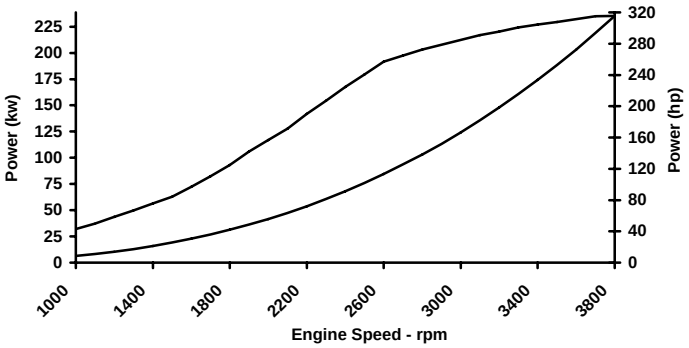
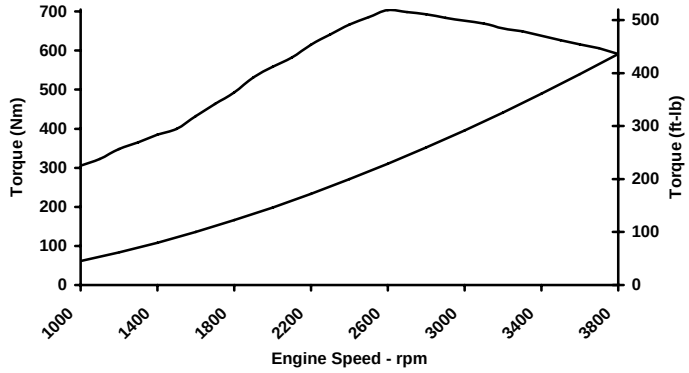
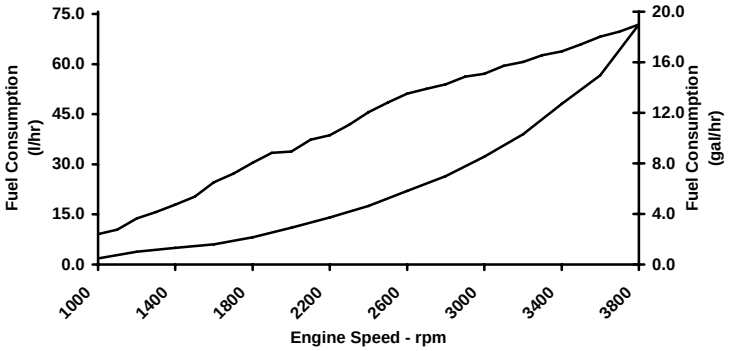
| CUMMINS MERCRUISER DIESEL<br>Charleston, SC 29405<br>Marine Performance Curves | Basic Engine Model<br>QSD4.2-320 LC | Curve Number:<br>BC9163, BC 9164 | |
|---|---|---|---|
| | Engine Configuration<br>D913003MX03 | CPL Code: | Date:<br>7-Jul-09 |

| | | | | |
|---|---|---|---|---|
| Displacement: | **4.2 liter** | **254 in³** | kW [bhp, mhp] @ rpm | |
| Bore: | **94 mm** | **3.70 in** | Advertised Power: | **235 [315, 320] @ 3800** |
| Stroke: | **100 mm** | **3.94 in** | | |
| Fuel System: | **Bosch Common Rail (CRS 2.0)** | | Aspiration: | **Turbocharged/Sea Water Aftercooled** |
| Cylinders: | **6** | | Rating Type: | **Light Commercial Duty** |

CERTIFIED: This marine diesel engine is certified to the model year requirements of EPA Marine Tier 2 per 40 CFR 94 and conforms with the NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13 as applicable.




**RATED POWER OUTPUT CURVE**

| rpm | kw | bhp |
|---|---|---|
| 3800 | 235 | 315 |
| 3600 | 232 | 311 |
| 3400 | 227 | 305 |
| 3200 | 220 | 295 |
| 3000 | 213 | 285 |
| 2800 | 203 | 272 |
| 2600 | 192 | 257 |
| 2200 | 142 | 190 |
| 1800 | 93 | 125 |
| 1400 | 56 | 76 |
| 1200 | 44 | 59 |
| 1000 | 32 | 43 |

**FULL LOAD TORQUE CURVE**

| rpm | N-m | ft-lb |
|---|---|---|
| 3800 | 591 | 436 |
| 3600 | 616 | 454 |
| 3400 | 638 | 471 |
| 3200 | 657 | 485 |
| 3000 | 676 | 499 |
| 2800 | 693 | 511 |
| 2600 | 703 | 519 |
| 2200 | 615 | 454 |
| 1800 | 493 | 364 |
| 1400 | 385 | 284 |
| 1200 | 348 | 257 |
| 1000 | 305 | 225 |

**FUEL CONSUMPTION - PROP CURVE**

| rpm | l/hr | gal/hr |
|---|---|---|
| 3800 | 71.9 | 19.0 |
| 3600 | 56.7 | 15.0 |
| 3400 | 48.1 | 12.7 |
| 3200 | 39.0 | 10.3 |
| 3000 | 32.3 | 8.5 |
| 2800 | 26.4 | 7.0 |
| 2600 | 22.0 | 5.8 |
| 2200 | 14.1 | 3.7 |
| 1800 | 8.1 | 2.1 |
| 1400 | 5.0 | 1.3 |
| 1200 | 3.8 | 1.0 |
| 1000 | 1.8 | 0.5 |

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. Power is in accordance with IMCI procedure. Member NMMA.

Rated Curves (upper) represents rated power at the crankshaft for mature gross engine performance capabilities obtained and corrected in accordance with ISO 15550. Propeller Curve (lower) is based on a typical fixed propeller demand curve using a 2.7 exponent. 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].

**Light Duty Commercial (LD)** Intended for use in variable load applications where full power is limited to one (1) hour out of every eight (8) hours of operation. Also, reduced power must be at or below 400 rpm of the maximum rated rpm. This power rating is for revenue generating or some government service propulsion applications that operate 500 hours per year or less.

CHIEF ENGINEER

# Propulsion Marine Engine Performance Data

| | |
|---|---|
| **Curve No.** | **BC9163, BC 9164** |
| **DS :** | **D91-MX-1** |
| **CPL :** | |
| **DATE:** | **7-Jul-09** |

**General Engine Data**

| | |
|---|---|
| Engine Model | QSD4.2-320 LC |
| Rating Type | Light Commercial Duty |
| Rated Engine Power ....kW [hp] | 235 [315] |
| Rated Engine Speed ....rpm | 3800 |
| Rated Power Production Tolerance ....±% | 5 |
| Rated Engine Torque ....N·m [lb·ft] | 591 [436] |
| Peak Engine Torque @ 2600 rpm ....N·m [lb·ft] | 703 [519] |
| Brake Mean Effective Pressure ....kPa [psi] | 1784 [259] |
| Indicated Mean Effective Pressure....kPa [psi] | 1784 [259] |
| Minimum Idle Speed Setting ....rpm | 600 |
| Normal Idle Speed Variation ....rpm | 25 |
| High Idle Speed Range Minimum ....rpm | 3880 |
| Maximum ....rpm | 3920 |
| Maximum Allowable Engine Speed ....rpm | 3900 |
| Compression Ratio | 17.5:1 |
| Piston Speed ....m/sec [ft/min] | 12.7 [2493] |
| Firing Order | 1-5-3-6-2-4 |
| Weight (Dry) - Engine With Heat Exchanger System - Average....kg [lb] | 460 [1014] |

**Fuel System[1]**

| | |
|---|---|
| Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle ....l/hr [gal/hr] | 48.3 [13] |
| Fuel Consumption at Rated Speed ....l/hr [gal/hr] | 71.9 [19] |
| Maximum Allowable Fuel Supply to Pump Temperature ....°C [°F] | 60.0 [140] |
| Approximate Fuel Return to Tank Temperature With Cooler....°C [°F] | 41.1 [106] |

**Air System[1]**

| | |
|---|---|
| Intake Manifold Pressure ....kPa [in Hg] | 190 [56] |
| Intake Air Flow ....l/sec [cfm] | 310 [657] |

**Exhaust System[1]**

| | |
|---|---|
| Exhaust Gas Flow ....l/sec [cfm] | 724 [1534] |
| Exhaust Gas Temperature (Turbine Out) ....°C [°F] | 545 [1013] |
| Exhaust Gas Temperature (Manifold) ....°C [°F] | 628 [1161] |

**Emissions (ISO 8178 Cycle E3- for Traditional Propulsion Applications)**

| | |
|---|---|
| NOx (Oxides of Nitrogen) ....g/kw·hr [g/hp·hr] | 6.35 [4.74] |
| HC (Hydrocarbons) ....g/kw·hr [g/hp·hr] | 0.16 [0.12] |
| CO (Carbon Monoxide) ....g/kw·hr [g/hp·hr] | 0.74 [0.55] |
| PM (Particulate Matter) ....g/kw·hr [g/hp·hr] | 0.22 [0.16] |

**Cooling System[1]**

| | |
|---|---|
| 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)**

| | |
|---|---|
| Standard Thermostat Operating Range (Start to Open) ....°C [°F] | 80 [176] |
| Standard Thermostat Operating Range (Full Open) ....°C [°F] | 95 [202] |

**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 ENGINE COMPANY, INC**

**COLUMBUS, INDIANA**