



CUMMINS INC.
Columbus, IN 47201
Marine Performance Curves

Basic Engine Model
QSB5.9-230 HO

Engine Configuration
D403075MX03

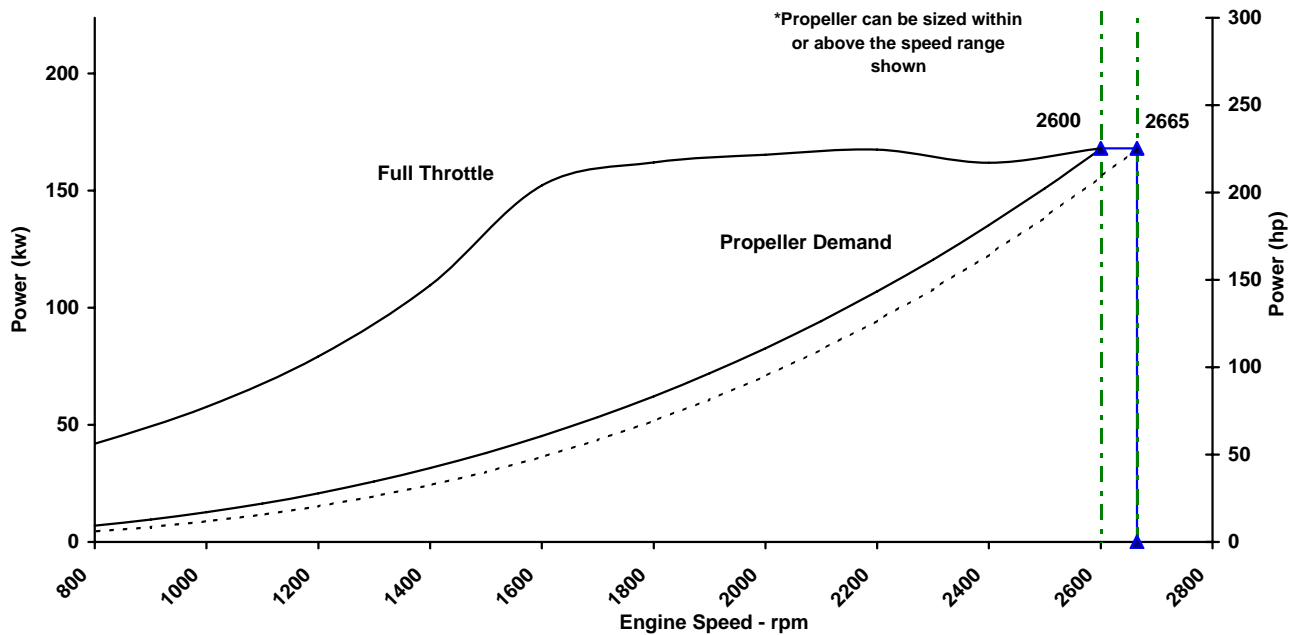
Curve Number:
M-91370

CPL Code:
8464

Date:
12-May-10

Displacement: **5.9 liter [359 in³]** Rated Power: **168 kw [225 bhp, 230 mhp]**
 Bore: **102 mm [4.02 in]** Rated Speed: **2600 rpm**
 Stroke: **120 mm [4.72 in]** Rating Type: **High Output**
 Fuel System: **HPCR** 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)		
2665	168	(225)	602	(444)		
2600	168	(225)	617	(455)	42.2	(11.1)
2400	162	(217)	644	(475)	36.8	(9.7)
2200	167	(225)	727	(536)	29.7	(7.9)
2000	165	(222)	789	(582)	23.2	(6.1)
1800	162	(217)	860	(634)	17.8	(4.7)
1600	152	(204)	908	(670)	13.0	(3.4)
1400	110	(147)	747	(551)	9.7	(2.6)
1200	79	(106)	630	(465)	7.0	(1.9)
1000	58	(77)	550	(406)	4.9	(1.3)
800	42	(56)	500	(369)	3.2	(0.9)

* 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-91370
DS : 3075
CPL : 8464
DATE: 12-May-10

General Engine Data

Engine Model	QSB5.9-230 HO
Rating Type	High Output
Rated Engine Power	168 [225]
Rated Engine Speed	2600
Rated Power Production Tolerance	5
Rated Engine Torque	616 [455]
Peak Engine Torque @ 1600 rpm.....	908 [670]
Brake Mean Effective Pressure	1316 [191]
Indicated Mean Effective Pressure.....	N.A. [N.A.]
Maximum Allowable Engine Speed	2685
Maximum Torque Capacity from Front of Crank ²	633 [467]
Compression Ratio	17.2:1
Piston Speed	10.4 [2047]
Firing Order	1-5-3-6-2-4
Weight (Dry) - Engine Only - Average	N.A. [N.A.]
Weight (Dry) - Engine With Heat Exchanger System - Average.....	612 [1350]
Weight Tolerance (Dry) Engine Only	N.A.

Governor Settings

High Speed Governor Break Point.....	rpm	2665
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	±rpm	10
High Idle Speed Range Minimum	rpm	2665
Maximum	rpm	2685

Noise and Vibration

Average Noise Level - Top	(Idle)..	dBa @ 1m	76
	(Rated)	dBa @ 1m	96
Average Noise Level - Right Side	(Idle)..	dBa @ 1m	76
	(Rated)	dBa @ 1m	98
Average Noise Level - Left Side	(Idle)..	dBa @ 1m	77
	(Rated)	dBa @ 1m	102
Average Noise Level - Front	(Idle)..	dBa @ 1m	76
	(Rated)	dBa @ 1m	97

Fuel System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	29.6 [7.8]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	42.2 [11.1]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	189.3 [50.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	147.1 [38.9]
Approximate Fuel Return to Tank Temperature	°C [°F]	65.6 [150]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	1.9 [110]
Fuel Transfer Pump Pressure Range.....	kPa [psi]	76 [11]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	N.A.
INSITE Reading	kPa [psi]	134999 [19580]

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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Propulsion Marine Engine Performance Data

Curve No. M-91370
DS : 3075
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DATE: 12-May-10

Air System¹

Intake Manifold Pressure	kPa [in Hg]	120 [35]
Intake Air Flow	l/sec [cfm]	228 [483]
Heat Rejection to Ambient	kW [Btu/min]	12 [708]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	465 [985]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	381 [718]
Exhaust Gas Temperature (Manifold)	°C [°F]	489 [912]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw-hr [g/hp-hr]	6.21 [4.63]
HC (Hydrocarbons)	g/kw-hr [g/hp-hr]	0.11 [0.08]
CO (Carbon Monoxide)	g/kw-hr [g/hp-hr]	0.25 [0.19]
PM (Particulate Matter)	g/kw-hr [g/hp-hr]	0.09 [0.07]

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]	238 [63]
Standard Thermostat Operating Range (Start to Open)	°C [°F]	74 [165]
Standard Thermostat Operating Range (Full Open)	°C [°F]	85 [185]
Heat Rejection to Engine Coolant ³	kW [Btu/min]	129 [7370]

Engines with Low Temperature Aftercooling (LTA)

Single Loop LTA

Coolant Flow to Cooler (with blocked open thermostat).....	l/min [gal/min]	238 [63]
LTA Thermostat Operating Range (Start to Open)	°C [°F]	66 [150]
LTA Thermostat Operating Range (Full Open)	°C [°F]	80 [175]
Heat Rejection to Engine Coolant ³	kW [Btu/min]	142 [8110]
Maximum Coolant Inlet Temperature from LTA Cooler.....	°C [°F]	54 [130]

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