



Shanghai Cummins Trade Co., Ltd.
Shanghai, China, 200030
Marine Performance Curves

Basic Engine Model

L8.9CMI238

Curve Number:

M-FR96909

Engine Configuration

D563033MX03

CPL Code:

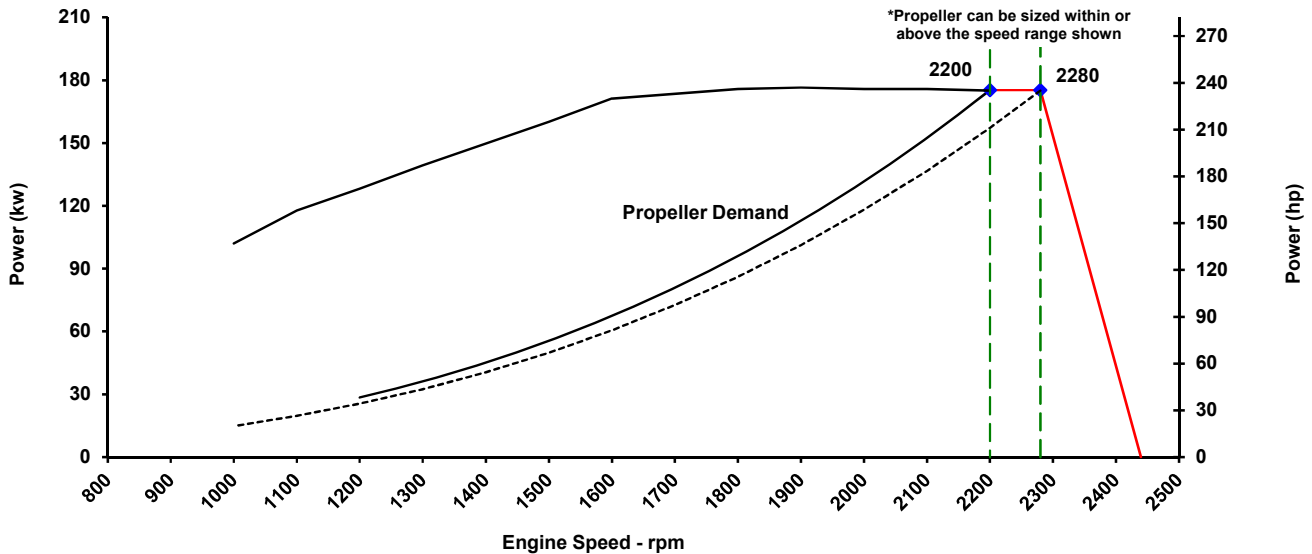
5570

Date:

15-Apr-19

| | | | |
|---------------|---------------------------------------|--------------|-------------------------|
| Displacement: | 8.9 liter [542 in³] | Rated Power: | 175 kw [235 bhp] |
| Bore: | 114 mm [4.49 in] | Rated Speed: | 2200 rpm |
| Stroke: | 145 mm [5.71 in] | Rating Type: | Continuous Duty |
| Cylinders: | 6 | Aspiration: | Turbocharged |
| Fuel System: | HPCR | 110% Power: | 193 kw [259 bhp] |

CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:
IMO Tier II (Two) NOx requirements of International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13
China Marine Emission Regulation Stage II GB15097-2016



| Speed | 100% Throttle | | | | Propeller Demand | | | | | |
|-------|---------------|-------|--------|---------|------------------|---------|--------|---------|------------------|----------|
| | Power | | Torque | | Power | | Torque | | Fuel Consumption | |
| | kw | (hp) | N·m | (ft·lb) | kw | (hp) | N·m | (ft·lb) | L/hr | (gal/hr) |
| 2280 | 175 | (235) | 734 | (541) | | | | | | |
| 2200 | 175 | (235) | 760 | (561) | 175 | (235.0) | 760 | (561) | 49.6 | (13.1) |
| 2100 | 176 | (236) | 800 | (590) | 152 | (204.4) | 693 | (511) | 42.7 | (11.3) |
| 2000 | 176 | (236) | 842 | (621) | 132 | (176.6) | 629 | (464) | 37.2 | (9.8) |
| 1900 | 177 | (237) | 887 | (654) | 113 | (151.4) | 567 | (418) | 31.0 | (8.2) |
| 1800 | 176 | (236) | 932 | (688) | 96 | (128.7) | 510 | (376) | 25.5 | (6.7) |
| 1700 | 174 | (233) | 977 | (721) | 81 | (108.4) | 454 | (335) | 20.8 | (5.5) |
| 1600 | 172 | (230) | 1022 | (754) | 67 | (90.4) | 403 | (297) | 16.5 | (4.4) |
| 1500 | 160 | (215) | 1022 | (754) | 56 | (74.5) | 354 | (261) | 13.4 | (3.5) |
| 1400 | 150 | (201) | 1022 | (754) | 45 | (60.6) | 308 | (227) | 10.9 | (2.9) |
| 1300 | 139 | (187) | 1022 | (754) | 36 | (48.5) | 266 | (196) | 8.7 | (2.3) |
| 1200 | 128 | (172) | 1022 | (754) | 28 | (38.1) | 226 | (167) | 6.9 | (1.8) |
| 1100 | 118 | (158) | 1022 | (754) | 22 | (29.4) | 190 | (140) | 5.5 | (1.4) |
| 1000 | 102 | (137) | 972 | (717) | 16 | (22.1) | 157 | (116) | 4.3 | (1.1) |

*** 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. 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].

Continuous Rating (CON): Intended for continuous use in applications requiring uninterrupted service at full power. This rating is an ISO 15550 standard power rating.



APPLICATION ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-FR96909

CPL : 5570
DATE: 15-Apr-19

General Engine Data

| | | |
|---|-----------------|-------------|
| Engine Model | L8.9CMII238 | |
| Rating Type | Continuous Duty | |
| Rated Engine Power | kW [hp] | 175 [235] |
| Rated Engine Speed | rpm | 2200 |
| Rated Power Production Tolerance | ±% | 3 |
| Rated Engine Torque | N·m [lb·ft] | 760 [561] |
| Peak Engine Torque @ 1500 rpm..... | N·m [lb·ft] | 1022 [754] |
| Brake Mean Effective Pressure | kPa [psi] | 1076 [156] |
| Indicated Mean Effective Pressure..... | kPa [psi] | 1240 [180] |
| Maximum Allowable Engine Speed | rpm | 2440 |
| Maximum Continuous Torque Capacity from Front of Crank Specifications | | |
| Maximum Torque Capacity from Front of Crank ² | N·m [lb·ft] | [N.A.] |
| Compression Ratio | | 16.6:1 |
| Piston Speed | m/sec [ft/min] | 10.6 [2093] |
| Firing Order | | 1-5-3-6-2-4 |
| Weight - Engine Only - Average | kg [lb] | 877 [1933] |
| Weight - Engine With Heat Exchanger System - Average..... | kg [lb] | 1001 [2207] |

Governor Settings

| | | |
|--------------------------------------|---|------|
| Default Droop Value..... | Refer to MAB 2.04.00-03/23/2006 for Droop explanation | 7% |
| Maximum Droop Allowed..... | | 16% |
| High Speed Governor Break Point..... | rpm | 2280 |
| Minimum Idle Speed Setting | rpm | 750 |
| Normal Idle Speed Variation | ±rpm | 50 |
| High Idle Speed Range Minimum | rpm | 2280 |
| Maximum | rpm | 2400 |

Noise and Vibration

| | | |
|---|--|---------|
| 1 m sound pressure level - GB/T1859 | | < 93 dB |
|---|--|---------|

Lubrication System¹

| | | |
|---|-----------|-----------|
| Max. Allowable Oil Temperature (Sump) | °C [°F] | 124 [255] |
| Oil Pan Capacity (OP9337) | | |
| Low/High..... | l/l | 18.9 22.7 |
| Min. Oil Pressure at idle speed..... | kPa [psi] | 69 [10] |
| Maximum Operational Angularity of Oil Pan | degree | 35 |

Fuel System¹

| | | |
|---|---------------|-------------|
| Fuel Consumption at Rated Speed | l/hr [gal/hr] | 49.6 [13.1] |
| Approximate Fuel Flow to Pump | l/hr [gal/hr] | 181 [47.9] |
| Maximum Allowable Fuel Supply to Pump Temperature | °C [°F] | 70 [158] |
| Approximate Fuel Flow Return to Tank | l/hr [gal/hr] | 132 [34.8] |
| Maximum Allowable Restriction to Fuel Pump | | |
| Clean Filter | kPa [psi] | 16 [2.3] |
| Dirty Filter | kPa [psi] | 30 [4.4] |

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] | 196 [58] |
| Intake Air Flow | l/sec [cfm] | 319 [676] |
| Heat Rejection to Ambient ⁵ | kW [Btu/min] | 23 [1309] |

Exhaust System¹

| | | |
|---|-------------|-------------|
| Exhaust Gas Flow | l/sec [cfm] | 739 [1,565] |
| Exhaust Gas Temperature (Turbine Out) | °C [°F] | 418 [784] |
| Max. Exhaust Pressure | kPa [in Hg] | 10 [3] |

Emissions (in accordance with ISO 8178 Cycle E3)

| | | |
|--------------------------------|-------------------|-------------|
| NOx (Oxides of Nitrogen) | g/kw-hr [g/hp-hr] | 4.75 [3.54] |
| HC (Hydrocarbons) | g/kw-hr [g/hp-hr] | 0.35 [0.26] |
| CO (Carbon Monoxide) | g/kw-hr [g/hp-hr] | 1.50 [1.12] |
| PM (Particulate Matter) | g/kw-hr [g/hp-hr] | 0.10 [0.07] |

Cooling System¹

| | | |
|--|--------------------|--------|
| Sea Water Pump flow ⁴ (Discharge Restriction Pressure 40 kPa) | m ³ /hr | 11.4 |
| Pressure Cap Rating (With Heat Exchanger Option) | kPa [psi] | 48 [7] |
| Max. Pressure Drop Across Any External Cooling System Circuit | kPa [psi] | 34 [5] |

Jacket Water Aftercooled Engine (JWAC)

| | | |
|---|-----------------|------------|
| Coolant Flow to Engine Heat Exchanger | l/min [gal/min] | 322 [85] |
| Standard Thermostat Operating Range (Start to Open) | °C [°F] | 71 [160] |
| Standard Thermostat Operating Range (Full Open) | °C [°F] | 83 [182] |
| Heat Rejection to Engine Coolant ³ | kW [Btu/min] | 138 [7854] |
| Coolant Capacity | | |
| Engine Only | l [gal] | 11 [3] |

Electrical and Start System

| | | |
|--|---------|-----------|
| Voltage | V | 24 |
| Cold Soak at -18°C (0°F) -Cold Cranking Amperes Rating | CCA | 750 |
| Maximum Allowable Resistance of Starting Circuit | Ohms | 2 |
| Min. start temperature without cold starting aid | °C [°F] | -12 [-10] |

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