



CUMMINS INC.
Columbus, IN 47201
Marine Performance Curves

Basic Engine Model
QSM11-M

Curve Number:
M-20093

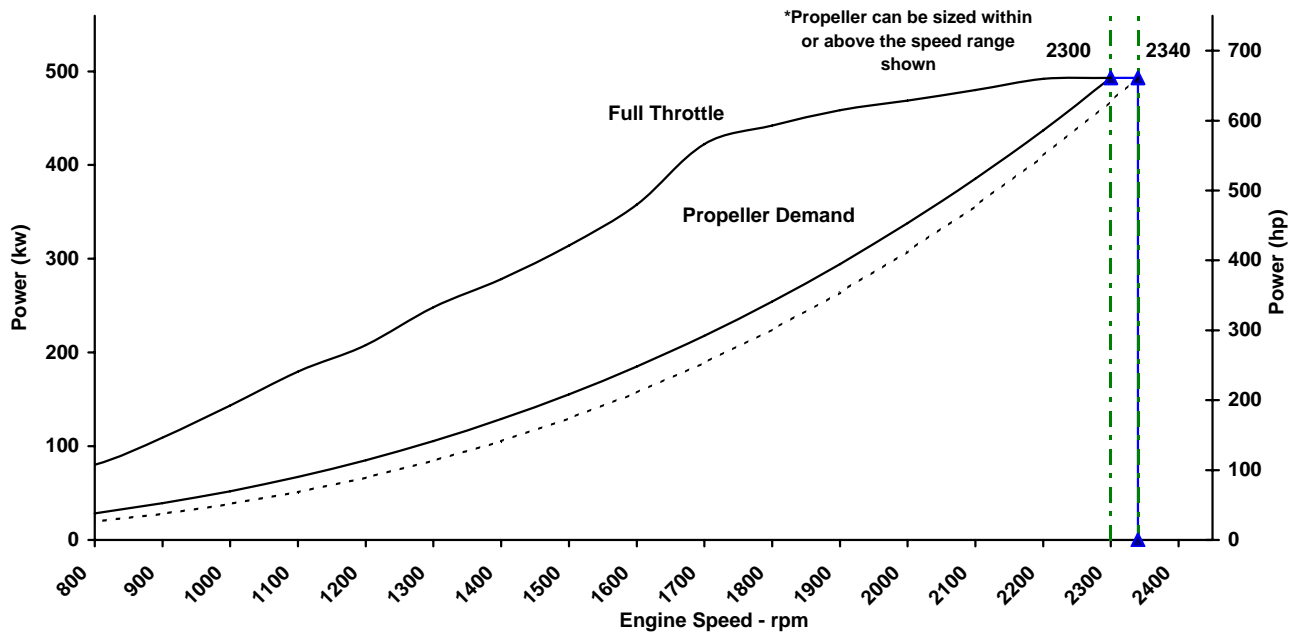
Engine Configuration
D353013MX03

CPL Code:
PP8753

Date:
12-May-10

Displacement: **10.8 liter [661 in³]** Rated Power: **493 kw [661 bhp, 670 mhp]**
 Bore: **125 mm [4.92 in]** Rated Speed: **2300 rpm**
 Stroke: **147 mm [5.79 in]** Rating Type: **High Output**
 Fuel System: **CELECT** Aspiration: **Turbocharged / Sea Water Aftercooled**
 Cylinders: **6**

CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:
 IMO Tier I - Tier 1 (One) NOx requirements of International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13
 EPA Tier 2 - Model year requirements of the EPA marine regulation (40CFR94)



| Speed | Full Throttle- Power | | Full Throttle- Torque | | Fuel Cons.- Prop. Curve 2.7 Exp. | |
|-------|----------------------|---------|-----------------------|---------------|----------------------------------|--------|
| | rpm | kw (hp) | N-m (ft-lb) | L/hr (gal/hr) | | |
| 2340 | 493 | (661) | 2011 | (1484) | | |
| 2300 | 493 | (661) | 2046 | (1509) | 127.9 | (33.8) |
| 2200 | 492 | (660) | 2135 | (1575) | 110.5 | (29.2) |
| 2100 | 480 | (644) | 2183 | (1610) | 93.3 | (24.7) |
| 2000 | 469 | (629) | 2238 | (1650) | 79.7 | (21.1) |
| 1900 | 459 | (615) | 2305 | (1700) | 68.9 | (18.2) |
| 1700 | 422 | (566) | 2373 | (1750) | 52.9 | (14.0) |
| 1500 | 314 | (421) | 2000 | (1475) | 38.9 | (10.3) |
| 1300 | 248 | (333) | 1824 | (1345) | 26.0 | (6.9) |
| 1200 | 208 | (279) | 1654 | (1220) | 20.6 | (5.4) |
| 1100 | 180 | (241) | 1559 | (1150) | 17.2 | (4.6) |
| 1000 | 143 | (192) | 1369 | (1010) | 13.3 | (3.5) |
| 900 | 109 | (147) | 1159 | (855) | 10.1 | (2.7) |
| 800 | 80 | (107) | 956 | (705) | 10.3 | (2.7) |

* 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 dragners, 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 humidity. Power is in accordance with IMCI procedure. Member NMMA. Unless otherwise specified, tolerance on all values is +/-5%.

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].

High Output (HO): Intended for use in variable load applications where full power is limited to one hour out of every eight hours of operation. Also, reduced power must be at or below 200 rpm of the maximum rated rpm. This power rating is for pleasure/non-revenue generating applications that operate 500 hours per year or less.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-20093
DS : 3075
CPL : PP8753
DATE: 12-May-10

General Engine Data

| | |
|---|---------------------|
| Engine Model | QSM11-M |
| Rating Type | High Output |
| Rated Engine Power | 493 [661] |
| Rated Engine Speed | 2300 |
| Rated Power Production Tolerance | ±% 5 |
| Rated Engine Torque | 2046 [1509] |
| Peak Engine Torque @ 1700 rpm..... | 2373 [1750] |
| Brake Mean Effective Pressure | 2376 [345] |
| Indicated Mean Effective Pressure..... | 2617 [380] |
| Maximum Allowable Engine Speed | 2360 |
| Maximum Torque Capacity from Front of Crank ² | N.A. [N.A.] |
| Compression Ratio | 16.3:1 |
| Piston Speed | 11.3 [2219] |
| Firing Order | 1-5-3-6-2-4 |
| Weight (Dry) - Engine Only - Average | kg [lb] N.A. [N.A.] |
| Weight (Dry) - Engine With Heat Exchanger System - Average..... | kg [lb] 1188 [2620] |
| Weight Tolerance (Dry) Engine Only | 3xStd Dev(±%) N.A. |

Governor Settings

| | | |
|--------------------------------------|------|------|
| High Speed Governor Break Point..... | rpm | 2340 |
| Minimum Idle Speed Setting | rpm | 600 |
| Normal Idle Speed Variation | ±rpm | 10 |
| High Idle Speed Range Minimum | rpm | 2340 |
| Maximum | rpm | 2360 |

Noise and Vibration

| | | | |
|----------------------------------|---------------|----------|-----|
| Average Noise Level - Top | (Idle).. | dBa @ 1m | TBD |
| | (Rated) | dBa @ 1m | TBD |
| Average Noise Level - Right Side | (Idle).. | dBa @ 1m | TBD |
| | (Rated) | dBa @ 1m | TBD |
| Average Noise Level - Left Side | (Idle).. | dBa @ 1m | TBD |
| | (Rated) | dBa @ 1m | TBD |
| Average Noise Level - Front | (Idle).. | dBa @ 1m | TBD |
| | (Rated) | dBa @ 1m | TBD |

Fuel System¹

| | | |
|---|---------------|--------------|
| Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle | l/hr [gal/hr] | 83.8 [22.1] |
| Avg. Fuel Consumption - ISO 8178 E5 Standard Test Cycle | l/hr [gal/hr] | 43.8 [11.6] |
| Fuel Consumption at Rated Speed | l/hr [gal/hr] | 127.9 [33.8] |
| Approximate Fuel Flow to Pump | l/hr [gal/hr] | 280.1 [74.0] |
| Maximum Allowable Fuel Supply to Pump Temperature | °C [°F] | 60.0 [140] |
| Approximate Fuel Flow Return to Tank | l/hr [gal/hr] | 152.2 [40.2] |
| Approximate Fuel Return to Tank Temperature | °C [°F] | 93.4 [200] |
| Maximum Heat Rejection to Drain Fuel | kW [Btu/min] | 4.2 [237] |
| Fuel Transfer Pump Pressure Range..... | kPa [psi] | N.A. |
| Fuel Pressure - Pump Out/Rail . Mechanical Gauge | kPa [psi] | 1151 [167] |
| INSITE Reading | kPa [psi] | N.A. |

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.

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Air System¹

| | | |
|---------------------------------|--------------|------------|
| Intake Manifold Pressure | kPa [in Hg] | 284 [84] |
| Intake Air Flow | l/sec [cfm] | 668 [1416] |
| Heat Rejection to Ambient | kW [Btu/min] | 38 [2189] |

Exhaust System¹

| | | |
|---|-------------|-------------|
| Exhaust Gas Flow | l/sec [cfm] | 1665 [3528] |
| Exhaust Gas Temperature (Turbine Out) | °C [°F] | 514 [957] |
| Exhaust Gas Temperature (Manifold) | °C [°F] | 688 [1270] |

Emissions (in accordance with ISO 8178 Cycle E3)

| | | |
|--------------------------------|-------------------|-------------|
| NOx (Oxides of Nitrogen) | g/kw-hr [g/hp-hr] | 4.60 [3.43] |
| HC (Hydrocarbons) | g/kw-hr [g/hp-hr] | 0.19 [0.14] |
| CO (Carbon Monoxide) | g/kw-hr [g/hp-hr] | 0.41 [0.31] |
| PM (Particulate Matter) | g/kw-hr [g/hp-hr] | 0.11 [0.08] |

Cooling System¹

| | | |
|--|------------------------|----------|
| Sea Water Pump Specifications | MAB 0.08.17-07/16/2001 | |
| Pressure Cap Rating (With Heat Exchanger Option) | kPa [psi] | 103 [15] |

Engines without Low Temperature Aftercooling (LTA)

Sea Water Aftercooled Engine (SWAC)

| | | |
|---|-----------------|------------|
| Coolant Flow to Engine Heat Exchanger | l/min [gal/min] | N/A [N.A.] |
| Standard Thermostat Operating Range (Start to Open) | °C [°F] | 71 [160] |
| Standard Thermostat Operating Range (Full Open) | °C [°F] | 80 [175] |
| Heat Rejection to Engine Coolant ³ | kW [Btu/min] | 153 [8707] |

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