



CUMMINS INC.
Columbus, IN 47201
Marine Performance Curves

Basic Engine Model
QSB5.9-230 GS

Curve Number:
M-91594

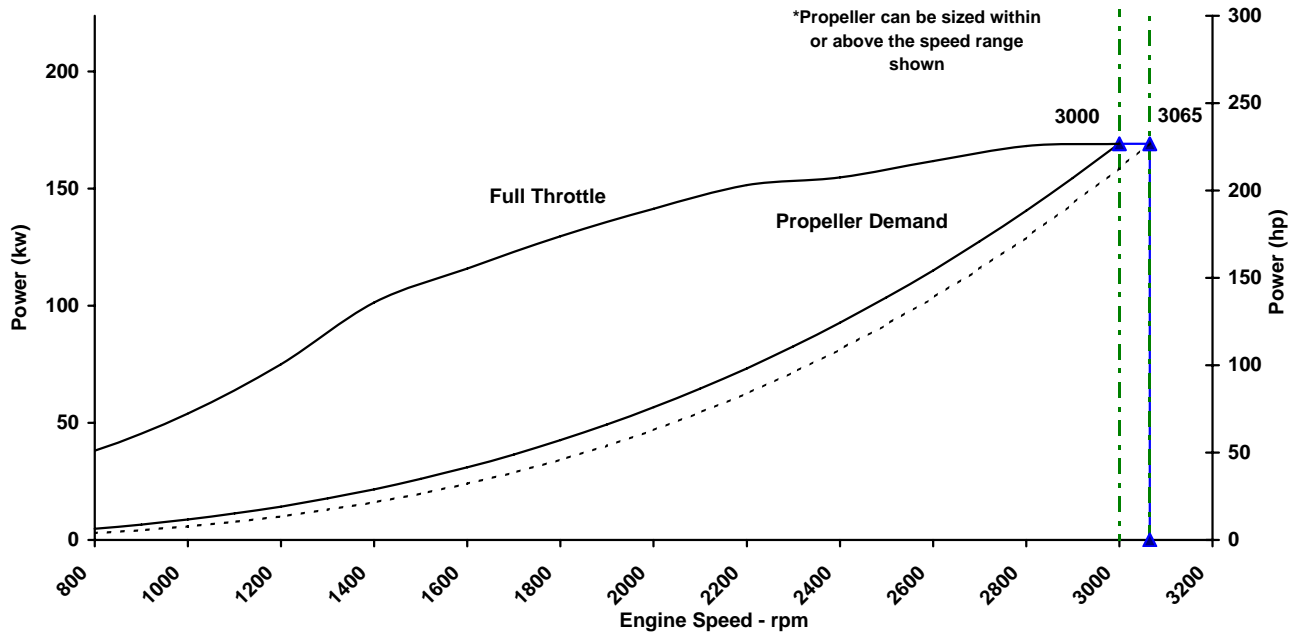
Engine Configuration
D403075MX03

CPL Code:
8464

Date:
12-May-10

Displacement: **5.9 liter** [359 in³] Rated Power: **169 kw** [227 bhp, 230 mhp]
 Bore: **102 mm** [4.02 in] Rated Speed: **3000 rpm**
 Stroke: **120 mm** [4.72 in] Rating Type: **Government Service**
 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)		
3065	169	(227)	527	(389)		
3000	169	(227)	538	(397)	47.3	(12.5)
2800	168	(226)	574	(423)	40.0	(10.6)
2600	162	(217)	594	(438)	33.0	(8.7)
2400	155	(207)	616	(454)	26.8	(7.1)
2200	151	(203)	658	(485)	22.2	(5.9)
2000	141	(190)	675	(498)	17.3	(4.6)
1800	130	(174)	687	(507)	13.5	(3.6)
1600	116	(155)	691	(510)	9.8	(2.6)
1400	101	(136)	691	(510)	7.8	(2.1)
1200	75	(101)	597	(440)	5.5	(1.5)
1000	54	(72)	515	(380)	3.8	(1.0)
800	38	(51)	456	(336)	2.9	(0.8)

* 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].

Government Service (GS): 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 300 RPM of the maximum rated RPM. This power rating is only for use in National, State or Local government non-revenue producing applications.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-91594
DS : 3075
CPL : 8464
DATE: 12-May-10

General Engine Data

Engine Model	QSB5.9-230 GS
Rating Type	Government Service
Rated Engine Power	169 [227]
Rated Engine Speed	3000
Rated Power Production Tolerance	5
Rated Engine Torque	539 [397]
Peak Engine Torque @ 1400 rpm.....	691 [510]
Brake Mean Effective Pressure	1151 [167]
Indicated Mean Effective Pressure.....	N.A. [N.A.]
Maximum Allowable Engine Speed	3085
Maximum Torque Capacity from Front of Crank ²	271 [200]
Compression Ratio	17.2:1
Piston Speed	12.0 [2362]
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	3065
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	±rpm	10
High Idle Speed Range Minimum	rpm	3065
Maximum	rpm	3085

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	101
Average Noise Level - Left Side	(Idle)..	dBa @ 1m	77
	(Rated)	dBa @ 1m	105
Average Noise Level - Front	(Idle)..	dBa @ 1m	76
	(Rated)	dBa @ 1m	100

Fuel System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	30.8 [8.1]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	47.3 [12.5]
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]	142.0 [37.5]
Approximate Fuel Return to Tank Temperature	°C [°F]	65.6 [150]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	1.9 [106]
Fuel Transfer Pump Pressure Range.....	kPa [psi]	76 [11]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	N.A.
INSITE Reading	kPa [psi]	139033 [20165]

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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Curve No. M-91594
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Air System¹

Intake Manifold Pressure	kPa [in Hg]	149 [44]
Intake Air Flow	l/sec [cfm]	271 [575]
Heat Rejection to Ambient	kW [Btu/min]	14 [805]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	602 [1275]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	366 [690]
Exhaust Gas Temperature (Manifold)	°C [°F]	491 [915]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw-hr [g/hp-hr]	5.43 [4.05]
HC (Hydrocarbons)	g/kw-hr [g/hp-hr]	0.15 [0.11]
CO (Carbon Monoxide)	g/kw-hr [g/hp-hr]	N.A.
PM (Particulate Matter)	g/kw-hr [g/hp-hr]	N.A.

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]	254 [67]
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]

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