REVISION No._____. **CHANGE NO._____.**

TECHNICAL OEM REPAIR SERVICE REQUIREMENTS FOR CUMMINS QSC 8.3 MARINE ENGINE

ORIGINATED BY_____Michael McHale DATE: 09/24_____

ORIGINATOR'S COMMAND__Surface Forces Logistics Center (SFLC)

DEPARTMENT / DIVISION____Small Boat Product Line (SBPL)_____

INTERNAL REVIEWER_____

SOWRB APPROVAL_____DATE:_____

TECHNICAL OEM REPAIR SERVICE REQUIREMENTS

FOR CUMMINS QSC 8.3 ENGINE USCG FOR 47' "C" CLASS MOTOR LIFEBOAT (MLB)

1.0 SCOPE

1.1. This specification provides the requirements for a commercial contractor to provide engine troubleshooting, repairs and testing for the CUMMINS Marine Diesel QSC 8.3 at the contractor's facility for services that cannot be accomplished while installed on the vessel. This requirement is for all US Coast Guard boats currently using CUMMINS QSC 8.3 engines. These engines operate the propulsion system onboard the vessel. These services shall be required on all the USCG 47' MLB vessels.

2.0 APPLICABLE DOCUMENTS

2.1. DOCUMENT AVAILABILITY - To obtain the referenced documents see section 6.1.

2.2. GOVERNMENT DOCUMENTS – Not applicable

2.3. COMMERCIAL DOCUMENTS - The following documents form a part of this specification to the extent specified herein. The documents shall be the version listed by numbers from the referenced industry organization. Commercial documents may also be listed in the Department of Defense Index of Specifications and Standards (DODISS).

2.3.1. CUMMINS Inc Documents

a. CUMMINS QSC 8.3 CUMMINS QSC 8.3 Troubleshooting & Repair Manual 4021416 and 4021418 & 4021571 QSC 8.3 Marine Operation & Maintenance Manuals.

b. CUMMINS Performance Data Document Curve Number M-97287 at Rated Power of 530 bhp @ 2800 RPM.

c. American National Standards Institute (ANSI)/ National Conference of Standards Laboratories (NCSL). ANS/ISO/IEC 17025:2017 for Part 1 and ANSI/NCSL Z540.3-2010 for Part 2, Calibration Laboratories and Measuring and Test Equipment – General Requirements.

2.4. SPECIFICATION ORDER OF PRECEDENCE - In the event of a conflict between the text of this specification and the references cited herein, this specification shall take precedence, unless otherwise specified herein.

3.0 REQUIREMENTS

3.1. GENERAL - The contractor shall provide a CUMMINS Diesel (OEM) Technical Representative for repair services at the contractor's facility which shall include, but not limited to, trouble shooting, repairs, failure analysis, inspections, corrective and preventive maintenance, removal, installation, alignment, calibration dynamometer testing, and other technical services for the CUMMINS QSC 8.3 engine.

3.2. TECHNICAL REPRESENTATIVE QUALIFICATIONS

3.2.1. Description of Technical Representative at a minimum:

a. Is currently fully employed with an Original Equipment Manufacturer (OEM) Licensed distributor and is designated as a field service representative for the OEM for this product Line.

b. The technical representative shall use as guidance CUMMINS Inc. technical manuals, service bulletins, drawings and all OEM standard practices.

3.3. REPAIRS

3.3.1. The OEM Technical Representative shall be capable of calibration and testing and all (OEM) adjustments required for proper operation of the Cummins QSC 8.3 Propulsion system.

3.3.2. The OEM Technical Representative shall provide, but not limited to, technical oversight, recorded critical readings, manage repair schedule, generate parts lists, and oversee post-repair testing.

3.3.3. The contractor shall provide all special tooling required, including components to accomplish the repairs. All tools requiring calibration shall be calibrated in accordance with ANS/ISO/IEC 17025:2017 for Part 1 and ANSI/NCSL Z540.3-2010 for Part 2, General Requirements for Calibration Laboratories and Measuring and Test Equipment.

3.3.4. LOCATIONS – The above services shall be performed at an authorized OEM Cummins Distributor's facility or at an authorized OEM Cummins Distributor sub-contractor's facility. If services are being provided by a sub-contractor of the primary contractor, the primary contractor is responsible for ensuring the sub-contractor has a certified Cummins technician performing all disassembly, repairs, reassembly and testing.

3.3.5. The USCG SFLC shall provide a storage container to the USCG Unit for the shipment of the Cummins QSC 8.3 engine to and from the primary contractor's facility at the Government's expense.

3.4. SERVICES: The contractor shall provide the following services upon receipt of the engine at the contractor's or the sub-contractor's facility:

3.4.1. TROUBLESHOOTING: CUMMINS QSC 8.3 Engine Propulsion Failures.

a. PROBLEM DIAGNOSIS: As required, the contractor shall provide all labor and materials required to investigate the root cause of failure on the CUMMINS QSC 8.3 engine and/or the engine component. Upon determination, the contractor shall provide in writing to the Contracting Officer with a condition found report along with a corrective action recommendation.

3.5. PARTS REPLACEMENT - Parts required during the repair or replacement of the Cummins QSC 8.3 engine shall be the responsibility of the contractor. In the event any other repair part is available through the USCG SFLC Supply System, the Contracting Officer reserves the option to use GFE (Government Furnished Equipment) in lieu of contractor furnished parts or equipment.

3.6. CONTRACTOR SCHEDULE: – The contractor shall follow the repair schedule of the CUMMINS QSC 8.3 engine as listed below. Any changes required to the schedule shall be approved by the Contracting Officer.

General - The contractor shall provide all labor, equipment, special tools and materials required to accomplish the following sequence of activities:

a. Receive propulsion unit
b. Uncrate propulsion unit
c. Disassemble and clean propulsion unit
d. Submit Core Condition Report (Appendix A)
e. Submit Disassembly Report (Appendix B)
f. Repair engine propulsion unit
g. Reassemble propulsion unit
h. Perform dynamometer testing (Appendix C)
i. Preserve
j. Paint
k. Package and mark propulsion unit as required.
l. Ship propulsion unit back to USCG (Government funded).

3.6.1. The contractor shall adhere to the following timeline for the repair of the Cummins QSC 8.3 engine. Any additional time needed, at any phase of the QSC 8.3 engine repair process, shall be requested by the contractor for authorization from the Contracting Officer.

a. Core Condition Report(s) – Due to COR (5) calendar days from receipt of each engine.
b. Disassembly Report(s) – Due to COR (15) calendar days from receipt of each engine.
c. Dynamometer Test Report(s) – Notify COR (3) business days before test. Test Report to be completed at the time of final Quality Assurance Inspection.
d. Repaired port engine return to USCG, – (45) calendar days from receipt of Contracting Officer's authorization to proceed.
e. Repaired stbd engine return to USCG – (45) calendar days from receipt of Contracting Officer's authorization to proceed.

Note: In the event the Cummins QSC 8.3 engine is found to be beyond economical repair (BER) and requiring full reconditioning, the contractor shall report these findings in writing, to the Contracting Officer and the Contracting Officer's Representative, to prevent delays on the decision for repairing or replacement of the engine. All findings shall be documented in writing within (1) Calendar Day after completion.

3.7. QUALITY ASSURANCE

Responsibility For Inspection - The contractor shall be responsible for all inspections/test requirements specified herein. The contractor shall provide space, personnel, and test equipment to conduct all inspection requirements. All testing and inspection shall be conducted at the contractor's facility or other facilities acceptable to the Government. The Government reserves the right to witness the performance of any inspection/tests set forth in this specification where such inspections are deemed necessary to ensure that supplies or services conform to the prescribed requirements. The contractor shall notify the Contracting Officer (3) business days prior to all inspections and tests.

4.0 PRESERVATION, PACKAGING, AND MARKING

Engine Preservation (External)

Upon completion of final dyno testing, the marine propulsion unit shall be prepared as follows:

Surfaces shall be cleaned and free of grease/oil. All loose scale and paint shall be removed; uneven paint layers shall be sanded smooth.

The following items will be masked and not painted:

a. Rubber hoses, wires and harnesses
b. Glass and chrome gauge bezels and covers
c. Identification plates
d. Any discharge or breather openings
e. Flywheel rear bolt face
f. Front and rear seals

4.1. On All exposed metal surfaces shall be primed with one coat (2-3 mils) of primer in accordance with Cummins item number SS8061. Allow a minimum of seven (7) hours to dry.

4.2. Two color coats approximately (2 mils); total thickness (3-5 mils) shall be sprayed on all surfaces. Allow seven (7) hours of drying time between coats. The color shall be Cummins White Enamel item number 3979758.

4.3. When all paint is dry, all masking shall be removed. All unpainted metal surfaces shall be coated with a light grease film. (Except for hot surfaces). Plug or cap all fittings/flanges and openings that may allow seepage from the engine during storage.

5.0 MARKING

5.1. As per USCG Contracting Officer's Representative direction

6.0 GOVERNMENT & COMMERCIAL DOCUMENT SOURCES

6.1. GOVERNMENT DOCUMENTS (Not applicable)

a. USCG Surface Forces Logistics Center
2401 Hawkins Point Rd
Baltimore, MD 21226
Attn: Contracting Officer, CPD-3

6.2. COMMERCIAL DOCUMENTS

a. CUMMINS Inc.
Box 3005
Columbus, Indiana 47202

b. American National Standards Institutes (ANSI)
1430 Broadway
New York, N.Y. 10018
Tel - 212-642-4900

Appendix A
Core Condition Report

Work Order #_____
Port/Stbd _____
Contract/Delivery Order #_____
Engine Serial # _____

Core Acceptance is based on the following:

a. Core must be in the configuration of Master Serial Number
b. Core must have no non-operational damage
c. Core must be a complete unit and not disassembled

NOTE: Missing parts from Appendix A are to be replaced and priced as per section B of this contract.

a. Core acceptable_____, non-acceptable_____
   Remarks _____
   _____
   _____
   _____

b. Metal shipping crate: Acceptable_____, non-acceptable_____
   Remarks _____
   _____
   _____
   _____

Note 1: The core condition report shall include photographs of engine; front, right side, left side, and rear views to include serial number in picture frame.

Note 2: List all discrepancies with Propulsion Unit including all damaged or missing parts identified by name, part number and comments.

APPENDIX A CONTINUED

Name	P/N	Missing	Comments

APPENDIX A (CONTINUED)

Additional Comments

Appendix B
Disassembly Report

Contract/Delivery Order Number: _____

Date: _____

Unit Serial Number: _____

Reason for Replacement	Qty	Part No.	*Part Description*	*Unit Price*	*Amount*

Appendix C
ENGINE TEST REPORT

Each marine engine shall be tested by the contractor using the contractor's onsite engine dynamometer (dyno) rated for the USCG Cummins QSC 8.3 engine and capable of holding full power (BHP) for a minimum of 1 hour. The Cummins QSC 8.3 engine shall be dynamometer tested by the contractor using an approved test plan and all requirements outlined in this specification for the marine engine as per Cummins Diesel Shop Manual.

1.0 Engine Test Requirements

1.1 The equipment used to record/provide the dynamometer test readings shall have the capability to print required parameters in a computerized format. During the final acceptance test, the Coast Guard Representative shall have the capability to visually monitor all required parameters as detailed in CUMMINS QSC 8.3 Troubleshooting & Repair Manual 4021416 and 4021418 & 4021571 QSC 8.3 Marine Operation & Maintenance Manuals.

1.2 Each marine engine shall be fitted with all "engine" equipment, with the exception of the alternator. This equipment shall be "Contractor Supplied" and used for each engine test.

1.3 The engine shall be tested as per the dyno test specifications of Appendix C. After the final dyno test is accepted by a Coast Guard Representative, all filter elements shall be replaced.

1.4 Any unusual noises, external leakage, or if any other noncompliance to this specification, as determined by the Coast Guard Representative, shall be cause for the marine engine to be found unacceptable.

1.5 The Government reserves the right to witness any part of the overhaul and testing requirements set forth in this specification.

1.6 Upon final acceptance the contractor shall provide the Coast Guard copies of all test results.

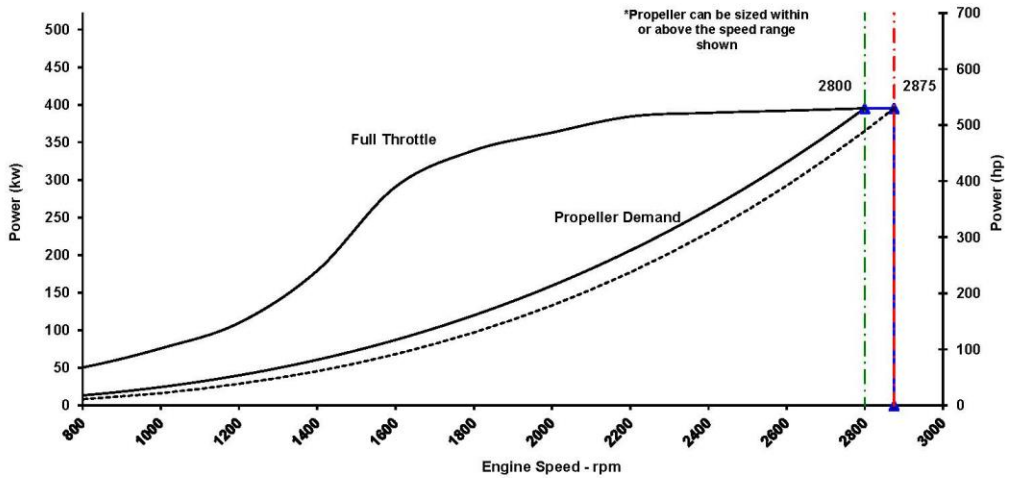
1.7 The following CUMMINS rating data shall be maintained during the dyno testing:

CUMMINS INC. Columbus, IN 47201 Marine Performance Curves gce.cummins.com	Basic Engine Model: QSC8.3-530 INT	Curve Number: M-97287	
	Engine Configuration: D413038MX03	CPL Code: 5234	Date: 21-Oct-20

Displacement: **8.3 liter** **[505 in³]**
Bore: **114 mm** **[4.49 in]**
Stroke: **135 mm** **[5.31 in]**
Fuel System: **HPCR**
Cylinders: **6**

Rated Power: **395 kw** **[530 bhp, 537 mhp]**
Rated **2800 rpm**
Rating Type: **Intermittent Duty**
Aspiration: **Turbocharged / Sea Water Aftercooled**

CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:
EPA Tier 3 - Model year requirements of the EPA marine regulation (40CFR1042)
IMO Tier II - Tier 2 (Two) NOx requirements of International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13



Speed	Full Throttle				Propeller Demand - 2.7 Exp.	
	Power		Torque		Fuel Consumption	
rpm	kw	(hp)	N·m	(ft-lb)	L/hr	(gal/hr)
2800	395	(530)	1313	(994)	110.3	(29.1)
2800	395	(530)	1348	(994)	108.6	(28.7)
2600	392	(526)	1440	(1062)	85.1	(22.5)
2400	389	(522)	1548	(1142)	67.7	(17.9)
2200	384	(515)	1668	(1230)	52.8	(14.0)
2000	363	(487)	1733	(1278)	41.3	(10.9)
1800	339	(455)	1799	(1327)	32.2	(8.5)
1600	291	(390)	1735	(1280)	23.5	(6.2)
1400	179	(240)	1223	(902)	16.5	(4.4)
1200	110	(147)	874	(645)	11.1	(2.9)
1000	76	(102)	725	(535)	7.2	(1.9)
800	51	(68)	603	(445)	4.4	(1.2)
600	34	(46)	545	(402)	2.8	(0.7)

*** Cummins Full Throttle Requirements:**

- Engine achieves or exceeds rated rpm at full throttle under any steady operating condition
- Engines in variable displacement boats (such as pushboats, tugboats, net draggers, etc.) achieve no less than 100 rpm below rated speed at full throttle during a dead push or bollard pull
- Engine achieves or exceeds rated rpm when accelerating from idle to full throttle

Rated Conditions: Ratings are based upon ISO 15550 reference conditions; air pressure of 100 kPa [29.612 in Hg], air temperature 25deg. C [77 deg. F] and 30% relative humidy. Member NMMA. Unless otherwise specified, tolerance on all values is +/-5%. Values from engine control modules and displayed on instrument panels are not absolute. Tolerance varies, but is generally less than +/-5% when operating within 30% of rated power.

Full Throttle curve represents power at the crankshaft for mature gross engine performance corrected in accordance with ISO 15550. Propeller Curve represents approximate power demand from a typical propeller. Propeller Shaft Power is approximately 3% less than rated crankshaft power after typical reverse/reduction gear losses and may vary depending on the type of gear or propulsion system used.

Fuel Consumption is based on fuel of 35 deg. API gravity at 16 deg C [60 deg. F] having LHV of 42,780 kj/kg [18390 Btu/lb] and weighing 838.9 g/liter [7.001 lb/U.S. gal].

Intermittent (INT): Intended for intermittent use in variable load applications with a load factor of 20–40 percent. Full power is limited to two out of every eight hours of operation. Reduced power operations must be at or below 80 percent load.

TECHNICAL DATA DEPT.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No.	**M-97287**
DS :	**3075**
CPL :	**5234**
DATE:	**21-Oct-20**

General Engine Data

Engine Model		QSC8.3-530 INT	
Rating Type		Intermittent Duty	
Rated Engine Power	kW [hp]	395	[530]
Rated Engine Speed	rpm	2800	
Rated Power Production Tolerance	±%	5	
Rated Engine Torque	N·m [lb·ft]	1348	[994]
Peak Engine Torque @ 1800 rpm	N·m [lb·ft]	1799	[1327]
Brake Mean Effective Pressure	kPa [psi]	2048	[297]
Maximum Allowable Engine Speed	rpm	2875	
Maximum Torque Capacity from Front of Crank[2]	N·m [lb·ft]	475	[350]
Compression Ratio		16.3:1	
Piston Speed	m/sec [ft/min]	12.6	[2480]
Firing Order		1-5-3-6-2-4	
Weight (Dry) - Engine With Heat Exchanger System - Average	kg [lb]	896	[1975]

Governor Settings

High Speed Governor Break Point	rpm	2875
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	±rpm	10
High Idle Speed Range Minimum	rpm	2865
Maximum	rpm	2885

Noise and Vibration

Average Noise Level - Top	(Idle)	dBA @ 1m	82
	(Rated)	dBA @ 1m	98
Average Noise Level - Right Side	(Idle)	dBA @ 1m	82
	(Rated)	dBA @ 1m	98
Average Noise Level - Left Side	(Idle)	dBA @ 1m	82
	(Rated)	dBA @ 1m	98
Average Noise Level - Front	(Idle)	dBA @ 1m	82
	(Rated)	dBA @ 1m	98

Fuel System[1]

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	72.3	[19.1]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	110.3	[29.1]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	170.3	[45.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0	[140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	60.0	[15.9]
Approximate Fuel Return to Tank Temperature	°C [°F]	85.1	[185]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	1.4	[79]
Fuel Pressure - Pump Out/Rail INSITE Reading	kPa [psi]	160000	[23206]

TBD= To Be Determined **N/A = Not Applicable** **N.A. = Not Available**

1 **Unless otherwise specified, all data is at rated power conditions and can vary ± 5%.**
2 **No rear loads can be applied when the FPTO is fully loaded. Max PTO torque is contingent on torsional analysis results for the specific drive system. Consult Installation Direction Booklet for Limitations.**
3 **Heat rejection to coolant values are based on 50% water/50% ethylene glycol mix and do NOT include fouling factors. If sourcing your own cooler, a service fouling factor should be applied according to the cooler manufacturer's recommendation.**
4 **Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.**
5 **May not be at rated load and speed. Maximum heat rejection may occur at other than rated conditions.**

CUMMINS, INC

COLUMBUS, INDIANA

All Data is Subject to Change Without Notice - Consult the following Cummins intranet site for the most recent data: gce.cummins.com

Propulsion Marine Engine Performance Data

Curve No.	**M-97287**
DS :	**3075**
CPL :	**5234**
DATE:	**21-Oct-20**

Air System[1]		
Intake Manifold Pressure	kPa [in Hg]	220 [65]
Intake Air Flow	l/sec [cfm]	540 [1145]
Heat Rejection to Ambient	kW [Btu/min]	33 [1876]
Exhaust System[1]		
Exhaust Gas Flow	l/sec [cfm]	1257 [2664]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	477 [890]
Exhaust Gas Temperature (Manifold)	°C [°F]	646 [1194]
Emissions (in accordance with ISO 8178 Cycle E3)		
NOx (Oxides of Nitrogen)	g/kw·hr [g/hp·hr]	5.10 [3.81]
HC (Hydrocarbons)	g/kw·hr [g/hp·hr]	0.15 [0.11]
CO (Carbon Monoxide)	g/kw·hr [g/hp·hr]	0.43 [0.32]
PM (Particulate Matter)	g/kw·hr [g/hp·hr]	0.07 [0.05]
Cooling System[1]		
Sea Water Pump Specifications		See MAB 0.08.17-07/16/2001
Pressure Cap Rating (With Heat Exchanger Option)	kPa [psi]	103 [15]

Engines with Low Temperature Aftercooling (LTA)

Single Loop LTA

Coolant Flow to Cooler (with blocked open thermostat)	l/min [gal/min]	473 [125]
LTA Thermostat Operating Range (Start to Open)	°C [°F]	71 [160]
LTA Thermostat Operating Range (Full Open)	°C [°F]	81 [178]
Heat Rejection to Engine Coolant[3]	kW [Btu/min]	241 [13720]
Maximum Coolant Inlet Temperature from LTA Cooler	°C [°F]	54 [130]

TBD= To Be Determined **N/A = Not Applicable** **N.A. = Not Available**

[1] Unless otherwise specified, all data is at rated power conditions and can vary ± 5%.
[2] No rear loads can be applied when the FPTO is fully loaded. Max PTO torque is contingent on torsional analysis results for the specific drive system. Consult Installation Direction Booklet for Limitations.
[3] Heat rejection to coolant values are based on 50% water/50% ethylene glycol mix and do NOT include fouling factors. If sourcing your own cooler, a service fouling factor should be applied according to the cooler manufacturer's recommendation.
[4] Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.
[5] May not be at rated load and speed. Maximum heat rejection may occur at other than rated conditions.

CUMMINS, INC

COLUMBUS, INDIANA

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Cummins Sales Service Engine Dynometer Report
Harrisburg, Pa

MODEL: _____ S/N: _____ WO#: _____

Fuel Pump Code _____ CPL: _____ Customer: U.S Coast Guard

ECM CODE: _____

PHASE	1	2	3	4	REMARKS
RPM	0	0	0	0	____HP @ ____Rpm's
HP					
TORQ					
Boost					
Oil Psi					__psi Min at rated/__psi min idle hot
WATER TEMP					____ - ____ Deg F*
BLOW BY					Using Insite
Intake Air					*F
Barometric pressure					