

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Bid Receiving - PWGSC / Réception des soumissions -
TPSGC
11 Laurier St. / 11, rue Laurier
Place du Portage , Phase III
Core 0A1 / Noyau 0A1
Gatineau, Québec K1A 0S5
Bid Fax: (819) 997-9776

SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

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

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

Comments - Commentaires

Vendor/Firm Name and Address
Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution
Ship Refits and Conversions / Radoubss et
modifications de navires and / et
11 Laurier St. / 11, rue Laurier
6C2, Place du Portage
Gatineau, Québec K1A 0S5

Title - Sujet Services for Floating refit	
Solicitation No. - N° de l'invitation F2599-135004/A	Amendment No. - N° modif. 001
Client Reference No. - N° de référence du client F2599-135004	Date 2013-05-24
GETS Reference No. - N° de référence de SEAG PW-\$\$MD-028-23736	
File No. - N° de dossier 028md.F2599-135004	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2013-06-13	Time Zone Fuseau horaire Eastern Daylight Saving Time EDT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Avery, David	Buyer Id - Id de l'acheteur 028md
Telephone No. - N° de téléphone (819) 956-5939 ()	FAX No. - N° de FAX (819) 956-0897
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation

F2599-135004/A

Amd. No. - N° de la modif.

001

Buyer ID - Id de l'acheteur

028md

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

F2599-135004

File No. - N° du dossier

028mdF2599-135004

CCC No./N° CCC - FMS No/ N° VME

Solicitation Amendment #1: is issued 1) to revise the specifications included in Annex A of the solicitation, 2) Replace Annex G, 3) Replace Annex H

1) Revise specification for 356.13, and add new specification 355.13 to the work package included in Annex A

Remove: Annex A in its entirety

Replace with:

Solicitation No. - N° de l'invitation

F2599-135004/A

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

F2599-135004

Amd. No. - N° de la modif.

001

File No. - N° du dossier

028mdF2599-135004

Buyer ID - Id de l'acheteur

028md

CCC No./N° CCC - FMS No/ N° VME

ANNEX A

Technical Specification

CCGS GRIFFON FLOATING REFIT 2013, REV 9

Specification no. 756.13 (ATTACHEMENTS AND ASSOCIATED DRAWINGS)

Dated May 16, 2013

AND

CCGS Griffon Electrical Refit 2013 Rev. 5

Specification no: Spec # 755.13 rev. 5,

Date: May 17, 2013

Solicitation No. - N° de l'invitation

F2599-135004/A

Amd. No. - N° de la modif.

001

Buyer ID - Id de l'acheteur

028md

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

F2599-135004

File No. - N° du dossier

028mdF2599-135004

CCC No./N° CCC - FMS No/ N° VME

2) Replace Annex G

Remove: Annex G in it entirety

Replace with:

ANNEX G**Financial Bid Presentation Sheet****G1 Price for Evaluation**

A)	Known Work For work as stated in Part 1 Clause 1.2, Specified in Annex "A" and detailed in the attached Pricing Data Sheets Appendix 1a of Annex "G"(for Specification 756.13),, for a FIRM PRICE of:	\$ _____
B)	<p>Unscheduled Work Contractor Labour Cost: Estimated labour hours at a firm Charge-out Labour Rate, including overhead and profit for evaluation purpose only: 1000 person hours X \$ _____ per hour for a PRICE of: See Article G2.1 and G2.2 below.</p> <p>Overtime premium for time and one half: Estimated hours for evaluation purposes only: 100 person hours X \$ _____ per hour for a PRICE of: See Article G3 Below.</p> <p>Overtime premium for double time: Estimated hours for evaluation purposes only: 80 person hours X \$ _____ per hour for a PRICE of: See Article G3 below.</p>	<p>\$ _____</p> <p>\$ _____</p> <p>\$ _____</p>
C)	Total cost of options Specification 756.13 , Specified in Annex "A" and detailed in the attached Pricing Data Sheets Appendix 1b of Annex "G", for a FIRM PRICE of: Items numbers 8,10, 14 and 15.(included for evaluation only and will only be included in contract if options exercised by Canada)	\$ _____
D)	Known Work For work as stated in Part 1 Clause 1.2, Specified in Annex "A" and detailed in the attached Pricing Data Sheets Appendix 2 of Annex "G" (for Specification 755.13), for a FIRM PRICE of:	\$ _____
E)	<p>Daily Service Fees for evaluation purposes only As per Clause G4</p> <p>i) Ten (10) working days X \$ _____ firm daily service fee = \$ _____</p> <p>ii) Four (4) non-working days X \$ _____ firm daily service fee = \$ _____</p>	<p>\$ _____</p> <p>\$ _____</p>
F)	<p>Vessel Transfer Cost as Per Clause G7</p> <p>Proposed shipyard / ship repair facility: _____</p>	\$ _____
G)	EVALUATION PRICE GST Excluded, [A + B + C+ D+E+F] For an EVALUATION PRICE of (GST/HST excluded):	\$ _____

G2 **Unscheduled Work**

The Contractor will be paid for unscheduled work arising, as authorized by Canada. The authorized unscheduled work will be calculated as follows:

"Number of hours (to be negotiated) X \$ _____, being the Contractor's firm hourly charge-out labour rate which includes overhead, consumables, and profit, plus net laid-down cost of materials to which will be added a mark-up of 10 percent, plus Goods and Services Tax or Harmonized Sales Tax, if applicable, of the total cost of material and labour. The firm hourly charge-out labour rate and the material mark-up will remain firm for the duration of the Contract and any subsequent amendments."

G2.1: Notwithstanding definitions or usage elsewhere in this document, or in the Contractor's Cost Management System, when negotiating Hours for unscheduled work, PWGSC will consider only those hours of labour directly involved in the production of the subject work package.

Elements of Related Labour Costs identified in G2.2 below, will not be negotiated, but will be compensated for in accordance with Note G2.2. It is therefore incumbent upon the bidder to have bid appropriately which will result in fair compensation, regardless of their Cost Management System.

G2.2: Allowance for Related Labour Costs such as: Management, all Supervision, Purchasing and Material Handling, Quality Assurance and Reporting, First Aid, Gas Free Certification Inspecting and Reporting, and Estimating and preparing unscheduled work Submissions will be included as Overhead for the purposes of determining the Charge-out Labour Rate entered in line G2 above.

G2.3: The 10% mark-up rate for materials will also apply to subcontracted costs. The mark-up rate includes any allowance for material and subcontract management not allowed for in the Chargeout Labour Rate. The Contractor will not be entitled to a separate labour component for the purchase and handling of materials or subcontract administration.

G3 **Overtime**

The Contractor must not perform any overtime under the Contract unless authorized in advance and in writing by the Contracting Authority. There will be no overtime payment for Known Work. Any request for payment must be accompanied by a copy of the overtime authorization and a report containing the overtime performed pursuant to the written authorization. Payment for authorized overtime will be calculated as follows:

For unscheduled work, the Contractor will be paid the authorized overtime hours at the quoted charge-out labour rate plus the following premium rates:

For Time and one half: \$ _____ per hour; or,

For Double time \$ _____ per hour

The above premiums will be calculated by taking the average hourly direct labour rate premiums, plus certified fringe benefit, plus profit on labour premium and fringe benefits. These rates will remain firm for the duration of the Contract, including all amendments and are subject to audit if considered necessary by Canada.

G4 Daily Services Fee

In the event of a delay in the performance of the Work, and if such delay is recognized and agreed upon by the Contracting Authority as being attributable to Canada, Canada agrees to pay the Contractor the daily services fee, described below, for each day of such delay. This fee shall be the sole liability of Canada to the Contractor for the delay.

The firm daily services fee is:

- (a) For a working day: \$ _____
- (b) For a non-working day: \$ _____

The above fees shall include but not be limited to, all aspects of the following costs: Project Management Services, Administrative Support, Production Services, Quality Assurance, Material Support, Planned Maintenance and Ship Services, and all other resources and direct costs needed to maintain the Vessel at the Contractor's facility. These fees are firm and not subject to any additional charges for mark-up or profit.

G5 Vessel, Refit, Repair or Docking Cost

The following costs must be included in the price:

1. Ship Services: include all costs for ship services such as water, steam, electricity, etc., required for vessel maintenance for the duration of the Contract.
2. Berthing include:
 - (a) all costs resulting from , wharfage, security, shoring, shifting and/or moving of the vessel within the successful Bidder's facility;
 - (b) the cost of services to tie up the vessel alongside and to cast off.

Unless specified otherwise, the vessel will be delivered by Canada to the successful Bidder's facility alongside a mutually agreed safe transfer point, afloat and upright, and the successful Bidder will do the same when the Work is completed. The cost of services to tie up the vessel alongside and to cast off must be included in the evaluation price.

3. Field Service Representatives/Supervisory Services: include all costs for field service representatives/supervisory services including manufacturers' representatives, engineers, etc.

These services must not be an extra charge except where unscheduled work requiring these services is added to the Contract.

4. Removals: include all costs for removals necessary to carry out the Work and will be the responsibility of the successful Bidder whether or not they are identified in the specifications, except those removals not apparent when viewing the vessel or examining the drawings. The successful Bidder will also be responsible for safe storage of removed items and reinstalling them on completion of the Work. The successful Bidder will be responsible for renewal of components damaged during removal.

5. Sheltering, Staging, Cranage and Transportation: include the cost of all sheltering, staging including handrails, cranage and transportation to carry out the Work as specified.

The successful Bidder will be responsible for the cost of any necessary modification of these facilities to meet applicable safety regulations.

G6 Vessel Transfer Costs

1. The evaluation price must include the cost for transferring the vessel from its home port to the shipyard/ship repair facility where the Work will be performed and the cost of transferring the vessel to its home port following completion of the Work, in accordance with the following:

(a) The Bidder must provide the location of the shipyard/ship repair facility where it proposes to perform the Work together with the applicable vessel transfer cost from the list provided under paragraph 2 of this clause shall be entered into Table G1:

(b) If the list in paragraph 2 of this clause does not provide the shipyard/ship repair location where the Bidder intends to perform the Work, then the Bidder must advise the Contracting Authority, in writing, at least 5 calendar days before the bid closing date, of its proposed location for performing the Work. The Contracting Authority will confirm to the Bidder, in writing, at least 3 calendar days before the bid closing date, the location of the shipyard/ship repair and the applicable vessel transfer cost.

A bid that specifies a location for executing the Work which is not on the list of paragraph 2 of this clause, and for which a notification in writing has not been received by the Contracting Authority as required above, will be considered non-responsive.

2. List of shipyard/ship repair facilities and applicable vessel transfer costs

Vessel: CCGS Griffon
Home port: Prescott, Ontario

Transfer costs in the case of vessels transferred using a government delivery crew include the fuel cost at the vessel's most economical speed of transit and for unmanned refits only, crew transportation costs for the delivery crew based on the location of the vessel's home port and the shipyard/ship repair facility. Crew transportation costs do not include any members of the delivery crew who remain at the shipyard/ship repair facility in order to discharge project responsibilities related to the vessel being transferred.

Transfer costs in the case of vessels transferred unmanned by either commercial towing, railway, highway or other suitable means of transportation must be:

(i) included as part of the Bidder's financial bid in the case where the Bidder is responsible for the transfer; or

(iii) identified as the applicable vessel transfer cost, as given in the list below, in the case when Canada is responsible for the transfer.

Solicitation No. - N° de l'invitation

F2599-135004/A

Amd. No. - N° de la modif.

001

Buyer ID - Id de l'acheteur

028md

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

F2599-135004

File No. - N° du dossier

028mdF2599-135004

CCC No./N° CCC - FMS No/ N° VME

Shipyard/ship repair facility**Applicable vessel transfer cost**

Company	City	Transfer Cost Manned
New Dock, St. John's Dockyard Ltd.	St. John's	C\$107,929.00
Halifax Shipyard Ltd.	Halifax	C\$87,371.00
Group Verreault Navigation Inc.	Les Mechins	C\$41,027.00
Davie Canada Yard Inc.	Levis	C\$21,355.00
Heddle Marine Service Inc.	Hamilton	C\$19,406.00
Seaway Marine & Industrial Inc.	St. Catharines Ont.	C\$17,722.00
Kiewit Offshore Services	Marystown	C\$96,055.00
Shelbourne Marine	Shelbourne	C\$96,321.00
Ocean Industries	Quebec	C\$25,786.00
Fraser Marine	Port Clobourne	C\$20,558.00
Allied Marine & Industrial	Port Colbourne	C\$20,558.00
Central Machine and Marine	Sarnia	C\$42,888.00
Hike Metal	Wheatley	C\$34,027.00

Proposed Drydocking Location: _____

Solicitation No. - N° de l'invitation

F2599-135004/A

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

F2599-135004

Amd. No. - N° de la modif.

001

File No. - N° du dossier

028mdF2599-135004

Buyer ID - Id de l'acheteur

028md

CCC No./N° CCC - FMS No/ N° VME

ANNEX G - PRICING DATA SHEETS APPENDIX 1a**CCGS GRIFFON FLOATING REFIT 2013 Specification Number 756.13**

Spec. #	Description	Total Hours	Total Labour Cost	Total Material Cost	Total FSR& Sub-Contractors Cost	Total Firm Price	Unit Price
2.0	SERVICES		\$	\$	\$	\$	
2.6.5	Unit Rate / Kw-hr.						\$
2.7	Unit rate/ m3						\$
	Quote @10m3/ day		\$	\$	\$	\$	
2.10	Unit rate/ hr. for crane, 15 hours						\$
5.0	BILGE CLEANING		\$	\$	\$	\$	
6.0	FUEL TANK CLEANING AND INSPECTION		\$	\$	\$	\$	
7.0	MAIN FIRE PUMP REPLACEMENT (SURVEY ITEM)		\$	\$	\$	\$	
7.9	DOCUMENTATION		\$	\$	\$	\$	
9.0	BALLAST PUMP REPLACEMENT (SURVEY ITEM)		\$	\$	\$	\$	
9.9	DOCUMENTATION		\$	\$	\$	\$	
11.0	NEW RADAR WIREWAY AND TRANSIT INSTALL		\$	\$	\$	\$	
11.7	DOCUMENTATION		\$	\$	\$	\$	
12.0	PORT WATERTIGHT VENT TRUNK REPAIR		\$	\$	\$	\$	
12.7	DOCUMENTATION		\$	\$	\$	\$	
13.0	REPLACEMENT OF WHEELHOUSE HVAC SYSTEM		\$	\$	\$	\$	
13.8	DOCUMENTATION		\$	\$	\$	\$	
	Total		\$	\$	\$	\$	

ANNEX G - PRICING DATA SHEETS APPENDIX 1b**Option Items as noted from Specification 756.13**

Spec. #	Description	Total Hours	Total Labour Cost	Total Material Cost	Total FSR& Sub- Contractors Cost	Total Firm Price
8.0	BILGE PUMP REPLACEMENT (SURVEY ITEM)		\$	\$	\$	\$
8.9	DOCUMENTATION		\$	\$	\$	\$
10.0	BILGE AND BALLAST PUMP REPLACEMENT (SURVEY ITEM)		\$	\$	\$	\$
10.9	DOCUMENTATION		\$	\$	\$	\$
14.0	FLIGHT & BOAT DECK RIVETED SEAM CORROSION REPAIR		\$	\$	\$	\$
14.5	DOCUMENTATION		\$	\$	\$	\$
15.0	REPLACEMENT OF REFRIGERATION SYSTEM SEA WATER PIPING		\$	\$	\$	\$
15.4	DOCUMENTATION		\$	\$	\$	\$
	Total for options		\$	\$	\$	\$

NOTE: These Option Items will not form part of the "Known Work" Contract Price. Canada may exercise any or all of these four (4) Option Items.

Solicitation No. - N° de l'invitation

F2599-135004/A

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

F2599-135004

Amd. No. - N° de la modif.

001

File No. - N° du dossier

028mdF2599-135004

Buyer ID - Id de l'acheteur

028md

CCC No./N° CCC - FMS No/ N° VME

ANNEX G - PRICING DATA SHEETS APPENDIX 2**CCGS GRIFFON FLOATING REFIT 2013 Specification Number 755.13**

Spec. #	Description	Total Hours	Total Labour Cost	Total Material Cost	Total FSR& Sub-Contractors Cost	Total Firm Price
1.0	GENERAL NOTES		\$	\$	\$	\$
4.0	PROPULSION SYSTEM INSPECTION (SURVEY ITEM)		\$	\$	\$	\$
4.3.3.3.	Quote 16 hours		\$	\$	\$	\$
	DOCUMENTATION		\$	\$	\$	\$
5.0	PROPULSION GENERATORS & MOTORS INSPECTION (SURVEY ITEM)		\$	\$	\$	\$
	DOCUMENTATION		\$	\$	\$	\$
6.0	PROPULSION SYSTEM OVERCURRENT PROTECTION SYSTEM INSPECTION (SURVEY ITEM)		\$	\$	\$	\$
	DOCUMENTATION		\$	\$	\$	\$
7.0	CIRCUIT BREAKER TESTING		\$	\$	\$	\$
	DOCUMENTATION		\$	\$	\$	\$
8.0	MEGGER TESTING OF ELECTRICAL CIRCUITS		\$	\$	\$	\$
	DOCUMENTATION		\$	\$	\$	\$
	TOTAL		\$	\$	\$	\$

Solicitation No. - N° de l'invitation

F2599-135004/A

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

F2599-135004

Amd. No. - N° de la modif.

001

File No. - N° du dossier

028mdF2599-135004

Buyer ID - Id de l'acheteur

028md

CCC No./N° CCC - FMS No/ N° VME

3) Revise Annex H

Remove: Annex H in it entirety

Replace with:

ANNEX H DELIVERABLES/CERTIFICATIONS

H1 Mandatory Tender Deliverables Check List

Notwithstanding deliverable requirements specified within the bid solicitation and its associated Technical Specification (Annex A), mandatory deliverables that must be submitted with the Bidder's tender to be deemed responsive are summarized below.

The Bidder must submit a completed Annex "H1" Deliverables/ Certifications.

The following are mandatory and the Bidder's submission will be evaluated against the requirements as defined herein. The Bidder must be determined to be compliant on each item to be considered responsive.

Item	Description	Completed and Attached
1	Invitation To Tender document part 1 page 1 completed and signed;	
2	Completed Annex "G" Financial Bid Presentation Sheet", clauses G1 through G6;	
3	Completed Pricing Data Sheets, per clause 3.1 Section II, Annex "G", Appendix 1a, Appendix 1b, Appendix 2;	
4	Completed Annex "H1" Deliverables/Certifications;	
5	Changes to Applicable Laws (if any), as per clause 2.4	
6	Submission of Code of Conduct - List of Directors as per, section 5.1.1 and attached as Annex "I ";	
7	Federal Contractors Program for Employment Equity, Complete section 5.1.2;	
8	Vessel Transfer Cost, as per clause 6.2 and Annex "G"	
9	To comply with requirements of Refit Specification 756.13 (Annex "A") Item 2.2 Berthing (Provide documentation/letter)	
10	Proof of good standing with Worker's Compensation Board, as per clause 6.4	
11	Proof of valid Labor Agreement or similar instrument covering the work period, as per clause 6.5	
12	Preliminary Work Schedule , per clause 6.6;	
13	If Registered its Valid ISO 9001-2008 Certification, as per clause 6.7	
14	Objective evidence of documented Health and Safety System, as per clause 6.8;	
15	Insurance Requirements, as per clause 6.10	
16	Proof of welding certification, as per clause 6.11	
17	Project Management as per clause 6.12	
18	List of subcontractors, as per clause 6.13	
19	Example of its Quality Control Plan, as per clause 6.14	
20	Example of an Inspection and Test Plan as per clause 6.15	
21	Details of Environmental Emergency Response Plan, Details of Formal Environmental Training as per Clause 6.16	
22	Objective evidence of documented Fire Protection, Fire Fighting and Training Procedure, as per clause 6.17	
23	Contractor Contacts, as per clause 7.4.4	

Solicitation No. - N° de l'invitation

F2599-135004/A

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

F2599-135004

Amd. No. - N° de la modif.

001

File No. - N° du dossier

028mdF2599-135004

Buyer ID - Id de l'acheteur

028md

CCC No./N° CCC - FMS No/ N° VME

H2 Deliverables after Contract Award

Item	Description	Reference	Due By
1	Insurance requirements as per Annex "C"	Clause 7.10 and Annex "C"	10 Working Days after contract award
2	Revised Work Schedule	Clause 7.13	5 calendar days after contract award
3	The Contractor's Quality Control Plan	Clause 7.18	5 calendar days after contract award

H3 Deliverables Prior to Contract Award (If Requested)

Item	Description	Reference	Due By
1	Financial Capability	Clause 6.1	5 Working Days prior to contract award if requested

Solicitation No. - N° de l'invitation

F2599-135004/A

Amd. No. - N° de la modif.

001

Buyer ID - Id de l'acheteur

028md

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

F2599-135004

File No. - N° du dossier

028mdF2599-135004

CCC No./N° CCC - FMS No/ N° VME

End of Solicitation Amendment #1

CCGS Griffon Electrical Refit 2013 Rev 5

Specification No: 755.13

Date: May 17, 2013

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

TABLE OF CONTENTS

TABLE OF CONTENTS	1
1.0 GENERAL NOTES	3
1.1 IDENTIFICATION	3
1.2 WORK PERIOD	3
1.3 WORK LOCATION.....	3
1.4 REFERENCES	3
1.5 OCCUPATIONAL HEALTH AND SAFETY	4
1.6 ACCESS TO WORKSITE	5
1.7 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHIMS)	5
1.8 SMOKING IN THE WORK SPACE	5
1.9 CLEAN AND HAZARD FREE WORKSITE	5
1.10 FIRE PROTECTION	6
1.11 TOUCH-UP / DISTURBED PAINT	6
1.12 CCG EMPLOYEES AND OTHERS ON THE VESSEL.....	6
1.13 REGULATORY INSPECTIONS AND/OR CLASS SURVEYS	7
1.14 TEST RESULTS AND DATA BOOK	7
1.15 CONTRACTOR SUPPLIED MATERIALS AND TOOLS.....	8
1.16 GOVERNMENT SUPPLIED MATERIALS & TOOLS.....	8
1.17 RESTRICTED AREAS	8
1.18 CONTRACTOR INSPECTIONS AND PROTECTION OF EQUIPMENT AND THE WORKSITE.....	9
1.19 RECORDING OF WORK IN PROGRESS	9
1.20 LIST OF CONFINED SPACES	9
1.21 LEAD PAINT AND PAINT COATINGS	9
1.22 ASBESTOS CONTAINING MATERIALS	9
1.23 REMOVED MATERIALS AND EQUIPMENT	10
1.24 WELDING CERTIFICATION.....	11
1.25 ELECTRICAL INSTALLATIONS.....	11
1.26 ELECTRIC POWER.....	11
2.0 LIST OF ACRONYMS	12
3.0 VESSEL PARTICULARS	13
4.0 PROPULSION SYSTEM INSPECTION (SURVEY ITEM)	14
4.1 IDENTIFICATION	14
4.2 REFERENCES	14
4.3 TECHNICAL	15
4.3.1 <i>Propulsion Control System</i>	15
4.3.2 <i>Propulsion System Current Isolators</i>	16
4.3.3 <i>Propulsion Diesels Shutting Down on Blackout (Fault)</i>	16

4.4	INSPECTIONS, TESTS AND TRIALS	17
4.5	DOCUMENTATION	18
5.0	PROPULSION GENERATORS & MOTORS INSPECTION (SURVEY ITEM) ..	19
5.1	IDENTIFICATION	19
5.2	REFERENCES	19
5.3	TECHNICAL	19
5.3.1	<i>Propulsion Motors and Generators</i>	<i>19</i>
5.4	INSPECTIONS, TESTS AND TRIALS	20
5.5	DOCUMENTATION	20
6.0	PROPULSION SYSTEM OVERCURRENT PROTECTION SYSTEM INSPECTION (SURVEY ITEM).....	21
6.1	IDENTIFICATION	21
6.2	REFERENCES	21
6.3	TECHNICAL	21
6.3.1	<i>Main Circuit Breaker Details</i>	<i>21</i>
6.3.2	<i>Main Circuit Breakers Testing and Inspection.....</i>	<i>21</i>
6.3.3	<i>Shunt Replacement.....</i>	<i>23</i>
6.4	INSPECTIONS, TESTS AND TRIALS	23
6.5	DOCUMENTATION	23
7.0	CIRCUIT BREAKER TESTING.....	24
7.1	IDENTIFICATION	24
7.2	REFERENCES	24
7.3	TECHNICAL	25
7.3.1	<i>Inspection.....</i>	<i>25</i>
7.4	INSPECTION, TESTS AND TRIALS	25
7.5	DOCUMENTATION	26
8.0	MEGGER TESTING OF ELECTRICAL CIRCUITS.....	27
8.1	GENERAL	27
8.2	REFERENCES	27
8.3	TECHNICAL	27
8.4	INSPECTION TEST AND TRAILS	28

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 Work Period

1.2.1 The work period will be July 15, 2013 until August 14, 2013.

1.3 Work Location

1.3.1 Not Used.

1.4 References

1.4.1 Applicable regulations and documentation:

FSSM Procedures	Title	Included Yes/No	
7.A.7	Fall Protection		
7.B.3.	Entry Into Confined Spaces		
7.B.4.	Hotwork		
7.B.5.	Lockout and Tagout		
7.E.5.	Handling, Storage & Disposal of Hazardous Material		
10.A.7.	Contractor Safety and Security		
7.B.6.	Electrical Safety - Energized Circuits		
Ship Specific	Vessel Specific - Asbestos Management Plan		
Publications			
T127E	Transport Canada Marine Safety Electrical Standard		
IEEE 45	Recommended Practice for Electrical Installation on Ships		

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 shall 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.
- 1.5.2 The Contractor and the Contractor's employees, including any sub-contractors shall attend an onboard 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 to note CCG provides this orientation. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.
- 1.5.3 The Contractor shall 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 work aboard.
- 1.5.4 For the purpose of the Lock Out/Tag Out procedure the Contractor shall 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 not have access to the vessel's washrooms and crew mess facilities. The Contractor shall provide the necessary amenities for the Contractor's and sub-contractors employees as required.

1.6 Access to Worksite

- 1.6.1 The work site will be the CCGS Griffon at the Coast Guard Base at Prescott, Ontario. Contractor shall obey all base rules as far as access and security.

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 shall ensure that every employer, and any person acting on behalf of an employer, shall ensure that persons refrain from smoking in any work space under the control of the employer. The Contractor shall ensure that there is absolutely no smoking onboard the vessel.

1.9 Clean and Hazard Free Worksite

- 1.9.1 The Contractor, during the work period shall 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.
- 1.9.2 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.
- 1.9.3 Upon completion of this contract, the Contractor shall be responsible for the removal and disposal 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.
- 1.9.4 Once all known work and final clean-up has been completed the Contractor's QA Representative and the TA shall perform a 'walk through' of the vessel to view all areas where work was performed by the Contractor. Any deficiencies or damage noted shall 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 shall 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. 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.
- 1.10.2 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.
- 1.10.3 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:
- Disabling only one portion of a system at a time;
 - By maintaining system function using spares while work is in progress;
 - Other means acceptable to and approved by the TA.
- 1.10.4 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.

1.11 Touch-up / Disturbed Paint

- 1.11.1 Unless stated otherwise the Contractor shall 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 shall 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 manufacturer's representatives and/or TCMS 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.

1.13 Regulatory Inspections and/or Class Surveys

- 1.13.1 The Contractor shall 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 the specification.
- 1.13.2 The Contractor shall convene a meeting of the Contractors Project Manager for the work of this specification, the attending TCMS surveyor, and the TA, no less than 3 weeks 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 TCMS regulatory inspections or Class surveys.
- 1.13.5 The Contractor shall provide no less than 48 hours notice to TCMS and TA of the starting or completion of a work item, and of the reaching of an inspection point such that TCMS and TA can witness the conduct of the work or perform an inspection.
- 1.13.6 The Contractor shall ensure the TCMS inspector has the opportunity to inspect all materials to be installed on the vessel prior to the commencement of work. The Contractor shall ensure all materials have their associated heat numbers and mill test reports available to the TCMS inspector.

1.14 Test Results and Data Book

- 1.14.1 The Contractor shall develop a Test and Trials Plan which shall include as a minimum, all tests and trials stated in the specification. This plan shall be provided for TA review one week prior to the originally scheduled Tests and Trials commencement.
- 1.14.2 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 and TCMS.
- 1.14.3 Recorded dimensions shall be to a precision of three decimal places (unless otherwise stated) in the measuring system currently in use on the vessel.
- 1.14.4 The Contractor shall 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.
- 1.14.5 Hard copy reports shall be bound in standard 3-ring binders, type written on letter size paper and indexed by specification number. Electronic copies shall be in unprotected Adobe PDF format and provided on CD-ROM media. The Contractor shall provide 3 hard copies and 1 electronic copy of all reports.

- 1.14.6 All documentation from the contract period shall be inserted in a data book and delivered to the TA on completion of the contract.

1.15 Contractor Supplied Materials and Tools

- 1.15.1 The Contractor must ensure all materials are new and unused.
- 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 prior to use.
- 1.15.4 The Contractor shall provide all equipment, devices, tools and machinery such as crane, staging, scaffolding and rigging necessary for the completion of the work in this specification.
- 1.15.5 The Contractor shall provide waste disposal services for any oil, oily waste or other hazardous or controlled waste generated by the work of this specification. The Contractor shall provide waste disposal certificates for all of the above generated waste and the disposal certificates shall 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 shall 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) shall 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 all 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.
- 1.18.2 Any damage incurred as a result of the Contractor's work and that is attributable to the Contractor's work performance shall 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.
- 1.18.3 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.

1.19 Recording of Work in Progress

- 1.19.1 The TA 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 Pre-Refit meeting.

1.21 Lead Paint and Paint Coatings

- 1.21.1 The Contractor shall 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 shall 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.
- 1.21.3 The Contractor shall have in place a Lead Paint Abatement Program in order to deal with any lead paint discovered in the course of this specification.
- 1.21.4 Any expenses due to lead remediation (containment, disposal, etc.) will be covered by 1379 action.
- 1.21.5 The Contractor must provide HC product approval for underwater hull surface paints controlled by HC and the Pest Management Regulatory Agency.

1.22 Asbestos Containing Materials

- 1.22.1 The Contractor shall not use any asbestos containing materials.
- 1.22.2 Handling of any asbestos containing materials shall 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 shall 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 shall remain the property of the Coast Guard unless otherwise instructed in the specification sections.

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 shall 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) shall be provided to the TA.

1.25 Electrical Installations

- 1.25.1 All electrical installations and repairs shall 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.

1.26 Electric Power

- 1.26.1 CCG shall allow the use of a limited number of 115 VAC, 1 phase, 15 amp receptacles by the Contractor for the contracted period.

2.0 LIST OF ACRONYMS

CA	Contract Authority (PWGSC)
CCG	Canadian Coast Guard
CLC	Canada Labour Code
CSM	Contractor Supplied Material
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
DFO	Department of Fisheries and Oceans
FSSM	Fleet Safety & Security Manual (CCG) (DFO 5737 – Latest Version)
FSR	Field Service Representative
GSM	Government Supplied Materials
HC	Health Canada
IEEE	Institute of Electrical and Electronic Engineers
LOA	Length Over All
MSDS	Material Safety Data Sheet
OHS	Occupational Health and Safety
PWGSC	Public Works and Government Services Canada
SSMS	Safety & Security Management System
TBS	Treasury Board of Canada Secretariat
TCMS	Transport Canada Marine Safety
TA	Technical Authority – Owner’s Representative (CCG)
WHMIS	Workplace Hazardous Material Information System

3.0 VESSEL PARTICULARS

Name: CCGS Griffon

Type: Twin Screw, Medium Icebreaker/Naval Tender

Ice Class: Lloyd's Class 100A

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

Year Built: 1970

Principal Dimensions:

Length O.A.: 234' - 0" (71.32m)

Length B.P.: 214' - 0" (65.23m)

Breadth, molded: 49' - 0" (14.94m)

Depth, moulded: 21' - 6" (6.55m)

Draft (Mld Design): 15' 6 1/4" (4.73m)

Tonnages:

Gross: 2211.87 L.T. (2252 M.T.)

Reg. Net: 751.9 L.T. (765.56 M.T.)

Displacement 15' - 6 1/4": 2944 L.T. (2991 M.T.)

Deadweight Max.: 744 L.T. (757.5 M.T.)

Propulsion:

Twin screw, fixed pitch, diesel electric, total power 2 X 2000 S.H.P.

Main machinery: four Fairbanks Morse 38D8-1/8" diesel engines driving four

Westinghouse DC two wire single armature, non-reversing variable voltage generators.

Two Westinghouse DC Shunt Motors.

4.0 PROPULSION SYSTEM INSPECTION (SURVEY ITEM)

4.1 Identification

- 4.1.1 The Griffon's propulsion system is due for Transport Canada Marine Safety survey. In addition, there are some control issues to be investigated.
- 4.1.2 The survey shall involve the various propulsion control system components and all 8 exciters (drives).
- 4.1.3 The Contractor shall perform routine maintenance and conduct a condition assessment of the propulsion system components in order to obtain this TCMS survey credit.
- 4.1.4 The Griffon has had load sharing issues with both port and starboard propulsion systems (port is the main problem) since installation in 2003. Despite considerable time and expense, we have been unable to resolve the issue. General Electric technicians have indicated a possible cause could be that the propulsion system current isolators (SVIA Shunt Isolator Board) are not properly calibrated. The Contractor is to verify the calibration of the six fitted current isolators.
- 4.1.5 The Griffon has an issue at present where the main engines shut down on black out. This is a recent issue and we would like the cause determined and rectified.

4.2 References

Drawing Number	Drawing Title	Electronic File Name
	GE Propulsion System Drawings	Griffon Propulsion Drawings.pdf
	Report by GE - 2008	CCGS GRIFFON propulsion system audit 2008.pdf
	Application and Replacement Instructions for SIVA Shunt Isolator Board	GE SIVA Shunt Isolator Board.pdf

4.3 Technical

4.3.1 Propulsion Control System

4.3.1.1 The Contractor shall provide the services of a qualified General Electric Technician to aid in the testing of the propulsion control system and circuitry. This shall include the inspection and verification of the mechanical and electrical condition of the following propulsion system components such that a TCMS Survey credit can be obtained:

- Item 3E022 Port Outboard Propulsion Generator Exciter GF 2000.
- Item 3E023 Port Inboard Propulsion Generator Exciter GF 2000.
- Item 3E024 Starboard Inboard Propulsion Generator Exciter GF 2000.
- Item 3E025 Starboard Outboard Propulsion Generator Exciter GF 2000.
- Item 3E026 (duplicate 3E030) Propulsion Generator Spare Exciter GF 2000.
- Item 3E031 Port Propulsion Motor Exciter GM 2000.
- Item 3E032 Starboard Propulsion Motor Exciter GM 2000.
- Item 3E033 Propulsion Motor Spare Exciter GM 2000.

4.3.1.2 The Contractor shall perform the following work:

- All exciter cabinets and fitted components shall be cleaned of visible dust;
- The GF/GM 2000 drives shall be cleaned of all visible dust.
- All electrical connections to the exciter shall be verified as being secure.
- The cooling fan to be replaced on each exciter drive unit except the two spare units. The cooling fan model to be as fitted on board.
- All exciter units to be tested for correct operation.
- Spare propulsion generator exciter unit to be shown fully functional in operation with each propulsion generator.
- Spare propulsion motor exciter to be shown fully functional in operation with each motor.
- Contractor to verify software installed on GF/GM drives backed up to ship's laptop computer.
- A report of all findings on each exciter to be prepared and provided to the Technical Authority.
- A survey credit for each exciter shall be obtained from TCMS for the Division III continuous survey.

4.3.1.3 Propulsion Equipment

- Item 3E029 Propulsion Control System.

4.3.1.3.1 The Contractor shall perform the following work on the Port and Starboard propulsion control systems:

- Port and Starboard UC 2000 units to be cleaned of visible dust.
- All electrical connections to be UC units unit verified secure.
- The cooling fan to be replaced on each UC.
- All UC units to be tested for correct operation.
- All electrical connections to be GE90-30 PLCs and I/O modules verified secure.
- Batteries of the two GE90-30 PLCs to be replaced.
- Contractor to verify software installed on UCs and PLCs backed up to ship's laptop computer.
- A report of all findings on the Propulsion Control System to be prepared and provided to Coast Guard.
- Propulsion control system to be presented to TCMS for survey credit.

4.3.1.4 The inspection of the Propulsion Control System shall also include the verification and calibration if necessary of any circuit protective devices within the system. The end result of the inspection shall be that the General Electric Technician is able to provide a written statement indicating that the propulsion control system is fully functional, calibrated and operating within its parameters as designed such that the attending TCMS survey can sign off the continuous survey requirements for the propulsion control system.

4.3.2 Propulsion System Current Isolators

4.3.2.1 The Contractor shall verify the calibration of the six SIVA Shunt Isolator Boards.

4.3.2.2 The isolators are to be verified functional and properly calibrated as per the reference documentation (note that the reference document is from 2003).

4.3.3 Propulsion Diesels Shutting Down on Blackout (Fault)

4.3.3.1 The four propulsion diesels shut down when the vessel blacks out. This creates a delay in restoring propulsion after the blackout.

4.3.3.2 Under normal conditions, the diesels should continue to run during a blackout as the propulsion control and governors should seamlessly switch to back up 24 volt power.

4.3.3.3 The Contractor is to troubleshoot this fault and provide a technical solution. For bid purposes the Contractor shall quote 16 hours labour to investigate and repair this item.

4.4 Inspections, Tests and Trials

- 4.4.1 The Contractor shall be responsible for coordinating for TCMS inspections.
- 4.4.2 The Contractor shall prove that the propulsion control system is functional. This shall include a sea trial. This sea trial shall demonstrate the following conditions functional (for acronyms see supplied GE propulsion system audit report):

POG alone
POG master PIG slave
PIG alone (port side)
PIG master POG slave
PIG alone (starboard side)
SOG alone
SOG master SIG slave
SIG alone (starboard side)
SIG master SOG slave
SIG alone (port side)
AXG on single POG on motor @1/2 ahead
AXG on single PIG on motor @1/2 ahead
AXG on single SIG on motor @1/2 ahead
AXG on single SOG on motor @1/2 ahead
PME on line
SME on line
AME as PME on motor @1/2 ahead
AME as SME on motor @1/2 ahead

- 4.4.3 The Contractor shall record, for each condition:
- Generator voltage, current, and field current
 - Motor voltage, current, field current, and RPM.
- 4.4.4 This functional demonstration is to be done in the presence of the TA and the TCMS Inspector.

4.5 Documentation

4.5.1 The Contactor shall also provide 3 paper copies and one electronic copy of the GE Representative's report which shall include:

- The condition, findings and settings of the propulsion control system for the Griffon.
- The results and settings of the current isolator calibration.
- The results of the troubleshooting efforts in regard to the propulsion diesels shutting down on blackout.
- The propulsion readings recorded during sea trials.

4.5.2 This report shall also be provided in electronic format in either a PDF or MS Word format. All copies shall be given to the Technical Authority prior to the completion of this Contract.

5.0 PROPULSION GENERATORS & MOTORS INSPECTION (SURVEY ITEM)

5.1 Identification

- 5.1.1 The Griffon's four propulsion generators and two propulsion motors are due for Transport Canada Marine Safety survey.
- 5.1.2 The six machines must be inspected by a qualified electrical contractor and their condition assessed.

5.2 References

Drawing Number	Drawing Title	Electronic File Name
	GE Propulsion System Drawings	Griffon Propulsion Drawings.pdf
	Report by Ainsworth 2008	Griffon Ainsworth Prop. Motors and Generators.pdf

5.3 Technical

5.3.1 Propulsion Motors and Generators

- 5.3.1.1 The Contractor shall perform the following described work to obtain a TCMS Division III survey credit for the Propulsion Motor and Generator units.
- 5.3.1.2 Motor Details: Westinghouse 2000/2500HP, 833/900 VDC, 1910/2220 Amps
- 5.3.1.3 Generator Details: Westinghouse 1032/1290 KW, 833/900 VDC, 1238/1432 Amps
- Item 3E002 Port Propulsion Motor
 - Item 3E007 Starboard Propulsion Motor
 - Item 3E014 Port Outboard Propulsion Generator No. 1
 - Item 3E016 Port Inboard Propulsion Generator No. 2
 - Item 3E018 Starboard Inboard Propulsion Generator No. 3
 - Item 3E020 Starboard Outboard Propulsion Generator No. 4
- 5.3.1.4 The Contractor shall perform a visual inspection of each machine and shall inspect the following points:
- Commutator surface condition;
 - Armature winding condition - mechanical and insulation condition;
 - Armature core and spider condition;
 - Stator frame and structure;
 - Brushes and brush gear - brush length and spring tension to be measured;
 - Field poles and connections;

- Shaft bearings;
- Take a megger reading of each machine's armature, stator windings and main supply cabling to the propulsion switch gear. During the cable check, both line to line and line to ground reading shall be taken for all cables.

5.3.1.5 The Contractor shall note that access to the lower brushes of the propulsion generators is challenging. Dexterity is required.

5.3.1.6 The Contractor shall prepare a technical report for each machine detailing the findings and readings recorded for each machine.

5.4 Inspections, Tests and Trials

5.4.1 The Contractor shall be responsible for coordinating for TCMS inspections.

5.5 Documentation

5.5.1 The Contractor shall also provide 3 paper copies and one electronic copy of the contractor's detailed condition report for each motor and generator.

5.5.2 This report shall also be provided in electronic format in either a PDF or MS Word format. All copies shall be given to the Technical Authority prior to the completion of this contract.

6.0 PROPULSION SYSTEM OVERCURRENT PROTECTION SYSTEM INSPECTION (SURVEY ITEM)

6.1 Identification

- 6.1.1 The current over protection system for the main propulsion system is due for Transport Canada Marine Safety survey. As such the Contractor shall be required to obtain a TCMS survey credit for the six (6) main circuit breakers fitted as part of the system protection.
- 6.1.2 The TCMS survey item is: 3E028 Propulsion Overcurrent System.
- 6.1.3 TCMS also requires calibrated shunts in order to test the circuit breakers using secondary injection. Coast Guard has purchased new calibrated shunts and these will be installed at this time.

6.2 References

Drawing Number	Drawing Title	Electronic File Name
	GE Propulsion System Drawings	Griffon Propulsion Drawings.pdf
	2003 Report on the Circuit Breaker overhaul	GE Sub Contractor Pelikan Report.pdf

6.3 Technical

6.3.1 Main Circuit Breaker Details

Manufacturer: ITE
Type: FB-20
Frame Size: RMV-1000VDC, 2000A
Serial Numbers: 20-302 through 20-307

6.3.2 Main Circuit Breakers Testing and Inspection

- 6.3.2.1 The Contractor shall remove all 6 circuit breakers from the breaker cabinets for inspection.
- 6.3.2.2 The Contractor shall perform a visual check of the 6 fitted circuit breakers. This inspection shall include:
- Bus bar connections - condition and tightness.
 - Main contact condition.
 - Cleanliness - clean as required.
 - Arc chute condition.

- Wiring connection tightness.
 - Condition of wiring (note we have had issues with breaking of wires to the moving holding coil).
 - Megger testing of electrical components.
- 6.3.2.3 Repairs of defects will be done through 1379 action.
- 6.3.2.4 All moving parts of the circuit breaker shall be lubricated as required.
- 6.3.2.5 The Contractor shall test the six (6) main circuit breakers fitted to the Griffon's propulsion system. The testing may be done in situ, on board the Griffon, or at the Contractor's facility.
- 6.3.2.6 The Contractor will be responsible for removal and installation of the breakers as required.
- 6.3.2.7 If the Contractor removes the circuit breakers from the ship, the Contractor is responsible for all transportation to / from the Contractor's facility. All circuit breakers shall be protected from any damage during the time that they are in the care and custody of the Contractor for this portion of the specification.
- 6.3.2.8 The Contractor shall provide calibration certificates for all test equipment.
- 6.3.2.9 The circuit breaker trip setting shall be verified and tested in the presence of the Technical Authority and a TCMS surveyor.
- 6.3.2.10 Secondary injection shall be used to verify the setting and working of all breaker trip mechanisms.
- 6.3.2.11 Circuit breaker testing shall be done to the satisfaction of the attending TCMS surveyor.
- 6.3.2.12 Prior to removal, the Contractor shall clearly mark and label all primary and secondary circuits connected to the circuit breakers. All circuit breakers shall be returned to the same location from which they were removed from the vessel.
- 6.3.2.13 For each breaker, at a minimum the testing will consist of:
- The circuit breakers shall be inspected for any mechanical and electrical defects. Any defects noted shall be brought to the immediate attention of the Technical Authority and will be repaired under 1379 action if required.
 - Long time, short time, and instantaneous trip functions are to be tested. Test results and breaker trip relay indications are to be recorded.
 - Contact resistance of the two poles is to be measured and recorded.
 - Megger testing of all breakers: phase to ground, phase to phase when the breaker is closed, and line to load when the breaker is open.

6.3.3 Shunt Replacement

- 6.3.3.1 The Contractor shall install four new shunts in the propulsion system. These shunts are GFM and will be direct replacements for the four shunts which provide input to the trip units of the circuit breakers.

6.4 Inspections, Tests and Trials

- 6.4.1 The Contractor shall prove that the propulsion control system is function upon re-installation of the main circuit breakers and that all circuit breaker controls and interlock functions work. This shall be done in the presence of the TCMS Surveyor and the Technical Authority.
- 6.4.2 The Contractor shall be responsible for coordinating for TCMS inspections on board the vessel. The Contractor is also responsible for coordinating for TCMS inspections and associated fees for any inspections not on board the vessel (e.g. at the contractor's facility).

6.5 Documentation

- 6.5.1 The Contractor shall provide a written report of all circuit breaker inspections and test reports detailing the condition of the circuit breakers and any faults found with the circuit breakers. The report shall also detail any repairs made.
- 6.5.2 The Contractor shall provide a detailed report of the electrical testing of the circuit breakers. This report shall also include the calibration documentation for the test equipment.
- 6.5.3 The Contractor shall provide 3 hard copies of the report as well as an electronic copy in either PDF format or MS Word. Copies of the report shall be provided to the Technical Authority prior to the completion of the contract.

7.0 CIRCUIT BREAKER TESTING

7.1 Identification

7.1.1 The Contractor shall provide the services of an Authorized ITE service center to inspect, test, and calibrate five ITE 600 Amp Frame circuit breakers.

7.2 References

7.2.1 Drawings:

Drawing Number	Drawing Title	Electronic File Name
	CCG GRIFFON EMERGENCY GENERATOR CIRCUIT BREAKER TRIPPING CURVES	CCGS Griffon - EG CB Trip Curve.pdf
5210822-001A	CCGS GRIFFON - VLE PROJECT GENERATOR CIRCUIT BREAKERS TRIPPING CURVE	CCGS Griffon SSG CB Trip Curve.pdf

7.2.2 Breaker Details:

Manufacturer: ITE
Type: K-600
Frame Size: 600 Amp
Breaker Type: Air/Draw-Out
ITE Serial Numbers and trip units fitted:
SSG #1 - 93186, Westrip RMS-2000
SSG #2 - 93179, Digitrip RMS/R500
SSG #3 - 93177, Digitrip RMS/R500
Shore Power Breaker - 93180, Digitrip RMS/R500
Emergency Generator - 46732-M12-1-7A, Suretrip RMS- 2007AF

7.3 Technical

7.3.1 Inspection

- 7.3.1.1 The Contractor shall remove the five circuit breakers from the switchboards of the vessel.
- 7.3.1.2 The Contractor shall install the vessel's two spare circuit breakers in the switchboard to maintain the shore supply and the emergency generator. The Contractor shall set the spare breaker digital trip units to match the two breakers removed.
- 7.3.1.3 The Contractor is responsible for removal/installation of the breakers from the vessel and transportation to/from the Contractor's test facility.
- 7.3.1.4 Any damage to the circuit breakers incurred while handling and transporting the breakers shall be repaired at the Contractor's expense.
- 7.3.1.5 The Contractor shall inspect the referenced circuit breakers for proper mechanical and electrical operation.
- 7.3.1.6 The Contractor shall megger the control circuit insulation and measure the primary contact resistance.
- 7.3.1.7 The Contractor shall inspect the circuit breakers and provide a report as to the physical condition of the circuit breakers.
- 7.3.1.8 All damaged or worn parts that have been identified will be replaced under 1379 action.

7.4 Inspection, Tests and Trials

- 7.4.1 The Contractor shall test all circuit breaker control circuits for proper resistance and shall verify proper main contact resistance. The circuit breaker shall be meggered for proper insulation resistance.
- 7.4.2 The Contractor shall test the circuit breaker for proper sequencing of all contacts, verify all interlocks and verify all visual indicators. The electronic trip unit shall be verified for proper trip operation.
- 7.4.3 The Contractor shall cycle the circuit breaker a minimum of 10 times to verify that all mechanical mechanisms are functioning properly.
- 7.4.4 For the SSG and EG breakers, the Contractor shall use primary injection to verify all circuit breaker operations and trip settings as per the trip curves.
- 7.4.5 For the Shore Power Breaker, the Contractor shall use primary injection to verify all circuit breaker operations and trip settings. The Contractor shall use the existing trip settings of the Digitrip unit to verify the trip settings.
- 7.4.6 The Contractor shall perform the primary injection test in the presence of a Transport Canada Marine Safety Surveyor and the Technical Authority.

- 7.4.7 The Contractor shall be responsible for coordinating for TCMS inspections on board the vessel. The contractor shall also be responsible for coordinating for TCMS inspections and associated fees for any inspections not on board the vessel (e.g. at the contractor's facility).

7.5 Documentation

- 7.5.1 The Contractor shall provide a record of all inspections, megger readings, parts found worn or out of tolerance, all adjustments made and a certificate of final inspection.
- 7.5.2 The Contractor shall develop a trip curve for the shore power breaker based upon the existing settings which were verified.
- 7.5.3 The Contractor shall provide 3 paper copies of all documentation and also an electronic copy of the documentation. The electronic documentation shall be in electronic format in PDF on CR DOM media.
- 7.5.4 All documentation shall be provided to the Technical Authority prior to completion of the contract.

8.0 MEGGER TESTING OF ELECTRICAL CIRCUITS

8.1 General

- 8.1.1 The Contractor shall perform a complete Megger survey as per TCMS requirements for all electrical circuits on board the vessel.

8.2 References

8.2.1 Drawings:

Drawing No.	Drawing Title.	Electronic File No.
766401 Rev A8	Electrical Plant Schematic Wiring Diagram	766401 A8.dwg

8.2.2 Documentation:

- Megger Report: 2012 MEGGER TEST REPORT.xls
- Standards: TP127E – latest edition.

8.3 Technical

- 8.3.1 The Contractor shall Megger test all electrical circuits on the vessel and shall record the readings obtained. The Contractor shall update the vessel's 2012 electronic copy of the Megger report file as attached in these specifications.
- 8.3.2 The Coast Guard will provide one crew member familiar with the vessel to assist the Contractor as required.
- 8.3.3 Testing shall be from power leads to ground. All motor circuits shall 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 shall be as per the requirements of TP127E.
- 8.3.4 The Contractor shall submit a copy of the updated Megger Report to the Technical Authority within 24 hours of completion of the work.
- 8.3.5 Based on the initial Megger report the Coast Guard Technical Authority will designate those electrical circuits that are to be repaired by the Contractor under 1379 action.

8.4 Inspection Test and Trails

- 8.4.1 The Contractor shall provide the Technical Authority with updated copies of the ship's electronic Megger report in an electronic MS Excel format on CD-ROM media. The Contractor shall also provide three (3) paper copies of the report on 8.5 by 11 inch paper.
- 8.4.2 The Contractor shall provide the Technical Authority with a list of any circuits which indicate poor insulation reading and /or deficiencies.
- 8.4.3 The Contractor shall provide the Technical Authority with updated Megger reports for any circuits and / or deficiencies corrected with 1379 action for this specification item.

CCGS Griffon Floating Refit 2013 Rev 9

Specification No: 756.13

Date: May 16, 2013

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

TABLE OF CONTENTS

TABLE OF CONTENTS	1
1.0 GENERAL NOTES	6
1.1 IDENTIFICATION	6
1.1.2 <i>Work Period</i>	6
1.2 REFERENCES	6
1.3 OCCUPATIONAL HEALTH AND SAFETY	7
1.4 ACCESS TO WORKSITE	8
1.5 WORKPLACE HAZARD MATERIAL INFORMATION SYSTEM (WHMIS)	8
1.6 SMOKING IN THE WORK SPACE	8
1.7 CLEAN AND HAZARD FREE WORKSITE	9
1.8 TOUCH-UP / DISTURBED PAINT	9
1.9 CCG EMPLOYEES AND OTHERS ON THE VESSEL	9
1.10 REGULATORY INSPECTIONS AND/OR CLASS SURVEYS	10
1.11 TEST RESULTS AND DATA BOOK	10
1.12 CONTRACTOR SUPPLIED MATERIALS AND TOOLS	11
1.13 GOVERNMENT SUPPLIED MATERIALS & TOOLS	11
1.14 RESTRICTED AREAS	11
1.15 CONTRACTOR INSPECTIONS AND PROTECTION OF EQUIPMENT AND THE WORKSITE	12
1.16 RECORDING OF WORK IN PROGRESS	12
1.17 LIST OF CONFINED SPACES	12
1.18 LEAD PAINT AND PAINT COATINGS	12
1.19 ASBESTOS CONTAINING MATERIALS	13
1.20 REMOVED MATERIALS AND EQUIPMENT	13
1.21 WELDING CERTIFICATION	13
1.22 ELECTRICAL INSTALLATIONS	13
2.0 SERVICES	14
2.1 GENERAL	14
2.2 BERTHING	14
2.3 MOORING LINES	14
2.4 GANGWAYS	14
2.5 TELEPHONE SERVICES	15
2.6 ELECTRICAL POWER	15
2.7 POTABLE WATER SUPPLY	15
2.8 NON POTABLE WATER	16
2.9 BLACK AND GREY WATER SERVICE	16
2.10 CRANAGE	16
2.11 GARBAGE REMOVAL	17
3.0 LIST OF ACRONYMS	18

4.0	GENERAL PARTICULARS OF EXISTING VESSEL	19
5.0	BILGE CLEANING	20
5.1	IDENTIFICATION	20
5.2	REFERENCES	20
5.2.1	<i>Drawings:</i>	20
5.3	TECHNICAL	20
5.3.1	<i>Initial Bilge Cleaning</i>	20
5.3.2	<i>Disposal of Liquid and Waste from the Bilges</i>	21
5.4	INSPECTION, TEST AND TRIALS	21
6.0	FUEL TANK CLEANING AND INSPECTION	22
6.1	IDENTIFICATION	22
6.2	REFERENCES	22
6.3	TECHNICAL	22
6.4	TESTS AND TRIALS.....	23
7.0	MAIN FIRE PUMP REPLACEMENT (SURVEY ITEM)	24
7.1	GENERAL	24
7.2	GAS-FREEING AND CERTIFICATION OF AREAS FOR HOT WORK.....	24
7.3	RIGGING.....	24
7.4	PROTECTION OF EXISTING EQUIPMENT	24
7.5	REFERENCES	25
7.5.1	<i>Drawings</i>	25
7.5.2	<i>Manuals and Documents:</i>	25
7.5.3	<i>Materials</i>	25
7.6	TECHNICAL	26
7.6.1	<i>Main Pump Details</i>	26
7.6.2	<i>Description of Fitted Installation</i>	27
7.6.3	<i>Strip Out Requirement</i>	28
7.6.8	<i>New Pump Installation</i>	29
7.7	COMMISSIONING	34
7.8	INSPECTION, TESTS AND TRIALS	35
7.9	DOCUMENTATION	35
8.0	BILGE PUMP REPLACEMENT (SURVEY ITEM)	36
8.1	GENERAL	36
8.2	GAS-FREEING AND CERTIFICATION OF AREAS FOR HOT WORK.....	36
8.3	RIGGING.....	36
8.4	PROTECTION OF EXISTING EQUIPMENT	36
8.5	REFERENCES	37
8.5.1	<i>Drawings</i>	37
8.5.2	<i>Manuals and Documents:</i>	37
8.5.3	<i>Materials</i>	38
8.6	TECHNICAL	39

8.6.1	<i>Bilge Pump Details</i>	39
8.6.2	<i>Description of Fitted Installation</i>	40
8.6.3	<i>Strip Out Requirement</i>	40
8.6.8	<i>New Pump Installation</i>	42
8.7	COMMISSIONING	46
8.8	INSPECTION, TESTS AND TRIALS	47
8.9	DOCUMENTATION	47
9.0	BALLAST PUMP REPLACEMENT (SURVEY ITEM)	48
9.1	GENERAL	48
9.2	GAS-FREEING AND CERTIFICATION OF AREAS FOR HOT WORK.....	48
9.3	RIGGING.....	48
9.4	PROTECTION OF EXISTING EQUIPMENT	48
9.5	REFERENCES	49
9.5.1	<i>Drawings</i>	49
9.5.2	<i>Manuals and Documents:</i>	49
9.5.3	<i>Materials</i>	50
9.6	TECHNICAL	51
9.6.1	<i>Ballast Pump Details</i>	51
9.6.2	<i>Description of Fitted Installation</i>	52
9.6.3	<i>Strip Out Requirement</i>	52
9.6.8	<i>New Pump Installation</i>	54
9.7	COMMISSIONING	58
9.8	INSPECTION, TESTS AND TRIALS	59
9.9	DOCUMENTATION	59
10.0	BILGE AND BALLAST PUMP REPLACEMENT (SURVEY ITEM)	60
10.1	GENERAL	60
10.2	GAS-FREEING AND CERTIFICATION OF AREAS FOR HOT WORK.....	60
10.3	RIGGING.....	60
10.4	PROTECTION OF EXISTING EQUIPMENT	60
10.5	REFERENCES	61
10.5.1	<i>Drawings</i>	61
10.5.2	<i>Manuals and Documents:</i>	61
10.5.3	<i>Materials</i>	62
10.6	TECHNICAL	63
10.6.1	<i>Bilge and Ballast Pump Details</i>	63
10.6.2	<i>Description of Fitted Installation</i>	64
10.6.3	<i>Strip Out Requirement</i>	64
10.6.8	<i>New Pump Installation</i>	66
10.7	COMMISSIONING	70
10.8	INSPECTION, TESTS AND TRIALS	71
10.9	DOCUMENTATION	71
11.0	NEW RADAR WIREWAY AND TRANSIT INSTALL.....	72

11.1	GENERAL	72
11.2	BACKGROUND	72
11.3	GAS FREEING TANKS AND COMPARTMENTS.....	72
11.4	REFERENCES	73
11.5	TECHNICAL.....	74
11.5.1	GENERAL.....	74
11.5.2	STRIPOUT.....	74
11.5.3	STRIPOUT FLUME TANK BULKHEADS.....	74
11.5.4	STRIPOUT BUOYWINCH COMPARTMENT.....	75
11.5.5	STRIPOUT FORWARD CARGO HOLD BULKHEAD (FRAME 95)	75
11.5.6	INSTALLATION.....	75
11.6	INSPECTION AND TESTING	80
11.7	DOCUMENTATION	80
12.0	PORT WATERTIGHT VENT TRUNK REPAIR	81
12.1	GENERAL.....	81
12.2	SCOPE OF WORK	81
12.3	GAS FREEING TANKS AND COMPARTMENTS.....	81
12.4	REFERENCES	82
12.5	TECHNICAL.....	82
12.5.1	GENERAL.....	82
12.6	INSPECTION AND TESTING	84
12.7	DOCUMENTATION	85
13.0	REPLACEMENT OF WHEELHOUSE HVAC SYSTEM	86
13.1	IDENTIFICATION.....	86
13.2	GAS-FREEING AND CERTIFICATION OF AREAS FOR HOT WORK.....	86
13.3	RIGGING.....	86
13.4	PROTECTION OF EXISTING EQUIPMENT	86
13.5	REFERENCES	87
13.6	TECHNICAL	89
13.7	COMMISSIONING	97
13.8	DOCUMENTATION	97
14.0	FLIGHT & BOAT DECK RIVETED SEAM CORROSION REPAIR.....	98
14.1	IDENTIFICATION.....	98
14.2	REFERENCES	98
14.3	TECHNICAL	99
14.4	INSPECTION, TESTING, TRIALS.....	101
14.5	DOCUMENTATION	101
15.0	REPLACEMENT OF REFRIGERATION SYSTEM SEA WATER PIPING	102
15.1	IDENTIFICATION.....	102
15.2	REFERENCES	102
15.3	TECHNICAL	103

15.4 DOCUMENTATION 103

1.0 GENERAL NOTES

1.1 Identification

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

1.1.2 Work Period

1.1.2.1 The work period for this contract is July 15, 2013 until August 14, 2013.

1.2 References

1.2.1 Applicable documentation:

FSSM Procedures	Title	Included Yes/No		
7.B.2.	Fall Protection	Yes		
7.A.1.	Hazard Prevention Program	Yes		
7.B.3.	Entry Into Confined Spaces	Yes		
7.B.4.	Hotwork	Yes		
7.B.5.	Lockout and Tagout	Yes		
10.A.7.	Contractor Liability	Yes		
1.3.2	Publications:			
TP3177E	Standard for the Control of Gas Hazards in Vessels to be Repaired or Altered			
T127E	Transport Canada Marine Safety Electrical Standard			
IEEE 45	Recommended			

	Practice for Electrical Installation on Ships			
70-000-000-EU-JA-001	Specification for the Installation of Shipboard Electronic Equipment			
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			

1.2.2 Acts & Regulations:

- CSA Canada Shipping Act
- CLC Canada Labour Code
- MOHS Marine Occupational Health and Safety

1.3 Occupational Health and Safety

- 1.3.1 The Contractor and all sub-contractors shall 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.
- 1.3.2 The Contractor and the Contractor's employees, including any sub-contractors shall attend an on board 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 to note CCG provides this orientation. The Contractor will have access to an uncontrolled copy of the Fleet Safety and Security Manual.

- 1.3.3 The Contractor shall 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 work aboard.
- 1.3.4 For the purpose of the Lock Out/Tag Out procedure the Contractor shall supply locks and locking devices for the Contractor's employees in addition to those provided by the Chief Engineer for the ship's crew.
- 1.3.5 The Contractor shall supply a copy of a certified marine chemist or other qualified person's Gas Free Certificate to the Technical Authority where any work shall be carried out in tanks or bilge areas prior to commencing work. The certificates shall specify, "Safe for persons" or "Safe for hot work" as appropriate. All Certificates shall be posted in full view and adjacent to the opening of the compartment.
- 1.3.6 All tanks and pipe tunnels which have been opened for inspection and testing are to be cleaned and submitted for a final inspection by the Technical Authority prior to the closing of the space.
- 1.3.7 The Contractor and Contractor's employees will not have access to the vessel's washrooms and crew mess facilities. The Contractor shall provide the necessary amenities for the Contractor's and sub-contractor's employees as required.

1.4 Access to Worksite

- 1.4.1 The Contractor shall ensure the TA and CG staff has unrestricted access to the worksite at all times during the contract period.

1.5 Workplace Hazard Material Information System (WHMIS)

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

1.6 Smoking in the Work Space

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

1.7 Clean and Hazard Free Worksite

- 1.7.1 Before the Contractor starts any work on the vessel the Contractor's Quality Assurance Representative, the TA shall 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 shall take digital pictures of each area showing the outfit therein and download the photos in JPG format onto a CD or DVD. Each picture shall be dated and labeled as to the location on the vessel. Copies of this CD or DVD are to be provided to the TA for reference purposes within 48 hours of the start of the contract.
- 1.7.2 The Contractor, during the work period shall 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.
- 1.7.3 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.
- 1.7.4 Upon completion of this contract, the Contractor shall be responsible for the removal and disposal 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.
- 1.7.5 Once all known work and final clean-up has been completed the Contractor's QA Representative and TA shall perform a 'walk through' of the vessel to view all areas where work was performed by the Contractor. Any deficiencies or damage noted shall 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 shall be repaired by the Contractor at no cost to the Coast Guard.

1.8 Touch-up / Disturbed Paint

- 1.8.1 Unless stated otherwise the Contractor shall supply and apply two coats of marine primer compatible with the vessel's existing coating system to all new and/or disturbed metal surfaces.
- 1.8.2 The Contractor shall prepare all new and disturbed steelwork to the paint manufacturer's standards prior to painting.

1.9 CCG Employees and Others on the Vessel

- 1.9.1 CCG / DFO employees and other personnel such as manufacturer's representatives and/or TCMS 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.

1.10 Regulatory Inspections and/or Class Surveys

- 1.10.1 The Contractor shall 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 the specification.
- 1.10.2 The Contractor shall convene a meeting of the Contractors Project Manager for the work of this specification, the attending TCMS surveyor, and the TA, no less than 3 weeks 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.
- 1.10.3 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.
- 1.10.4 The Contractor must not substitute inspection by the TA for the required TCMS regulatory inspections or Class surveys.
- 1.10.5 The Contractor shall provide no less than 48 hours notice to TCMS and TA of the starting or completion of a work item, and of the reaching of an inspection point such that TCMS and TA can witness the conduct of the work or perform an inspection.
- 1.10.6 The Contractor shall ensure the TCMS inspector has the opportunity to inspect all materials to be installed on the vessel prior to the commencement of work. The Contractor shall ensure all materials have their associated heat numbers and mill test reports available to the TCMS inspector.

1.11 Test Results and Data Book

- 1.11.1 The Contractor shall develop a Test and Trials Plan which shall include as a minimum, all tests and trials stated in the specification. This plan shall be provided for TA review one week prior to the originally scheduled Tests and Trials commencement.
- 1.11.2 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 and TCMS.
- 1.11.3 Recorded dimensions shall be to a precision of three decimal places (unless otherwise stated) in the measuring system currently in use on the vessel.
- 1.11.4 The Contractor shall 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.
- 1.11.5 Hard copy reports shall be bound in standard 3-ring binders, type written on letter size paper and indexed by specification number. Electronic copies shall be in unprotected Adobe PDF format and provide on CD-ROM media. The Contractor shall provide 3 hard copies and 1 electronic copy of all reports.

1.11.6 All documentation from the contract period shall be inserted in a data book and delivered to the TA on completion of the contract.

1.11.7 For any drawings requested, the drawings shall be plotted on standard ANSI paper size paper – minimum ANSI B (11” x 17”). Three copies shall be provided.

Also the drawings shall be provided in AutoCAD 2000 DWG format (as a minimum – more recent versions are acceptable) and shall be on CD-ROM media. The drawings shall not be password protected. One (1) copy shall be provided

1.12 Contractor Supplied Materials and Tools

1.12.1 The Contractor must ensure all materials are new and unused.

1.12.2 The Contractor must ensure replacement material such as jointing, packing, insulation, small hardware, oils, lubricants, cleaning solvents, preservatives, paints, coatings, bolts and bolting materials etc. are in accordance with the equipment manufacturer’s drawings, manuals and/or instructions.

1.12.3 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 prior to use.

1.12.4 The Contractor shall provide all equipment, devices, tools and machinery such as welding machines, crange, staging, scaffolding and rigging necessary for the completion of the work in this specification.

1.12.5 The Contractor shall provide waste disposal services for any oil, oily waste or other hazardous or controlled waste generated by the work of this specification. The Contractor shall provide waste disposal certificates for all of the above generated waste and the disposal certificates shall indicate that the disposal was in accordance with Federal, Provincial and Municipal regulations in effect.

1.13 Government Supplied Materials & Tools

1.13.1 All tools are Contractor supplied unless otherwise stated in the technical specifications.

1.13.2 Where tools are supplied by the TA they shall 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.

1.13.3 Any Government supplied material (GSM) shall 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.

1.14 Restricted Areas

1.14.1 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.

- 1.14.2 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.

1.15 Contractor Inspections and Protection of Equipment and the Worksite

- 1.15.1 The Contractor must coordinate all 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.
- 1.15.2 Any damage incurred as a result of the Contractor's work and that is attributable to the Contractor's work performance shall 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.
- 1.15.3 The Contractor shall 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.

1.16 Recording of Work in Progress

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

1.17 List of Confined Spaces

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

1.18 Lead Paint and Paint Coatings

- 1.18.1 The Contractor shall not use lead based paints.
- 1.18.2 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 shall 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.
- 1.18.3 The Contractor shall have in place a Lead Paint Abatement Program in order to deal with any lead paint discovered in the course of this specification.
- 1.18.4 Any expenses due to lead remediation (containment, disposal, etc.) will be covered by 1379 action.
- 1.18.5 The Contractor must provide HC product approval for underwater hull surface paints controlled by HC and the Pest Management Regulatory Agency.

1.19 Asbestos Containing Materials

- 1.19.1 The Contractor shall not use any asbestos containing materials.
- 1.19.2 Handling of any asbestos containing materials shall 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 Manual. The Contractor shall 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.

1.20 Removed Materials and Equipment

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

1.21 Welding Certification

- 1.21.1 For any item requiring the application of fusion welding for steel structures, the Contractor or his Sub-Contractors shall be certified in accordance with the Canadian Welding Bureau, CSA\ACNOR W47.1; Division 2.1 certification – latest revision.
- 1.21.2 For any item requiring the application of fusion welding for stainless steel structures, the Contractor or his Sub-Contractors shall be certified in accordance with the Canadian Welding Bureau, CSA\ACNOR AWS; Division 16 certification – latest revision.
- 1.21.3 For any item requiring the application of fusion welding to aluminum structures, the Contractor or his Sub-Contractors shall be certified in accordance with the Canadian Welding Bureau, CSA\ACNOR W47.2; Division 2.1 certification – latest revision.
- 1.21.4 The Contractor shall provide documentation to the Technical Authority clearly identifying the welding certification of all employees performing any welding included in this specification.

1.22 Electrical Installations

- 1.22.1 All electrical installations and repairs shall 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.
- 1.22.2 All installations of electronic equipment shall 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”.

2.0 SERVICES

2.1 General

- 2.1.1 The Contractor shall supply the following services to the vessel for the entire work period and disconnect upon completion of the work period. The Contractor shall be responsible for the re-establishment of services if the vessel is moved during the work period.
- 2.1.2 Each of the services noted below shall be separately priced in the Contractor's submitted bid.
- 2.1.3 The Contractor shall be responsible for supplying all material, hoses, cables etc. and labor required to connect and disconnect the services to the vessel. Unless otherwise stated these services shall be available 24 hours a day 7 days a week for the entire contract period.
- 2.1.4 All staging, crange, screens, lighting and any other support services, equipment and materials necessary to carry out the work identified in these specifications shall be Contractor supplied.

2.2 Berthing

- 2.2.1 The berthing and mooring facilities must be suitable for a vessel of this size in local weather / tide / sea conditions. Fenders shall be supplied by the Contractor to prevent the vessel from contacting the wharf in local weather / tide / sea conditions.
- 2.2.2 The length of the dock must be a minimum of 90% of the length of the vessel (LOA).
- 2.2.3 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 2 meters under the vessel at extreme low tide to ensure the vessel will not touch bottom.
- 2.2.4 The Contractor shall be responsible for all movements of the vessel, including berthing and mooring of the vessel for the contract period and arrangements and costs for line handlers, tugs and pilots.

2.3 Mooring Lines

- 2.3.1 The Contractor shall be 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.

2.4 Gangways

- 2.4.1 Contractor shall 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 shall be required to supply and maintain the gangways.

2.4.2 Any movement of the gangways required by the Contractor will be at the expense of the Contractor.

2.4.3 Gangways shall be at separate locations to facilitate fire evacuation.

2.5 Telephone Services

2.5.1 Not used.

2.6 Electrical Power

2.6.1 The Contractor shall be responsible for supplying 600Volt Alternating Current, 60 Hertz, 3 Phase, 300 Ampere electrical power for the duration of the contract.

2.6.2 The Contractor shall be responsible for supplying and connecting the necessary shore cable to the ship's shore power connection.

2.6.3 The Contractor shall be responsible for ensuring that the correct phase rotation on a 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 shall be carried out by certified electricians.

2.6.4 The Contractor shall supply all power to the vessel through a Contractor supplied kilowatt-hour meter. The Contractor shall read the kilowatt-hour meter when the connection is made and once again when the power is disconnected. Both readings of the meter shall be witnessed by the TA. The Contractor shall provide a calibration certificate for the kilowatt-hour meter.

2.6.5 The Contractor shall supply a price quote per kilowatt-hour for electrical power for the duration of the work period.

2.6.6 Final price for this item shall be determined at the end of the contract once the meter has been read The final power consumption total shall be adjusted up or down by PWGSC 1379 action.

2.7 Potable Water Supply

2.7.1 The Contractor shall provide a 2 inch diameter sized hose, disinfected and certified for use for potable water only, to supply potable water to the vessel. Water shall be supplied through a calibrated pressure regulator and calibrated water meter, complete with pressure gauge and isolation valve. Potable water pressure shall be capable of being regulated between 40 to 100 psig. The dock connection shall be flushed for at least 5 minutes before connecting the supplied hose to the ship to ensure standing water in the system has been cleared from the pipe.

2.7.2 The Contractor shall read the water meter at the beginning of the contract period and again at the end. The readings shall be taken in the presence of the TA and shall be used to calculate the total water usage.

- 2.7.3 The water shall be supplied from an approved municipal drinking water supply system that has been certified safe for consumption. (Reference CCG FSSM 7F12 Potable Water Quality paragraphs 3.3 Shore Supply, 3.6 Potable Water Testing).
- 2.7.4 At the start of the contract the Contractor shall provide the TA with a copy of water test results for the potable water being supplied to the vessel showing at a minimum the following 5 parameters:
- 2.7.4.1 E. Coli must be 0 detectable per 100ml;
 - 2.7.4.2 Total Coliform must be 0 detectable per 100ml;
 - 2.7.4.3 Total Dissolved Solids must be less than 500 mg/L;
 - 2.7.4.4 pH must be between 6.5 and 8.5 pH units;
 - 2.7.4.5 Iron shall be below 0.3 mg/L.
- 2.7.5 The test results must have been taken within 3 month of the start of the contract date.
- 2.7.6 Provisions shall be made by the Contractor to ensure that the potable water supply does not freeze during cold weather.
- 2.7.7 The Contractor shall supply a price quote per cubic meter of potable water. The Contractor shall also quote on supplying 10 cubic meter of potable water per day for the duration of the contract.
- 2.7.8 The final amount of potable water used shall be calculated from the calibrated water meter and adjusted up or down by PWGSC 1379 action.

2.8 Non Potable Water

- 2.8.1 Not Used.

2.9 Black and Grey Water Service

- 2.9.1 Not Used

2.10 Cranage

- 2.10.1 The Contractor shall quote on the general services of a crane, including an operator and a rigger, for the support of the vessel's day-to-day activities, i.e. the moving of stores from the vessel to the Contractor's facilities ashore while the vessel is in the dry-dock. The Contractor shall quote on providing this service for 15 hours over the duration of the contract. The 15 hours of cranage shall not include transit or assembly of the crane prior to commencing lifts.
- 2.10.2 The crane capacity - lift height and SWL - shall be sufficient to perform all work within this specification.

2.11 Garbage Removal

- 2.11.1 A garbage container or dumpster of 5 cubic meters shall be located adjacent to the vessel. The garbage container shall be emptied as required if full or at a minimum every 4 days. Ship's personnel shall comply with any recycling programs that the Contractor has in place, provided the appropriate containers are made available.
- 2.11.2 If required by the Contractor, the Contractor may also supply a green bin for food waste. The green bin shall be emptied daily.

3.0 LIST OF ACRONYMS

CA	Contract Authority (PWGSC)
CCG	Canadian Coast Guard
CLC	Canada Labour Code
CSM	Contractor Supplied Material
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
DFO	Department of Fisheries and Oceans
FSSM	Fleet Safety & Security Manual (CCG) (DFO 5737 – Latest Version)
FSR	Field Service Representative
GSM	Government Supplied Materials
GFM	Government Furnished Materials
HC	Health Canada
IEEE	Institute of Electrical and Electronic Engineers
LOA	Length Over All
MSDS	Material Safety Data Sheet
OHS	Occupational Health and Safety
PWGSC	Public Works and Government Services Canada
SSMS	Safety & Security Management System
TBS	Treasury Board of Canada Secretariat
TCMS	Transport Canada Marine Safety
TA	Technical Authority – Owner’s Representative (CCG)
WHMIS	Workplace Hazardous Material Information System
MCR	Machinery Control Room
HVAV	Heating ventilation and Air Conditioning
AHU	Air Handling Unit
HMI	Human Machine Interface

4.0 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.

5.0 BILGE CLEANING

5.1 Identification

- 5.1.1 The Contractor shall clean all of the bilge area of the vessel's main engine room, propulsion motor room, and shaft compartment prior to the commencement of several items of work of this specification.

This bilge cleaning shall consist of a thorough cleaning of all the bilge areas in the first week of the contract and as required spot cleaning throughout the contract.

The reasons of this cleaning are:

- a. An annual cleaning for housecleaning purposes.
- b. To ensure hot work can be carried out safely in the engine room, motor room, and shaft compartment.

5.2 References

5.2.1 Drawings:

Drawing Number	Drawing Title	Electronic File Name
664-AF-507	General Arrangement Profile & Superstructure Decks	G05A0803.MIL.pdf
664-AF-507	General Arrangement Profile & Superstructure Decks	ASFITGA2.pdf

5.3 Technical

5.3.1 Initial Bilge Cleaning

- 5.3.1.1 The Contractor shall clean all bilge areas such that they can be certified safe for man entry and safe for hot work in the following locations:

- Engine Room Bilge.
- Motor Room Bilge
- Shaft Compartment Bilge

- 5.3.1.2 This certification shall be maintained for the duration of the contract.

- 5.3.1.3 All bilge cleaning shall be completed before work items in the following sections are started:

- a. Fuel Tank Cleaning and Inspection.
- b. Pump Replacements - any hot work in these sections.

- 5.3.1.4 The Contractor shall quote on removing 20 cubic meters of oily waste from the bilges prior to the start of the cleaning operation.

5.3.2 Disposal of Liquid and Waste from the Bilges

- 5.3.2.1 All material from the bilges shall be removed and disposed of ashore in accordance with Federal, Provincial and Municipal regulations in effect at the time of the contract. The Contractor shall provide copies of waste oil manifests showing that the materials removed from the bilges were disposed of in accordance with Federal, Provincial and Municipal regulations in effect at the time.
- 5.3.2.2 Where water or any foreign materials are allowed to ingress into the bilge as a result of subsequent work performed by the Contractor; this material shall be removed from the bilge areas prior to the close of the contract at the Contractor's expense.

5.4 Inspection, Test and Trials

- 5.4.1 The Contractor shall have the Technical Authority inspect the bilges for cleanliness once the work is completed.
- 5.4.2 The Contractor shall provide the Technical Authority with all copies of waste oil manifests showing the disposal of the materials removed from the vessel's bilges.

6.0 FUEL TANK CLEANING AND INSPECTION

6.1 Identification

- 6.1.1 The Contractor shall open, drain, and clean the listed fuel tanks.
- 6.1.2 The tanks must be cleaned and certified “Safe for Hotwork” in order to perform hot work in the adjacent upper flume tank.

6.2 References

- 6.2.1 Drawings:

Drawing Number	Drawing Title	Electronic File Name
664-AF-501	General Arrangement and Capacity Plan	G05A0807.MIL.pdf
664-120-4	Framing Plan	G05A0855.MIL.pdf
664-120-7	Fore End Framing	G05A0861.MIL.pdf
664-120-9	Watertight and Non Watertight Bulkheads Aft and Fore	G05A0865.MIL.pdf
664-120-10	Oil Stabilization Tanks	G05A0867.MIL.pdf

6.3 Technical

- 6.3.1 The Contractor shall open all access covers to the fuel tanks listed in the following list. Depending on the amount of fuel remaining onboard at the time, the Contractor may need to work in conjunction with the ship’s crew to shift fuel from various fuel tanks to allow all the work in this section to be completed.

Description	Location	Particulars
Fuel Oil Settling Tank Port	Frames 62-67	Capacity: 41.53 L. Tons
Fuel Oil Settling Tank Center	Frames 62-67	Capacity: 43.09 L. Tons
Fuel Oil Settling Tank Stbd	Frames 62-67	Capacity: 41.53 L. Tons

- 6.3.2 The Contractor shall remove any remaining fuel from the tanks and shall provide a marine chemist or other qualified person's gas free certificate stating the tanks are safe for entry and work. The Contractor shall quote on removing a total of 10 cubic meters of fuel from the tanks. The Contractor shall be responsible to arrange for the disposal of this fuel. All fuel removed from the vessel and all waste generated from the tank cleaning shall be tracked in accordance with all Federal, Provincial and Municipal regulations in effect. The Contractor shall provide disposal documentation for all generated waste to the Technical Authority.
- 6.3.3 The Contractor shall supply all materials and labor necessary to clean all internal surfaces of the three tanks such that the tanks can be ready to accept hot work.
- 6.3.4 The Contractor shall close all tank covers and shall install new Contractor supplied fiber-re-enforced neoprene gaskets for all tank covers.

6.4 Tests and Trials

- 6.4.1 Not used

7.0 MAIN FIRE PUMP REPLACEMENT (SURVEY ITEM)

7.1 General

- 7.1.1 Griffon requires replacement of the Main Fire Pump fitted to the vessel. The existing pump and structure must be removed and a new pump and priming system must be installed including piping. The new pump and primer is Government Furnished Material (GFM). The new pump is a similar design - vertical centrifugal - but different dimensionally. The new primer is an air venturi system with electric solenoids. The Contractor shall install a new air line to the primer unit. The main electrical circuitry will be reused. The circuitry shall be required to be modified to operate the new primer and pump.
- 7.1.2 The work in this section of the specification is to be completed in conjunction with Section 5- Bilge Cleaning.
- 7.1.3 All references to Auto Fire Pump in any documents or drawings shall mean Main Fire Pump for the purposes of clarity for this specification.

7.2 Gas-Freeing and Certification of Areas for Hot Work

- 7.2.1 The Contractor shall certify the following spaces safe for hot work:
 - Lower Engine Room inclusive of bilges

7.3 Rigging

- 7.3.1 The Contractor shall be responsible for all materials and labor required for rigging and transporting equipment and material into and from the Lower Engine Room. Any additional lifting lugs that are required to be welded as a result of this specification are the responsibility of the Contractor. Any additional welded lifting lugs shall be approved by the Chief Engineer prior to installation. The Contractor shall be responsible for proof testing the lifting lugs to 200% the SWL prior to using them.

7.4 Protection of Existing Equipment

- 7.4.1 The Contractor shall exercise extreme caution and ensure that remaining electrical and mechanical equipment is well protected from the ingress of dirt, debris and water or exposure to heat. In particular, attention shall be given to all wiring and equipment in the area where the work is to be done. The Contractor is responsible for all labor and equipment required to take all necessary precautions in order to prevent damage to the surrounding fixtures and equipment.

7.5 References

7.5.1 Drawings

7.5.1.1 The following drawings are provided for guidance. These drawings are not to be construed as production drawings.

Drawing Number	Drawing Title	Electronic File Name
B38689	Arrangement of Drysdale 6/4 Falcon Rotary Centrex Main Fire Pump	B38689 Drysdale Fire Pump.pdf
664-4211-1	Compressed Air System	G05A1051.MIL Rev. 1.pdf
G05MFP	Main Fire Pump Arrangement	G05MFP.DWG
664-M1 (1 of 5)	Machinery Arrangement Plan View at Lower Level	No record
664-M1 (4 of 5)	Machinery Arrangement - Plan View - Sections	G05A1015.MIL.pdf

7.5.2 Manuals and Documents:

- Peacock-Drysdale Pumps for Davie Shipbuilding, Peacock Ref. # 68DR-3270
- Instruction Manual CG Centrifugal Pump
- Manual Hamworthy PMB Primer
- Technical Datasheet for CGA065R-V048-AAN-B03J1-CNB
- SU 03393-007 CGB 100 Form 48 General Description & Outline
- SU S2487-002 Centrifugal Pump CGA, B, C Form V Sectional Drawing
- SU S3685-001 Centrifugal Pump, Type CG Parts List

7.5.2.1 Regulations:

7.5.2.1.1 The following standards apply specifically to this section of the specification:

- Canada Shipping Act, Fire Detection and Extinguishing Equipment Regulations- Latest version.
- Canada Shipping Act, Marine Machinery Regulations – Latest version.

7.5.3 Materials

7.5.3.1 New steel structural material shall be C.S.A. G40.21 Grade 44W quality plate and sections, unless otherwise specified. All piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade “A”. Material test certificates shall be a deliverable for this specification and shall be inspected by the TCMSB Inspector prior to installation on the vessel.

7.6 Technical

7.6.1 Main Pump Details

7.6.1.1 Existing Pump Details:

Drysdale/Peacock 6/4 Falcon Rotary Centrex Main Fire Pump
Unit I.D. # J302
Capacity 254 Imp. Gall per min.
Discharge Pressure (Head) 232.5 feet
Suction Pipe Flange Size 6"
Discharge Pipe Flange Size 4"
Motor Make Lawrence Scott Electromotor Ltd
Motor Model No. M424893
Motor Frame VD 200LBD
Motor Voltage 440 VAC, 3 PH, 60 Hz
Motor HP 40 HP
Motor Speed 1750 RPM
Motor Current 52 Amps
Connection Star
Insulation Class B
Rating Continuous
Manufactured 1969
Spec. CU 12 SP

7.6.1.2 Replacement Pump Details:

Hamworthy CG centrifugal, single suction, single stage, radially split, vertical, inline
Main Fire Pump
Unit Model # CGA065R-V048-AAN-B03J1-CNB
Pump Serial Number 11-20468
Pump KW 21.6
Capacity 69 m3/hr
Discharge Pressure (Head) 70.4 m
Total Head 70.4 m
Suction Pipe Flange Size DN 80
Discharge Pipe Flange Size DN 65
Pump Weight 120 KG(without motor)
Motor Make TECO
Motor Model AEVBKB020030FMX
Motor Serial 10730046843-1
Motor Frame 180 MA
Motor Voltage 460V,
Motor KW 24.2

Motor Speed 3530 RPM
Motor Current 37.2
Connection Δ
Insulation Class F
Rating Continuous
Motor Weight 190 KG
Manufactured 2011
Pump Spec. 11-20468
Total pump assembly weight 202 KG

7.6.2 Description of Fitted Installation

7.6.2.1 Mechanical

7.6.2.1.1 The existing Main Fire Pump is located in the lower engine room, starboard side just aft of the starboard main seabox. It is a single stage centrifugal pump fitted with a water ring/separator priming system fitted on the suction of the pump. The pump draws suction from a dedicated 5" suction valve mounted on the lower sea chest outboard and forward of the pump. The pump suction piping is fitted with a 5" duplex strainer and air separator. The pump is also fitted with a water ring primer on top of the electric motor. The pump discharge piping has a 5" lift-check valve and 4" safety valve fitted .

7.6.2.1.2 The existing pump is mounted on a fabricated, welded support structure which straddles frame 43 and 44. The support structure is composed of two transverse steel angles 13 inches apart measuring 7/16" X 3 1/4" X 5 1/2" X 23" long and longitudinal flat bar 22 5/8" apart measuring 7/16" X 5 1/2" X 31" long. This structure is continuously welded to the tank top. Two transverse C4 X 7.25 standard steel channels are bolted to the welded structure. The steel channels are 13" apart. This assembly forms the base of the pump which is 10 1/8" above the tank top. The pump is bolted to the top of the channel by 3 bolts in each channel. The pump centerline is just aft of Frame 44 and approximately 15 feet to Starboard of centerline. The air separator is rigidly supported by a separate support structure that is welded to both the pump base and the tank top.

7.6.2.2 Electrical

7.6.2.2.1 The Main Fire Pump is powered from cubical 5 on the Essential MCC located in the Machinery Control Room via a three conductor cable, 440 VAC, circuit 32-P-2. It is controlled by a Klockner - Moeller AC magnetic reduced voltage autotransformer starter. The pump is operated manually from the Machinery Control Room via a Hand-Off-Auto switch mounted at the MCC or automatically via a pressure switch mounted on the fire main piping on the starboard side of the lower motor room. The pump has a Lock-On/Stop switch mounted locally at the pump for testing and maintenance purposes. Remote indication of power available by way of white indicator light and pump running by way of green indicator is fitted at the MCC.

7.6.3 Strip Out Requirement

7.6.4 Piping Removals

7.6.4.1 The Contractor must ensure all piping is drained, isolated and locked out prior to removal of all piping. The Contractor shall be responsible to supply all labour and materials to remove the following existing main Fire Pump piping:

- The short 6” pipe spool on the suction of the air separator shall be released from the suction piping and removed and discarded. The flange on the suction piping shall be blanked.
- The copper discharge gauge line shall be removed and discarded.
- The discharge piping from the pump to the 5” check valve shall be released and discarded. The Contractor shall notify the Chief Engineer prior to commencing this work. Griffon’s engine room staff will assist with isolating and draining the pipe as required so that the vessel’s firefighting system is not disabled for a prolonged period.
- The discharge check valve shall be removed and retained by the Contractor for overhaul and reuse on the new installation. The discharge piping shall be blanked and the Chief Engineer shall be notified when the Fire Main piping has been blanked so that the system can be put back in operation.
- The discharge pipe from the air primer shall be removed, retained and reinstalled on the old pump.

7.6.5 Main Fire Pump Electrical Removals

7.6.5.1 The Contractor must ensure all Main Fire Pump circuits have been isolated and locked out in accordance with the FSSM. The Contractor shall ensure all cables are identified and all wires are marked as to their intended reconnection prior to removal. The Contractor shall disconnect the following electrical equipment and cabling for the existing Main Fire Pump:

- The power cable to the Main Fire Pump junction box shall be disconnected and released from the existing wire way and pulled back to the deckhead and secured out of the way of work. These cables will be reused on the new installation. The Contractor must not bend these cables in such a way as to damage them.
- The two control cables to the Lock-On/Stop junction box shall be released from the existing wire way and peeled back to the deckhead out of the way of the work. The switch and junction box shall be retained on board for reuse.

7.6.6 Main Fire Pump Removals

- 7.6.6.1 The Contractor must remove the main fire pump, primer and separator from the vessel. The Contractor is advised to break down the pump into at least 4 parts (motor, pump, separator, and primer) in order to facilitate easier dismounting and removal from the vessel. The Contractor shall release the Main Fire Pump from its mount and remove it from the vessel. The pump unit shall be reassembled and returned to CG in an undamaged state at the completion of the work.

7.6.7 Miscellaneous Removals

- 7.6.7.1 The Contractor shall remove the following:
- The support structure for the air separator only shall be cropped off 1” from the tank top and cropped from the pump support it is welded to, removed from the vessel and discarded. The Contractor shall protect the tank top from all undue heat as a result of the cutting.
 - The wire way adjacent to the pump shall be released from its attachment point and retained on board for reuse.
 - All unused brackets associated with the support of the Main Fire Pump and components shall be cropped and base structure ground flush.
 - The deck plate aft and inboard of the pump shall be removed and the supporting structure cropped as required. A new support structure and new deck plating shall be installed to accommodate the new pump arrangement.
 - Any additional removals required in order to execute the pump installation shall be the responsibility of the Contractor.
 - The C4 X 7.25 standard steel channel sections shall remain and be used in the new support arrangement.

7.6.8 New Pump Installation

- 7.6.8.1 The Contractor shall adhere to the manufacturer’s installation and all instructions concerning installation of the pump, piping, electrical and pneumatics. All deviation from the installation instructions shall be approved by the Technical Authority prior to the commencement of work.
- 7.6.8.2 The Contractor may use whatever method considered best for introducing the new material into the vessel and welding it in place, provided there is no damage to the surrounding structure. The Contractor shall remove the pressure gauges, piping and primer system prior to transporting the new pump. They shall be reconnected once the pump is bolted in place. The Contractor shall verify the condition of all grease fittings prior to transporting the pump. Any damage to the pump shall be repaired at the Contractor’s expense.

7.6.9 Mounting Arrangement

- 7.6.9.1 The Contractor shall construct a support structure according to the supplied guidance drawing Main Fire Pump Arrangement. The Contractor shall verify exact location where the pump is to be installed with the Chief Engineer prior to installing the supports.
- 7.6.9.2 The Contractor may propose alternate construction and fitting arrangements that shall be submitted for review by the Technical Authority. Any alternative arrangement shall be approved by the Technical Authority prior to implementation and be accompanied by drawings showing the intended “as fitted” arrangement.
- 7.6.9.3 The pump centerline shall be aligned in the center of the new base plate. The pump suction flange shall be aligned vertically with the existing 6” suction flange taking into account a 3” to 6” eccentric reducer will be fitted to this flange.
- 7.6.9.4 The pump shall be mounted such that the maintenance opening in the entablature of the pump is facing inboard and forward at 45 degrees. Final orientation of the pump shall be verified with the Chief Engineer prior to final installation. The recommended access clearance for maintenance at the pump opening is 1000 mm. This access clearance must be respected. Pump orientation shall not result in obstruction of the main sea box strainer cover. Pump piping shall not interfere with the fuel piping forward of the pump.
- 7.6.9.5 The pump shall be mounted such that the manufacturers recommended vertical clearance of 160 mm for the removal of the motor is respected.
- 7.6.9.6 The location of the motor junction box shall be facing outboard free of obstruction and easily accessible for maintenance. The Contractor shall be responsible for orienting the motor correctly on the entablature. The motor flange has 4 mounting bolts allowing it to be rotated in 90 degree intervals. The Contractor shall perform alignment measurements on the pump before and after disturbing the alignment. Copies of the results shall be presented to the Technical Authority for approval prior to commissioning the pump. Rotation of the motor on it’s base shall be considered as disturbing the alignment. The pump coupling shall be removed prior to moving the motor.

7.6.10 Base Support

- 7.6.10.1 The Contractor must fabricate a new welded pump support frame to rigidly support the pump. The base support shall be built off and welded to the existing C4 X 7.25 steel channel sections. This arrangement shall be stiff to reduce vibration. The Contractor shall take into account the intended location of the pump prior to welding the support to the existing base.
- 7.6.10.2 The Contractor shall fabricate the pump support from ½” steel plate on top and ¾” steel plate on bottom. The Contractor shall construct a rigid box structure from 3/8” steel plate to support the top plate. The side plates shall have 7” lightening holes to reduce

the overall weight of the box structure and bottom corners cropped to allow for continuous welding and drainage. The Contractor must ensure there is no distortion to the pump foundation as a result of welding. The Contractor shall ensure the pump foundation is flat. The bottom support plate shall be welded to the existing steel channel sections by continuous welding. The Contractor shall tack then unbolt the channel from the existing base in order to perform the welding underneath the plate.

- 7.6.10.3 The new pump support and all exposed steel, created as a result of removals, shall be coated with 2 coats of marine primer prior to fitting the pump.

7.6.11 Discharge Check Valve

- 7.6.11.1 The Contractor shall remove the 5" discharge valve from the Fire Main Piping.
- 7.6.11.2 The Contractor shall open up the check valve for inspection by the Chief Engineer. The seat shall be cleaned and all defects repaired. This valve is a Morrison #3045, 5", 150 # A.S.A bronze lift check valve. The seat shall be lapped and the valve reassembled with new gasket material approved for the application.
- 7.6.11.3 The Contractor shall reinstall the check valve using new non -corroding steel fasteners and lock washers.

7.6.12 Pump

- 7.6.12.1 The Contractor shall bolt the new pump to the pump support using 7/8" non-corroding steel fasteners, washers and lock washers. The pump has a three point attachment to the foundation. The Contractor shall ensure the foundation is free from distortion prior to bolting the pump in place.

7.6.13 Piping

- 7.6.13.1 All new Main Fire Pump piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade "A". All pipe fittings to be seamless steel, butt weld, schedule 40. All piping runs are to be flanged at their ends.
- 7.6.13.2 The Contractor shall ensure flange parallelism at the pump is within +/- 0.3 mm of a compressed gasket. Flange eccentricity shall be such that the flange bolts easily pass through both bolt holes.
- 7.6.13.3 All piping shall be assembled using full penetration, continuous butt welds.
- 7.6.13.4 All fittings shall be long radius so long as space permits.
- 7.6.13.5 The Contractor shall connect the 6" flange of the existing suction piping to the 80 mm flange of the pump inlet. The Contractor shall ensure the piping is removable for galvanizing.
- 7.6.13.6 The Contractor shall connect the 65 mm flange at the pump outlet with the 5" flange of the Main Fire Pump Discharge Valve. The Contractor shall remove all sections of piping once proper piping alignment is verified.
- 7.6.13.7 All piping sections shall be pressure tested to 150 psi prior to being sent for galvanizing. The pressure testing is to be witnessed by the Technical Authority. All

leaks are to be repaired prior to galvanizing. Where leak repairs are carried out, the piping shall be retested in the presence of the Technical Authority.

- 7.6.13.8 The Contractor shall send the piping for hot dip galvanizing. This is a regulatory requirement. Copies of the galvanizing report are to be provided to the Technical Authority prior to final fitting of the main fire pump piping. All costs associated with the shipping and galvanizing of the pipes shall be at the Contractor's expense.
- 7.6.13.9 Piping shall be adequately supported on either side of the pump. The Contractor must weld steel bracketing with bolted clamps to ensure all sections of pipe are adequately supported.
- 7.6.13.10 The piping shall be reinstalled with appropriate fasteners for the size of flange being connected. All fasteners to be fitted with lock washers and be corrosion resistant.
- 7.6.13.11 The Contractor shall provide new 1/8" thick reinforced black neoprene rubber gaskets between flanges.
- 7.6.13.12 The Contractor shall provide two coats of marine primer to the finished piping.

7.6.14 New Pump Installation - Primer Installation

7.6.14.1 Primer - Mechanical Installation

- 7.6.14.1.1 The Contractor to note all piping, fitting and hose shall be Contractor supplied to complete this section.
- 7.6.14.1.2 The Contractor shall connect ejector supply air to the new primer. The Griffon crew have roughed in a 1" air primer piping system in the Engine Room. It is composed of 1" seamless steel pipe and 300 lb socket weld fittings. The Contractor shall complete the piping to the Main Fire Pump, Bilge Pump, and Ballast pump, weld and pressure test this pipe to the satisfaction of the TCMSB Inspector. The Contractor shall note the primer air connection is 3/4" BSP.
- 7.6.14.1.3 The ship's Service Air piping shall be cut and the new primer piping branched into the existing piping. All steel piping shall be fabricated 1" seamless steel pipe and 300 lb socket weld black steel fittings. The exact location of the branch line to the existing system shall be determined on site in consultation with the Chief Engineer. The Contractor shall connect the new 1" steel piping to the pump ejector inlet air connection. The pipe shall terminate 3 ft short of the pump and be terminated with a Contractor supplied flexible rubber hose suitable for the application. The rubber hose shall be 3/4" internal diameter and have non corroding process connections. The ejector inlet is a tapered, 3/4" BSP female thread. All fittings and hose shall be Contractor supply.
- 7.6.14.1.4 The Contractor shall pipe the primer ejector outlet to bilge. The piping on this connection shall be NPT threaded, schedule. 40, galvanized steel. The connection to the ejector shall be completed with a non corroding, 1" BSP to 1" NPT adapter suitable for the application.

7.6.14.1.5 All new primer piping shall be suitable supported with steel brackets to eliminate any stress on primer components.

7.6.15 Primer - Electrical Installation

7.6.15.1 The Contractor shall install a new electrical supply for the primer circuits in the engine room. A new junction box has been installed on the aft bulkhead of the engine room to provide power to the primer circuits for the Main Fire Pump, Bilge Pump, and Ballast Pump.

7.6.15.2 The Contractor shall run a new 14/2 conductor bronze armored cable from Panel EL-8, Circuit #6, 15 amp breaker to a watertight, metal junction box mounted on the aft bulkhead of the engine room. EL-8 is located adjacent to the forward MCR entrance door at Frame 44. The metal junction box is GFM.

7.6.15.3 The Contractor will use one of the existing pipe transits below the panel to transition to the lower engine room. The Contractor shall use the existing wire transit and wire ways to run this cable. The cable shall be suitably supported along the wire way.

7.6.15.4 The Contractor shall run new 14/2 conductor bronze armored cable from the junction box to the pressostat on the Main Fire Pump. The Contractor shall use existing wireways and ensure the cable is supported along its entire route.

7.6.15.5 The Contractor shall complete the wiring to the primer circuit.

7.6.16 New Pump Installation - Electrical

7.6.16.1 Electrical - General

7.6.16.1.1 The Contractor shall be responsible for supplying all glands, connectors, brackets, and any other material required to secure and connect the Main Fire pump wiring.

7.6.16.1.2 The new motor full load current is less than the existing motor. The Contractor shall replace the existing Klockner-Moeller Z4-80 overload relay with a new overload relay of suitable rating for the new motor. The new relay shall be GFM.

7.6.17 Power Wiring

7.6.17.1 The Contractor shall reconnect the existing cable to the new motor.

7.6.17.2 The Contractor shall install and connect the power wiring to the new overload relay.

7.6.18 Control Wiring

7.6.18.1 The Contractor shall connect the control circuitry to the new overload relay. The relay shall be set to trip the motor at 125% overload. The relay will be GFM.

7.7 Commissioning

- 7.7.1 The Contractor shall schedule and co-ordinate the commissioning of the Main Fire Pump and associated equipment.
- 7.7.2 The pump shall not be operated until the Contractor has proven to the Chief Engineer that the suction is flooded and all air in the pump and suction piping has been bled. The Contractor shall prove to the Chief Engineer that the pump shaft can be turned by hand without binding. All other manufacture's recommendations for pre-start checks and running the pump shall be adhered to.
- 7.7.3 The Contractor shall put the motor shaft into alignment with the pump shaft prior to operating the pump. The Contractor shall follow the manufacturer's recommended procedure for alignment. The results of the final alignment checks are to be witnessed by the Chief Engineer.
- 7.7.4 The Contractor, with the assistance of the engine room staff, will arrange a 2 hour full flow operational test of the Main Fire pump. The Fire Main shall be used for the test. The Contractor discharge water from hydrants on the Poop Deck. The test shall be done with the vessel's 2" fire hoses hooked up to at least two connections.
- 7.7.5 The Contractor shall verify and record the following items during commissioning:
 - 1) All piping is leak free and flooded.
 - 2) The pump seal is leak free.
 - 3) The motor is bump tested and turns in the correct direction. The Contractor should note the pump start circuit has an anti-restart timer.
 - 4) The proper operation of the primer at start-up.
 - 5) The motor can be operated in Auto using the Low Pressure Switch and manually with the Hand-Auto switch.
 - 6) The motor can be stopped locally using the Lock-On/Stop Switch.
 - 7) The motor is operating within rated values.
 - 8) The pump is operating within rated values with minimum vibration.
 - 9) The Contractor shall close the discharge valve momentarily to record the closed discharge pressure. The Contractor shall note the pump will overheat rapidly when operating against a closed discharge.
 - 10) The Contractor shall record the motor full load current while the pump is operating at full flow capacity.

7.8 Inspection, Tests and Trials

- 7.8.1 The Contractor shall be responsible for all labour and equipment required to perform the Main Fire Pump Testing in the presence of the TCMSB surveyor and the Technical Authority.
- 7.8.2 The Main Fire Pump and associated equipment shall be tested to the minimum standards as follows:
 - Fire Detection and Extinguishing Equipment Regulations C.R.C, c.1422 of the Canada Shipping Act
- 7.8.3 The Contractor must provide an Inspection and Test Plan to both the TCMS and Technical Authorities for approval prior to the commencement of all Main Fire Pump testing.
- 7.8.4 In the case where additional lift lugs were installed, the static load test of 2 times SWL shall be applied and witnessed by the Technical Authority and it shall be in accordance with the Tackle Regulations of the Canada Shipping Act.

7.9 Documentation

- 7.9.1 The Contractor shall provide final as-fitted Main Fire Pump and Piping Arrangement drawings.
- 7.9.2 The Contractor shall provide new drawings of the electrical installation of the pump, from Essential MCC to the pump including all control and primer circuitry.
- 7.9.3 The Contractor shall provide the Technical Authority with copies of the readings recorded as per section Testing & Inspection of this specification item.
- 7.9.4 The Contractor shall provide a Pump Alignment Report to the Technical Authority prior to commissioning of the pump. The Report shall be in Word or Excel format.
- 7.9.5 The Contractor shall provide a copy of the Galvanizing Report to the Technical Authority prior to the final fitting of the piping.
- 7.9.6 The Contractor shall supply material test certificate for this specification to the Technical Authority.

8.0 BILGE PUMP REPLACEMENT (SURVEY ITEM)

8.1 General

- 8.1.1 CCGS Griffon requires replacement of the Bilge Pump fitted to the vessel. The existing pump and structure must be removed and a new pump and priming system must be installed. The new pump and primer is Government Furnished Material (GFM). The new pump is a similar design - vertical centrifugal - but different dimensionally. The new primer is an air venturi system with electric solenoids. A new air connection to the primer will be required. The main electrical circuitry will be reused. The circuitry will require to be modified to operate the new primer and pump. Some deck plating in the vicinity of the new pump will require to be modified.
- 8.1.2 The work in this section of the specification is to be completed only after Section 5, Bilge Cleaning has been performed.
- 8.1.3 The work in this section shall be performed in conjunction with the Main Fire and Ballast pump replacement sections of this specification. All three pumps will share the same primer air piping and electrical circuitry.

8.2 Gas-Freeing and Certification of Areas for Hot Work

- 8.2.1 The Contractor shall certify the following spaces safe for hot work:
- Lower Engine Room inclusive of bilges

8.3 Rigging

- 8.3.1 The Contractor shall be responsible for all materials and labor required for rigging and transporting equipment and material into and from the Lower Engine Room. Any additional lifting lugs required as a result of this specification are the responsibility of the Contractor. Any additional lifting lugs shall be approved by the Chief Engineer prior to installation. The Contractor shall be responsible for proof testing the lifting lugs to 200% the SWL prior to using them.

8.4 Protection of Existing Equipment

- 8.4.1 The Contractor shall exercise extreme caution and ensure that remaining equipment is well protected from the ingress of dirt, debris and water or exposure to heat. In particular, attention shall be given to all wiring and equipment in the area where the work is to be done. The Contractor is responsible for all labor and equipment required to take all necessary precautions in order to prevent damage to the surrounding fixtures and equipment.
- 8.4.2 The Contractor shall be responsible for maintaining flooding protection of all engine room spaces while the work is being carried out. As both Bilge and Bilge & Ballast

Pumps are to be replaced during this work period, either the Contractor shall schedule the work such that one pump is available while the other is being replaced or the Contractor shall put temporary means of emergency flood control in place while the work is being carried out. Should the Contractor decide that temporary flood protection is required, the pump shall be able to be operated in the event of shore power loss. The Contractor shall be responsible for all labor, material, equipment and costs associated with maintaining this requirement for the duration of the work period.

8.5 References

8.5.1 Drawings

8.5.1.1 The following drawings are provided for guidance. These drawings are not to be construed as production drawings.

Drawing Number	Drawing Title	Electronic File Name
B38625	Arrangement of Drysdale 3/3 Bilge Pump	B38625 Drysdale Bilge Pump.pdf
664-4211-1	Compressed Air System	G05A1051.MIL Rev. 1.pdf
1WD68Q462-122, Sht 1 of 4	List of Equipment, Layout, Legend & NP - Emergency MCC	G05322milModel(1).pdf
1WD68Q462-122, Sht 2 of 4	Power & Control Schematic Diagram - Emergency MCC	G05322sc2Model(1).pdf
1WD68Q462-122, Sht 3 of 4	Control Schematic - Emergency MCC	G05322sc3Model(1).pdf
664-M-1 (1 of 5)	Machinery Arrg't Plan View at Lower Level	No record
664-4200-1 (Sht 1)	Bilge & Ballast Piping Arrangement	G05A0461.pdf
G05BPA	Hamworthy Bilge Pump Arrangement	G05BPA.dwg

8.5.2 Manuals and Documents:

- Peacock-Drysdale Pumps for Davie Shipbuilding, Peacock Ref. # 68DR-3270
- Instruction Manual C2G Centrifugal Pump
- Manual Hamworthy PMB Primer
- Technical Datasheet for C2G065LR-AAN-B02B1-CNB
- TU 17845 General Description & Outline
- SU S4082-001 Centrifugal Pump, Type C2G-LA Sectional Drawing
- SU S3725-003 Centrifugal Pump, Type C2G-LA Parts List

8.5.2.1 Regulations

8.5.2.1.1 The following standards apply specifically to this section of the specification:

- Canada Shipping Act, Marine Machinery Regulations SOR/90-264 - Latest Version

8.5.3 Materials

8.5.3.1 New steel structural material shall be C.S.A. G40.21 Grade 44W quality plate and sections, unless otherwise specified. All piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade “A” or equivalent. Material test certificates shall be a deliverable for this specification.

8.6 Technical

8.6.1 Bilge Pump Details

8.6.1.1 Existing Pump Details

Drysdale/Peacock 6/4 Falcon Rotary Centrex Bilge Pump

Unit I.D. # J292

Capacity 170 Imp. Gall per min.

Discharge Pressure (Head) 62 feet

Suction Pipe Flange Size 3"

Discharge Pipe Flange Size 3"

Motor Make Lawrence Scott & Electromotors Ltd

Motor Model No. M424888

Motor Frame VD 100MD

Motor Voltage 440 VAC, 3 PH, 60 Hz

Motor HP 8.5 HP

Motor Speed 1750 RPM

Motor Current 14 Amps

Insulation Class B

Rating Continuous

Manufactured 1969

8.6.1.2 Replacement Pump Details

Hamworthy C2G centrifugal, single suction, single stage, radially split, vertical, inline Bilge Pump

Unit Model # C2G-065LR-AAN-B02B1-CNB

Pump Serial Number 11-20471

Pump KW 3.3 KW

Capacity 46 M3/HR

Discharge Pressure (Head) 18.9 M

Total Head 18.9 M

Suction Pipe Flange Size DN80

Discharge Pipe Flange Size DN65

Pump Weight 50 KG

Motor Make Teco

Motor Model AEVBKB025R50FMX

Motor Serial 10730046863-1

Motor Frame TEFC

Motor Voltage 460 VAC

Motor KW 4.4
Motor Speed 3480 RPM
Motor Current 7.10 A
Insulation CLASS F
Rating IP 55, 2 POLE
Motor Weight 45 KG
Manufactured 2011
Pump Spec. 11-20471
Total pump assembly weight 92 KG

8.6.2 Description of Fitted Installation

8.6.2.1 Mechanical

8.6.2.1.1 The existing Bilge Pump is fitted in the lower engine room, approximately 16'7" off centerline to starboard and straddles frame 42. It is a single stage centrifugal pump fitted with a water ring/separator priming system fitted to the suction of the pump. The pump draws suction from the bilge suction manifold. The pump discharge is 3" pipe and connects to a 4" discharge valve via a 3" to 4" reducing 90 degree elbow. Access for maintenance of this pump is from aft and accomplished by vertically splitting the pump casing. The pump is supported by a column composed of ½" steel plates top and bottom and a 10" pipe located slightly forward of frame 42. The pump is bolted in four places to the circular top plate in four places. This structure is supported by two sections of 7/16" X 5 ½" flat bar welded longitudinally to the tank top across Frame 42.

8.6.2.2 Electrical

8.6.2.3 The existing Bilge Pump motor is powered from the Emergency MCC located in the Emergency Generator Compartment via 3 conductor cable, 440 VAC circuit 19-EP-2. It is controlled by a Klockner - Moeller AC across-the-line starter. The pump has a local Start/Stop pushbutton station mounted locally at the pump. Remote indication of power available by way of a white indicator light is fitted on the Essential MCC in the MCR. Remote indication of pump running/stopped status is by way of green/red illuminated pushbutton lights on the Sub Mimic Display in the MCR. These pushbuttons also provide remote start/stop control.

8.6.3 Strip Out Requirement

8.6.4 Piping Removals

8.6.4.1 The Contractor must ensure all piping is drained, isolated and locked out prior to removal of all piping. The Contractor shall be responsible to supply all labor and materials to remove the following existing Bilge Pump piping:

- The Contractor shall remove all separator and primer piping. This is to be removed from the vessel and retained for reassembly onto the pump

- Release and remove and discard the 3”to 4” reducing 90 degree elbow on the pump discharge.
- Release, remove and discard the copper pipe to the pressure gauges.
- Release, remove and discard the 9” long X 3” pipe spool at the outlet flange of the bilge suction manifold.

8.6.5 Bilge Pump Electrical Removals

8.6.5.1 The Contractor must ensure all Bilge Pump circuits have been isolated and locked out in accordance with the FSSM. The Contractor must ensure all cables are identified and all wires are marked as to their intended reconnection prior to removal. The Contractor shall disconnect the following electrical equipment and cabling for the existing Bilge Pump:

- The power cable to the Bilge Pump junction box is to be released from the supporting wire way, disconnected and pulled back and secured temporarily out of the way of the work. This cable will be reused on the new installation. The Contractor must not bend these cables in such a way as to cause damage to them.

8.6.6 Bilge Pump Removals

8.6.6.1 The Contractor must remove the Bilge Pump, Primer and Separator from the vessel.

8.6.6.2 The Contractor is advised to break down the Bilge Pump into at least 4 parts (motor, pump, separator and primer) in order to facilitate easier dismounting and removal from the vessel. The Contractor shall release the Bilge Pump and air separator from it's mount and remove it from the vessel. The pump unit shall be reassembled and returned to CG in an undamaged state at the completion of the work

8.6.7 Miscellaneous Removals

8.6.7.1 The Contractor shall remove and discard the following:

- The pressure gauge support bracket is to be released, removed and discarded.
- The aluminum checker plating aft of the pump and outboard of the pump shall be removed and discarded.
- The 3” X 3/8” steel angle supporting the deck plate shall be cropped and discarded aft and outboard of the pump. Temporary supports shall be installed where necessary to support adjacent deck plating.
- One vertical section of 3” steel angle adjacent to the existing pump discharge pipe shall be cropped off 1” from the tank top and removed.
- All unused brackets associated with the support of Bilge Pump and components are to be cropped and base structure ground flush.
- Crop flush and discard the 10” pipe column support and 5/8” circular steel top plate of the old pump support. The bottom support plate shall have all remaining weld ground off and top surface prepared for welding.
- The support bracket for the air separator shall be cropped off 1” from the tank top and from the bottom pump support plate and discarded. The tank top shall be protected from undo heat.

- Any additional removals required in order to execute the pump installation shall be the responsibility of the Contractor.

8.6.8 New Pump Installation

- 8.6.8.1 The Contractor must adhere to the manufacturer's installation and all instructions concerning installation of the pump, piping, electrical and pneumatics. All deviation from the installation instructions shall be approved by the Technical Authority prior to the commencement of work.
- 8.6.8.2 The Contractor may use whatever method considered best for introducing the new material into the vessel and welding it in place, provided there is no damage to the surrounding structure.
- 8.6.8.3 The Contractor shall remove the pressure gauges, piping and primer system prior to transporting the new pump. They shall be reconnected once the pump and piping is installed.

8.6.9 Mounting Arrangement

- 8.6.9.1 The Contractor must construct a support structure according to the supplied guidance drawing "Hamworthy Bilge Pump Arrangement". The Contractor shall be responsible for verifying all dimensions of all scantlings, sizes and clearances on site prior to commencement of work.
- 8.6.9.2 The Contractor shall verify exact location where the pump is to be installed with the Chief Engineer prior to installing the supports.
- 8.6.9.3 The Contractor may propose alternate construction and fitting arrangements that shall be submitted for review by the Technical Authority. Any alternative arrangement shall be approved by the Technical Authority prior to implementation and be accompanied by drawings showing the intended "as fitted" arrangement.
- 8.6.9.4 The pump centerline shall be aligned above Frame 42. The suction flange of the pump shall align vertically and horizontally with the outlet flange of the Bilge Suction Manifold.
- 8.6.9.5 The pump shall be mounted such that the maintenance opening in the entablature of the pump is facing aft, the primer piping is inboard, above the suction piping and the motor junction box in facing inboard. The recommended access clearance for maintenance in this area is 700 mm. This clearance shall be respected.
- 8.6.9.6 The pump shall be mounted such that the manufacturers recommended vertical clearance for the removal of the motor is respected. This clearance is 230 mm.
- 8.6.9.7 The location of the motor junction box shall be facing inboard, free of obstruction and easily accessible for maintenance. The Contractor shall be responsible for orienting the motor correctly on the pump entablature. The Contractor shall perform alignment measurements on the pump before and after disturbing the alignment. Copies of the results shall be presented to the Technical Authority for approval prior to

commissioning the pump. Rotation of the motor on it's base shall be considered as disturbing the alignment.

8.6.10 Base Support

- 8.6.10.1 The Contractor must fabricate a new welded box structure to rigidly support the pump and provide a solid mounting surface for the pump. The Contractor shall fabricate the box structure from steel plate according to the guidance drawing "Hamworthy Bilge Pump Arrangement". The box structure shall be fabricated from a 3/4" bottom plate, 1/2" top plate and 3/8" side plates. The side plating shall have lightening holes to provide access for welding and bolting. The transverse plates shall have mouse holes to complete welding and provide drainage. The box structure shall be continuously fillet welded at all seams. The Contractor must ensure there is no distortion to the pump foundation as a result of welding. The Contractor shall ensure the pump foundation is flat.
- 8.6.10.2 The Contractor shall install a new support to mount the pump on. The support shall be arranged according to the guidance drawing provided - "Hamworthy Bilge Pump Arrangement". The support structure shall be continuously welded to the existing structure. In places where, due to space constraints, continuous welding is not possible, plug welding adjacent and along a seam will be accepted. The support shall be installed so that the pump suction flange aligns with the Bilge Suction Manifold flange.
- 8.6.10.3 The new pump support and all exposed steel, created as a result of removals, shall be coated with 2 coats of marine primer prior to fitting the pump.

8.6.11 Pump

- 8.6.11.1 The Contractor shall bolt the new pump to the pump support using 7/16"-N.C. non-corroding steel fasteners, washers and lock washers. The pump has a four point attachment to the foundation. The Contractor shall ensure the foundation is free from distortion prior to bolting the pump in place.

8.6.12 Piping

- 8.6.12.1 All new Bilge Pump piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade "A" or equivalent. All pipe fittings shall be seamless steel, butt weld, schedule 40. All piping runs shall be flanged at the ends.
- 8.6.12.2 The Contractor shall ensure flange parallelism at the pump is within +/- 0.3 mm of a compressed gasket. Flange eccentricity shall be such that the flange bolts easily pass through both bolt holes.
- 8.6.12.3 All piping shall be assembled using full penetration, continuous butt welds.
- 8.6.12.4 All fittings shall be long radius so long as space permits.

- 8.6.12.5 The Contractor shall connect the 3" flange of the existing Bilge Suction Manifold to the DIN 80 mm flange of the pump inlet. The Contractor shall ensure the piping is removable for galvanizing.
- 8.6.12.6 The Contractor shall connect the DIN 65 mm flange at the pump outlet with the 4" flange of the S.D.N.R. globe valve on the discharge piping.
- 8.6.12.7 The Contractor shall remove all sections of piping once proper piping alignment is verified. All piping sections shall be pressure tested to 100 psi prior to being sent for hot dip galvanizing. The pressure testing is to be witnessed by the Technical Authority. All leaks are to be repaired prior to galvanizing. Where leak repairs are carried out, the Contractor shall retest the piping in the presence of the Technical Authority. The Contractor shall subcontract to have the piping hot dip galvanized. This is a regulatory requirement. Copies of the galvanizing quality report are to be provided to the Technical Authority prior to final fitting of the Bilge Pump piping. All costs associated with the shipping and galvanizing of the pipes shall be at the Contractor's expense.
- 8.6.12.8 Piping must be adequately supported on either side of the pump, at the Discharge Valve and at the suction piping such that the flanges of the pump and existing equipment are not subjected to any stress. The Contractor shall weld steel bracketing with bolted clamps to ensure all sections of pipe are adequately supported. The Contractor shall not weld on the tank top.
- 8.6.12.9 The piping shall be reinstalled with appropriate fasteners for the size of flange being connected. All fasteners to be fitted with lock washers and be corrosion resistant. The Contractor shall provide new, oil and fuel compatible, 1/8" thick reinforced black nitrile rubber gaskets between flanges.
- 8.6.12.10 The Contractor shall provide two coats of marine primer to the finished piping.
- 8.6.13 Miscellaneous
- 8.6.13.1 The Contractor shall reinstall the steel wire way and secure the existing power cable to it.
- 8.6.14 New Pump Installation - Primer Installation
- 8.6.14.1 Primer - Mechanical Installation
- 8.6.14.1.1 The Contractor to note all piping, fitting and hose shall be supplied by the Contractor to complete this section.
- 8.6.14.1.2 The Contractor shall connect the new 1" steel piping from the vessel's service air supply to the inlet connection at the ejector solenoid. The Contractor shall terminate the piping approximately 3 feet before the pump and terminate the line with a metal reinforced 3/4" rubber hose appropriate for the application. The hose shall have non corroding fittings. All steel piping shall be fabricated 1" seamless steel pipe and 300 lb socket weld black steel fittings. The ejector inlet is a tapered, 3/4" BSP female thread. All new sections of steel pipe not tested as part of Section 8.6.4.7. shall be pressure tested to the satisfaction of the TCMSB Inspector.

8.6.14.1.3 The Contractor shall pipe the primer ejector outlet to bilge. The piping on this connection shall be NPT threaded, Schedule 40, galvanized steel. The connection to the ejector shall be completed with a galvanized, 1" BSP to 1" NPT adapter suitable for the application.

8.6.14.1.4 All new primer piping shall be suitable supported with steel brackets to eliminate any stress on primer components and directed to bilge.

8.6.15 Primer - Electrical Installation

8.6.15.1 The Contractor shall install a new electrical supply for the primer circuits in the Engine Room. This section shall be done in conjunction with Section 7 (Main Fire Pump Install). A new junction box has been installed on the aft bulkhead of the Engine Room to provide power to the primer circuits for the Main Fire Pump, Bilge Pump, and Ballast Pump. The Contractor shall run a new 14/2 conductor bronze armored cable from the new junction box on the aft bulkhead of the Engine Room to the Danfoss pressure control. The Contractor shall use the existing wire transit and wire ways to run this cable. The cable shall be suitably supported along the wire way.

8.6.15.2 All glands, clips, ties or any other equipment required to complete the installation of the electrical supply to the primer shall be Contractor supplied material.

8.6.16 New Pump Installation - Electrical

8.6.16.1 Electrical - General

8.6.16.1.1 The Contractor shall be responsible for supplying all glands, connectors, brackets, and any other material required to secure and connect the Bilge Pump wiring.

8.6.16.1.2 The new motor full load current is less than the existing motor. The Contractor shall replace the existing Klockner-Moeller Z2-15.5 overload relay with a new overload relay of suitable rating for the new motor. The new relay shall be GFM.

8.6.17 Power Wiring

8.6.17.1 The Contractor shall reconnect the existing cable to the new motor.

8.6.17.2 The Contractor shall install and connect the power wiring to the new overload relay.

8.6.18 Control Wiring

8.6.18.1 The Contractor shall connect the control circuitry to the new overload relay. The relay shall be set to trip the motor at 125% overload. The relay will be GFM.

8.7 Commissioning

- 8.7.1 The Contractor shall be responsible to schedule and co-ordinate the commissioning of the Bilge Pump and associated equipment.
- 8.7.2 The pump shall not be operated until the Contractor has proven to the Chief Engineer that the suction is free of air. The engine room staff will assist the Contractor to operate the required valves to flood the pipe with the vessel's sea suction.
- 8.7.3 The Contractor, with the assistance of the vessel's staff, will arrange a 2 hour full flow operational test of the Bilge Pump. The Contractor shall remove the discharge piping on the outlet of the 4" SDNR discharge valve and install a 2 ½" hose assembly on the 4" SDNR Globe Valve discharge flange. The hose assembly shall be long enough to reach the engine room starboard bilge well. The Contractor shall take suction from the starboard bilge well using the vessel's 4" Bilge Main and discharge using the new pump into the same well. The Contractor shall perform items 1 to 10 in 8.7.4. The Contractor shall then reinstall the pipe with new oil compatible rubber reinforced gaskets and original fasteners.
- 8.7.4 The Contractor shall verify and record the following items during commissioning:
 - 1) All piping is leak free and flooded.
 - 2) The pump seal is leak free.
 - 3) The motor is bump tested and turns in the correct direction.
 - 4) The proper operation of the primer at start-up.
 - 5) The motor can be operated locally and remotely from the MCR Sub-Mimic panel.
 - 6) The motor can be stopped locally and remotely from the MCR Sub-Mimic Panel.
 - 7) The motor is operating within rated values.
 - 8) The pump is operating within rated values with minimum vibration..
 - 9) The Contractor shall close the discharge valve momentarily to record the closed discharge pressure. The Contractor shall note the pump will overheat rapidly when operating against a closed discharge.
 - 10) The Contractor shall record the motor full load current while the pump is operating at full flow capacity.
 - 11) The Contractor shall take motor current readings at increments of 10 psi discharge pressure up to maximum discharge pressure and develop a pump curve to submit to the Technical Authority.

8.8 Inspection, Tests and Trials

- 8.8.1 The Contractor shall be responsible for all labor and equipment required to perform the Bilge Pump Testing in the presence of the TCMS and Technical Authority.
- 8.8.2 The Contractor must provide an Inspection and Test Plan to both the TCMSB Inspector and Technical Authority for approval prior to the commencement of all Bilge Pump testing.
- 8.8.3 The Bilge Pump and associated equipment shall be tested to the minimum standards as follows:
 - Canada Shipping Act, Marine Machinery Regulations, SOR/90-264.
- 8.8.4 The Contractor shall consult with the TCMSB Inspector and elaborate in the Inspection and Test Plan the specific requirements to be tested. The Contractor shall note there is a 1 ¼" test valve and pipe to bilge that can be utilized for testing purposes. Under no conditions shall the ship's side valve be put under pressure. The Contractor shall blank the flange above the test connection to ensure this condition is met and shall be responsible for removing the blank once testing is completed. The blanking of this line shall be a temporary measure to prevent accidental pollution during testing. The blank shall be temporary, shall be removed immediately after testing is completed and shall not endanger the vessel should an emergency flooding situation occur.
- 8.8.5 In the case where additional lift lugs were installed, the Static Load test of 2 times SWL and it shall be in accordance with the Tackle Regulations of the Canada Shipping Act.

8.9 Documentation

- 8.9.1 The Contractor shall provide final as-fitted Bilge Pump and Piping Arrangement drawings.
- 8.9.2 The Contractor shall provide new drawings of the electrical installation of the pump, from Emergency MCC to the pump including all control and primer circuitry.
- 8.9.3 The Contractor shall provide the Technical Authority with copies of the readings recorded as per section Testing & Inspection of this specification item.
- 8.9.4 The Contractor shall provide a Pump Alignment Report to the Technical Authority prior to commissioning of the pump. The Report shall be in Word or Excel format.
- 8.9.5 The Contractor shall provide a copy of the Galvanizing Report to the Inspection & Technical Authority prior to the final fitting of the piping.
- 8.9.6 The Contractor shall supply material test certificate for this specification to the Technical Authority.

9.0 BALLAST PUMP REPLACEMENT (SURVEY ITEM)

9.1 General

- 9.1.1 CCGS Griffon requires replacement of the Ballast Pump fitted to the vessel. The existing pump and structure must be removed and a new pump and priming system must be installed. The new pump and primer is Government Furnished Material (GFM). The new pump is a similar design - vertical centrifugal - but different dimensionally. The new primer is an air venturi system with electric solenoids. A new air connection to the primer will be required. The main electrical circuitry will be reused. The circuitry will require to be modified to operate the new primer and pump. Some deck plating in the vicinity of the new pump will require to be modified.
- 9.1.2 The work in this section of the specification is to be completed only after Section 6, Bilge Cleaning has been performed.
- 9.1.3 The work in this section shall be performed in conjunction with the Main Fire and Bilge pump replacement sections of this specification. All three pumps will share the same primer air piping and electrical circuitry.

9.2 Gas-Freeing and Certification of Areas for Hot Work

- 9.2.1 The Contractor shall certify the following spaces safe for hot work:
- Lower Engine Room inclusive of bilges

9.3 Rigging

- 9.3.1 The Contractor shall be responsible for all materials and labor required for rigging and transporting equipment and material into and from the Lower Engine Room. Any additional lifting lugs required as a result of this specification are the responsibility of the Contractor. Any additional lifting lugs shall be approved by the Chief Engineer prior to installation. The Contractor shall be responsible for proof testing the lifting lugs to 200% the SWL prior to using them.

9.4 Protection of Existing Equipment

- 9.4.1 The Contractor shall exercise extreme caution and ensure that remaining equipment is well protected from the ingress of dirt, debris and water or exposure to heat. In particular, attention shall be given to all wiring and equipment in the area where the work is to be done. The Contractor is responsible for all labor and equipment required to take all necessary precautions in order to prevent damage to the surrounding fixtures and equipment.

9.5 References

9.5.1 Drawings

9.5.1.1 The following drawings are provided for guidance. These drawings are not to be construed as production drawings.

Drawing Number	Drawing Title	Electronic File Name
B38686	Arrangement of Drysdale 5/5 Rotary Centrex Ballast Pump	
664-4211-1	Compressed Air System	G05A1051.MIL Rev. 1.pdf
IWD68Q462-120 (1 of 5)	List of Equipment, Layout, Legend & NP - Essential MCC	G05321mi1 Model(1).pdf
IWD68Q462-120 (2 of 5)	Power Schematic Diagram - Essential MCC	G05321sc2 Model(1).pdf
IWD68Q462-120 (3 of 5)	Control Schematic - Essential MCC	G05321sc3 Model(1).pdf
IWD68Q462-120 (5 of 5)	Essential MCC - Master Terminal Boards	G05321el5 Model(1).pdf
664-M1 (4 of 5)	Machinery Arrangement - Plan View - Sections	G05A1015.MIL.pdf
G05BALLPA	Hamworthy Ballast Pump Arrangement	G05BALLPA.dwg
664-4200-2	Bilge & Ballast Piping Arrangement	G05A0461.DWG

9.5.2 Manuals and Documents:

- Peacock-Drysdale Pumps for Davie Shipbuilding, Peacock Ref. # 68DR-3270
- Instruction Manual C2G Centrifugal Pump
- Manual Hamworthy PMB Primer
- Technical Datasheet for C2G-125LR-AAN-B004A5-CNB
- TU 17845-034 C2G-125LB Outline Drawing
- SUS4070-001 Centrifugal Pump C2G-LB Sectional Drawing
- SUS3741-003 Centrifugal Pump, Type C2G Parts List

9.5.2.1 Regulations

9.5.2.1.1 The following standards apply specifically to this section of the specification:

- Canada Shipping Act, Marine Machinery Regulations SOR/90-264 - Latest Version

9.5.3 Materials

9.5.3.1 New steel structural material shall be C.S.A. G40.21 Grade 44W quality plate and sections, unless otherwise specified. All piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade “A” or equivalent. Material test certificates shall be a deliverable for this specification.

9.6 Technical

9.6.1 Ballast Pump Details

9.6.1.1 Existing Pump Details

Drysdale/Peacock 6/4 Falcon Rotary Centrex Ballast Pump

Unit I.D. # J294 Rotary Centrex
Capacity 340 Imp. Gall per min.
Discharge Pressure (Head) 42 feet
Suction Pipe Flange Size 5"
Discharge Pipe Flange Size 5"
Motor Make Lawrence Scott & Electromotors Ltd
Motor Model No. M424889
Motor Frame VD 160 MD
Motor Voltage 440 VAC, 3 PH, 60 Hz
Motor HP 10 HP
Motor Speed 1750 RPM
Motor Current 13 Amps
Insulation Class B
Rating Continuous
Manufactured 1969
Spec. CU 12SP/Lloyd's #8893

9.6.1.2 Replacement Pump Details

Hamworthy CG centrifugal, single suction, single stage, radially split, vertical, inline Ballast Pump

Unit Model # C2G-125LR-AAN-B04A5-CNB
Pump Serial Number 11-20470
Pump KW 4.7 KW
Capacity 93 M3/HR
Discharge Pressure (Head) 12.8 mLC
Total Head 12.8 M
Suction Pipe Flange Size DIN 150 MM
Discharge Pipe Flange Size DIN 125 MM
Pump Weight 135 KG
Motor Make TECO
Motor Model AEVBKB067R50FMX
Motor Serial 10730046873-1
Motor Frame 132M
Motor Voltage 440
Motor KW 6.1

Motor Speed 1160
Motor Current 11.0 AMPS
Insulation F
Rating CONT.
Motor Weight 65 KG
Manufactured 2011
Pump Spec. 11-20470
Total pump assembly weight 200 KG

9.6.2 Description of Fitted Installation

9.6.2.1 Mechanical

9.6.2.1.1 The existing Ballast Pump is fitted in the lower engine room, approximately 15 feet of centerline to port. It is a single stage centrifugal pump fitted with a water ring/separator priming system fitted to the suction of the pump. The pump draws suction from the Ballast Pump Suction Manifold. The pump discharge is 5" and discharges into the bottom of the Ballast Pump Discharge Manifold. Access for maintenance of this pump is from inboard and accomplished by vertically splitting the pump casing.

9.6.2.2 Electrical

9.6.2.2.1 The existing Ballast Pump motor is powered from the Essential MCC located in the Machinery Control Room (MCR) via 3 conductor cable, 440 VAC circuit 30-P-2. It is controlled by a Klockner - Moeller across-the-line AC starter. The pump has a Local Start/stop pushbutton station mounted locally at the pump. The pump has a Remote Start/stop pushbutton station and a white power available light mounted in the MCR on the Essential MCC section 5. Remote indication of pump running/stopped/power available status is by way of green/yellow/blue illuminated lights on the Main Mimic Display in the MCR and by green and white lights at the MCC.

9.6.3 Strip Out Requirement

9.6.4 Piping Removals

9.6.4.1 The Contractor must ensure all piping is drained, isolated and locked out prior to removal of all piping. The Contractor shall be responsible to supply all labor and materials to remove the following existing Ballast Pump piping:

- The Contractor shall remove all separator and primer piping. This is to be removed from the vessel and retained for reassembly onto the pump
- Remove and discard all copper tubing for the pressure gauges.
- Release, remove and discard the 15 3/5" X 5" pipe spool and attached process connection piping and isolation valve at the outlet of the Ballast Suction Manifold.
- Release, remove and discard the 4 1/2" long X 5" pipe spool at the inlet to the air separator.

- Release and discard the 4 ½" X 5" pipe spool at the outlet of the pump.
- Release, remove and discard the 5" - 90 degree flanged elbow at the bottom of the Ballast Discharge Manifold.

9.6.5 Ballast Pump Electrical Removals

9.6.5.1 The Contractor must ensure all Ballast Pump circuits have been isolated and locked out in accordance with the FSSM. The Contractor must ensure all cables are identified and all wires are marked as to their intended reconnection prior to removal. The Contractor shall disconnect the following electrical equipment and cabling for the existing Ballast Pump:

- One power cable to the Ballast Pump junction box is to be released from the supporting wire way, disconnected and pulled back to the deckhead and secured temporarily out of the way of the work.
- One cable running to the Start/Stop pushbutton junction box shall be disconnected and wire pulled back and temporarily secured out of the way of work.
- Note these cables will be reused on the new installation. The Contractor must not bend these cables in such a way as to cause damage to them.

9.6.6 Ballast Pump Removals

9.6.6.1 The Contractor must remove the Ballast Pump, Primer and Separator from the vessel.

9.6.6.2 The Contractor is advised to break down the Ballast Pump into at least 4 parts (motor, pump, separator and primer) in order to facilitate easier dismounting and removal from the vessel. The Contractor shall release the Ballast Pump from its mount and remove it from the vessel. The pump unit shall be reassembled and returned to CG in an undamaged state at the completion of the work

9.6.7 Miscellaneous Removals

9.6.7.1 The Contractor shall remove and discard the following:

- Release the pushbutton station mounting plate and remove from the wire way. This shall be retained on board and reinstalled.
- Release and remove wire way support and retain on board for reuse.
- All unused brackets associated with the support of Ballast Pump and components are to be cropped and base structure ground flush.
- The aluminum deck plating aft and inboard of the pump is to be removed and discarded.
- The 3" angle aft and inboard of the pump shall be cropped and removed to provide access to the work area. All vertical supports that require removal shall be cropped 1" from the tank top. The tank top shall be protected from undue heat. The Contractor is responsible to provide all temporary supports in order to adequately support the adjoining deck plating in the area should they be required. Welding to the tank top is prohibited.

•Any additional removals required in order to execute the pump installation shall be the responsibility of the Contractor.

9.6.8 New Pump Installation

- 9.6.8.1 The Contractor must adhere to the manufacturer's installation and all instructions concerning installation of the pump, piping, electrical and pneumatics. All deviation from the installation instructions shall be approved by the Technical Authority prior to the commencement of work.
- 9.6.8.2 The Contractor may use whatever method considered best for introducing the new material into the vessel and welding it in place, provided there is no damage to the surrounding structure.
- 9.6.8.3 The Contractor shall remove the pressure gauges, piping and primer system prior to transporting the new pump. They shall be reconnected once the pump and piping is installed.

9.6.9 Mounting Arrangement

- 9.6.9.1 The Contractor must construct a support structure according to the supplied guidance drawing "Hamworthy Ballast Pump Arrangement". The Contractor shall be responsible for verifying all dimensions of all scantlings, sizes and clearances on site prior to commencement of work.
- 9.6.9.2 The Contractor shall verify exact location where the pump is to be installed with the Chief Engineer prior to installing the supports.
- 9.6.9.3 The Contractor may propose alternate construction and fitting arrangements that shall be submitted for review by the Technical Authority. Any alternative arrangement shall be approved by the Technical Authority prior to implementation and be accompanied by drawings showing the intended "as fitted" arrangement.
- 9.6.9.4 The pump centerline shall be aligned between Frame 40 and 41. The pump shall be oriented such that the pump suction faces forward, the pump discharge faces aft, and the primer assembly is forward over the suction flange.
- 9.6.9.5 The pump suction shall be aligned vertically with the outlet flange on the Ballast Suction Manifold. The pump suction flange shall be aligned horizontal such that there is a 7" jog inboard between the Ballast Main Suction flange and the pump suction flange. This will locate the pump directly above the existing support structure.
- 9.6.9.6 The pump shall be mounted such that the maintenance opening in the entablature of the pump is facing inboard. The recommended access clearance for maintenance in this area is 1000 mm. This clearance shall be respected.
- 9.6.9.7 The pump shall be mounted such that the manufacturers recommended vertical clearance for the removal of the motor is respected. The clearance for this pump is 230 mm.

9.6.9.8 The location of the motor junction box shall be facing outboard, free of obstruction and easily accessible for maintenance. The Contractor shall be responsible for orienting the motor correctly on the pump entablature. The Contractor shall perform alignment measurements on the pump before and after disturbing the alignment. Copies of the results shall be presented to the Technical Authority for approval prior to commissioning the pump. Rotation of the motor on it's base shall be considered as disturbing the alignment.

9.6.10 Base Support

9.6.10.1 The Contractor shall install a new welded box structure approximately 20" high to rigidly support the pump. The new support shall be built off and welded to the existing pump base plate.

9.6.10.2 The Contractor must fabricate a new welded box structure to rigidly support the pump and provide a solid mounting surface for the pump. The Contractor shall fabricate the support from steel plate according to the guidance drawing "Hamworthy Ballast Pump Arrangement". The top and bottom plates shall be ½" thick and the side plates shall be 3/8" thick. All side plates shall have lightening holes for access to pump fasteners and the fore and aft side plates shall have mouse holes for drainage and completion of continuous welding. The Contractor must ensure there is no distortion to the pump foundation as a result of welding. The Contractor shall ensure the pump foundation is flat.

9.6.10.3 The new pump support and all exposed steel, created as a result of removals, shall be coated with 2 coats of marine primer prior to fitting the pump.

9.6.11 Pump

9.6.11.1 The Contractor shall bolt the new pump to the pump support using 7/16" non-corroding steel fasteners, washers and lock washers. The pump has a four point attachment to the foundation. The Contractor shall ensure the foundation is free from distortion prior to bolting the pump in place.

9.6.12 Piping

9.6.12.1 All new Ballast Pump piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade "A" or equivalent. All pipe fittings shall be seamless steel, butt weld, schedule 40. All piping runs shall be flanged.

9.6.12.2 The Contractor shall ensure flange parallelism at the pump is within +/- 0.3 mm of a compressed gasket. Flange eccentricity shall be such that the flange bolts easily pass through both bolt holes.

9.6.12.3 All piping shall be assembled using full penetration, continuous butt welds.

9.6.12.4 All fittings shall be long radius so long as space permits.

9.6.12.5 The Contractor shall connect the 5" flange of the existing Ballast Suction Manifold to the 150 mm flange of the pump inlet. The Contractor shall ensure the piping is

removable for galvanizing. The piping shall have a ¼" NPT process connection for connection to the existing suction pressure gauge.

9.6.12.6 The Contractor shall connect the 125 mm flange at the pump outlet with the 5" flange on the bottom of the Ballast Discharge Manifold. The piping shall have a ¼" NPT process connection for the connection to the existing discharge pressure gauge..

9.6.12.7 The Contractor shall remove all sections of piping once proper piping alignment is verified. All piping sections shall be pressure tested to 100 psi prior to being sent for hot dip galvanizing. The pressure testing is to be witnessed by the Technical Authority. All leaks are to be repaired prior to galvanizing. Where leak repairs are carried out, the Contractor shall retest the piping in the presence of the Technical Authority. The Contractor shall subcontract to have the piping hot dip galvanized. This is a regulatory requirement. Copies of the galvanizing quality report are to be provided to the Technical Authority prior to final fitting of the Ballast Pump piping. All costs associated with the shipping and galvanizing of the pipes shall be at the Contractor's expense.

9.6.12.8 Piping must be adequately supported on either side of the pump such that the flanges of the pump and existing equipment are not subjected to any stress. The Contractor shall weld steel bracketing with bolted clamps to ensure all sections of pipe are adequately supported. The Contractor shall not weld on the tank top.

9.6.12.9 The piping shall be reinstalled with appropriate fasteners for the size of flange being connected. All fasteners to be fitted with lock washers and be corrosion resistant. The Contractor shall provide new 1/8" thick reinforced black neoprene rubber gaskets between flanges.

9.6.12.10 The Contractor shall provide two coats of marine primer to the finished piping.

9.6.13 Miscellaneous

9.6.13.1 The Contractor shall install ¼" NPT galvanized piping, brass isolation valves and new copper tubing from the pressure connection on the on the new pipes to the existing pressure gauges located at the ship's side. The copper tubing shall be suitably supported to prevent vibration.

9.6.13.2 The Contractor shall reinstall the steel wire way and support to accommodate the new motor junction box location and secure the existing power and control cables to it.

9.6.13.3 The Contractor shall install new 3" X 3/8" deck angle to close in the space around the new pump installation. All deck angle shall be rigidly supported and built off existing brackets or framing. Welding to the tank top is prohibited.

9.6.13.4 The Contractor shall supply and install new ¼" aluminum checker deck plating inboard and aft of the pump such that there are no openings to bilge. The checker plate shall be secured to the deck angle by countersunk, stainless machine screws. The screws shall be GFM.

9.6.14 New Pump Installation - Primer Installation

9.6.14.1 Primer - Mechanical Installation

9.6.14.1.1 The Contractor to note all piping, fitting and hose shall be supplied by the Contractor to complete this section.

9.6.14.1.2 The Contractor shall connect the new 1" steel piping from the vessel's service air supply that was completed in specification section 8 to the inlet connection at the ejector solenoid. The Contractor shall terminate the piping approximately 3 feet before the pump and terminate the line with a metal reinforced 3/4" rubber hose appropriate for the application. The hose shall have non corroding fittings. All steel piping shall be fabricated 1" seamless steel pipe and 300 lb socket weld black steel fittings. The ejector inlet is a tapered, 3/4" BSP female thread. All new sections of steel pipe not tested as part of Sections 7.0 and 8.0 shall be pressure tested to the satisfaction of the TCMSB Inspector.

9.6.14.1.3 The Contractor shall pipe the primer ejector outlet to Bilge approximately 4" from the tank top.. The piping on this connection shall be NPT threaded, Schedule 40, galvanized steel. The connection to the ejector shall be completed with a non-corroding, 1" BSP to 1" NPT adapter suitable for the application.

9.6.14.1.4 All new primer piping shall be suitable supported with steel brackets to eliminate any stress on primer components and directed to Ballast.

9.6.15 Primer - Electrical Installation

9.6.15.1 The Contractor shall install a new electrical supply for the primer circuits in the Motor Room. This section shall be done in conjunction with Sections 7.0 and 8.0. A new junction box has been installed on the aft bulkhead of the Engine Room to provide power to the primer circuits for the Main Fire Pump, Ballast Pump, and Ballast Pump. The Contractor shall run a new 14/2 conductor bronze armored cable from the new junction box on the aft bulkhead of the Engine Room to the Danfoss pressure control. The Contractor shall use the existing wire transit and wire ways to run this cable. The cable shall be suitably supported along the wire way.

9.6.15.2 All glands, clips, ties or any other equipment required to complete the installation of the electrical supply to the primer shall be Contractor supplied material.

9.6.16 New Pump Installation - Electrical

9.6.16.1 Electrical - General

9.6.16.1.1 The Contractor shall be responsible for supplying all glands, connectors, brackets, and any other material required to secure and connect the Ballast Pump wiring.

9.6.16.1.2 The new motor full load current is less than the existing motor. The Contractor shall replace the existing Klockner-Moeller Z2-15.5 overload relay with a new overload relay of suitable rating for the new motor. The new relay shall be GFM.

9.6.17 Power Wiring

9.6.17.1 The Contractor shall reconnect the existing cable to the new motor.

9.6.17.2 The Contractor shall install and connect the power wiring to the new overload relay.

9.6.18 Control Wiring

9.6.18.1 The Contractor shall connect the control circuitry to the new overload relay. The relay shall be set to trip the motor at 125% overload. The relay will be GFM.

9.7 Commissioning

9.7.1 The Contractor shall be responsible to schedule and co-ordinate the commissioning of the Ballast Pump and associated equipment.

9.7.2 The pump shall not be operated until the Contractor has proven to the Chief Engineer that the suction is flooded.

9.7.3 The Contractor, with the assistance of the vessel's staff, will arrange a 2 hour full flow operational test of the Ballast Pump. The Contractor shall arrange for the vessel's staff to perform the test. The vessel's staff shall utilize the sea suction and discharge overboard to perform the test. The Ballast Discharge Overboard on the Ballast Discharge Manifold shall be used to perform throttling of the flow.

9.7.4 The Contractor shall verify and record the following items during commissioning:

- 1) All piping is leak free and flooded.
- 2) The pump seal is leak free.
- 3) The motor is bump tested and turns in the correct direction.
- 4) The proper operation of the primer at start-up.
- 5) The motor can be operated locally and remotely from the MCR Essential MCC panel.
- 6) The motor can be stopped locally and remotely from the MCR Essential MCC Panel.
- 7) The motor is operating within rated values.
- 8) The pump is operating within rated values with minimum vibration..
- 9) The Contractor shall close the discharge valve momentarily to record the closed discharge pressure. The Contractor shall note the pump will overheat rapidly when operating against a closed discharge.
- 10) The Contractor shall record the motor full load current while the pump is operating at full flow capacity.
- 11) The Contractor shall take motor current readings at increments of 10 psi discharge pressure up to maximum discharge pressure and develop a pump curve to submit to the Technical Authority.

9.8 Inspection, Tests and Trials

- 9.8.1 The Contractor shall be responsible for all labor and equipment required to perform the Ballast Pump Testing in the presence of the TCMS and Technical Authority.
- 9.8.2 The Contractor must provide an Inspection and Test Plan to both the TCMSB Inspector and Technical Authority for approval prior to the commencement of all Ballast Pump testing.
- 9.8.3 The Ballast Pump and associated equipment shall be tested to the minimum standards as follows:
 - Canada Shipping Act, Marine Machinery Regulations, SOR/90-264.
- 9.8.4 The Contractor shall consult with the TCMSB Inspector and elaborate in the Inspection and Test Plan the specific requirements to be tested.
- 9.8.5 In the case where additional lift lugs were installed, the Static Load test of 2 times SWL and it shall be in accordance with the Tackle Regulations of the Canada Shipping Act.

9.9 Documentation

- 9.9.1 The Contractor shall provide final as-fitted Ballast Pump and Piping Arrangement drawings.
- 9.9.2 The Contractor shall provide new drawings of the electrical installation of the pump, from Essential MCC to the pump including all control and primer circuitry.
- 9.9.3 The Contractor shall provide the Technical Authority with copies of the readings recorded as per section Testing & Inspection of this specification item.
- 9.9.4 The Contractor shall provide a Pump Alignment Report to the Technical Authority prior to commissioning of the pump. The Report shall be in Word or Excel format.
- 9.9.5 The Contractor shall provide a copy of the Galvanizing Report to the Inspection & Technical Authority prior to the final fitting of the piping.
- 9.9.6 The Contractor shall supply material test certificate for this specification to the Technical Authority.

10.0 BILGE AND BALLAST PUMP REPLACEMENT (SURVEY ITEM)

10.1 General

- 10.1.1 CCGS Griffon requires replacement of the Bilge and Ballast Pump fitted to the vessel. The existing pump and structure must be removed and a new pump and priming system must be installed. The new pump and primer is Government Furnished Material (GFM). The new pump is a similar design - vertical centrifugal - but different dimensionally. The new primer is an air venturi system with electric solenoids. A new air connection to the primer will be required. The main electrical circuitry will be reused. The circuitry will require to be modified to operate the new primer and pump. Some deck plating in the vicinity of the new pump will require to be modified.
- 10.1.2 The work in this section of the specification is to be completed only after Section 6, Bilge Cleaning has been performed.

10.2 Gas-Freeing and Certification of Areas for Hot Work

- 10.2.1 The Contractor shall certify the following spaces safe for hot work:
- Lower Motor Room inclusive of bilges

10.3 Rigging

- 10.3.1 The Contractor shall be responsible for all materials and labor required for rigging and transporting equipment and material into and from the Lower Motor Room. Any additional lifting lugs required as a result of this specification are the responsibility of the Contractor. Any additional lifting lugs shall be approved by the Chief Engineer prior to installation. The Contractor shall be responsible for proof testing the lifting lugs to 200% the SWL prior to using them.

10.4 Protection of Existing Equipment

- 10.4.1 The Contractor shall exercise extreme caution and ensure that remaining equipment is well protected from the ingress of dirt, debris and water or exposure to heat. In particular, attention shall be given to all wiring and equipment in the area where the work is to be done. The Contractor is responsible for all labor and equipment required to take all necessary precautions in order to prevent damage to the surrounding fixtures and equipment.

10.5 References

10.5.1 Drawings

10.5.1.1 The following drawings are provided for guidance. These drawings are not to be construed as production drawings.

Drawing Number	Drawing Title	Electronic File Name
B38693	Arrangement of Drysdale 5/5 Rotary Centrex Bilge and Ballast Pump	B38693 Drysdale bilge and Ballast Pump.pdf
664-4211-1	Compressed Air System	G05A1051.MIL Rev. 1.pdf
IWD68Q462-120 (1 of 5)	List of Equipment, Layout, Legend & NP - Essential MCC	G05321mi1 Model(1).pdf
IWD68Q462-120 (2 of 5)	Power & Control Schematic Diagram - Essential MCC	G05321sc2 Model(1).pdf
IWD68Q462-120 (3 of 5)	Control Schematic - Essential MCC	G05321sc3 Model(1).pdf
664-4200-2	Bilge & Ballast Piping	
664-M1 (4 of 5)	Machinery Arrangement - Plan View - Sections	G05A1015.MIL.pdf
G05BBPA.DWG	Hamworthy Bilge and Ballast Pump Arrangement	G05BBPA.dwg
664-M1 (1 of 5)	Machinery Arrangement - Plan View - Lower Level	No Record

10.5.2 Manuals and Documents:

- Peacock-Drysdale Pumps for Davie Shipbuilding, Peacock Ref. # 68DR-3270
- Instruction Manual C2G Centrifugal Pump
- Manual Hamworthy PMB Primer
- Technical Datasheet for C2G100LR-AAN-B03B2-CNB
- TU 17845-021 C2G-100LA Outline Drawing
- SU S4082-001 Centrifugal Pump C2G-LA Sectional Drawing
- SU S3735-003 Centrifugal Pump, Type C2G Parts List

10.5.2.1 Regulations

10.5.2.1.1 The following standards apply specifically to this section of the specification:

- Canada Shipping Act, Marine Machinery Regulations SOR/90-264 - Latest Version

10.5.3 Materials

10.5.3.1 New steel structural material shall be C.S.A. G40.21 Grade 44W quality plate and sections, unless otherwise specified. All piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade “A” or equivalent. Material test certificates shall be a deliverable for this specification.

10.6 Technical

10.6.1 Bilge and Ballast Pump Details

10.6.1.1 Existing Pump Details

Drysdale/Peacock 5/5 Rotary Centrex Bilge and Ballast Pump

Unit I.D. # J296
Capacity 329 Imp. Gall per min.
Discharge Pressure (Head) 56 feet
Suction Pipe Flange Size 5"
Discharge Pipe Flange Size 5"
Motor Make Lawrence Scott & Electromotors Ltd
Motor Model No. M424890
Motor Frame VD 160MD
Motor Voltage 440 VAC, 3 PH, 60 Hz
Motor HP 13 HP
Motor Speed 1750 RPM
Motor Current 16.5 Amps
Insulation Class B
Rating Continuous
Manufactured 1969
Spec. CU 12SP/Lloyd's #8605

10.6.1.2 Replacement Pump Details

Hamworthy C2G centrifugal, single suction, single stage, radially split, vertical, inline
Bilge and Ballast Pump

Unit Model # C2G-100LR-AAN-B03B2-CNB
Pump Serial Number 11-20469
Pump KW 6.6 KW
Capacity 90 M3/HR
Discharge Pressure (Head) 17.8 M
Total Head 17.8 M
Suction Pipe Flange Size DIN 125 MM
Discharge Pipe Flange Size DIN 100 MM
Pump Weight 60 KG (without motor)
Motor Make TECO
Motor Model AEVBKB020010FMX
Motor Serial 10730046853-1
Motor Frame TEFC 132S
Motor Voltage 460
Motor KW 8.3 KW

Motor Speed 3485 RPM
Motor Current 12.9 AMPS
Insulation CLASS F
Rating CONT.
Motor Weight 60 KG
Manufactured 2011
Pump Spec.SHOP CODE:11-20469
Total pump assembly weight 120 KG

10.6.2 Description of Fitted Installation

10.6.2.1 Mechanical

10.6.2.2 The existing Bilge and Ballast Pump is fitted in the Lower Motor room, 16” off centerline to Port, between Frames 30 and 31. It is a single stage centrifugal pump fitted with a water ring/separator priming system fitted to the suction of the pump. The pump draws suction from the Bilge and Ballast Pump Suction Manifold. The pump discharge is 5” diameter and discharges to the Bilge & Ballast Pump Discharge Manifold. Access for maintenance of this pump is from aft and accomplished by vertically splitting the pump casing.

10.6.2.3 Electrical

10.6.2.4 The existing Bilge and Ballast Pump motor is powered from the Essential MCC, Section 5 located in the Machinery Control Room (MCR) via 3 conductor cable, 440 VAC circuit 31-P-2. It is controlled by a Klockner - Moeller AC starter. The pump has a Local Start/stop pushbutton station mounted locally at the pump. Remote indication of pump running/stopped status is by way of green/white lights on the MCC in the MCR. The pump has remote Start/Stop control at the MCC. The Contractor shall note the control circuit as listed has been modified during the life of the vessel and is not accurate. Indicating lights and Start/Stop controls have been relocated from the Sub Mimic display and now reside on the MCC. Also, the indicator light colors have been modified. The Contractor shall be responsible for developing an accurate and current control schematic for this pump.

10.6.3 Strip Out Requirement

10.6.4 Piping Removals

10.6.4.1 The Contractor must ensure all piping is drained, isolated and locked out prior to removal of all piping. The Contractor shall be responsible to supply all labor and materials to remove the following existing Bilge and Ballast Pump piping:

- The Contractor shall remove all separator and primer piping. This is to be removed from the vessel and retained for reassembly onto the pump
- Release and discard the copper tubing leading to both pressure gauge.

- Release and discard the 5" discharge piping from the pump flange to the bottom flange of the Bilge & Ballast Discharge Manifold.
- Release and discard the 4 ½" X 5" pipe spool on the outlet of the air separator.

10.6.5 Bilge and Ballast Pump Electrical Removals

10.6.5.1 The Contractor must ensure all Bilge and Ballast Pump circuits have been isolated and locked out in accordance with the FSSM. The Contractor must ensure all cables are identified and all wires are marked as to their intended reconnection prior to removal. The Contractor shall disconnect the following electrical equipment and cabling for the existing Bilge and Ballast Pump:

- One power cable to the Bilge and Ballast Pump junction box is to be released from the supporting wire way, disconnected and pulled back to the deckhead and secured temporarily out of the way of the work. This cable will be reused on the new installation.
- The Contractor must not bend these cables in such a way as to cause damage to them.

10.6.6 Bilge and Ballast Pump Removals

10.6.6.1 The Contractor must remove the Bilge and Ballast Pump, Primer and Separator from the vessel.

10.6.6.2 The Contractor is advised to break down the Bilge and Ballast Pump into at least 4 parts (motor, pump, separator and primer) in order to facilitate easier dismounting and removal from the vessel. The Contractor shall release the Bilge and Ballast Pump from its mount and remove it from the vessel. The pump unit shall be reassembled and returned to CG in an undamaged state at the completion of the work

10.6.7 Miscellaneous Removals

10.6.7.1 The Contractor shall remove and discard the following:

- Crop the support structure for the air separator 1" from the tank top and discard from the vessel. The plate that is in-line with the separator centerline is to be cropped and angle to within 1" from the tank top to match the adjacent brackets. Crop lines shall be ground smooth. The tank top shall be protected from all undo heat as a result of this work.
- All unused brackets associated with the support of Bilge and Ballast Pump and components are to be cropped and base structure ground flush.
- The Contractor must remove and discard the deck plating aft and to port of the existing pump mount.
- The deck angles running longitudinally along the pump base shall be modified to accommodate the new piping arrangement. The Contractor shall crop the deck angle where required to gain access and install piping and equipment.
- The Contractor shall be responsible for temporarily supporting the deck plating where required.

•Any additional removals required in order to execute the pump installation shall be the responsibility of the Contractor.

10.6.8 New Pump Installation

- 10.6.8.1 The Contractor must adhere to the manufacturer's installation and all instructions concerning installation of the pump, piping, electrical and pneumatics. All deviation from the installation instructions shall be approved by the Technical Authority prior to the commencement of work.
- 10.6.8.2 The Contractor may use whatever method considered best for introducing the new material into the vessel and welding it in place, provided there is no damage to the surrounding structure.
- 10.6.8.3 The Contractor shall remove the pressure gauges, piping and primer system prior to transporting the new pump. They shall be reconnected once the pump and piping is installed.

10.6.9 Mounting Arrangement

- 10.6.9.1 The Contractor must construct a support structure according to the supplied guidance drawing "Hamworthy Bilge and Ballast Pump Arrangement". The Contractor shall be responsible for verifying all dimensions of all scantlings, sizes and clearances on site prior to commencement of work.
- 10.6.9.2 The Contractor shall verify exact location where the pump is to be installed with the Chief Engineer prior to installing the supports.
- 10.6.9.3 The Contractor may propose alternate construction and fitting arrangements that shall be submitted for review by the Technical Authority. Any alternative arrangement shall be approved by the Technical Authority prior to implementation and be accompanied by drawings showing the intended "as fitted" arrangement.
- 10.6.9.4 The pump centerline shall be aligned between Frame 30 and 31. The new pump suction flange shall align vertically and horizontally with the 5" flange approximately 3 ½" to starboard of the 10" pillar.
- 10.6.9.5 The pump shall be mounted such that the maintenance opening in the entablature of the pump is facing aft. The recommended access clearance for maintenance in this area is 700 mm. This clearance shall be respected.
- 10.6.9.6 The pump shall be mounted such that the manufacturers recommended vertical clearance for the removal of the motor is respected. For this pump, the clearance is 230 mm.
- 10.6.9.7 The location of the motor junction box shall be facing aft, free of obstruction and easily accessible for maintenance. The Contractor shall be responsible for orienting the motor correctly on the pump entablature. The Contractor shall perform alignment measurements on the pump before and after disturbing the alignment. Copies of the results shall be presented to the Technical Authority for approval prior to

commissioning the pump. Rotation of the motor on it's base shall be considered as disturbing the alignment.

10.6.10 Base Support

10.6.10.1 The Contractor shall install a new base support structure for the pump.

10.6.10.2 The Contractor must fabricate a new welded support structure to rigidly support the pump and provide a solid mounting surface for the pump. The new support structure shall be welded to the existing pump support structure and raise the pump such that the pump suction flange is in-line to the piping suction flange. The Contractor shall fabricate the pump support from ¾" steel plate on bottom, ½" steel plate on top and 3/8" steel plate on sides according to the guidance drawing "Bilge and Ballast Pump Arrangement". The sides shall have lightening holes to provide access for pump fasteners and 1" radiused mouse holes to facilitate continuous welding and provide drainage. The Contractor must ensure there is no distortion to the pump foundation as a result of welding. The Contractor shall ensure the pump foundation is flat.

10.6.10.3 The Contractor shall weld the new support structure to the existing support structure with continuous fillet welding on all perimeter seams.

10.6.10.4 The new pump support and all exposed steel, created as a result of removals, shall be coated with 2 coats of marine primer prior to fitting the pump.

10.6.11 Pump

10.6.11.1 The Contractor shall bolt the new pump to the pump support using 7/16" non-corroding steel fasteners, washers and lock washers. The pump has a four point attachment to the foundation. The Contractor shall ensure the foundation is free from distortion prior to bolting the pump in place.

10.6.12 Piping

10.6.12.1 All new Bilge and Ballast Pump piping shall be seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade "A" or equivalent. All pipe fittings shall be seamless steel, butt weld, schedule 40. All piping runs shall be flanged.

10.6.12.2 The Contractor shall ensure flange parallelism at the pump is within +/- 0.3 mm of a compressed gasket. Flange eccentricity shall be such that the flange bolts easily pass through both bolt holes.

10.6.12.3 All piping shall be assembled using full penetration, continuous butt welds.

10.6.12.4 All fittings shall be long radius so long as space permits.

10.6.12.5 The Contractor shall connect the 5" flange of the existing suction piping to the 125mm flange of the pump inlet. The Contractor shall ensure the piping is removable for galvanizing.

10.6.12.6 The Contractor shall connect the 100 mm flange at the pump outlet with the 5" flange at the bottom of the Bilge & Ballast Pump Discharge Manifold. The Contractor shall note the pipes in the close vicinity of the new discharge piping are not to be disturbed. The Contractor shall crop deck angle where required in order to accommodate the new

piping arrangement. The discharge pipe shall be fitted with a 1/4" NPT process connection on the top of the new pipe close to the first flange after the pump. This shall provide a new connection point for the discharge pressure gauge.

- 10.6.12.7 The Contractor shall remove all sections of piping once proper piping alignment is verified. All piping sections shall be pressure tested to 100 psi prior to being sent for hot dip galvanizing. The pressure testing is to be witnessed by the Technical Authority. All leaks are to be repaired prior to galvanizing. Where leak repairs are carried out, the Contractor shall retest the piping in the presence of the Technical Authority. The Contractor shall subcontract to have the piping hot dip galvanized. This is a regulatory requirement. Copies of the galvanizing quality report are to be provided to the Technical Authority prior to final fitting of the Bilge and Ballast Pump piping. All costs associated with the shipping and galvanizing of the pipes shall be at the Contractor's expense.
- 10.6.12.8 Piping must be adequately supported on either side of the pump, as such that the flanges of the pump and existing equipment are not subjected to any stress. The Contractor shall weld steel bracketing with bolted clamps to ensure all sections of pipe are adequately supported. The Contractor shall not weld on the tank top.
- 10.6.12.9 The piping shall be reinstalled with appropriate fasteners for the size of flange being connected. All fasteners to be fitted with lock washers and be corrosion resistant. The Contractor shall provide new 1/8" thick reinforced black neoprene rubber gaskets between flanges.
- 10.6.12.10 The Contractor shall fit a new 1/4" galvanized pipe nipple and brass isolation valve to the process connection on the discharge piping.
- 10.6.12.11 The Contractor shall provide two coats of marine primer to the finished piping.
- 10.6.13 Miscellaneous
- 10.6.13.1 The Contractor shall install new copper tubing from the pressure connection on the Bilge and Ballast Pump piping to the existing pressure gauge located on the 10" pipe pillar. The copper tubing shall be suitably supported to prevent vibration.
- 10.6.13.2 The Contractor shall secure the existing power cable back on the existing wireway.
- 10.6.13.3 The Contractor shall install new 3" X 3/8" steel angle to close in the open areas adjacent to the new pump and piping. All new support required for the deck angle shall be built off existing bracketing. Welding to the tank top is prohibited.
- 10.6.13.4 The Contractor shall install new 1/4" aluminum checker plate to cover all open areas adjacent to the new pump and piping.

10.6.14 New Pump Installation - Primer Installation

10.6.14.1 Primer - Mechanical Installation

10.6.14.1.1 The Contractor to note all piping, fitting and hose shall be supplied by the Contractor to complete this section.

10.6.14.1.2 The primer air piping has already been run to this pump. The air supply terminates at a flanged isolation valve some 4 feet off the deckplate midships. The Contractor shall connect the air supply 1" steel piping from the isolation valve to the inlet connection at the ejector solenoid. The Contractor shall terminate the piping approximately 3 feet before the pump and terminate the line with a metal reinforced 3/4" rubber hose appropriate for the application. The hose shall have non corroding fittings. All steel piping shall be fabricated 1" seamless steel pipe and 300 lb socket weld black steel fittings. The ejector inlet is a tapered, 3/4" BSP female thread. All new sections of steel pipe shall be pressure tested to the satisfaction of the TCMSB Inspector.

10.6.14.1.3 The Contractor shall pipe the primer ejector outlet to bilge. The piping on this connection shall be NPT threaded, Schedule 40, galvanized steel. The connection to the ejector shall be completed with a galvanized, 1" BSP to 1" NPT adapter suitable for the application.

10.6.14.1.4 All new primer piping shall be suitable supported with steel brackets to eliminate any stress on primer components and directed to bilge.

10.6.15 Primer - Electrical Installation

10.6.15.1 The Contractor shall install a new electrical supply for the primer circuits in the Motor Room. A junction box has been installed on the forward bulkhead of the Motor Room to provide power to the primer circuits for the Bilge and Ballast Pump. The Contractor shall run a new 14/2 conductor bronze armored cable from the new junction box on the aft bulkhead of the Engine Room to the Danfoss pressure control. The Contractor shall use the existing wire transit and wire ways to run this cable. The cable shall be suitably supported along the wire way.

10.6.15.2 All glands, clips, ties or any other equipment required to complete the installation of the electrical supply to the primer shall be Contractor supplied material.

10.6.16 New Pump Installation - Electrical

10.6.16.1 Electrical - General

10.6.16.1.1 The Contractor shall be responsible for supplying all glands, connectors, brackets, and any other material required to secure and connect the Bilge and Ballast Pump wiring.

10.6.16.1.2 The new motor full load current is less than the existing motor. The Contractor shall replace the existing Klockner-Moeller Z2-19.5 overload relay with a new overload relay of suitable rating for the new motor. The new relay shall be GFM.

10.6.17 Power Wiring

10.6.17.1 The Contractor shall reconnect the existing cable to the new motor.

10.6.17.2 The Contractor shall install and connect the power wiring to the new overload relay.

10.6.18 Control Wiring

10.6.18.1 The Contractor shall connect the control circuitry to the new overload relay. The relay shall be set to trip the motor at 125% overload. The relay will be GFM.

10.7 Commissioning

10.7.1 The Contractor shall be responsible to schedule and co-ordinate the commissioning of the Bilge and Ballast Pump and associated equipment.

10.7.2 The pump shall not be operated until the Contractor has proven to the Chief Engineer that the suction is flooded.

10.7.3 The Contractor, with the assistance of the vessel's staff, will arrange a 2 hour full flow operational test of the Bilge and Ballast Pump. The Contractor shall remove a "T" section of 5" Bilge and Ballast Pump discharge piping in the Engine Room Port side. The Contractor shall supply and connect a 5" flanged hose assembly to re-circulate the bilge water discharged by the pump during testing to the Port Engine Room Bilge Well. The Contractor shall take suction from the vessel's Bilge Main - Port Engine Room Bilge Well to perform the test.

10.7.4 The Contractor shall re-install the 'T' section with new reinforced nitrile rubber gasket material and original fasteners after the tests are completed.

10.7.5 The Contractor shall verify and record the following items during commissioning:

- 1) All piping is leak free and flooded.
- 2) The pump seal is leak free.
- 3) The motor is bump tested and turns in the correct direction.
- 4) The proper operation of the primer at start-up.
- 5) The motor can be operated locally and remotely from the MCR Essential MCC panel.
- 6) The motor can be stopped locally and remotely from the MCR Essential MCC Panel.
- 7) The motor is operating within rated values.
- 8) The pump is operating within rated values with minimum vibration..
- 9) The Contractor shall close the discharge valve on the Bilge & Ballast Discharge Manifold momentarily to record the closed discharge pressure. The Contractor shall note the pump will overheat rapidly when operating against a closed discharge.

10) The Contractor shall record the motor full load current while the pump is operating at full flow capacity.

11) The Contractor shall take motor current readings at increments of 10 psi discharge pressure up to maximum discharge pressure and develop a pump curve to submit to the Technical Authority. The overboard discharge valve on the Bilge & Ballast Pump Discharge Manifold shall be used for this test.

10.8 Inspection, Tests and Trials

- 10.8.1 The Contractor shall be responsible for all labor and equipment required to perform the Bilge and Ballast Pump Testing in the presence of the TCMS and Technical Authority.
- 10.8.2 The Contractor must provide an Inspection and Test Plan to both the TCMSB Inspector and Technical Authority for approval prior to the commencement of all Bilge and Ballast Pump testing.
- 10.8.3 The Bilge and Ballast Pump and associated equipment shall be tested to the minimum standards as follows:
 - Canada Shipping Act, Marine Machinery Regulations, SOR/90-264.
- 10.8.4 The Contractor shall consult with the TCMSB Inspector and elaborate in the Inspection and Test Plan the specific requirements to be tested.
- 10.8.5 In the case where additional lift lugs were installed, the Static Load test of 2 times SWL and it shall be in accordance with the Tackle Regulations of the Canada Shipping Act.

10.9 Documentation

- 10.9.1 The Contractor shall provide final as-fitted Bilge and Ballast Pump and Piping Arrangement drawings.
- 10.9.2 The Contractor shall provide new drawings of the electrical installation of the pump, from Essential MCC to the pump including all control and primer circuitry.
- 10.9.3 The Contractor shall provide the Technical Authority with copies of the readings recorded as per section Testing & Inspection of this specification item.
- 10.9.4 The Contractor shall provide a Pump Alignment Report to the Technical Authority prior to commissioning of the pump. The Report shall be in Word or Excel format.
- 10.9.5 The Contractor shall provide a copy of the Galvanizing Report to the Inspection & Technical Authority prior to the final fitting of the piping.
- 10.9.6 The Contractor shall supply material test certificate for this specification to the Technical Authority.

11.0 NEW RADAR WIREWAY AND TRANSIT INSTALL

11.1 GENERAL

- 11.1.1 CCGS Griffon will be renewing the radar navigation system on board thus requires new transits, wireways installed as part of the new system.
- 11.1.2 The Contractor shall install new wireways, transits and hollow steel structure where required. This hollow steel structural square tube will be installed through the Upper Flume Tanks to provide a wireway for passage of cables into the Tween Deck. A new cable tray system will be installed by the Contractor from the forward Flume Tank bulkhead to the Forward Cargo Hold bulkhead and from the Forward Cargo Hold bulkhead to the transit into the M-G Set Compartment.

11.2 BACKGROUND

- 11.2.1 The Cargo Hold deck head and bulkheads are insulated with a sprayed fiber fire-resistive material called Cafco Deckshield on to chicken wire to an A-60 rating. This is a porous insulation that readily retains dirt and debris.
- 11.2.2 A new wire way was installed which commences in the deckhead of the Captain's Cabin on the Bridge Deck and passes down through the accommodations, between Frames 58 and 59 to the Upper Deck.
- 11.2.3 Recently two new dual Roxtec transits were installed in the Winchman's cabin and the Aft ER Workshop bulkhead to allow the passage of cables into the Engine Room and forward into the ER Workshop.

11.3 GAS FREEING TANKS AND COMPARTMENTS

- 11.3.1 This specification shall be performed in conjunction with Fuel tank cleaning and inspection Section 6.0. The Contractor shall perform all necessary work to have the following tanks and compartments certified. "Safe For Hot Work" prior to the commencement of hot work on the Flume Tanks:
 - 1) Port Settling Tank
 - 2) Clean oil Tank
 - 3) Stbd Settling Tank
 - 4) Upper Flume Tank
 - 5) Lower Flume Tank
- 11.3.2 The Contractor shall have the following compartments certified "Safe For Hot Work":
 - 1) Engine Room Workshop
 - 2) Cargo Hold (inclusive of Tween deck)
 - 3) Buoy Winch Compartment

11.3.3 The Tween Deck is composed of plywood. The Contractor shall supply all labour and materials to take all necessary precautions to ensure the deck is protected from damage and fire for the duration of the work in this specification.

11.3.4 The Cargo Hold bilge wells (Port and Stbd at Frame 78) shall be cleaned of oil residue.

11.3.5 The Contractor shall be responsible for provision of fire watches in the affected spaces.

11.3.6 The Griffon's engine room staff will be responsible for emptying the Upper and Lower Flume Tanks prior to commencement of the work.

11.4 REFERENCES

11.4.1 Drawings:

Drawing No.	Title	Electronic file
Dwg. No. 786111 sht 1/1	Griffon Radar Block & connection Diagram Rev. E Sht 1/1	Dwg No. 786111 sht 1/1.pdf
EN12527-01 Rev1 sht 1/2	New radar wire way installation	EN12527-01 Rev1 sht 1 of 2.pdf
EN12527-01 Rev1 sht 2/2	New radar wire way installation	EN12527-01 Rev1 sht 2 of 2.pdf

11.4.2 Standards:

Document	Title	Remarks
70-000-000-EU-JA-001	CCG Specification for the Installation of Shipboard Electronic Equipments	Table 1 Recommended Cable Separation for Electronic Navaid and Communication Equipments
VapCor Marine	VapCor Marine Coat 195W	Product Sheet
TP 127 E	TCMS Ships Electrical Standards	

11.4.3 List of GFM:

1. Rextec unit complete (3 No.)

11.5 TECHNICAL

11.5.1 GENERAL

- 11.5.1.1 The Coast Guard has developed a production drawing. The drawings are listed on the reference section and are not to be deviated from without the consent of the Technical Authority.
- 11.5.1.2 The Contractor shall note all welding in this specification shall be performed by welders certified by CWB for steel and shall conform to CWB standards.

11.5.2 STRIPOUT

- 11.5.2.1 The ship's crew will be responsible for removal of any cabinets stored in way of the work being performed in the Engine Room Workshop, Tween Deck, Cargo Hold, Buoy Winch Compartment and M-G Set Compartment prior to the work taking place.
- 11.5.2.2 The Contractor shall supply all labour, equipment and materials to perform the strip out work. All other required strip out items not mentioned below shall be the responsibility of the Contractor.

11.5.3 STRIPOUT FLUME TANK BULKHEADS

- 11.5.3.1 The Contractor shall remove and dispose of the A-60 bulkhead insulation in the area where the upper flume tank transit tunnel will be installed on the forward side of the bulkhead at Frame 71. An area of approximately 9 square feet shall be removed.
- 11.5.3.2 The Flume Tank interior coated with corrosion prevention coating VapCor Marine Coat 195W. The Contractor shall remove an area of approximately 9 square feet of tank coating in each area where the transit tunnel will be installed between bulkheads at Frame 71 and 67. The Contractor shall be responsible for all labor and materials required and cleanup associated with this work.
- 11.5.3.3 VapCor Marine Coat 195W coating adheres to anything it touches thus precautions shall be taken by the Contractor not to track the coating outside the Flume Tank.
- 11.5.3.4 The Contractor shall be responsible for containing and disposing of all refuse as a result of the tank coating removal and cleanup.
- 11.5.3.5 The Contractor shall remove the perforated aluminum sheathing and insulation in the area of the structural steel tube install on the aft side of the bulkhead at Frame 67. A section at least 9 square feet shall be removed and discarded. Where it is deemed welding or modifications will damage or interfere with linings or insulation and cannot be protected from damage, these materials are to be removed and over the extent required and reinstalled in good condition after the hot work has been completed.
- 11.5.3.6 The Contractor shall take care not to disturb the CO2 flooding system that is located adjacent to the work.

11.5.4 STRIPOUT BUOYWINCH COMPARTMENT

- 11.5.4.1 In order to install the new Roxtec Transit on the Port side of the Bouywinch Compartment at Frame 95, the bulkhead shall be prepared for hot work. The Contractor shall remove the aluminum sheathing and bulkhead insulation to clear an area approximately 6 square feet. The Contractor shall carefully remove the aluminum sheathing, modify it and reinstall upon completion of the work. Insulation and sheathing that is damaged during removal will be replaced by the Contractor at the Contractor's expense.
- 11.5.4.2 The ships staff will be responsible for removing the items stored in the aft corner of the compartment, items stored in the Port aft cabinet and removal of the cabinet prior to the start of the work.
- 11.5.4.3 The Contractor will be required to install a cable tray from the new Roxtec transit leading to the pipe transit for the Radar equipment inboard of the Winch Compartment stairwell at Frame 107.
- 11.5.4.4 The Contractor shall carefully release and remove sections of aluminum sheathing and insulation where required in order to install the new wireway on the deckhead.
- 11.5.4.5 The Contractor shall develop a wireway route that will take into account the minimum disruption to the deckhead sheathing and insulation and adequately support the cable tray its entire length. The cable tray shall not be supported from the aluminum sheathing.

11.5.5 STRIPOUT FORWARD CARGO HOLD BULKHEAD (FRAME 95)

- 11.5.5.1 The Contractor shall remove an area of 4 square feet of the Cafco A-60 bulkhead insulation in way of the intended Roxtec transit installation on bulkhead at Frame 95.
- 11.5.5.2 The intended area for the new transit shall be vertically in-line with the Midship Winch hydraulics lines and as per attached radar wireway installation drawing. Exact location shall be confirmed with the Chief Engineer once the aluminum sheathing in the Buoywinch Compartment has been removed.

11.5.6 INSTALLATION

11.5.6.1 TRANSITS INSTALL

- 11.5.6.1.1 All A-60 Roxtec bulkhead transits shall be GFM. All other material and equipment required in order to complete this specification shall be the responsibility of the Contractor.
- 11.5.6.1.2 The Contractor shall ensure all bulkhead transits are installed and assembled in compliance with the conditions specified in the certificate of approval for the transit and the details shown on the manufacturer's approved drawing and guidelines and in compliance with TP 11469 - Guide to Structural Fire Protection.

11.5.6.2 CABLE TRAYS INSTALL

- 11.5.6.2.1 The Contractor shall follow the supplied production drawing showing new radar wire way installation plan sheets 1/2 and 2/2.
- 11.5.6.2.2 All cable trays referred to in this specification shall be steel, bottom-ventilated, corrugated, non-corroding, trough type having a depth of 2 ½" to 3" and of a modular design to allow easy assembly and support. They shall be designed so that there are no burrs, projections, or sharp edges to damage cable insulation. The tray and fittings shall be Contractor supplied.
- 11.5.6.2.3 Cable trays shall be rigidly supported along their entire length and installed according to manufacturer's recommendations.
- 11.5.6.2.4 Where cable trays are slung or supported by angle brackets, they will be bolted to the supports to prevent the tray vibrating or moving within the support. The Contractor shall ensure that all cable trays are supported in such a way to prevent vibration, exposure to excessive heat or moisture and does not obstruct access ways or create hazards where hazards did not previously exist.
- 11.5.6.2.5 Where cable trays make turns the appropriate cable trays system fittings shall be installed and connected to the straight sections with lockable, non-corroding fasteners.

11.5.6.3 INSULATION INSTALL

- 11.5.6.3.1 Insulated area affected due to the installation as a part of this specification shall be replaced with chicken wire and re-sprayed to match existing.

11.5.6.4 UPPER FLUME TANK CABLE TRANSIT TUNNEL INSTALL

- 11.5.6.4.1 The Contractor shall supply and install a structural steel tube transit tunnel from the aft bulkhead of the Upper Flume Tank (Frame 67) to the forward bulkhead of the Upper Flume Tank (Frame 71) with Roxtec transits Type SF6 X 1 welded on each ends. The tube shall be welded inside and outside both bulkheads according to the drawings provided. The Roxtec transits Type SF6 X 1 two complete set supplied will be GFM.
- 11.5.6.4.2 The Contractor shall be responsible for all craneage and rigging required to load, position and fit the structural tube. The structural steel tube to be 12" X 8" X 3/8" CSA G40.20 GR.44W Hollow Structural Section.
- 11.5.6.4.3 The Contractor shall note the bulkhead plating is 5/16" thick and is vertically stiffened in the area concerned at intervals of 24". The Contractor shall locate and layout the proposed crop lines and confirm location with the Chief Engineer prior to cutting and according to the drawings provided. The penetration shall be centrally located between vertical stiffeners.
- 11.5.6.4.4 The Contractor shall develop and adhere to welding schedules that will prevent the distortion of the Flume Tank bulkheads and transition plates. The welding schedule shall be developed and presented to TCMS for approval prior to the work commencing.

11.5.6.4.5 The Contractor shall crop a hole in the forward and aft Flume Tank bulkheads, position the structural tube, fit and weld the structural tube according to the drawings provided.

11.5.6.4.6 The Contractor shall submit the Upper Flume Tank to a hydrostatic test.

11.5.6.4.7 Upon a successful hydrostatic test of the Upper Flume Tank, the Contractor shall coat any bare steel as a result of the tunnel install with one coat of Interprime 198 primer and two coats of Intersheen 579 White.

11.5.6.4.8 The Contractor shall then repair the Cafco insulation in the Tween Deck with new insulation to an A60 rating matching.

11.5.6.4.9 The Contractor shall modify and reinstall the insulation and aluminum sheathing on the bulkhead at Frame 67 in good order.

11.5.6.5 UPPER FLUME TANK AND TRANSIT TUNNEL COATINGS

11.5.6.5.1 The Contractor shall remove the manhole cover Upper Flume Tank upon successful completion of testing, dry all exposed metal areas that were disturbed during the execution of this work and coat the exposed metal areas with VapCor Marine Coat 195W.

11.5.6.5.2 The Contractor shall be responsible for the labour, materials and equipment required to adequately touch up the affected areas according to manufacturer's recommendations.

11.5.6.6 WIRE TRANSIT AT FRAME 95 INSTALL

11.5.6.6.1 The Contractor shall install one Roxtec S6 X 1, A-60 rated wire transit on bulkhead 95. The Roxtec Transit will be GFM. The location of the transit shall be vertically in line with the Midship Winch hydraulic piping and as per supplied drawings. Exact location shall be determined on site in consultation with the Chief Engineer. The Contractor shall ensure the transit is centered between vertical bulkhead stiffeners. The Contractor shall note the bulkhead stiffeners in this area are 5" X 3 1/2" X 3/8" steel angle spaced at 24" intervals.

11.5.6.6.2 The Contractor shall crop a rectangular penetration. Edges of the cropped opening shall be prepared for welding. The Contractor shall note the bulkhead plating is 9/32" thick in this location.

11.5.6.6.3 The Contractor shall develop a welding schedule that takes into the account the manufactures recommendations for A-60 bulkheads and prevents distortion of the bulkhead. The Contractor shall consult the transits manufacturers welding instructions prior to developing a welding schedule. The welding schedule shall be presented to TCMS authority for approval prior to commencing the work.

11.5.6.6.4 The Contractor shall weld the Roxtec transit to the bulkhead using a single continuous fillet weld on both sides of the bulkhead.

- 11.5.6.6.5 Upon final inspection of the transit, the Contractor shall coat any bare steel as a result of the transit install with one coat of Interprime 198 primer and two coats of Intersheen 579 White.
- 11.5.6.6.6 The Contractor shall modify and reinstall the insulation and sheathing in the Buoywinch Compartment. The Cafco insulation in the Cargo Hold shall be repaired with new insulation to an A60 rating.
- 11.5.6.7 CARGO HOLD WIREWAY INSTALL
- 11.5.6.7.1 The Contractor shall create a passage for the installation of a wireway passing from the new transit on bulkhead 95 to the aft side of Deep Frame 78. The Contractor will be required to penetrate the Deep Frames 78, 81, 84, 87 & 90 and supply as well as install required extra strengthening, cable trays and cable tray support arrangement as per supplied drawing, details of new radar wire way installation sheet 2/2.
- 11.5.6.7.2 The Contractor shall layout a wireway passage whose centerline will be parallel to and vertically in-line with the Midship Winch hydraulic piping and will align horizontally with the centerline of the new transit on bulkhead 95.
- 11.5.6.7.3 The Contractor shall crop flat oval shaped penetrations in the Deep Frames 78, 81, 84, 87 and 90 having 4" X ½" fabricated ring reinforcement. The opening shall have radiuses at both ends of 2". The radii shall be for continuous fillet welded on both sides of the Deep Frame plating as per supplied drawings.
- 11.5.6.7.4 The Contractor shall weld 2" X ¼" X 6" angle longitudinally on both sides of the deep frame plating to support the cable tray sections which will be installed between each deep frame. The arrangement of the angles provided on the supplied drawings.
- 11.5.6.7.5 The Contractor shall supply a cable tray system that is steel, non-corroding, modular, bottom ventilated, 2.5 to 3" deep and 12" wide. For bidding purposes, the amount of cable tray required in the Cargo Hold area is approximately 40 feet in total length. The span between deep frames is 6 feet and the span between deep frame 90 and bulkhead 95 is 10 feet.
- 11.5.6.7.6 The Contractor shall install the cable tray in between each deep frame span and from deep frame 90 to bulkhead 95. The section of cable tray leading to bulkhead 95 from bulkhead 71 shall be suitably supported on its span.
- 11.5.6.7.7 The cable trays shall be supported mid span by tray hangers welded to the under deck structure.
- 11.5.6.7.8 After coatings are applied as specified, the Contractor is responsible for the labour and material for the removal and replacement of all insulation required to complete the welding.
- 11.5.6.7.9 The cable tray shall be rigidly bolted to each location where the steel angle is supporting the tray. The fasteners shall be non corroding and employ lock washers.

11.5.6.8 TWEEN DECK WIREWAY INSTALL

11.5.6.8.1 The Contractor shall develop a cable tray route for approval by the Chief Engineer prior to commencing the work. For bidding purposes, the length of cable tray required is 21 feet in the Tween Deck area. The cable tray route will contain 45 and 90 degree bends in order to line up with the penetration at Deep Frame 78. The route shall take into account all interference items at deckhead level. Should fixtures require relocation, the Chief Engineer shall be consulted for approval on an individual item basis. The Sprinkler piping and existing wireway in this area shall not be modified.

11.5.6.8.2 The Contractor shall install 12 inch wide cable tray from the transit at the Upper Flume Tank fwd bulkhead at Frame 71 to the penetration at Deep Frame 78. The cable tray to follow the path indicated on the supplied drawings to accept the cables from the transit at Frame 71 such that no obstruction exists at the top of the stairway and the cables are protected from abrasion by traffic in the stairway area.

11.5.6.8.3 The Contractor shall ensure the cable tray shall be installed as close to the deck beams as possible in the Tween Deck area.

11.5.6.8.4 The cable tray shall be rigidly supported from the deckhead structure. The Contractor shall be responsible for the removal and re-insulating of deckhead structure in order to complete this work.

11.5.6.9 BOUYWINCH COMPARTMENT WIREWAY INSTALL

11.5.6.9.1 The Contractor shall install a 12" wide by 2.5"- 3" high cable tray from the new cable transit at Frame 95 leading to the pipe transit for the Radar equipment inboard of the Winch Compartment stairwell at Frame 107.

11.5.6.9.2 The Contractor shall develop a wireway route that will take into account the minimum disruption to the deckhead sheathing and adequately support the cable tray along its entire route.

11.5.6.9.3 The wireway shall be rigidly supported to the deckhead structure at 48" spans. The Contractor shall not attach the wireway to the deckhead sheathing. Where attachment points are required and sheathing and insulation are to be removed, openings shall be cut in the sheathing and insulation then replaced in good order. Existing or redundant brackets already existing may be used. Any fixtures, wiring or junction boxes that require relocation as a result of this work shall be approved by the Chief Engineer in advance and shall be noted by the Contractor and allotted for accordingly.

11.5.6.10 COATINGS

11.5.6.10.1 Before any cables are run, the Contractor shall coat all bare steel with one coat of Interprime 198 primer and two coats of Intersheen 579 White. (TP127 E).

11.6 INSPECTION AND TESTING

- 11.6.1 The Contractor shall develop an inspection and test plan for approval by the TA.
- 11.6.2 Prior to commencing the work the Contractor shall submit to the TCMS for approval all welding schedules for the bulkhead and deep frame penetrations.
- 11.6.3 The Contractor shall afford the TCMS authority adequate opportunity to perform all inspections of the work in order to receive approval. The Contractor shall be responsible for scheduling and arranging inspection of the work.
- 11.6.4 Upon completion of this work the Contractor shall arrange for the inspection of welds by the Technical Authority and the TCMS Inspector. All noted defects shall be ground out to the root and rewelded to the satisfaction of TCMS at no cost to CCG.
- 11.6.5 The Contractor shall close the tank covers for the Upper and Lower Flume Tanks and shall install new Contractor supplied fibre-re-inforced neoprene gaskets for these tanks covers.
- 11.6.6 The Contractor shall submit the Upper Flume tank to a hydrostatic test to a 2.5 meter (8 foot) head of water. The Contractor shall blank all suction/discharge lines, sounding pipes and vents during the test. The Contractor shall be responsible for supplying, fitting, and subsequent removal of blanks. The pressure test shall be witnessed by the TCMS Inspector and the Technical Authority.
- 11.6.7 Upon successful completion of testing, the Contractor shall arrange for Griffon staff to dump the contents of the Upper Flume Tank to the Lower Flume Tank so that tank entry can be made to repair coatings.

11.7 DOCUMENTATION

- 11.7.1 The Contractor shall submit copies of the Inspection and Test Plan prior to the work commencing to the Technical Authority.
- 11.7.2 The Contractor shall submit a completed Inspection and Test Plan sign off sheet upon completion of this work as proof all inspections were carried out.

12.0 PORT WATERTIGHT VENT TRUNK REPAIR

12.1 GENERAL

- 12.1.1 CCGS Griffon Cargo Hold is ventilated by two cowlings located on the Upper Deck which passes air down into the watertight vent trunkings located Port and Starboard. The watertight vent trunkings runs from the Engine Room Workshop at Frame 66, through the Upper Flume tank at Frame 67 to the forward bulkhead at Frame 71. The Port side watertight vent trunk is in way of the entrance hatch for the Tween deck, it is this section of the vent trunk that is partially corroded and must be repaired.

12.2 SCOPE OF WORK

- 12.2.1 This work shall be completed in conjunction with Fuel Tank Cleaning and Inspection (Section 6) and Radar Wireway and Cable Install (Section 11) to reduce the amount of duplication involved in tank cleaning and certifying, hotwork, testing, tank re-coating and bulkhead re-insulating. The Contractor shall allot for savings realized by having common tasks in different sections of the specification completed at the same time.
- 12.2.2 The Contractor shall prepare the appropriate tanks and compartments safe for hotwork. Remove the insulation on the forward side of the bulkhead at Frame 71, install a temporary support structure between longitudinal girder and Frame 71, crop corroded section of vent trunking and weld new insert steel plating in its place
- 12.2.3 Upon a successful hydrostatic pressure test, the tank surface coatings shall be renewed and the bulkhead insulation repaired by the Contractor. Remove the temporary structure after completion of tank pressure testing.

12.3 GAS FREEING TANKS AND COMPARTMENTS

- 12.3.1 This specification shall be performed in conjunction with Section 6 and Section 11. The Contractor shall perform all necessary work to have the following tanks certified "Safe For Hot work" prior to the commencement of hot work on the Flume Tanks:
- 1) Port Settling Tank
 - 2) Clean Tank
 - 3) Stbd Settling Tank
 - 4) Upper Flume Tank
 - 5) Lower Flume Tank
- 12.3.2 The Contractor shall have the following compartments certified "Safe For Hot work":
- 1) Engine Room Workshop
 - 2) Cargo Hold (inclusive of Tween deck)
- 12.3.3 The Cargo Hold bilge wells (Port and Stbd at Frame 78) shall be cleaned of oil residue.

12.3.4 The Tween Deck is composed of plywood. The Contractor shall supply all labour and materials to take all necessary precautions to ensure the deck is protected from damage and fire for the duration of the work in this specification.

12.3.5 The Contractor shall be responsible for provision of fire watches in the affected spaces.

12.3.6 The Griffon's engine room staff will be responsible for emptying the Upper and Lower Flume Tanks prior to commencement of the work.

12.4 REFERENCES

12.4.1 Drawings:

Drawings	Title	Electronic file No.
664-120-10	Oil and Stabilisation Tanks, O.T. and W.T. Bhds. Fwd	G05A0867.MIL Rev. 3.pdf
EN12527-02 Rev 1 sheet 1/2	Vent trunk repair	EN12527-02 Rev 1 sht 1 of 2.pdf
EN12527-02 Rev 1 sheet 2/2	Vent trunk repair	EN12527-02 Rev 1 sht 2 of 2.pdf

12.4.2 Standards: Transport Canada Marine Safety – Hull Construction Regulations (Latest Version)

12.5 TECHNICAL

12.5.1 GENERAL

12.5.1.1 CCG has developed a production drawing. The drawings are listed on the reference section and is not to be deviated from without the consent of the Technical Authority.

12.5.1.2 The Contractor to note Cargo Hold deck head and bulkheads are insulated with a sprayed fiber fire-resistive material called Cafco Deckshield on to chicken wire to an A-60 rating.

12.5.1.3 STRIPOUT

12.5.1.3.1 The Contractor shall remove the tank coating and insulation in the area where the hot work shall take place. The Contractor shall be responsible for all labour and materials required to complete this work. All refuse produced as a result of this work shall be disposed of by the Contractor on a daily basis according to Provincial environmental regulations. The Contractor shall take all necessary precautions to prevent the tracking of the tank coating throughout the vessel.

12.5.1.3.2 Where solvents are used to remove the coating, adequate ventilation shall be provided to prevent the fumes from traveling outside the tank and into the vessel's work spaces.

- 12.5.1.3.3 The Contractor shall note the vent trunk steel plating is 3/8" thick and the bulkhead at Frame 71 is 5/16" thick.
- 12.5.1.3.4 The Contractor shall supply and install a W6 x 25 I beam to be installed as a temporary support of the longitudinal girder in the cargo hold area of the vent trunk repair. This support will be approximately 5 feet long.
- 12.5.1.3.5 The Contractor shall prepare the attachment area on the bulkhead at Frame 71 and longitudinal girder to weld a temporary support out of W6X25# beam as per the supplied drawings before the release of the Vent Trunk section. Exact location of the support shall be confirmed in consultation with the Technical authority.
- 12.5.1.3.6 The Contractor shall remove the Cafco Insulation in order to install the temporary support.
- 12.5.1.3.7 The Contractor to note the vertical stiffeners on either side of the vent trunking shall be preserved. The Contractor shall remove the existing bracket on the vertical stiffener which is 8' off centerline port looking outboard.
- 12.5.1.3.8 The Contractor shall remove the welds where the vent trunking penetrates the bulkhead at Frame 71 along the lower surface of the vent trunking and extending up the sides 12 inches on both sides of the bulkhead. The Contractor shall release the bottom section of the vent trunking from the bulkhead. A section of vent trunk extending aft 18" from the forward edge of the trunk is to be cropped out as per supplied drawings.
- 12.5.1.3.9 The Contractor shall note existing longitudinal 1/2" girder web plate to be preserved.
- 12.5.1.3.10 The Contractor shall remove and dispose of the corroded section that was cropped out.

12.5.1.4 INSERT INSTALLATION

- 12.5.1.4.1 The Contractor shall prepare the edges of the bulkhead, vent trunking and existing stiffeners on either side of the vent trunk for welding. Weld edges shall be ground smooth to remove all notches and surface oxides.
- 12.5.1.4.2 The Contractor shall develop a welding schedule for approval by TCMS Inspector and that prevents distortion to the bulkhead, stiffeners, bracket and vent trunk.
- 12.5.1.4.3 The Contractor shall fabricate a new 3/8" thick 18" Long X 24" wide X 12" high Lloyds grade "A" plate insert exact dimension to suit the existing trunk. The insert shall be cranked at each side with an inside radius to suit the existing. The edges of the insert shall be dressed as per supplied drawings for welds on the inside and outside of the tank and vent trunking. The Contractor to note existing longitudinal 1/2" girder web plate to be preserved and reattached to the new trunk plate. The Contractor shall ensure the approved welding schedule is to be adhered. Any deviation from approved welding schedule shall result in a new welding schedule being produced and submitted for approval before the work is commenced.

- 12.5.1.4.4 The Contractor shall weld the vertical stiffeners and one Lloyds grade “A” 14”X12”X3/8” bracketing with 2” lapped to the trunking.
- 12.5.1.4.5 The Contractor shall clean the tank to an “as found” and make it ready for closing.
- 12.5.1.4.6 The Contractor shall notify the Chief Engineer when the tank is ready for closing. The Chief Engineer is responsible for a final inspection of the tank prior to the hydrostatic test.
- 12.5.1.5 COATINGS AND INSULATION**
- 12.5.1.5.1 All coatings are to be applied after the Flume tank has successfully passed a hydrostatic test.
- 12.5.1.5.2 The Contractor shall coat any bare metal outside the tank resulting from the repair work with one coat of Interprime 198 primer and two coats of Intersheen 579 White.
- 12.5.1.5.3 The bare metal inside the flume tank is to be coated with VapCor MARINE COAT 195W as stated in the spec section detailing the new radar wireway and transit installation.
- 12.5.1.5.4 The Cafco insulation on the aft cargo hold bulkhead which was removed for the work in this spec section is to be replaced to match existing by the Contractor.
- 12.5.1.5.5 The Contractor shall close the tank cover.
- 12.5.1.5.6 The Contractor to note after successful tank testing the temporary support shall be dismantled and area of contacts to be brought back to the previous condition.

12.6 INSPECTION AND TESTING

- 12.6.1 The Contractor shall prepare an inspection and testing plan and submit to TA for approval prior to commencing the work. The Contractor shall notify TA and TCMS at stages when the work is ready for inspection.
- 12.6.2 The Contractor shall submit all completed welding of the trunk, bulkhead, vertical stiffeners and brackets for inspection by the TA and TCMS inspector.
- 12.6.3 The Upper Flume Tank shall be hydrostatically pressure tested to a 2.5 meter (8 feet) head of water in the presence of the TCMS Inspector and Technical Authority. Any leak or defect due to the work of the Contractor shall be repaired at no cost to CCG. The Contractor to note - the test to be conducted in conjunction with the work done in section 11.0.
- 12.6.4 The Contractor shall be responsible for supplying, installing and removal of blanks on all suction and discharge pipes, vents and sounding pipes to perform the test.
- 12.6.5 The Contractor shall arrange for the Engine Room staff to empty the Upper Flume Tank.
- 12.6.6 The Contractor shall open the manhole for the Upper Flume, dry the affected surfaces and recoat with Vapcor Marine Coat 195W all bare areas affected by the work undertaken in specification Section – 11 and Section - 12. For bidding purposes, the

Contractor shall bid on the application of one 205 liter drum of Vapcor Marine Coat 195W.

- 12.6.7 The Contractor shall allot for a 72 hour period for the tank coating to cure prior to closing the tank. The Contractor shall adhere to the manufacturer's guidelines for coating the tank.
- 12.6.8 Upon completion, the Contractor shall notify the Chief Engineer that the tank is ready for closing prior to closing the manhole. Upon final inspection, the Contractor shall install the manhole with a new Contractor supplied ¼" fiber re-enforced neoprene gasket.

12.7 DOCUMENTATION

- 12.7.1 The Contractor shall obtain a Division III credit for the hydrostatic pressure test performed on this tank. This survey credit shall be provided to the Technical Authority prior to the completion of the contract.

13.0 REPLACEMENT OF WHEELHOUSE HVAC SYSTEM

13.1 Identification

- 13.1.1 The Coast Guard has a requirement to replace the HVAC system for the Wheelhouse on the Griffon.
- 13.1.2 The Griffon's wheelhouse is cooled and heated by a dedicated system which is inadequate for both heating and cooling. A feasibility study was undertaken by Coast Guard to determine the requirements of a new system.
- 13.1.3 Based upon these requirements, Coast Guard has purchased the major components of the HVAC system. The fitted system is to be removed and the new components installed and commissioned.
- 13.1.4 In conjunction with new component installation some supply air ducting in the Wheelhouse will require modification.

13.2 Gas-Freeing and Certification of Areas for Hot Work

- 13.2.1 The Contractor shall certify the following spaces safe for hot work:

- Upper fan room
- Emergency generator room (below upper fan room)
- Engine room stack compartment
- Wheelhouse
- Wheelhouse stair tower
- Wheelhouse bathroom

13.3 Rigging

- 13.3.1 The Contractor shall be responsible for all materials and labor required for rigging and transporting equipment and material into and from the wheelhouse top, upper fan room, and upper stack. Any additional lifting lugs required as a result of this specification are the responsibility of the Contractor. Any additional lifting lugs shall be approved by the Chief Engineer prior to installation. The Contractor shall be responsible for proof testing the lifting lugs to 200% the SWL prior to using them.

13.4 Protection of Existing Equipment

- 13.4.1 The Contractor shall exercise extreme caution and ensure that remaining equipment is well protected from the ingress of dirt, debris and water or exposure to heat. In particular, attention shall be given to all wiring and equipment in the area where the work is to be done. The Contractor is responsible for all labor and equipment required to take all necessary precautions in order to prevent damage to the surrounding fixtures and equipment.

13.4.2 The contractor to note that there is extensive navigation equipment located in the wheelhouse. Any items damaged shall be repaired or replaced at the contractor's expense.

13.5 REFERENCES

13.5.1 Drawings:

Drawing No.	Drawing Title.	Electronic File No.
664-1059-1 Sheet 3	Air Conditioning and Ventilation Ducting Layout, Boat Deck, Bridge Deck, & Nav. Bridge Decks	G05195hv3.pdf
G05WHHVAC-01 SH 1 OF 3	CCGS GRIFFON WHEELHOUSE HVAC STRIP OUT	Wheelhouse HVAC Stripout SH 1.pdf
G05WHHVAC-01 SH 2 OF 3	CCGS GRIFFON WHEELHOUSE HVAC STRIP OUT	Wheelhouse HVAC Stripout SH 2.pdf
G05WHHVAC-01 SH 3 OF 3	CCGS GRIFFON WHEELHOUSE HVAC STRIP OUT	Wheelhouse HVAC Stripout SH 3.pdf
G05-WHHVAC-02 Rev. 2	CCGS GRIFFON WHEELHOUSE HVAC DUCTING MODIFICATIONS	Wheelhouse HVAC Ducting Mods Rev 2.pdf
CMG05-246-MI	CCGS GRIFFON STRUCTURAL FIRE PROTECTION	CCGS Griffon Structural Fire.pdf
G05-WHHVAC-04	CCGS GRIFFON WHEELHOUSE HVAC - UPPER FAN ROOM	CCGS Griffon WH HVAC Upper Fan Room.pdf
G05WHHVAC-02 SH 1	CCGS GRIFFON WHEELHOUSE HVAC AHU MOUNTING ARRANGEMENT - AS FITTED ARRANGEMENT	CCGS Griffon WH HVAC AHU Mounting SH 1.pdf
G05WHHVAC-02 SH 2	CCGS GRIFFON WHEELHOUSE HVAC AHU MOUNTING ARRANGEMENT - MODIFIED DUCTING	CCGS Griffon WH HVAC AHU Mounting SH 2.pdf
G05WHHVAC-02 SH 3	CCGS GRIFFON WHEELHOUSE HVAC AHU MOUNTING ARRANGEMENT - NEW AHU LOCATION	CCGS Griffon WH HVAC AHU Mounting SH 3.pdf
G05WHHVAC-02 SH 4	CCGS GRIFFON WHEELHOUSE HVAC AHU MOUNTING ARRANGEMENT - NEW AHU SEATING	CCGS Griffon WH HVAC AHU Mounting SH 4.pdf
664-1335-5	Funnel Plan	Griffon Funnel Plan.pdf
4219-030-001 Sh 1 and 2	Condensing Unit General Arrangement	Bronswerk 4219-030-001.pdf

4219-080-001 Sh 1 through 6	Air Handling Unit	Bronswerk 4219-080-001-A.pdf
4219-320-030-001 Sh 1, 2, and 3	Condensing Unit Control Panel	Bronswerk 4219-320-030-001.pdf
4219-320-030-002 Sh 1 through 6	Wheelhouse Air Handling Unit (Electrical)	Bronswerk 4219-320-030-002.pdf
4219-038-001 Sh 1	Refrigerant Piping Diagram - AC System - Condensing Unit	Bronswerk 4219-038-001.pdf

13.5.2 Documents

- Griffon Wheelhouse HVAC System Control System Philosophy (Bronswerk Control Philosophy.pdf)
- Refrigeration Systems Piping Design and Installation Guidelines (Bronswerk Piping Design Guidelines.pdf)
- Silencer Details (Bronswerk Duct Silencer.pdf)
- AHU Griffon wheelhouse HVAC system manual (Bronswerk – 4219-7220)

13.5.3 Government Furnished Materials

- Air handler
- Condensing unit
- Control system (HMI)
- Water regulating valve.
- Raw water feed, return, and by-pass valves.
- Flex lines to condensing unit raw water feed and return.
- Aluminum Rextec Transit and associated components.
- Steam modulating valve.
- Steam trap.
- In-Duct Silencer

13.6 Technical

13.6.1 Fitted Installation

- 13.6.1.1 The fitted air handler (AHU) is located on the wheelhouse top. This unit consists of a fan/evaporator unit, a steam coil, and filter bank. These components are located in an enclosure.
- 13.6.1.2 The condensing unit is located in the vessel's stack above the main engine room intake fan plenum. Cooling water for the condensing unit is via piping from the upper fan room. Refrigeration lines run via a plastic conduit from the stack to the AHU.
- 13.6.1.3 Power for the wheelhouse HVAC is from a 15 ampere breaker 54-P-2 located in the MCR on the Essential MCC. This 460VAC feed terminates at the condensing unit where a step down transformer is fitted. This transformer provides 220 VAC for the air handler and condensing unit.
- 13.6.1.4 The AHU draws air from the wheelhouse return duct and returns the air to the wheelhouse via the supply duct.

13.6.2 Removals (General)

- 13.6.2.1 The contractor shall provide a licensed HVAC technician to evacuate all halocarbons from the fitted wheelhouse HVAC system. The Contractor shall provide written documentation from the licensed technician stating that the halocarbons were disposed of according to Provincial Legislation (required for our halocarbon tracking).
- 13.6.2.2 The contractor shall disconnect the condensing unit - electrical, refrigeration, and raw water piping - and dispose of the condensing unit. Any bulkhead penetrations shall be properly blanked or sealed.
- 13.6.2.3 The contractor shall strip out and dispose of the refrigeration piping from the condensing unit AHU.
- 13.6.2.4 The contractor shall strip out and dispose of the step down transformer in the stack.
- 13.6.2.5 The contractor shall retain the 460 volt feed cable to the step down transformer as this will be used to supply the new AHU. The contractor shall terminate this cable in a suitable NEMA 4 rated junction box located in the engine casing. The contractor to supply all materials to install the junction box.
- 13.6.2.6 The contractor shall disconnect the AHU - electrically, refrigeration piping, steam piping - and unbolt the AHU from the mounting frame on the wheelhouse top. The AHU shall be removed and disposed of.
- 13.6.2.7 The contractor shall remove and dispose of the two plastic conduits running from the funnel to the AHU.
- 13.6.2.8 The contractor shall take appropriate measures to prevent water ingress to the ducting and wheelhouse when the AHU is removed. Any water damage to the vessel or equipment due to water ingress shall be repaired at the contractor's expense.

- 13.6.2.9 The contractor shall strip out and dispose of the ¾" condensing water cooling water piping from the upper fan room to the condensing unit. Note that this pipe route will now be used to run refrigeration piping between the AHU and the condensing unit.
- 13.6.2.10 The contractor shall remove the fitted frame supporting the existing AHU - all metal to be removed and the deck ground flush. Contractor to note this frame straddles the aluminum to steel transition seam - the aft section of the wheelhouse top is steel while the forward section is aluminum. The contractor is responsible for all deckhead and insulation removal below the wheelhouse top to perform a fire watch. This shall include removal and replacement of all lighting, speakers, ventilator grills, etc.
- 13.6.2.11 The contractor shall remove and discard the two ¾" steel flanged lines from bulkhead at frame 55 forward under the deck of the wheelhouse and up through the deck under the AHU. (These pipes were used to supply water to the previous version AHU - pipes are not used). Contractor to supply and install blank flanges at the pipe penetrations at frame 55.
- 13.6.2.12 All control and other wiring at the AHU is to be stripped out where practical. Contractor to note there are multiple conductors of unknown origin. Where strip out is not practical, these wires are to be stripped back to within the vessel at the deckhead level. These cables are to be tagged be safely terminated in a contractor supplied and installed junction box mounted in the deckhead of the wheelhouse.

13.6.3 Penetration Repair and Deck Preparation

- 13.6.3.1 There are numerous penetrations through the wheelhouse top on both the steel and aluminum sections. These penetrations include:
- 8 stand pipes for electrical wiring under the fitted AHU.
 - 2 stand pipes for electrical wiring forward of the fitted AHU.
 - 1 stand pipes for electrical wiring aft of the fitted AHU.
 - 2 flanged water lines under the fitted AHU (not used)
 - 2 blanked flange connections to starboard of the fitted steam lines.
- 13.6.3.2 The contractor may retain any of these connections as required for the new AHU installation. All other penetrations are to be blanked by removing them and fitting an insert plate in the deck. The insert plates shall be material of the same thickness and composition. Inserts shall be welded in place using vee preparation and a full penetration weld from the wheelhouse top side.
- 13.6.3.3 The contractor shall also blank off the inboard penetration of the ship's funnel - this is not required with the new installation. An insert plate is to be welded in to the funnel (note aluminum). The insert plates shall be material of the same thickness and composition and welded in place using vee preparation and a full penetration weld from the outside of the funnel.
- 13.6.3.4 The contractor shall demonstrate water tightness of the repairs to the technical authority using a hose test.

13.6.3.5 The aluminum and steel deck under the AHU requires preparation prior to the replacement of the AHU. The deck in the area of the AHU (from frame 55 to frame 60 - 4 feet off the vessel centerline port and starboard) is to be mechanically cleaned of paint and rust to bare metal.

13.6.4 New Equipment Installation.

13.6.4.1 Condensing Unit

13.6.4.1.1 The exact location of the condensing unit will be determined by the Technical Authority. The contractor shall note the upper fan room structure - the forward bulkhead is steel (engine casing) but the rest of the structure is aluminum.

13.6.4.1.2 The contractor shall install a suitable aluminum frame welded to the upper fan room deck to support the new condensing unit. The contractor shall supply construction drawings of the proposed frame to the technical authority prior to installation of the support frame. The contractor is responsible for all deckhead and insulation removal below the upper fan room in the emergency generator room and air plenum.

13.6.4.1.3 The condensing unit is GFM and will fit through the upper fan room door. The contractor shall take extreme care when transporting the condensing unit so as not to damage the components.

13.6.4.1.4 The contractor shall install the condensing unit on the aluminum frame using suitable non-corroding fasteners. The steel frame of the condensing unit will be separated from the aluminum frame by suitable dielectric isolating material.

13.6.4.1.5 The contractor shall install a new 460 volt feed to the condensing unit. This feed will come from spare circuit breaker 55-P-2 on the Essential MCC in the MCR. Contractor shall supply suitably sized marine approved cable between this breaker and the condensing unit. The wire route is to be through the existing transits below the MCC to the lower ER, up the stack and in to the upper fan room through the Roxtec transit between the stack and upper fan room.

13.6.4.1.6 The contractor shall supply and install a new circuit breaker of appropriate size to replace the fitted 15 amp breaker 55-P-2 in the Essential MCC. The spare 15Amp breaker to be returned to the Coast Guard.

13.6.4.1.7 The Coast Guard has fabricated new supply piping within the upper fan room to allow easier hook up of the condensing unit. The contractor shall install new raw water supply piping from the supply and discharge valves at the main HVAC raw water circulation piping on the port side of the upper fan room. The exact route of the piping will be determined by the Technical authority - essentially the piping will go forward on the port side of the upper fan room then across to the condensing unit located in the starboard forward corner.

13.6.4.1.8 All new piping to and from the condensing unit shall be 1-1/2" seamless steel, black pipe, Schedule 40 to A.S.T.M. Spec. A.53 Grade "A" or equivalent. All pipe fittings shall be seamless steel, butt weld, schedule 40. All piping runs shall be flanged.

- 13.6.4.1.9 The new piping shall incorporate the water regulating valve (GFM) as well as a water regulating valve by-pass valve (GFM). The contractor shall install ½” female NPT pipe saddles on the inlet and outlet pipes near the condenser for pressure gauge connections. The exact locations shall be determined by the Technical Authority.
- 13.6.4.1.10 All piping sections shall be pressure tested to 100 psi prior to being sent for hot dip galvanizing. The pressure testing is to be witnessed by the Technical Authority. All leaks are to be repaired prior to galvanizing. Where leak repairs are carried out, the Contractor shall retest the piping in the presence of the Technical Authority. The Contractor shall subcontract to have the piping hot dip galvanized. Copies of the galvanizing quality report are to be provided to the Technical Authority prior to final fitting of piping. All costs associated with the shipping and galvanizing of the pipes shall be at the Contractor’s expense.
- 13.6.4.1.11 The raw water piping shall be suitably supported at intervals not exceeding 3 feet. These supports shall be clamped to the pipes and welded to the ship’s structure.
- 13.6.4.1.12 After galvanizing, the piping shall be reinstalled with appropriate fasteners for the size of flange being connected. All fasteners to be corrosion resistant. The Contractor shall provide new 1/8” thick reinforced black neoprene rubber gaskets between flanges.
- 13.6.4.2 Wheelhouse Ducting Modifications
- 13.6.4.2.1 In order to achieve the required air flow for the new HVAC components, the supply ducting in the wheelhouse must be modified. The deckhead panels in the wheelhouse, stair tower, and WH washroom must be removed to gain access to the supply ducting midships. The contractor is responsible for all deckhead and insulation removal below the wheelhouse top to perform a fire watch. This shall include removal and replacement of:
- Lighting fixtures.
 - Intercom speakers
 - Supply and return ventilators and grills
 - Various ceiling panel trim pieces
 - Damper controls.
 - Whistle pulls
 - Wiper controls and compass light control.
 - Sprinkler heads.
- 13.6.4.2.2 The contractor shall inform the Technical authority before any sprinkler heads are removed as the system loop will have to be isolated.
- 13.6.4.2.3 The contractor shall remove any ducting supports to the ship’s structure - contractor to note the wheelhouse deckhead is aluminum. Any thermal insulation removed as part of this work is to be replaced or renewed at the contractor’s expense.

- 13.6.4.2.4 The contractor shall strip and discard all duct insulation from the supply air ducting from the wheelhouse top deck to the midships center cross duct damper assembly at frame 61. The contractor shall remove and discard the duct insulation on the diffuser ducting port and starboard of the cross duct damper assembly 2 feet outboard port and starboard.
- 13.6.4.2.5 The contractor shall move the diffuser dampers port and starboard outboard 6" to allow for the ducting modifications. The contractor shall repair any penetrations in the diffuser ducting as a result of moving the dampers. The contractor shall supply and install new damper linkages to accommodate the damper relocation.
- 13.6.4.2.6 The contractor shall strip out the supply ducting from the cross duct damper to the wheelhouse top flange.
- 13.6.4.2.7 The contractor shall re-locate the pull cable system for the two whistles outboard enough to allow for the ducting aft of the cross duct damper. This is to include new pull cables, guide piping, pulleys, and supports as required. The whistle pull system is to be proven functional to the Technical authority after modification.
- 13.6.4.2.8 The contractor shall supply and install new supply air ducting from the wheelhouse top duct flange to the cross duct damper. The existing cross damper ducting is to be modified to accept the new larger ducting. The new ducting, as shown on the reference drawing, shall be 24" wide by 8" high and shall be constructed of 12 gauge galvanized sheet metal.
- 13.6.4.2.9 The Contractor shall incorporate the in-duct silencer in the new supply duct as per the reference drawings and documentation. This silencer is GFM.
- 13.6.4.2.10 The new ducting shall be sealed to the wheelhouse top duct flange and existing cross damper ducting.
- 13.6.4.2.11 After the new supply ducting is installed, all bare steel ductwork is to be insulated with 2" of Rockwool insulation. All insulation removed from the wheelhouse structure is to be replaced with new insulation. All insulation to be secured with mechanical fasteners - pins and clips, strapping, or equivalent. Adhesive pins are not permitted.
- 13.6.4.3 Air Handling Unit Installation
- 13.6.4.3.1 The air handling unit is equipped with lifting lugs for installation purposes. The contractor shall use extreme care when handling the AHU to avoid damage.
- 13.6.4.3.2 In order to allow for a transition from the air handler to the wheelhouse top, a support structure is to be fabricated from mild steel in order provide enough space under the air handler. The support structure is to be strong enough to support the weight of the AHU. The weight of the AHU is approximately 1892 lbs. This support structure is to act as a transition from the return and supply connections of the AHU to the fitted return and supply connections on the wheelhouse top. An example of the expected support structure is shown on the reference drawings. The contractor shall determine

an appropriate design for this support structure and present construction drawings to the Technical authority for approval prior to fabrication.

- 13.6.4.3.3 The support structure is to be welded to the wheelhouse top. The reference drawings show a suggested mounting arrangement. The contractor is to determine the appropriate mounting arrangement for the AHU seating and provide a welding plan to the Technical authority for approval prior to fabrication.
- 13.6.4.3.4 As the support structure will act as air ducting, any ducting must be insulated to prevent heat loss and condensation. Any insulation installed is to be mechanically protected by aluminum sheathing affixed with non-corroding fasteners. The reference drawings show possible arrangement of insulated supply and return plenums. The contractor shall submit an insulation plan to the Technical Authority for approval prior to installation of the seating structure.
- 13.6.4.3.5 There is to be access to the inside of the support structure for maintenance purposes. The reference drawings show an example of access panels. These panels are to be bolted in place and be sealed with suitable gasket material. Fasteners to be stainless steel. The contractor shall clearly show the means of access to the inside of the support structure on the reference drawings.
- 13.6.4.3.6 The support structure is to be painted with two coats of Interprime 198 primer and two coats of Intersheen 579 White.
- 13.6.4.3.7 The contractor shall modify the supply duct transiting the wheelhouse top. The contractor shall extend the duct above the wheelhouse top enough to supply and install a fire damper in this supply duct. The damper actuator shall be easily accessible on the wheelhouse top and shall be lockable in the open and closed positions. The fire damper external operating mechanism shall be painted with one coat of Interprime 198 primer and two coats of Interlac 664 Red (red Coast Guard supply) and have the open and closed positions clearly marked. The damper shaft shall be sealed and shall not allow the ingress of water into the mounting arrangement.
- 13.6.4.3.8 After installation of the AHU support structure, the decks are to be primed with 2 coats of suitable primer (Interprime 198 for steel, Interprime 539 for aluminum) and two coats of deck red (deck red Coast Guard Supply).
- 13.6.4.3.9 The AHU is to be bolted to the support structure with suitable non corroding fasteners.
- 13.6.4.3.10 The contractor shall supply 460 VAC to the AHU using suitable approved marine approved cable. The supply will be from the existing 460 volt feed terminated in the engine casing junction box. This cable is to run through the new funnel Roxtec to the AHU via the new wire way on the wheelhouse top. Power for this circuit is derived from 54-P-2.
- 13.6.4.4 AHU Cable Transit and Wireway
 - 13.6.4.4.1 The PVC cable transit from the funnel to the AHU will be replaced with a proper marine installation. Contractor to note the funnel is aluminum while the deck between the funnel and the AHU is steel (transition seam at the funnel base).

- 13.6.4.4.2 The contractor will weld in an aluminum transit in the funnel in way of the 3" PVC transit on the forward side of the funnel. The transit will be GFM. The contractor shall follow the Roxtec welding schedule and instructions when installing the transit.
- 13.6.4.4.3 The contractor shall install a new wire way between the funnel transit and the AHU. This wire way is to be mounted 4" off the wheelhouse top. Before installation of any cables or refrigeration piping the wire way and supports are to be coated with one coat of Interprime 198 primer and two coats of Intersheen 579 White. The deck coatings are to be repaired with one coat of Interprime 198 primer and two coats of Intersheen 664 deck red (red Coast Guard Supply).
- 13.6.4.4.4 The contractor is responsible for supply and installation of any cable transits through the wheelhouse top. As mentioned in the Deck Penetration Repair section, the contractor may use the existing deck penetrations if practical. Where new cable transits are required in the wheelhouse top, the contractor shall weld threaded standpipes fitted with cable glands as required. Cable glands are to be non-corroding and contractor supply.
- 13.6.4.5 Refrigeration Piping
- 13.6.4.5.1 The contractor shall utilize a licensed refrigeration contractor to install new refrigeration piping between the condensing unit in the upper fan room and the AHU. The recommended route for this piping is along the route of the previously stripped out raw water piping to the funnel, out the new Roxtec transit, and along the new wire way to the AHU.
- 13.6.4.5.2 The Contractor shall reference Bronswerk guidance drawing "Refrigerant Piping Diagram" (Drawing 4219-038-001) prior to installing the refrigerant piping.
- 13.6.4.5.3 The Contractor to reference the Bronswerk document "Refrigeration systems piping design and Installation Guidelines" prior to installing the refrigerant piping.
- 13.6.4.5.4 Refrigeration tubing shall be specifically designed for refrigeration and be deoxidized, dehydrated, and sealed in accordance with ASTM B 280. The tubing shall be copper Type "L" and shall meet ASTM B 88. All refrigerant lines larger than 3/8" shall be hard drawn. All fittings shall be long radius, wrought copper.
- 13.6.4.5.5 The discharge tubing shall be 5/8" OD. The suction tubing shall be 1-1/8" OD. Where the suctions lines exit each AHU coil, the tubing shall be 7/8" and shall be connected to the main suction line using an inverted trap.
- 13.6.4.5.6 The suction lines shall be pitched toward the condensing unit a minimum 20 mm/m.
- 13.6.4.5.7 The refrigerant lines shall allow for thermal expansion without stressing fixed elements. The refrigeration piping is to be supported along its entire length using bolted plastic lined clamp supports at intervals not exceeding 5 feet. The clamp bases will be welded or bolted to the ship's structure. The contractor is responsible for all fire watches and removals in order to install these clamps and install the piping.
- 13.6.4.5.8 All refrigeration pipe connections between the condensing unit and the AHU are to be brazed with silver solder. The piping shall be installed in such a way that the number

of soldered joints is minimized. At all times during assembly the system is to be kept clean with the use of inert gas when making sweat joints.

- 13.6.4.5.9 The contractor shall supply and install flexible connections on the suction and discharge refrigeration lines at the condensing unit and AHU. Where threaded pipe connections are required, they shall be sealed with Loctite 554 or equivalent.
- 13.6.4.5.10 The suction and discharge lines shall be insulated along their entire length. Insulation shall be a flexible elastomeric type - Armaflex NH, 1/2" thickness or equivalent. Where the piping is exposed on the wheelhouse top the insulation is to be sheathed in stainless steel cladding using stainless fasteners.
- 13.6.4.5.11 The refrigerant piping shall be tested in accordance with guidance drawing provided "Refrigerant Piping Diagram" (Drawing 4219-038-001) . The Contractor is responsible for all materials, labor, and equipment in order to complete the work. The pressure and vacuum tests shall be incorporated into the inspection and test plan and shall be witnessed by the Terchnical Authority.
- 13.6.4.6 Steam Piping
- 13.6.4.6.1 The contractor shall install new steam piping from the existing steam flange connections at the wheelhouse top deck to the new AHU. The piping is to be 3/4" schedule 80 seamless steel pipe using #3000 socket weld steel fittings. Before fitting, the newly fabricated pipes are to be pressure tested to 100 psi which is to be witnessed by the technical authority.
- 13.6.4.6.2 The contractor shall install the GFM steam modulating valve at the AHU location - exact location to be determined by the technical authority.
- 13.6.4.6.3 The contractor shall install the GFM steam trap at the AHU location - exact location to be determined by the technical authority.
- 13.6.4.6.4 After final installation the piping shall be lagged with Rock Wool pipe insulation. The insulation shall stop 1" from the wheelhouse top flange. The insulation is to be covered with stainless steel sheathing secured with stainless steel fasteners.
- 13.6.4.7 AHU Drain Piping
- 13.6.4.7.1 The AHU is fitted with drains to ensure moisture does not accumulate within the AHU. In addition, the AHU is fitted with a drain pan to collect condensate from the cooling coil and water droplet separator- this drain pan has a drain connection.
- 13.6.4.7.2 The contractor is to supply and install non-corroding drain piping to lead all drains to a common header running aft in the AHU support structure. This header is to be sloped aft and exit the AHU support structure aft end. (Drainage will be to the exposed deck).
- 13.6.4.7.3 Where the piping transits bulkheads which constitute plenums the penetrations will be suitably sealed.

13.6.4.8 Control System

13.6.4.8.1 The contractor shall mount the control panel (operator interface) in the wheelhouse in the same location of the thermostat stripped out.

13.6.4.8.2 The contractor shall supply and install all control wiring as per the reference drawings. This is to include all wiring between the AHU and condensing unit, AHU and control panel, condensing unit and control panel, AHU and temperature sensors, AHU and humidity sensor, AHU and steam modulating valve, and power supply wiring.

13.7 Commissioning

13.7.1 The contractor shall provide the services of a Bronswerk technician for commissioning of the new wheelhouse HVAC system. For bidding purposes the contractor shall quote on 3 days on site plus travel and expenses.

13.7.2 The contractor is to work with the Bronswerk representative to come up with a commissioning plan. This plan is to be presented to the Technical Authority before commissioning commences.

13.7.3 The contractor is to supply all refrigerant for the installation - for bidding purposes the contractor shall quote on two 30 lb cylinders of R407C.

13.7.4 The Contractor shall measure and record benchmark operational data from the new system at the end of the commissioning. This data shall include all pressures, temperatures, amperages and settings from the CU, AHU and water and steam piping during all modes of operation.

13.8 Documentation

13.8.1 The Contractor shall include the following documentation in the data book:

- Proof test reports of any lifting points installed.
- Proof of responsible disposal of all halocarbons.
- Drawings of the CU deck support structure.
- Pressure test results for the CU water piping.
- Galvanizing reports from the CU water piping.
- Drawings of AHU support structure.
- Welding plan for AHU support structure.
- Insulation plan for AHU support structure.
- Pressure test results for new steam piping.
- Trials Book containing operational system data in all modes of operation.

14.0 FLIGHT & BOAT DECK RIVETED SEAM CORROSION REPAIR

14.1 Identification

- 14.1.1 The Coast Guard has a requirement to repair a section of the aluminum to steel transition joint of the vessel's superstructure.
- 14.1.2 The aft stair tower from the poop deck to the flight/boat deck is steel surrounded by aluminum at the flight deck level. A section of the steel on the starboard side at the flight deck has corroded through and requires replacement.
- 14.1.3 The repair will involve steel replacement and dismantling/replacement of a section of the steel to aluminum transition joint. The Contractor shall replace the corroded steel and restore the joint to original structural and watertight integrity. Approximately 49" of 4" X 1/4" steel flat bar is to be replaced.
- 14.1.4 The Contractor shall be responsible for certifying all necessary spaces "Safe For Hot Work" prior to commencing the work.

14.2 REFERENCES

- 14.2.1 Drawings:

Drawing No.	Drawing Title.	Electronic File No.
664-9000-2	Construction Sections	G05A1020.MIL
664-9000-3 (1 of 3)	Profile & Bhds. Scantlings	G05A0498.MIL
664-9000-3 (3 of 3)	Flight & Boat, Bridge, Nav. Bridge Decks & Wheelhouse Top Scantlings	G05A0504.MIL (part 1)
73421 (1 of 1)	Hiab Crane Support Modifications	73421.pdf
G05-RSLJL	CCGS GRIFFON Riveted Seam Lifejacket Locker	Riveted Seam Lifejacket Locker.pdf
Riveted Seam.DWG	Riveted Seam	Riveted Seam Plan.pdf

14.3 Technical

14.3.1 Removals

- 14.3.1.1 The Contractor shall remove and retain for reinstallation the deckheads panels in the following areas to provide access to the area of work:
 - 1) At Frame 32 to 34, Poop deck corridor starboard
 - 2) Bottom of the stairwell to the Boat & Flight Deck - Frame 32 - 34.
- 14.3.1.2 The Contractor shall remove and retain for reinstallation the following bulkhead coverings to provide access to the work:
 - 1) Frame 32 to 34, Flight & Boat Deck, inside Lifejacket Locker
 - 2) Frame 32, Flight & Boat Deck, Helicopter Gear Compartment starboard side
- 14.3.1.3 All bulkhead coverings damaged during removal shall be replaced with new material at the Contractor's expense.
- 14.3.1.4 The Contractor shall remove the insulation on the surfaces in way of the work and discard it ashore. New Roxul fireproof bat type insulation or equivalent of equal dimensions, fire rating and R-value shall be installed once the repair is completed.
- 14.3.1.5 The Contractor shall install a weather proof tarp in the area of work and shall dam the area concerned to prevent the ingress of water into the Lifejacket Locker, Helicopter Gear Locker or Accommodations.
- 14.3.1.6 The Contractor shall remove all the sealant filling the gap between the transitional deck joint and the bulkhead steel.
- 14.3.1.7 The Contractor shall isolate and disconnect the public address speaker fitted in the deckhead in the stairwell. This shall be put aside out of way of work and reinstalled at completion of the work.
- 14.3.1.8 All other removals required as part of this work shall be the responsibility of the Contractor.

14.3.2 Repair of Transitional Joint

- 14.3.2.1 The transitional joint on the bulkhead in way of the Lifejacket Locker door is to be released along its entire longitudinal length, separated and scraped free of all sealant and gasketing. The steel shall be cut vertically approximately 2" before it abuts the Emergency Generator bulkhead. The aluminum bulkhead along the joint is not to suffer damage or distortion that would effect the seal on the weathertight door. All distortion as a result of this work shall be repaired at the Contractor's expense.
- 14.3.2.2 The corroded steel bulkhead section shall be cropped off the deck the entire length of the joint and ground flush in preparation for welding. The Contractor shall ensure the transition joint on the deck is not affected by the use of heat in this area. The Contractor shall take whatever precautions necessary to ensure there is no distortion of

the deck or bulkhead as a result of work in this area. Any distortion or degradation of the joint shall be repaired at the Contractor's expense.

- 14.3.2.3 The Contractor shall ensure a weld procedure and schedule of welding is developed to prevent distortion of the deck, bulkhead, and adjacent transitional joint in way of the work. The weld procedure shall be submitted to the Technical Authority prior to commencement of welding.
- 14.3.2.4 The Contractor shall install a new section of steel 4" wide x 1/4" thick x approx. 47" long. The new steel section shall be tacked in place, bored in line with the original fastener pattern in the aluminum, and continuously fillet welded along its length. The welds shall overlap the where the existing joint remains. In areas exposed to weather and where exposed to standing water in wet spaces, all joints shall be continuous and seal welded. Tack welds used in the assembly of work of primary structural importance shall be removed and not remain in the finished joint. Tack welds otherwise need not be removed provided they are sound and the subsequent beads are thoroughly fused with them.
- 14.3.2.5 The joint faces are to be cleaned of all welds, flux, dirt, and greases by chemical washing and power grinding. All new surfaces shall be power tooled to SSPC-SP-3 standard.
- 14.3.2.6 The Contractor shall apply two coat of marine grade primer to all new steel.
- 14.3.2.7 The Contractor shall apply a galvanic insulating 3" wide x 1/8" thick, high temperature, self adhering, two sided, butyl rubber tape or equivalent to the mating surface of the new steel in the area where it overlaps the aluminum bulkhead. Holes shall be cut in the layer at each hole to allow the passage of new insulated fasteners.
- 14.3.2.8 The Contractor shall supply and install new insulating fasteners complete with insulating sleeves and washers such that no electrical connection is made between the steel and aluminum once the fasteners are tightened and the faces are brought together to compress the insulator between. The Contractor shall ensure there are no gaps in the area where the new steel abuts the old steel.
- 14.3.2.9 The Contractor shall suitably tighten all fasteners and trim all excess sealant from the joint.
- 14.3.2.10 The Contractor shall weld the vertical seam where the existing steel abuts the new steel such that the heat does not effect the joint in this area. Tack welding shall be accepted provided the weld is sealed along its length.
- 14.3.2.11 The Contractor shall seal all seams of the joint with Butyl rubber elastomeric sealant white in colour or equivalent.
- 14.3.2.12 The Contractor shall install a pourable polyurethane sealing compound or equivalent. The sealant shall be level with the adjacent deck plate in the gap between the deck transitional joint and the bulkhead. This seal shall be tough, not easily removable by abrasion from snow shovels or traffic, watertight to resist standing water and flexible to allow for expansion of metal in the summer heat. The surface shall be trowelled

smooth to accept paint. The Contractor shall ensure this sealant has properly cured prior to applying any coatings.

- 14.3.2.13 All areas in way of the work shall be coated with two coats of marine grade primer.
- 14.3.2.14 The area of repair shall be hose tested prior to installing any bulkhead or deck coverings.
- 14.3.2.15 All disturbed insulation shall be replaced with new material of equal fire rating and R-value.
- 14.3.2.16 All bulkhead and deck coverings shall be restored to an “as existing” condition. Any damaged sheathing, bulkheads or deckheads shall be replaced at the Contractor’s expense.
- 14.3.2.17 The Contractor shall reinstall the public address speaker in the deckhead of the stairwell to the Fight & Boat Deck.

14.4 Inspection, Testing, Trials

- 14.4.1 The repaired joint and welds, adjacent structure and weathertight door shall be hose tested by means of a 2” fire hose (ship supply) charged from the vessel’s fire hydrant on the Fight Deck in the presence of the Technical Authority. All leaks shall be corrected by the Contractor.
- 14.4.2 The Public Address speaker shall be tested for correct operation in the presence of the Chief Engineer.

14.5 Documentation

- 14.5.1 The Contractor shall provide material test documentation for all materials installed on the vessel as a result of this work to the Technical Authority.
- 14.5.2 The Contractor shall submit the welding procedure to the Technical Authority.
- 14.5.3 The Contractor shall include the testing of this work in the Test and Inspection Plan.

15.0 REPLACEMENT OF REFRIGERATION SYSTEM SEA WATER PIPING

15.1 Identification

15.1.1 The sea water pumps for the Griffon's domestic refrigeration system draw from the motor room sea bay from a 2 ½" cast steel angle globe valve mounted just forward of the Starboard Propulsion Motor approximately 4 feet to Starboard of the vessel's centerline. The piping consists of five sections flanged at each end. The piping is galvanized and runs in several directions to the Refrigeration Cooling Pumps mounted on the Starboard side of the Upper Motor Room and is composed of butt weld fittings. Recently this pipe has been inspected and found to be in need of replacement.

15.1.2 The Contractor shall replace the following sections of pipe:

- 1) Section 1 - approx. 6.5 feet of 2 ½" Schedule 80 pipe flanged at both ends.
- 2) Section 2 - approx. 12.5 feet of 2 ½" Schedule 80 pipe flanged at both ends.
- 3) Section 3 - approx. 6 feet of 2 ½" Schedule 80 pipe flanged at both ends.
- 4) Section 4 - approx. 5 feet of 2" Schedule 80 pipe flanged at both ends. This section has a 2 ½" to 2" concentric reducer fitted at the first flange.
- 5) Section 5 - approx. 6 feet of 2" Schedule 80 pipe flanged at both ends.

15.2 REFERENCES

15.2.1 Drawings:

Drawing No.	Drawing Title.	Electronic File No.
664-4207-20 (2 of 2)	Refrigeration & Air Conditioning Circulating Water Arrangement - Bill of Materials	
664-4207-20 (1 of 2)	Refrigeration & Air Conditioning Circulating Water Arrangement	G05A1052.MIL.pdf

15.3 Technical

- 15.3.1 The Contractor shall be responsible to all labor, equipment and materials to isolate, lock out, and drain the affected piping.
- 15.3.2 The Contractor shall release and remove the piping from the vessel. All removals required to perform the work shall be verified with the Chief Engineer prior to commencing the work.
- 15.3.3 All piping shall be Schedule 80 seamless steel pipe conforming to ASTM A53 Grade A, schedule 80 butt weld fittings and 150# slip-on flanges.
- 15.3.4 The Contractor shall fabricate new sections of piping and subject them to a pressure test of 150 psi in the presence of the Technical Authority and TC Inspection Authority prior to being galvanized. All defects shall be repaired at the Contractor's expense.
- 15.3.5 The Contractor shall hot-dip galvanize the piping prior to installation on the vessel.
- 15.3.6 The Contractor shall install the new piping in the same orientation as existing with new reinforced neoprene gaskets and suitable non corroding fasteners with lock-washers. The existing brackets and fasteners shall be reused for securing the pipe to the vessel's structure.
- 15.3.7 The Contractor shall flood the piping with the assistance of the engine room staff and check for leaks. All leaks are to be repaired at the Contractor's expense.
- 15.3.8 The Contractor shall apply two coats of marine primer to the new piping.

15.4 Documentation

- 15.4.1 The Contractor shall provide a galvanizing report of all piping that was coated.
- 15.4.2 The Contractor shall provide material documentation for all materials installed on the ship. The documentation shall include the heat numbers and material composition.
- 15.4.3 The Contractor shall provide a weld schedule prior to fabricating the new piping.
- 15.4.4 The Contractor shall include the pressure test in the Inspection and Test plan.