



CUMMINS INC.
Columbus, IN 47201
Marine Performance Curves

Basic Engine Model

K38-M

Curve Number:

M-6598

Engine Configuration

D233034MX02

CPL Code:

2721

Date:

4-Mar-13

Displacement: **38 liter [2309 in³]**
Bore: **159 mm [6.26 in]**
Stroke: **159 mm [6.25 in]**
Fuel System: **PT (Centry and V.S.)**
Cylinders: **12**

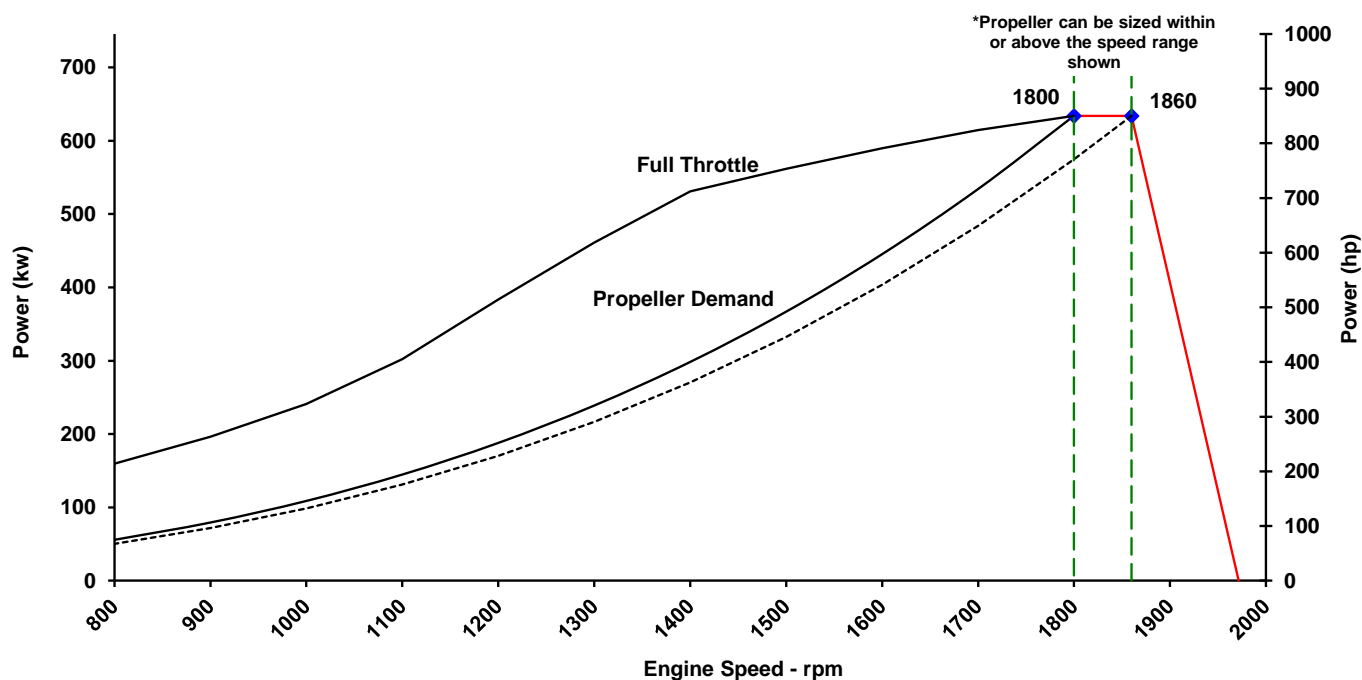
Rated Power: **634 kw [850 bhp]**
Rated Speed: **1800 rpm**
Rating Type: **Continuous Duty**
Aspiration: **Turbocharged / Low Temperature Aftercooled**

CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:

IMO Tier II - NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13

EPA Tier 2 - Model year requirements of the EPA marine regulation (40CFR94)

EU Stage IIIa - EC Nonroad Mobile Machinery Directive (2004/26/EC)



	Speed	Full Throttle- Power		Full Throttle- Torque		Fuel Cons.- Prop. Curve 3.0 Exp.	
	rpm	kw	(hp)	N·m	(ft·lb)	L/hr	(gal/hr)
	1860	634	(850)	3254	(2400)		
	1800	634	(850)	3362	(2480)	161.0	(42.5)
	1700	615	(825)	3454	(2547)	135.2	(35.7)
	1600	590	(791)	3521	(2597)	116.1	(30.7)
	1500	562	(753)	3576	(2638)	98.3	(26.0)
	1400	531	(712)	3622	(2672)	82.4	(21.8)
	1300	461	(618)	3386	(2498)	64.8	(17.1)
	1200	384	(514)	3053	(2252)	51.2	(13.5)
	1100	302	(405)	2624	(1935)	41.3	(10.9)
	1000	241	(323)	2302	(1698)	32.0	(8.5)
	900	196	(263)	2083	(1536)	25.0	(6.6)
	800	160	(214)	1905	(1405)	19.4	(5.1)

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

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.

TECHNICAL DATA DEPT.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-6598
DS : 4983
CPL : 2721
DATE: 4-Mar-13

General Engine Data

Engine Model	K38-M
Rating Type	Continuous Duty
Rated Engine Power	634 [850]
Rated Engine Speed	1800
Rated Power Production Tolerance	3
Rated Engine Torque	3363 [2480]
Peak Engine Torque @ 1400 rpm.....	3623 [2672]
Brake Mean Effective Pressure	1117 [162]
Indicated Mean Effective Pressure.....	2537 [368]
Maximum Allowable Engine Speed	2375
Maximum Torque Capacity from Front of Crank ²	4341 [3202]
Compression Ratio	16.7:1
Piston Speed	9.5 [1876]
Firing Order	1R-6L-5R-2L-3R-4L-6R-1L-2R-5L-4R-3L
Weight (Dry) - Engine Only - Average	4218 [9300]
Weight (Dry) - Engine With Heat Exchanger System - Average.....	4538 [10005]

Governor Settings

Default Droop Value.....	Refer to MAB 2.04.00-03/23/2006 for Droop explanation	6%
Minimum Droop Allowed.....		N/A
Maximum Droop Allowed.....		N/A
High Speed Governor Break Point.....		1860
Minimum Idle Speed Setting		650
Normal Idle Speed Variation		25
High Idle Speed Range Minimum		1860
High Idle Speed Range Maximum		1972

Noise and Vibration

Average Noise Level - Top	(Idle).....	dBA @ 1m	N.A.
	(Rated)	dBA @ 1m	N.A.
Average Noise Level - Right Side	(Idle).....	dBA @ 1m	N.A.
	(Rated)	dBA @ 1m	N.A.
Average Noise Level - Left Side	(Idle).....	dBA @ 1m	N.A.
	(Rated)	dBA @ 1m	N.A.
Average Noise Level - Front	(Idle).....	dBA @ 1m	N.A.
	(Rated)	dBA @ 1m	N.A.

Fuel System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	113.5 [30.0]
Fuel Consumption at Rated Speed	161.0 [42.5]
Approximate Fuel Flow to Pump	325.5 [86.0]
Maximum Allowable Fuel Supply to Pump Temperature	60.0 [140]
Approximate Fuel Flow Return to Tank	164.6 [43.5]
Approximate Fuel Return to Tank Temperature	68.4 [155]
Maximum Heat Rejection to Drain Fuel	2.4 [136]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	958 [139]
INSITE Reading	993 [144]

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 $\pm 5\%$.

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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<http://marine.cummins.com>

Propulsion Marine Engine Performance Data

Curve No. M-6598
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Air System¹

Intake Manifold Pressure	kPa [in Hg]	152 [45]
Intake Air Flow	l/sec [cfm]	1126 [2386]
Heat Rejection to Ambient	kW [Btu/min]	76 [4344]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	2366 [5013]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	387 [728]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw·hr [g/hp·hr]	5.42 [4.04]
HC (Hydrocarbons)	g/kw·hr [g/hp·hr]	0.26 [0.19]
CO (Carbon Monoxide)	g/kw·hr [g/hp·hr]	0.45 [0.34]
PM (Particulate Matter)	g/kw·hr [g/hp·hr]	0.10 [0.08]

Cooling System¹

Sea Water Pump Specifications	MAB 0.08.17-07/16/2001	
Pressure Cap Rating (With Heat Exchanger Option)	kPa [psi]	103 [15]
Max. Pressure Drop Across Any External Cooling System Circuit	kPa [psi]	34 [5]

Engines with Low Temperature Aftercooling (LTA)

Two Loop LTA

Main Engine Circuit

Coolant Flow to Main Cooler (with blocked open thermostat).....	l/min [gal/min]	1117 [295]
Standard Thermostat Operating Range	Start to open.....°C [°F]	82 [180]
	Full open.....°C [°F]	95 [202]
Heat Rejection to Engine Coolant ³	kW [Btu/min]	295 [16810]

Aftercooler (LTA) Circuit

Coolant Flow to LTA Cooler (with blocked open thermostat).....	l/min [gal/min]	288 [76]
LTA Thermostat Operating Range	Start to open.....°C [°F]	66 [150]
	Full open.....°C [°F]	80 [175]
Heat Rejection to Engine Coolant ³	kW [Btu/min]	103 [5835]
Maximum Coolant Inlet Temperature from LTA Cooler.....	°C [°F]	71 [160]

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