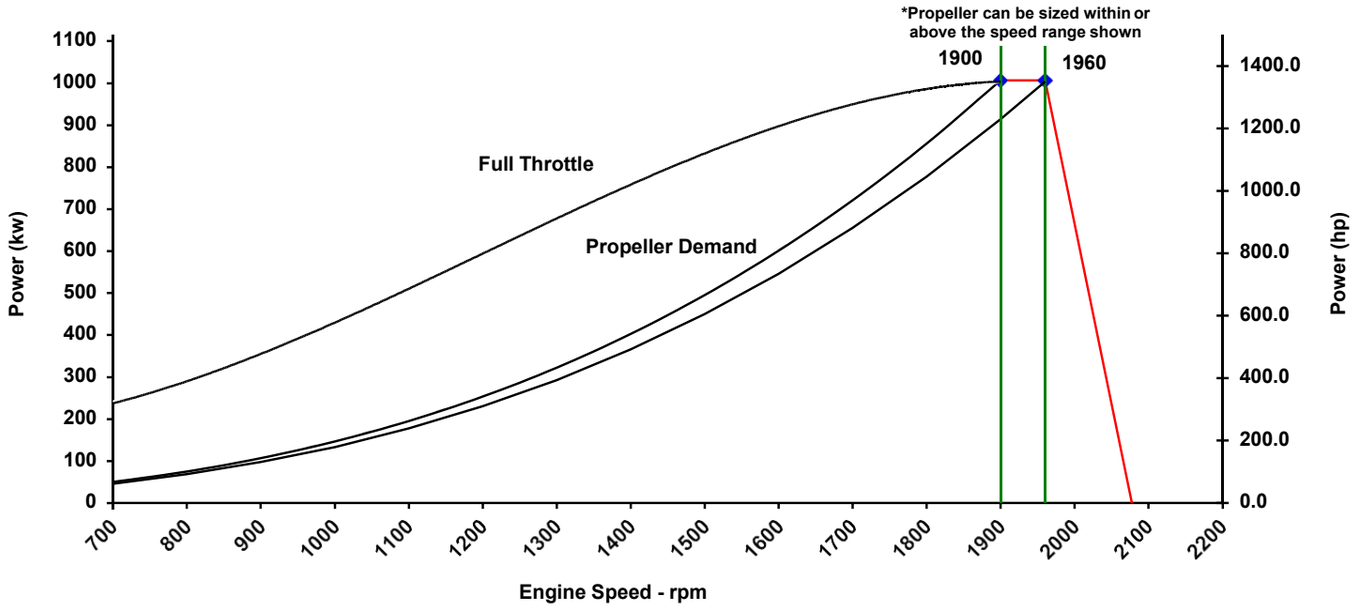
CUMMINS INC. Columbus, IN 47201 Marine Performance Curves	Basic Engine Model **K38-M**	Curve Number: **M-6909**	
	Engine Configuration **D233034MX02**	CPL Code: **3763**	Date: **19-Oct-11**

Displacement:	**38 liter**	**[2297 in³]**	Rated Power:	**1007 kw**	**[1350 bhp]**
Bore:	**159 mm**	**[6.26 in]**	Rated Speed:	**1900 rpm**	
Stroke:	**158 mm**	**[6.22 in]**	Rating Type:	**Heavy Duty**	
Cylinders:	**12**		Aspiration:	**Turbocharged / Low Temp. Aftercooler**	
Fuel System:	**PT (CENTRY AND V.S.)**				

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



Speed	Full Throttle				Propeller Demand					
	Power		Torque		Power		Torque		Fuel Consumption	
rpm	kw	(hp)	N·m	(ft-lb)	kw	(hp)	N·m	(ft-lb)	L/hr	(gal/hr)
1960	1007	(1350)	4905	(3618)						
1900	1007	(1350)	5060	(3732)	1007	(1350)	5059	(3732)	260.3	(68.8)
1800	972	(1304)	5159	(3805)	856	(1148)	4541	(3349)	220.4	(58.2)
1700	932	(1250)	5235	(3861)	721	(967)	4050	(2987)	186.3	(49.2)
1600	886	(1188)	5289	(3901)	601	(806)	3588	(2646)	158.7	(41.9)
1500	837	(1123)	5330	(3931)	495	(664)	3153	(2326)	133.4	(35.2)
1400	746	(1000)	5086	(3751)	403	(540)	2747	(2026)	111.8	(29.5)
1300	659	(883)	4839	(3569)	322	(432)	2369	(1747)	92.7	(24.5)
1200	593	(796)	4722	(3483)	254	(340)	2018	(1489)	68.6	(18.1)
1100	515	(691)	4473	(3299)	195	(262)	1696	(1251)	53.5	(14.1)
1000	409	(548)	3902	(2878)	147	(197)	1402	(1034)	40.9	(10.8)
900	338	(454)	3590	(2648)	107	(143)	1135	(837)	30.7	(8.1)
800	294	(394)	3507	(2587)	75	(101)	897	(662)	22.1	(5.8)
700	240	(322)	3272	(2413)	50	(68)	687	(507)	15.8	(4.2)

*** 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 draggers, 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 humidy. 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 [7.0011 lb/U.S. gal].

Heavy Duty (HD): Intended for continuous use in variable load applications where full power is limited to eight (8) hours out of every ten (10) hours of operation. Also, reduced power operations must be at or below 200 rpm of the maximum rated rpm. This is an ISO 15550 fuel stop power rating and is for applications that operate 5,000 hours per year or less.

TECHNICAL DATA DEPT.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-6909
DS : 4983
CPL : 3763
DATE: 19-Oct-11

General Engine Data		
Engine Model		K38-M
Rating Type		Heavy Duty
Rated Engine Power	kW [hp]	1007 [1350]
Rated Engine Speed	rpm	1900
Rated Power Production Tolerance	±%	3
Rated Engine Torque	N·m [lb·ft]	5059 [3732]
Peak Engine Torque @ 1500 rpm	N·m [lb·ft]	5330 [3931]
Brake Mean Effective Pressure	kPa [psi]	1689 [245]
Indicated Mean Effective Pressure	kPa [psi]	N.A. [N.A.]
Maximum Allowable Engine Speed	rpm	2375
Maximum Continuous Torque Capacity from Front of Crank Specifications		
Maximum Torque Capacity from Front of Crank²	N·m [lb·ft]	4341 [3202]
Compression Ratio		13.9:1
Piston Speed	m/sec [ft/min]	10.0 [1970]
Firing Order		1R-6L-5R-2L-3R-4L-6R-1L-2R-5L-4R-3L
Weight (Dry) - Engine Only - Average	kg [lb]	4354 [9600]
Weight (Dry) - Engine With Heat Exchanger System - Average	kg [lb]	4538 [10005]
Weight Tolerance (Dry) Engine Only	3xStd Dev(±%)	10.2
Governor Settings		
Default Droop Value	Refer to MAB 2.04.00-03/23/2006 for Droop explanation	6%
Maximum Droop Allowed		N/A
High Speed Governor Break Point	rpm	1960
Minimum Idle Speed Setting	rpm	650
Normal Idle Speed Variation	±rpm	25
High Idle Speed Range Minimum	rpm	1960
Maximum	rpm	2078
Fuel System¹		
Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	181.4 [47.9]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	260.5 [68.8]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	461.8 [122.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	201.3 [53.2]
Approximate Fuel Return to Tank Temperature	°C [°F]	11.8 [53]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	-2.9 [-166]
Fuel Pressure - Pump Out/Rail Mechanical Gauge	kPa [psi]	1055 [153]
INSITE Reading	kPa [psi]	1076 [156]

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.

CUMMINS ENGINE COMPANY, INC

COLUMBUS, INDIANA

Propulsion Marine Engine Performance Data

Curve No.	**M-6909**
DS :	**4983**
CPL :	**3763**
DATE:	**19-Oct-11**

Air System[1]		
Intake Manifold Pressure	kPa [in Hg]	203 [60]
Intake Air Flow	l/sec [cfm]	1398 [2961]
Heat Rejection to Ambient	kW [Btu/min]	79 [4511]
Exhaust System[1]		
Exhaust Gas Flow	l/sec [cfm]	3470 [7,353]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	470 [877]
Exhaust Gas Temperature (Manifold)	°C [°F]	629 [1,164]
Emissions (in accordance with ISO 8178 Cycle E3)		
NOx (Oxides of Nitrogen)	g/kw·hr [g/hp·hr]	7.71 [5.75]
HC (Hydrocarbons)	g/kw·hr [g/hp·hr]	0.29 [0.22]
CO (Carbon Monoxide)	g/kw·hr [g/hp·hr]	0.88 [0.66]
Cooling System[1]		
Sea Water Pump Specifications		MAB 0.08.17-07/16/2001
Pressure Cap Rating (With Heat Exchanger Option)	kPa [psi]	103 [15]
Max. Coolant Outlet Pressure from the Engine	kPa [psi]	228 [33]
Max. Pressure Drop Across Any External Cooling System Circuit	kPa [psi]	34 [5]
Engines with Low Temperature Aftercooling (LTA)		
Two Loop LTA (For both 1 & 2 pump systems)		
Main Engine Circuit		
Coolant Flow to Main Cooler (with blocked open thermostat)	l/min [gal/min]	1033 [273]
Standard Thermostat Operating Range — Start to open	°C [°F]	82 [180]
Standard Thermostat Operating Range — Full open	°C [°F]	95 [202]
Heat Rejection to Engine Coolant[3]	kW [Btu/min]	468 [26637]
Aftercooler (LTA) Circuit		
Coolant Flow to LTA Cooler (with blocked open thermostat)	l/min [gal/min]	303 [80]
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]	171 [9723]
Maximum Coolant Inlet Temperature from LTA Cooler	°C [°F]	71 [160]

TBD= To Be Determined **N/A = Not Applicable** **N.A. = Not Available**

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[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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