



CUMMINS MERCUISER DIESEL
 Charleston, SC 29405
Marine Performance Curves

Basic Engine Model:
220B

Curve Number:
M-90760

Engine Configuration:
D402013MX02

CPL Code:
8206

Date:
17-Aug-04

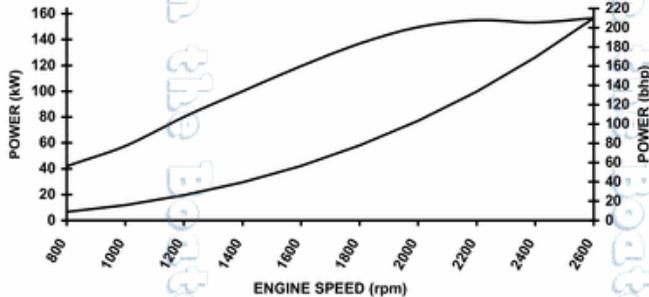
Displacement: **5.9 liter [359 in³]**
 Bore: **102 mm [4.02 in]**
 Stroke: **120 mm [4.72 in]**
 Fuel System: **Lucas CAV**
 Cylinders: **6**

Advertised Power: **157 [210, 220] @ 2600** kW [bhp, mhp] @ rpm

Aspiration: **Turbocharged**
 Rating Type: **High Output**

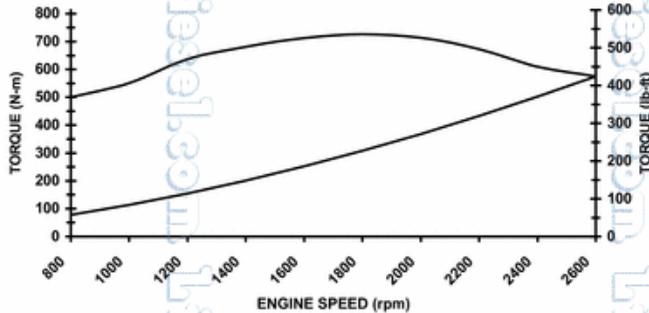
CERTIFIED: This marine diesel engine conforms with the NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13 as applicable.

RATED POWER OUTPUT CURVE



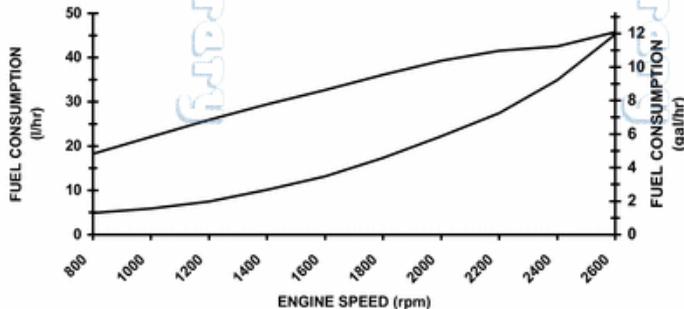
rpm	kW	bhp
2600	157	210
2400	153	205
2200	155	208
2000	150	201
1800	137	183
1600	119	160
1400	100	134
1200	80	107
1000	58	77
800	42	56

FULL LOAD TORQUE CURVE



rpm	N-m	lb-ft
2600	575	424
2400	609	450
2200	673	496
2000	714	527
1800	726	535
1600	712	525
1400	681	502
1200	637	470
1000	551	406
800	500	369

FUEL CONSUMPTION - PROP CURVE



rpm	l/hr	gal/hr
2600	45.3	12.0
2400	34.9	9.2
2200	27.4	7.2
2000	22.2	5.9
1800	17.4	4.6
1600	13.1	3.5
1400	10.1	2.7
1200	7.5	2.0
1000	5.9	1.6
800	4.9	1.3

Rated Conditions: Ratings are based upon ISO 8665 and SAE J1228 reference conditions; air pressure of 100 kPa [29.612 in Hg], air temperature 25 °C [77°F], and 30% relative humidity. 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 3046. 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 ° API gravity at 16°C [60°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 Rating: 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 200 rpm of the maximum rated rpm. This power rating is for pleasure/non-revenue generating applications that operate 300 hours per year or less.

[Signature]
 CHIEF ENGINEER

Marine Engine Performance Data

Curve No. M-90760
DS-4960
CPL: 8206
DATE: 17Aug04

General Engine Data

Engine Model.....	220B
Rating Type.....	High Output
Rated Engine Power.....kW [bhp]	157 [210]
Rated Engine Speed.....rpm	2600
Rated HP Production Tolerance..... %	± 5
Rated Engine Torque.....N•m [ft•lb]	575 [424]
Peak Engine Torque @ 1800 rpm.....N•m [ft•lb]	726 [535]
Brake Mean Effective Pressure.....kPa [psi]	1227 [178]
Indicated Mean Effective Pressure.....kPa [psi]	N.A.
Minimum Idle Speed Setting.....rpm	700
Normal Idle Speed Variation.....rpm	± 50
High Idle Speed Range Minimum.....rpm	2808
High Idle Speed Range Maximum.....rpm	2912
Maximum Allowable Engine Speed.....rpm	N/A
Maximum Torque Capacity from Front of Crank ²N•m [ft•lb]	N/A
Compression Ratio.....	16.5:1
Piston Speed.....m/sec [ft/min]	10.4 [2045]
Firing Order.....	1-5-3-6-2-4
Weight (Dry) Engine With Heat Exchanger System - Average.....kg [lb]	508 [1120]

Exhaust System¹

Exhaust Gas Flow.....l/sec [cfm]	506 [1072]
Exhaust Gas Temperature (Turbine Out).....°C [°F]	446 [836]
Exhaust Gas Temperature (Manifold).....°C [°F]	N/A

Fuel System¹

Fuel Consumption @ Rated Speed.....l/hr [gal/hr]	45.3 [12.0]
Approximate Fuel Flow to Pump.....l/hr [gal/hr]	53 [14]
Maximum Allowable Fuel Supply to Pump Temperature.....°C [°F]	60 [140]
Approximate Fuel Flow Return to Tank.....l/hr [gal/hr]	8 [2]
Approximate Fuel Return to Tank Temperature.....°C [°F]	N.A.
Maximum Heat Rejection to Drain Fuel ⁵kW [Btu/min]	N.A.
Fuel Transfer Pump Pressure Range.....kPa [psi]	34 [5]

Air System¹

Intake Manifold Pressure.....kPa [in Hg]	176 [52]
Intake Air Flow.....l/sec [cfm]	236 [500]
Heat Rejection to Ambient.....kW [Btu/min]	21 [1200]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen).....g/kw-hr [g/hp-hr]	8.23 [6.14]
HC (Hydrocarbons).....g/kw-hr [g/hp-hr]	0.78 [0.58]
CO (Carbon Monoxide).....g/kw-hr [g/hp-hr]	1.84 [1.37]
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 with Standard Aftercooling

Coolant Flow to Engine Heat Exchanger/Keel Cooler.....l/min [gal/min]	174 [46]
Standard Thermostat Operating Range Start to Open.....°C [°F]	83 [181]
Standard Thermostat Operating Range Full Open.....°C [°F]	95 [203]
Heat Rejection to Engine Coolant ³kW [Btu/min]	139 [7900]

TBD = To Be Decided

N/A = Not Applicable

N.A. = Not Available

¹All Data at Rated Conditions²Consult Installation Direction Booklet for Limitations³Heat rejection 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.⁴Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.⁵May not be at rated load and speed. Maximum heat rejection may occur at other than rated conditions.

CUMMINS ENGINE COMPANY, INC.
COLUMBUS, INDIANA

All Data is Subject to Change Without Notice - Consult the following Cummins intranet site for most recent data:

<http://www.cummins.com>