4	Coatings	31
4.4	PROOF OF PERFORMANCE	32
4.4.2	Inspections, Tests and Trials	32

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

4.4.3	Testing/Trials	32
4.4.4	Certification	33
4.5	DELIVERABLES	33
4.5.2	Intellectual Property (IP) License	33
4.5.3	Documentation (Reports/Drawings/Manuals).....	34
4.5.4	Spares.....	35
4.5.5	Training.....	35

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

1.0 GENERAL NOTES

1.1 Identification

- 1.1.1 These General Notes describe the CCG requirements applicable to all accompanying Technical Specifications.

1.2 Milestones and Work Periods

- 1.2.1 The design and engineering work period for this contract will consist of calendar 8 weeks following Contract award.
- 1.2.2 All system components must be delivered to Coast Guard by March 15th, 2018. Delivery must be to:
CCGS Griffon
Attn: Chief Engineer
401 King St. West, P.O. Box 1000
Prescott, Ontario
K0E 1T0
- 1.2.3 The installation work period for this contract will consist of a continuous 6 calendar week's period between June 1st and September 30th, 2018 at the Canadian Coast Guard base in Prescott Ontario. Canada will inform the Contractor of the exact dates and any change to the location 4 weeks prior to the start of the work period.

1.3 Official Language of Documentation

- 1.3.1 Canada must comply with the requirements of the Official Languages Act and related policies and directives issued by Treasury Board Secretariat. This vessel operates in a bilingual region; however its employees occupy unilingual English positions and many are unilingual English. The vessel will manage the work in this specification in the language of choice agreed upon at the contract start meeting however; all documentation that must be dealt with on the vessel must be in the working language of the ship.
- 1.3.2 For the purposes of safety and efficiency, all documentation that is a deliverable for this contract must be in the English working language of the ship.

1.4 References

- 1.4.1 Applicable regulations and documentation:

FSSM Procedures	Title	Included Yes/No
7.A.1	Assessing Risk	7.A.1 Assessing Risk.pdf
7.B.2	Fall Protection	7.B.2 Fall Protection.pdf

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

7.B.4	Hotwork	7.B.4 Hotwork.pdf
7.B.5	Lockout and Tagout	7.B.5 Lockout and Tagout.pdf
7.B.6	Electrical Safety Working on Energized Electrical Conductors or Circuit Parts	7.B.6 Electrical Safety Working on Energized Electrical Conductors or Circuit Parts.pdf
7.E.5	Handling, Storage & Disposal of Hazardous Material	7.E.5 Handling, Storage & Disposal of Hazardous Material.pdf
10.A.6	Paint and Other Coatings	10.A.6 Paint and Other Coatings
10.A.7	Contractor Safety and Security	10.A.7 Contractor Safety and Security.pdf
Ship Specific	Vessel Specific - Asbestos Survey Report	CCGS Griffon - Asbestos Survey Report (September 2016).pdf
Publications		
70-000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment	Specification for the Installation of Shipboard Electronic Equipment-eng.pdf
ASHRAE Standard 52.2	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size	
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 Z462-15	Workplace Electrical Safety	
CSA-Z431-12(R2016)	Basic Safety Procedures for man-Machine Interface – Marking and Identification	
CT-043-eq-eg-001	Canadian Coast Guard Welding	Canadian Coast Guard

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

	Specification	Welding Specification-eng.pdf
IEC 60092	IEC Electrical Installations in Ships	
IEEE 1531-2003	IEEE Guide for Application and Specification of Harmonic Filters	
IEEE 1584	Recommended Practice and Requirements for Harmonic Control in Electric Power Systems	
IEEE 45	IEEE Recommended Practice for Electrical Installation on Ships	
IEEE 519-2014	IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems	
IP	International Electro Technical Commission Ingress Protection Standards	
NEMA	National Electrical Manufacturer Association Standards	
TP11469E	Guide to Structural Fire Protection	
TP127E	Transport Canada Marine Safety Electrical Standard	
TP3177E	Standard for the Control of Gas Hazards in Vessels to be Repaired or Altered	
Acts		
CSA	Canada Shipping Act	
CLC	Canada Labour Code	
Regulations		
MOHS	Maritime Occupational Health and Safety	

1.5 Occupational Health and Safety

- 1.5.1 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 the safety of any personnel.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

- 1.5.2 The Contractor and the Contractor's employees, including any sub-Contractors must attend a safety orientation meeting of the vessel prior to the commencement of any work in order to familiarize the Contractor's employees with ship specific hazards and permit systems for work protocols as well as procedures for Security, Hazard Prevention, Hazard Intervention and Pre-Job Safety Assessments. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual. The familiarization meeting will be led by the crew and will take place prior to the Contractor starting any work.
- 1.5.3 The Contractor must comply with the Fleet Safety and Security Manual, DFO/5737 and shipboard work instructions in addition to the applicable Canada Labour Code regulations while performing all work on board including the following:
1. Pre-Job Safety Assessments
 2. Lock Out/Tag Out
 3. Confined Space Entry
 4. Hot Work
 5. Gas Freeing for Safe For Entry and Hotwork
 6. Work Aloft
- 1.5.4 For the purpose of the Lock Out/Tag Out procedure the Contractor must supply locks and locking devices for the Contractor's employees in addition to those provided by the Chief Engineer for the ship's crew.
- 1.5.5 The Contractor and Contractor's employees will have access to one designated washroom onboard the vessel. The Contractor will not have access to any other part of the vessel that is not directly related to the work in this specification.
- 1.5.6 The Contractor must supply a copy of a certified marine chemist or other qualified person's gas free certificate to the Technical Authority where any work must be carried out in tanks or bilge areas prior to commencing work. The certificates must specify, "Safe for persons" or "Safe for Hot Work" as appropriate. All certificates must be posted in full view and adjacent to the opening of the compartment.
- 1.6 Access to Worksite**
- 1.6.1 The Contractor must ensure the TA and CG staff has unrestricted access to the worksite at all times during the contract period.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

1.7 Workplace Hazardous Materials Information System (WHIMS)

- 1.7.1 The Contractor must provide the TA with Material Safety Data Sheets (MSDS) for all Contractor supplied WHIMS controlled products.
- 1.7.2 The TA will provide the Contractor with access to MSD sheets for all controlled products on the ship for all specified work items.

1.8 Smoking in the Work Space

- 1.8.1 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.

1.9 Clean and Hazard Free Worksite

- 1.9.1 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 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 Flash Drive. Each picture must be dated and labeled as to the location on the vessel. Copies of the pictures are to be provided to the TA and TI for reference purposes within 48 hours of the start of the contract.
- 1.9.2 The Contractor, during the work period must maintain those areas of the vessel which Contractor personnel use to access those areas where work is to be undertaken, in a clean condition, free from debris and remove garbage daily. The Contractor is responsible for storage in a Contractor supplied container and disposal of all debris and garbage related to this contract.
- 1.9.3 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 Labour Code requirements.
- 1.9.4 Upon completion of this contract, the Contractor must be responsible for the 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.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

- 1.9.5 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 the Coast Guard.

1.10 Fire Protection

- 1.10.1 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.
- 1.10.2 When the fire detection or fire suppression system is deactivated or disabled by the Contractor during the contract, the system(s) must be recertified by a 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.
- 1.10.3 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.
- 1.10.4 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:
1. Disabling only one portion of a system at a time;
 2. By maintaining system function using spares while work is in progress;
 3. Other means acceptable to and approved by the TA.

1.11 Touch-up / Disturbed Paint

- 1.11.1 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.
- 1.11.2 The Contractor must prepare all new and disturbed steelwork to the paint manufacturer's standards prior to painting.

1.12 CCG Employees and Others on the Vessel

- 1.12.1 CCG / DFO employees and other personnel such as other contractors, manufacturer's representatives and/or TCMS or Class surveyors may

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

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 must not be responsible for coordinating the related inspections or payment of inspection fees for the ship's crew's or other contractor's work unless otherwise specified.

1.13 Regulatory Inspections and/or Class Surveys

- 1.13.1 The Contractor must contact, coordinate and schedule all regulatory inspections and/or class surveys by the applicable authority: i.e. TCMS, HC, Environment Canada or others as required by this specification.
- 1.13.2 The Contractor must convene a meeting of the Contractors Project Manager for the work of this specification, the attending TCMS surveyor, and the TA, no less than one week before the scheduled start date of this project. The purpose of this meeting is to confer with all parties and determine the inspection and testing requirements of TCMS for the work of this specification.
- 1.13.3 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.
- 1.13.4 The Contractor must not substitute inspection by the TA for the required regulatory inspections or class surveys.
- 1.13.5 The Contractor must provide no less than 48 hours' notice of scheduled regulatory inspections and/or class surveys to the TA so they may witness the inspection.

1.14 Test Results and Data Book

- 1.14.1 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 CCG TA review one week prior to the originally scheduled Tests and Trials commencement.
- 1.14.2 Should extra or new work be added during the contract period, the Test and Trials Plan must be updated by the Contractor to reflect the additional inspection, testing and trials of the extra/new work has taken place.
- 1.14.3 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 and TCMS.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

- 1.14.4 Recorded dimensions must be to a precision of three decimal places (unless otherwise stated) in the measuring system currently in use on the vessel.
- 1.14.5 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.
- 1.14.6 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; provide on USB-KEY media and indexed by specification number. The Contractor must provide 1 hard copies and 1 electronic copy of all reports.
- 1.14.7 All documentation from the contract period must be inserted in a data book and delivered to the TA on completion of the contract.
- 1.14.8 For any drawings requested, the drawings must be plotted on standard ANSI paper size paper – minimum ANSI B (11" x 17"). Three copies must be provided.
- 1.14.9 Also the drawings must be provided in AutoCAD 2010 DWG format (as a minimum – more recent versions are acceptable) and must be on USB-KEY media. The drawings must not be password protected. One (1) copy must be provided.

1.15 Contractor Supplied Materials and Tools

- 1.15.1 The Contractor must ensure all materials are new and unused. The Contractor must provide the Contracting Authority with evidence that all components of the windlass are new and manufactured recently (less than 3 years). Canada will not accept equipment refurbished, reworked or rebuilt.
- 1.15.2 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.
- 1.15.3 Where no particular item is specified or where substitution must be made, the TA must approve the substituted item in writing. The Contractor must provide information about materials used, certificate of grade and quality of various materials to the TA and TI prior to use.
- 1.15.4 The Contractor must provide all equipment, devices, tools and machinery such as craneage, staging, scaffolding and rigging necessary for the completion of the work in this specification.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

- 1.15.5 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.

1.16 Government Supplied Materials & Tools

- 1.16.1 All tools are Contractor supplied unless otherwise stated in the technical specifications.
- 1.16.2 Where tools are supplied by the TA they must be returned by the Contractor in the same condition as when they were borrowed. Borrowed tools must be inventoried and signed for by the Contractor on receipt and return to the TA.
- 1.16.3 Any Government supplied material (GSM) must be received by the Contractor and stored in a secure warehouse or storeroom having a controlled environment appropriate for the equipment as per manufacturer's instructions.

1.17 Restricted Areas

- 1.17.1 The Contractor must not enter the following areas except to perform work as required by the specifications: all cabins, offices, workshops, Engineers' office, Wheelhouse, Control Room, all washrooms, Galley, Mess Rooms, Lounge areas and any other areas restricted by signage.
- 1.17.2 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.

1.18 Contractor Inspections and Protection of Equipment and the Worksite

- 1.18.1 The Contractor must coordinate an inspection with the TA and TI on the condition and location of items to be removed to gain access to a location to carry out the work prior to the commencement of any work.
- 1.18.2 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.
- 1.18.3 Materials used in any replacement or repairs must meet the criteria for Contractor supplied material noted above in section Contractor Supplied Materials and Tools.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

1.18.4 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.

1.18.5 Temporary covers to work areas must be installed.

1.19 Recording of Work in Progress

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

1.20 List of Confined Spaces

1.20.1 The Contractor may request a list of the vessel's identified confined spaces at the contract start meeting.

1.21 Lead Paint and Paint Coatings

1.21.1 The Contractor must not use lead based paints.

1.21.2 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. Results of the lead testing must be a deliverable for this contract.

1.22 Asbestos Containing Materials

1.22.1 The Contractor must not use any asbestos containing materials.

1.22.2 Handling of any asbestos containing materials must be performed and supervised 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.

1.23 Removed Materials and Equipment

1.23.1 All removed equipment as a result of this specification must remain the property of the Coast Guard unless otherwise instructed in the specification sections.

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL NOTES		

1.24 Welding Certification

- 1.24.1 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, latest revision – Certification of Companies for Fusion Welding of Steel Division 2 Certification as a minimum.
- 1.24.2 For any item requiring the application of fusion welding for stainless steel structures, the Contractor or the Sub-Contractors must be certified in accordance with the Canadian Welding Bureau, CSA\ACNOR AWS; Division 1.6 certification – latest revision.
- 1.24.3 For any item requiring the application of fusion welding to aluminum structures, the Contractor or the Sub-Contractors must be certified in accordance with the Canadian Welding Bureau, CSA\ACNOR W47.2; Division 3 certification – latest revision.
- 1.24.4 The Contractor must provide documentation to the Technical Authority clearly identifying the welding certification of all employees performing any welding included in this specification prior to the commencement of any welding.
- 1.24.5 For all items requiring the application of fusion welding for work in this specification the Contractor must comply with the latest revision of the Canadian Coast Guard Welding Specification CT-043-eq-eg-001.

1.25 Electrical Installations

- 1.25.1 All electrical installations and repairs must be carried out in accordance with the latest revisions of Transport Canada Marine Safety Electrical Standard TP127E.
- 1.25.2** All installations of electronic equipment must be carried out in accordance with Canadian Coast Guard Telecommunications and Electronics publication CGTS-3(E) entitled "General Specification for the Installation of Shipboard Electronic Equipment".

Spec Item:	Specification 844.17	TCMS Field #:
GENERAL PARTICULARS OF EXISTING VESSEL		

2.0 GENERAL PARTICULARS OF EXISTING VESSEL

Name: CCGS Griffon

Type: Twin Screw, Medium Icebreaker / Navais Tender

Class of Voyage: Inland Waters Class I Fire Extinguishing and Lifesaving Appliances for a vessel of Class X.

Year Built: 1970

Shipbuilder: Davie Shipbuilding Ltd., Lauzon, Quebec

Principal Dimensions:

- Length O.A. 234' – 0" (71.32m)
- Length B.P. 214' – 0" (65.23m)
- Breadth Mld. 49' – 0" (14.94m)
- Depth Mld. 21' – 6" (6.55m)
- Draft (Mld Design) 15' – 6 ¼" (4.73m)

Tonnages:

- Gross 2211.87 L.T. (2252 Metric Tonnes)
- Reg. Net 751.90 L.T. (765.56 Metric Tonnes)
- Displacement 15' – 6 ¼" 2944 L.T. (2991 Metric Tonnes)
- Deadweight Max 744 L.T. (757.5 Metric Tonnes)

Propulsion:

Twin screw, fixed pitch, diesel electric, total power 2x2000 S.H.P. Main machinery: four (4) Fairbanks Morse 38D8-1/8" diesel engines driving four (4) Westinghouse DC two wire single armature, non-reversing variable voltage generators.

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

3.0 PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM

3.1 Identification

- 3.1.1 The Canadian Coast Guard has a requirement to replace the controls, drive motor, drive motor mounts and associated drive components of the windlass on the CCGS Griffon with new contractor supplied equipment that complies with the Canada Shipping Act and associated Regulations pertaining to the CCGS Griffon. All plans and equipment selection must be approved by one of the Transport Canada Marine Safety recognized organizations (R.O.).
- 3.1.2 The Contractor must provide a new pedestal control console, new controls, AC drive motor complete with an integral electromechanical brake and motor mount, Variable Frequency Drive (VFD) complete with cabinet, dynamic brake resistor, coupling and housing, controls and all power and control wiring. The windlass gearbox must be retained and the slipping clutch must be removed.

3.2 Existing System Characteristics

- 3.2.1 The existing system is a Lloyd's certified Ward Leonard Electrically Driven Windlass system manufactured by Clarke Chapman & Co Ltd. and consists of the following main components:
1. Motor-Generator Set providing 57.6 KW of DC power to drive the DC motor. (located in the Hydraulics Compartment, on the lower deck level, Port Side, between Frames 110-113);
 2. Drive Control Cabinet (located in the Foc'sle, Stbd side, between Frames 112-113);
 3. Windlass complete with 72 H.P. D.C. Drive Motor rated at 290 Nm;
 4. Control Pedestal.
- 3.2.2 The system is rated as follows:
1. Cablelifter: 13 tons at 45 feet per minute(fpm);
 2. Warpend: 5 tons at 118 fpm, slack 208 fpm.
- 3.2.3 Lloyd's Register Calculations Information Data
1. Diameter of Chain(dc): 42mm (1 5/8");
 2. Grade of Chain(grade): 3;
 3. Design Depth of Anchor(Da): 40m;
 4. Anchor Weight(Wa): 2310 kg;
 5. Total length of Chain(Lc): 245m;
 6. Chain Stopper: Present.

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

3.3 Environmental Conditions

- 3.3.1 The new controls, drive motor and drive motor components must be able to operate in the following environmental conditions:
1. Outside air temperatures -35°C to 35°C and 100% humidity;
 2. Inside air temperatures 5°C to 45°C.

3.4 Access Limits

- 3.4.1 Dimension of access doors:
1. Upper deck to Foc'sle deck workshop: 0.755m wide x 1.575m high;
 2. Foc'sle deck workshop to Winch Compartment: 0.711m wide x 1.930m high;
 3. Winch Compartment to Bow Thruster Compartment: 0.628m wide x 1.676m high.

3.5 Ship Service Generators Information:

- 3.5.1 The CCGS Griffon is fitted with 3 Caterpilllar 3406C diesel engines each fitted with SR4B 320kW/400KVA/460V/60Hz electrical generators.

3.6 References

3.6.1 Drawings

Drawing Number	Description	Electronic File Name
CMG05-111-GA sheets 1-2	General Arrangement	G05111ga1.pdf & G05111ga2.pdf
CMG05-140-SE	Construction Sections	G05140se1.pdf
CMG05-108-ST sheet 6	Tank Top, Upper and Lower Deck Scantlings	G05108st6.pdf

3.6.2 Standards

- 3.6.2.1 Refer to standards listed in section 1.4.1.

3.7 Engineering

- 3.7.1 The Contractor must engineer a fully integrated new drive system for the CCGS Griffon windlass that must be approved by one of the TC recognized organizations.

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

- 3.7.2 As part of the solicitation bid, the Contractor must submit the proposed engineered design including the following:
1. Preliminary mechanical drawings showing orientation, size and location of all major components such as the drive motor, drive motor coupling, drive motor mount and connections to the existing reduction gearbox, reduction gearbox cover, pedestal stand details (including controls) and cabinet details (including measurements and controls) and mountings for the Variable Frequency Drive (VFD) components;
 2. Preliminary electrical schematic drawings showing the interconnection of the proposed major components and wire gauge details;
 3. Bill of Materials clearly indicating the detail characteristics, such as the manufacturer and ratings of the selected components for the AC motor, VFD, dynamic brake resistor and pedestal control console components.
- 3.7.3 Except where otherwise specified, all components located above deck must be certified to a minimum of NEMA 4x and meet or exceed IP56 rating.
- 3.7.4 Except where otherwise specified, all components located below deck must be certified to a minimum of NEMA 2 and meet or exceed IP22 rating.
- 3.7.5 All electrical components exposed to the elements such as control joystick, indicators and push buttons must be certified to a minimum of NEMA 4x and meet or exceed IP68.
- 3.7.6 All new enclosures must be fitted with anti-condensation heaters, i.e. motor, VFD cabinet, junction box, and pedestal control console. Anti-condensation heaters must be of sufficient size and quantity to provide heat to keep the electrical and electronic components moisture free at a temperature of -35°C.
- 3.7.7 All exposed non-painted components must be protected from corrosion or fabricated of non-corrosive materials such as stainless steel 316 or 17-4PH, manganese bronze, or composite hydrolysis resistant plastic.
- 3.7.8 All indicator and witness lights must be LED type.

3.8 Electrical components

- 3.8.1 The new electrical components of the system must include at minimum:
1. AC Motor;
 2. Dynamic Brake Resistor;
 3. Variable Frequency Drive for AC Motor;

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

4. New local and remote controls, instruments and indicators;
5. New power and shielded control cabling.

- 3.8.2 The Contractor must adapt the new drive system to re-use the existing power source of 440V/3/60 105.5 Amps.
- 3.8.3 The Contractor must design the electrical drive system to ensure that the load of the VFD and all associated electronic components never exceeds 70% of the existing ship service generators power supply capacity to eliminate the need for multiple line filters.
- 3.8.4 The Contractor must provide R.O. approved electrical calculations and provide a new, certified to a minimum of NEMA 6 and meet or exceed IP66 rating, totally enclosed, foot mounted AC electrical motor of equivalent torque/speed to the existing 72 HP DC motor complete with a new motor junction box and an integral electromechanical brake. The motor must be capable of producing a minimum of 290Nm at its nominal rating. The AC motor must be approved by the AC motor manufacturer for VFD applications. The AC motor drive end must be fitted with a D flange.
- 3.8.5 The Contractor must provide R.O. approved electrical calculations and provide a dynamic brake resistor sufficient to hold 100% of the brake capacity as per approved calculations.
- 3.8.6 The dynamic brake resistor must be fitted with sufficient forced ventilation to maintain the resistor's temperature within the OEM recommended operating temperature range under all Foc'sle deck ambient temperature conditions. The Contractor must provide the calculations demonstrating that the fitted ventilation arrangement meets this requirement.
- 3.8.7 The dynamic brake resistor must be fitted with physical protections to prevent humans and flammable materials to come directly in contact with the resistor element when in operation.
- 3.8.8 The Contractor must provide R.O. approved electrical calculations and provide a new Variable Frequency Drive compatible with the selected AC motor for the application. The VFD must be fitted within a protective cabinet and must include DC choke and full spectrum harmonic filters in compliance with IEEE Standard 519-2014 Recommended Practice and Requirements for Harmonic Control in Electric Power Systems and IEEE 1531-2003 Guide for Application and Specification of Harmonic Filters. The VFD Cabinet's must be located in the same general location as the existing Clarke Chapman 440V power panel such that the existing wiring can be successfully terminated inside the cabinet.

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

- 3.8.9 The VFD cabinet must be designed to be large enough to accommodate the controls for all anti-condensation heaters.
- 3.8.10 The Contractor must incorporate into the design of the VFD cabinet double pole (mechanically connected) breakers for the anti-condensation heaters of the AC motor, VFD cabinet and the pedestal control.
- 3.8.11 The VFD cabinet must be fitted with sufficient forced ventilation to maintain the ambient internal cabinet temperature within the OEM recommended operating temperature range under all Foc'sle deck ambient temperature conditions. The Contractor must provide the calculations demonstrating that the fitted ventilation arrangement meets this requirement. All ventilation openings in the VFD cabinet must be fitted with air filters compliant to MERV 9 or better of the ASHRAE 52.2 Standard.
- 3.8.12 The Contractor must design into the VFD program a minimum of 2 access levels, one as a view only for operators and the second for maintenance, troubleshooting, monitoring, and adjustments. The Contractor will provide the Chief Engineers with complete access level to the VFD program to perform all service maintenance, monitoring of all inputs/outputs, troubleshooting and settings adjustments.
- 3.8.13 The maximum combined room for the VFD cabinet, local controls and the dynamic brake resistor is 0.610m deep x 0.940m wide x 2.083m high.
- 3.8.14 The Contractor must design the following control and indicator functionalities into the front panel of the local VFD cabinet:
1. Disconnect breaker;
 2. Ammeter;
 3. VFD Monitoring Display;
 4. Start/stop/emergency stop;
 5. Run/stop/power available indicator lights;
 6. Hour meter.
- 3.8.15 The Contractor must design the following control and indicator functionalities into the top of the remote pedestal control console:
1. Joystick;
 2. Start/stop/emergency stop;
 3. Run/stop/power available indicator lights.
- 3.8.16 The Contractor must arrange the controls, instruments and indicators for the VFD drive cabinet and the pedestal console, in the most ergonomic configuration for the operator. The Contractor must submit a layout plan for each to the TA for comments prior to fabrication.

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

- 3.8.17 The Contractor must program the VFD to treat the joystick as a speed reference for both lowering (forward direction) and raising (aft direction) motions.
- 3.8.18 The emergency stops must be hard wired in series and must be of the mechanically locking mushroom type, pull to activate, that will interrupt the control power within the VFD drive to prevent its operation.
- 3.8.19 The Contractor must perform all electrical load calculations and provide new marine grade approved power and shielded control cabling for the entire new drive system components, as follows:
1. VFD to Motor;
 2. VFD to Dynamic Brake Resistor;
 3. VFD to local and remote controls;
 4. Power cables from the VFD cabinet to all anti-condensation heaters.
- 3.8.20 The Contactor must perform and provide the TA with all Arc Flash Hazard Analysis Studies for the new components as well as for the existing power source breaker in compliance with the latest revisions of CSA-Z462 Workplace Electrical Safety and CSA Z431 Basic Safety Procedures for Man-Machine Interface standards. The label template must include the following information and comply with the Standard IEEE 1584:
1. Working Distance
 2. Incident Energy
 3. Arc Flash Boundary
 4. Power system scenario (e.g., three generators connected, one generator + shore power, etc.)
 5. Nominal voltage of Shock Hazard
 6. Limited approach boundary
 7. Restricted approach boundary
 8. Glove class; PPE Class
 9. Equipment Location
 10. File name (One-Line Diagram Model file name)
 11. Contractor company name
 12. Date on which Arc Flash Analysis has been completed
 13. Standard according to which arc flash analysis has been completed

3.9 Mechanical and Structural Components:

- 3.9.1 The new mechanical and structural components of the system must include at minimum:
1. AC Motor mount;

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

2. A flexible coupling;
3. A bell housing;
4. A control console pedestal.

- 3.9.2 The Contractor must design a new mount for the AC motor. The mount must be fitted to the existing windlass and cannot extend more than 0.125m aft of the existing windlass base. The width of the mount must accommodate motor feet and protrusion from the windlass base must be kept to a minimum. The mount design must allow sufficient clearance for the use of shims under the motor feet for the AC motor alignment. The mount must allow aligning of the output shaft of new AC motor with the existing wormshaft of the Windlass gearbox to within 1 degree of angular misalignment. The mount must be fitted with drainage openings sufficient to prevent pooling of water within the mount.
- 3.9.3 The Contractor must adapt the existing 88.9 mm wire transit pipe from the Winch Compartment to the drive motor to a watertight Roxtec watertight and fire proof wire transit. The transit must be recommended by Roxtec for this type of application, and size and quantity of cable of the new motor drive installation.
- 3.9.4 The Contractor must provide a Dunlop Dunflex or equivalent flexible coupling between the existing windlass gearbox wormshaft and the new AC Motor. The end of the coupling installed onto the existing gearbox wormshaft must be sized or made to fit the wormshaft.
- 3.9.5 The Contractor must supply a sealed watertight bell housing to protect the flexible coupling, and motor and gearbox wormshaft seals from dirt and water ingress. The bell housing must in no way be a structural element of the windlass installation. The bell housing must be designed to fit the D flange of the new AC motor and must be fitted with a watertight access door. The access door must be of sufficient size to allow for the servicing and replacement of the flexible elements of the new coupling.
- 3.9.6 The Contractor must provide a new watertight control console pedestal. The new pedestal must be designed to fit the existing pedestal mount on the Foc'sle deck. The pedestal must not exceed the footprint of the existing mount and the top of the console must be between 0.920 and 1.000m high.
- 3.9.7 The pedestal must be made of stainless steel. The console must be fitted with a watertight access of sufficient size to service all control components. Access opening corners must be rounded. Access opening cut edges must be made smooth.

Spec Item:	Specification 844.17	TCMS Field #:
PERFROMANCE REQUIREMENTS – WINDLASS DRIVE SYSTEM		

- 3.9.8 The pedestal console must be fitted with a watertight cover on top. The watertight cover must be hinged at the forward end and be fitted with a quick release securing mechanism that will maintain the protection of all pedestal controls in all sea and ice conditions. The cover must have sufficient height to clear all controls when operated.
- 3.9.9 The Contractor must re-use the existing 76.2mm wire transit pipe from the Winch Compartment to the pedestal console. The Contractor must ensure watertight integrity between the new equipment and the existing wire transit pipe. The transit must be packed with fire-retardant expanding foam or equivalent once the cables have been run.

3.10 Proof of Performance

3.10.1 Certification

- 3.10.1.1 The Contractor is responsible to obtain a design approval certificate from the R.O. for the new windlass drive system.
- 3.10.1.2 The Contractor must submit the new windlass drive system approved design to TCMS Technical Services in Sarnia and must obtain TCMS approval prior to installation.

TCMS Technical Services
100 Front Street South
Sarnia, ON
N7T 2M4

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

4.0 WINDLASS DRIVE REPLACEMENT

4.1 Identification

- 4.1.1 The Contractor must install the components specified in Section 3.0 of this specification. All identified old components must be removed and kept for return to the Coast Guard at the completion of the contract.

4.2 References

4.2.1 Drawings

Drawing Number	Description	Electronic File Name
68/93/54E	Anchor Windlass - schematic	68_93-54.pdf
K.4028	General Arrangement	K_4028.pdf
L.1336	Layout for Unit Ward Leonard Set	L1336.pdf
766401/A10	Electrical Plant Schematic Wiring Diagram	766401.pdf
D1E	Propulsion system drawings	D1E.pdf
3084/9	Slipping Clutch	3084_9.pdf
3158/1A	Bedplate	3158_1.pdf
3158/2A	Wormcase	3158_2A.pdf
3158/3	Wormshaft	3158_3.pdf

4.2.2 Regulations

- 4.2.2.1 Transport Canada Marine Safety Marine Machinery Regulations, latest revision.
- 4.2.2.2 Lloyd's Register (LR) Classification Society, Standard for the Classification of Ships – all applicable regulations.

4.2.3 Standards

- 4.2.3.1 National Electrical Manufacturer Association Standards (NEMA), Latest Revision;
- 4.2.3.2 International Electro Technical Commission Ingress Protection Standards (IP), latest revision;
- 4.2.3.3 IEEE Standard 45 Recommended Practice for Electrical Installation on Ships, latest revision;
- 4.2.3.4 IEC 60092 Electrical Installations in Ships, latest revision;
- 4.2.3.5 ASHRAE Standard 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size, latest revision;
- 4.2.3.6 International Paint, all applicable technical data sheets, latest revision.

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

4.3 Technical

4.3.1 General

- 4.3.1.1 The Contractor must supply all materials, tools and labour required to complete the work in this Technical Specification.
- 4.3.1.2 All removed old drive components must be removed, safely stored and returned in a usable condition to CG at the end of the contract.
- 4.3.1.3 The Contractor must temporarily seal all openings in the wire transits created by the removal of cables and wires in this specification to prevent the ingress of moisture and dirt at all times.
- 4.3.1.4 The Contractor must not create any new opening in the ship's structure for the purpose of removing or installing the windlass drive system components.
- 4.3.1.5 All removed cables that are surplus to the requirement must be discarded by the Contractor.
- 4.3.1.6 All new cabling must meet TP127E requirement for their intended applications.
- 4.3.1.7 All new cabling intended for passage through a watertight gland must have a low-smoke, polymer exterior coating.

4.3.2 Removals

- 4.3.2.1 The Contractor must disconnect, remove from the ship, store and return to CG prior to the end of the contract the following equipment:
 - 1. Motor-Generator Set (M-G Set), fully assembled;
 - 2. Windlass DC Motor and motor mount;
 - 3. DC Motor Control Cabinet and Components;
 - 4. Slip Clutch Assembly;
 - 5. Pedestal Control Console.

4.3.2.2 Electrical components

- 4.3.2.2.1 The Contractor must use a lock out tag out system to lockout out breakers NP-4, circuit 10 and L-8, circuit 7 prior to commencing any removals.
- 4.3.2.2.2 The Contractor must disconnect and isolate the Machinery Control Room mimic windlass indication circuit at the back of the mimic panel in the MCR. Wires to input board 10763, 10757, 10762, 10764 on CCGS Griffon Propulsion Drawing D1E.
- 4.3.2.2.3 The Contractor must locate, identify and label the following cables. These cables must be disconnected, pulled back and reused with the new unit:

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

1. Main Supply Cable coming from NP-4 circuit 10.
2. Anti-condensation heater supply cable coming from L-8 circuit 7.
3. Machinery Control Room Indication cable (wires 4.8. & T2) off the aux. contact relay (460VAC coil) mounted on the inside, inboard side of the control cabinet.

- 4.3.2.2.4 The Contractor must disconnect all cables (8) from the windlass M-G Set and release the unit from its mount, remove it from the ship and return it to CG prior to the end of the contract. The unit can be disassembled for removal, but must be returned to CG fully assembled.
- 4.3.2.2.5 The M-G Set cables must be cut where they pass behind the 460 Volt Hydraulic Power Pack Panel at Frame 113 as well as where they emerge from the sheathing at the deckhead level. All remaining lengths of the 8 cables must be pulled back to its source and removed.
- 4.3.2.2.6 Where the M-G Set cables pass through the cable transit behind the Deck Winch Power Pack, the transit must be disassembled to remove the cables and then resealed using Contractor supplied new Roxtec module blocks.
- 4.3.2.2.7 The Contractor must disconnect and remove all other cables from the control cabinet, unbolt the control cabinet from its base and remove it from the vessel.
- 4.3.2.2.8 The Contractor must uncouple, unbolt, and remove the windlass drive motor and drive motor junction box from its base and remove them from the vessel.
- 4.3.2.2.9 The Contractor must disconnected and remove the 4 cables leading to the drive motor and the 3 cables leading to the control pedestal.

4.3.2.3 Mechanical and Structural Components:

- 4.3.2.3.1 The mounting arrangement for the M-G set must be left in place.
- 4.3.2.3.2 The steel angle cable supports must be cropped 1" above deck by low heat method. The Contractor must note the Port Deep Fuel Oil Tank is beneath the M-G set.
- 4.3.2.3.3 The Contractor must uncouple the slipping clutch from the windlass gearbox shaft and remove it from the vessel.
- 4.3.2.3.4 The Contractor must unbolt the existing control pedestal from its base and from the wire transit pipe and remove it from the vessel.

4.3.3 Installation

- 4.3.3.1 The Contractor must install all components in accordance with OEM instructions.
- 4.3.3.2 All equipment installations on the exterior deck must be watertight.

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

4.3.3.3 Except where otherwise specified, all fasteners used on the exterior deck must be new stainless steel locking fasteners.

4.3.3.4 Mechanical and Structural Components

- 4.3.3.4.1 The Contractor must sandblast the surface of the existing windlass mount in the way of the removed motor mount to SA 21/5 sspc.sp10 bare metal or equivalent. The Contractor must afford the Inspection Authority (IA) the opportunity to inspect the cleaned pedestal mount prior to priming.
- 4.3.3.4.2 The Contractor must prime and paint the existing windlass mount in the way of the removed motor mount as per the Coatings Section of this Technical Specification prior to the installation of the new motor mount.
- 4.3.3.4.3 The Contractor must provide and install the new AC motor mount to the existing windlass base. All welds between the mount and the windlass base must be continuous fillet welds.
- 4.3.3.4.4 The Contractor must provide, fit and install a new flexible coupling between the windlass gearbox wormshaft and the new drive motor. The Contractor must provide all machining to fit the new flexible coupling to the gearbox wormshaft. The Contractor must in no way alter the gearbox wormshaft. Machined surface final measurements must be recorded and provided to the TA prior to the end of the contract.
- 4.3.3.4.5 The Contractor must provide and install a new bell housing assembly. The bell housing adaptor must be fitted to the face of the gearbox. The housing must be shimmed and epoxy filled to ensure concentricity between the gearbox shaft alignment and drive motor mounting faces. The Contractor must demonstrate concentricity of the assembly to the IA.
- 4.3.3.4.6 The bell housing must be fitted to the adapter, ensuring the access door of the bell housing is located on the top side.
- 4.3.3.4.7 The Contractor must provide and install the new drive motor to the new motor mount using grade 8 bolts. The motor must be aligned to the existing gearbox wormshaft via laser alignment. The motor feet must be shimmed and epoxy levelled using Chockfast Orange or approved equivalent. The Contractor must afford the IA to witness the motor alignment. All alignment measurements must be recorded and provided to the TA prior to the end of the contract.
- 4.3.3.4.8 The Contractor must secure the bell housing to the motor D flange. A new o-ring must be fitted between the bell housing and the face of the D flange of the motor.


Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

- 4.3.3.4.9 The Contractor must adapt the existing DC drive motor wire transit pipe to accept a new Contractor supplied watertight Roxtec wire transit. The entire wire transit assembly must be made watertight. The wire transit pipe must be packed with approved fire retardant foam once the cables have been installed and after watertight testing has been witnessed by the IA.
- 4.3.3.4.10 The Contractor must clean the gasket surface of the pedestal mount to bare metal and sandblast the existing mount to SA 21/5 sspc.sp10 bare metal or equivalent. The Contractor must afford the IA the opportunity to inspect the cleaned pedestal mount prior to priming.
- 4.3.3.4.11 The Contractor must prime and paint the existing pedestal base as per the Coatings Section of this Technical Specification prior to the installation of the new pedestal control console.
- 4.3.3.4.12 The Contractor must provide and install the new operator control pedestal to the existing base using a Contractor supplied 1/8" red rubber gasket between the new pedestal and the existing base. All fasteners must be replaced.
- 4.3.3.4.13 The Contractor must connect the wire transit pipe to the control pedestal using a Contractor supplied 1/8" red rubber gasket between the new pedestal and the wire transit pipe flange. All flange fasteners must be replaced. The pipe must be packed with approved fire retardant foam once the cables have been installed and after watertight testing has been witnessed by the IA.
- 4.3.3.4.14 The Contractor must modify the existing control panel mounting arrangement to accommodate the footprint of the new VFD cabinet and braking resistor assemblies. The Contractor must clean to bare metal, prime and paint, as per the Coatings Section of this Technical Specification, the modified VFD cabinet and brake resistor assemblies mounting arrangements prior to installation of the assemblies.
- 4.3.3.4.15 The Contractor must provide and install onto the modified mounting arrangement the new VFD cabinet and dynamic brake resistor assemblies. The installation must be rigid and well supported.
- 4.3.3.5 Electrical Components**
- 4.3.3.5.1 The Contractor must label each end of all wires and all wire connections in a way that clearly identifies its use. Wire labelling must correspond to the final as fitted drawings.
- 4.3.3.5.2 The Contractor must megger the following cables prior to commencing with the install:
1. Main Supply Cable coming from NP-4 circuit 10.

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

2. Anti-condensation heater supply cable coming from L-8 circuit 7.
 3. Machinery Control Room Indication cable (wires 4.8. & T2) off the aux. contact relay (460VAC coil) mounted on the inside, inboard side of the control cabinet.
- 4.3.3.5.3 The Contractor must submit the results to the Technical Authority prior to commencing with the installation. Should any of the cables have unacceptable readings, they will be replaced using Public Service Procurement Services (PSPC) 1379 form.
 - 4.3.3.5.4 The Contractor must connect the three existing cables as required to supply power to the drive, power to the anti-condensation heaters and contacts for the Machinery Control Room indication mimic.
 - 4.3.3.5.5 The Contractor must ensure symmetrical wire distribution and labelling between the power source and the VFD and from the VFD and the motor. Interconnecting motor drive wiring between the VFD cabinet and the motor must be symmetric VFD cable with 3 power conductors and 3 ground conductors.
 - 4.3.3.5.6 The Contractor must supply and install all new cables and terminal blocks as required and as follows:
 1. Cables from the drive cabinet to the drive motor;
 2. Cables from the drive cabinet to the control pedestal;
 3. Cables from the drive cabinet to the braking resistors assembly.
 - 4.3.3.5.7 The Contractor must verify, and adjust to suit the new installation, all trip settings and protection curves for the 440V power source breaker.
 - 4.3.3.5.8 The Contractor must provide and install the Arc Flash labels on the outside of the VFD cabinet and the existing power source. The label template must be identical to the one below and have an orange header with the wording "WARNING" and include all information listed in the arc flash calculation section.

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		



WARNING

Arc Flash and Shock Hazard

ARC FLASH PROTECTION	SHOCK PROTECTION
Working distance: 460 mm (18 in)	Shock hazard when cover is removed: 600 VAC
Incident energy: 5.0 cal/cm²	Limited approach: 1.0 m (42 in)
Arc flash boundary: 1.2 m (46 in)	Restricted approach: 300 mm (12 in)
	Glove class: 0

Power system scenario: **three propulsion generators connected**

Equipment location: MCC#3 File: "ABC PLANT Rev X.xyz"	Arc Flash Analysis by: XYZ Consulting March 14, 2011 Std. IEEE 1584
---	--

4.3.3.5.9 The Contractor must remove all lockouts.

4.3.4 Coatings

- 4.3.4.1 All coatings must be applied following all of International Paints requirements for each product and application.
- 4.3.4.2 All new and disturbed metal on exterior surfaces must be cleaned and power tooled to an equivalent of SSPC-10 near white finish. The Contractor must then apply a three coat International Paint system consisting of Interzinc 52 Zinc-Epoxy Primer, Intergard 475 HS Modified Epoxy Tie-Coat, and Interfine 629 HS Modified Acrylic Top Coat, RAL 070 7040.
- 4.3.4.3 All bare and disturbed metal interior surfaces must be cleaned to bare metal. The Contractor must apply two coats of marine primer Interprime 234 and two coats marine primer Interlac 665, RAL 3011 to all bare and disturbed metal interior surfaces.

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

4.4 Proof of Performance

4.4.1 All testing must be performed in the presence of the Technical Authority and the TCMS Inspection Authority.

4.4.2 Inspections, Tests and Trials

4.4.2.1 The Contractor must perform a hose test at 60 psi for 20 minutes each on all exterior components seals and connections. All leaks will be repaired at the Contractor's expenses.

4.4.2.2 The Contractor must supply the services of a qualified NDT inspector, certified in the use of CTRL UL 101 ultrasonic inspection system or a model of equivalent capabilities. The wire transits to the pedestal console and to the drive motor must be inspected ultrasonically and must be to inspectors' satisfaction indicating that the penetrations are watertight. Any transits that fail testing must be reopened and reworked by Contractor until they pass inspection. The Contractor must provide the TA with a report from the NDT inspector indicating that the penetrations are watertight, prior to the end of the Contract.

4.4.2.3 The Contractor must commission the system, verify and demonstrate to the TA and the TCMS Inspector all operating and safety functions of the system and components, including power breaker protections, prior to load testing.

4.4.3 Testing/Trials

4.4.3.1 The anchor windlass must be tested under normal working conditions to demonstrate satisfactory operation. Tests for braking, power lowering, hoisting, and proper riding of the chain through the hawsepipe, over the wildcat, through the chain pipe, and stowing in the chain locker must be demonstrated.

4.4.3.2 All weights required to achieve test loads as detailed below must be measured in the presence of the Technical Authority by a device calibrated within the last year.

4.4.3.3 LR requires the anchor windlass to achieve a lift of the anchor from a depth of 82.5 m to a depth of 27.5 m at a mean speed of 9m/min. Exception to this requirement where water depth in the trial zone is inadequate must be made and, equivalent simulating conditions acceptable to the TCMS Inspector must be performed as an alternative. The Contractor is responsible for developing a test method that complies with LR requirements. For calculation purposes the anchor weight is 2273 kg (5000 lbs), and the chain weighs 37.5 kg/m (25.2 lbs./ft). The distance of the hawsepipe to the waterline is approximately 4 m (13.1 ft).

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

- 4.4.3.4 A no-load test must be performed where the windlass must be run once in the normal and once in the reverse direction for a sum of 30 minutes at the rated speed.
- 4.4.3.5 A load test to verify that the working load, rated speed, and overload pull are attainable must be performed. The working load is based on the type of chain fitted, and the windlass must be able to continuously pull the working load for 30 minutes. The overload pull is 150% of the working load, and the windlass must be able to operate under the overload pull for 2 minutes at reduced speed. The rated hoisting speed must be .15 m/sec (9m/min) or more. The Contractor is responsible for all weights, shackles, wires, crange, rigging, labor and equipment to demonstrate these capabilities.
- 4.4.3.6 The Contractor must perform a brake test to confirm the holding power of the brake, either by test or calculation. The holding load is 130% of the working load. The brake must also be tested onboard with the anchor dropping controlling the holding load by applying the brake at each half chain length.
- 4.4.3.7 Performance testing must include confirmation of remote control operation, automatic control brake system.
- 4.4.4 Certification**
- 4.4.4.1 The Contractor is responsible to obtain the approval from TCMS Inspector for the new windlass drive system once the installation is completed and all tests have been conducted to the TCMS Inspector's satisfaction.
- 4.5 Deliverables**
- 4.5.1 All system components must be delivered to Coast Guard by March 15th, 2018. Delivery must be to:
- CCGS Griffon
Attn: Chief Engineer
401 King St. West, P.O. Box 1000
Prescott, Ontario
K0E 1T0
- 4.5.2 Intellectual Property (IP) License**
- 4.5.2.1 The terms of Intellectual Property rights are set out in SACC Supplemental General Conditions 4006 – Contractor to Own Intellectual Property Rights in Foreground Information.
- 4.5.2.2 For clarity, Foreground Information includes, but is not limited to, all windlass drive system as fitted drawings; engineering calculations;

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

approvals and certifications; manuals produced or developed for operation, maintenance, parts and training; VFD programming specification. This information will be used in the operation, maintenance, servicing, set points adjustments and future upgrades to the windlass drive system.

4.5.3 Documentation (Reports/Drawings/Manuals)

- 4.5.3.1 The Contractor must submit to the TA for review the proposed engineering design, pedestal console and VFD cabinet controls, instrument and indicator layouts 8 weeks after contract award.
- 4.5.3.2 The Contractor must provide the TA with the R.O. design approval certificates and all R.O. approved documents for the new windlass drive system prior to installation.
- 4.5.3.3 The Contractor must provide the TA with all TCMS design approval documents for the new windlass drive system prior to installation.
- 4.5.3.4 The Contractor must provide a report detailing the following:
1. All settings and adjustments after the commissioning of the new equipment;
 2. Arc flash documentation for the VFD and the 440V power breaker;
 3. The final machining measurements for the coupling attached to the gearbox wormshaft, if applicable;
 4. The final new drive motor alignment readings after laser alignment is complete;
 5. All calibration certificates for any measuring devices used;
 6. "As-Fitted" drawings for new mechanical, structural and electrical components installed;
 7. All performance data recorded during the trials including methodology for each test, all weights used, and all speed and amperage readings taken;
 8. The bill of materials, complete with makes, models and part numbers for all new system components.
 9. Report on the Megger readings taken of existing cables.
- 4.5.3.5 The Contractor must provide the TA with electronic copies of all OEM operation, maintenance and parts manuals for the installed components.
- 4.5.3.6 The Contractor must provide the TA with an electronic copy of the VFD program, all program settings and user access levels and codes.
- 4.5.3.7 The Contractor must provide the TA with all specialty tools and programs required for the maintenance of the new windlass drive system.

Spec Item:	Specification 844.17	TCMS Field #:
WINDLASS DRIVE REPLACEMENT		

4.5.3.8 The Contractor must return, prior to the end of the contract, all removed windlass drive parts, unless otherwise specified.

4.5.4 Spares

4.5.4.1 The Contractor must provide the TA with a list including current prices of critical electrical and mechanical spares for the new windlass drive system.

4.5.5 Training

4.5.5.1 The Contractor must provide two separate none consecutive days (8 hours) of onboard training at the Canadian coast Guard Base in Prescott Ontario, one for each crew, for 4-6 people per crew on the new windlass drive system operation and troubleshooting. Any change in location will be changed using PSPC 1379 form.

4.5.5.2 Crew training must be completed after the new drive system has been fully tested by the Contractor and is deemed to be operational. One training day will occur immediately after commissioning. The Contractor must plan on travelling to the Coast Guard Prescott Base on a separate occasion for the second training day.

4.5.5.3 The training must cover all knowledge to acquire to perform all tasks listed in 3.8.12.