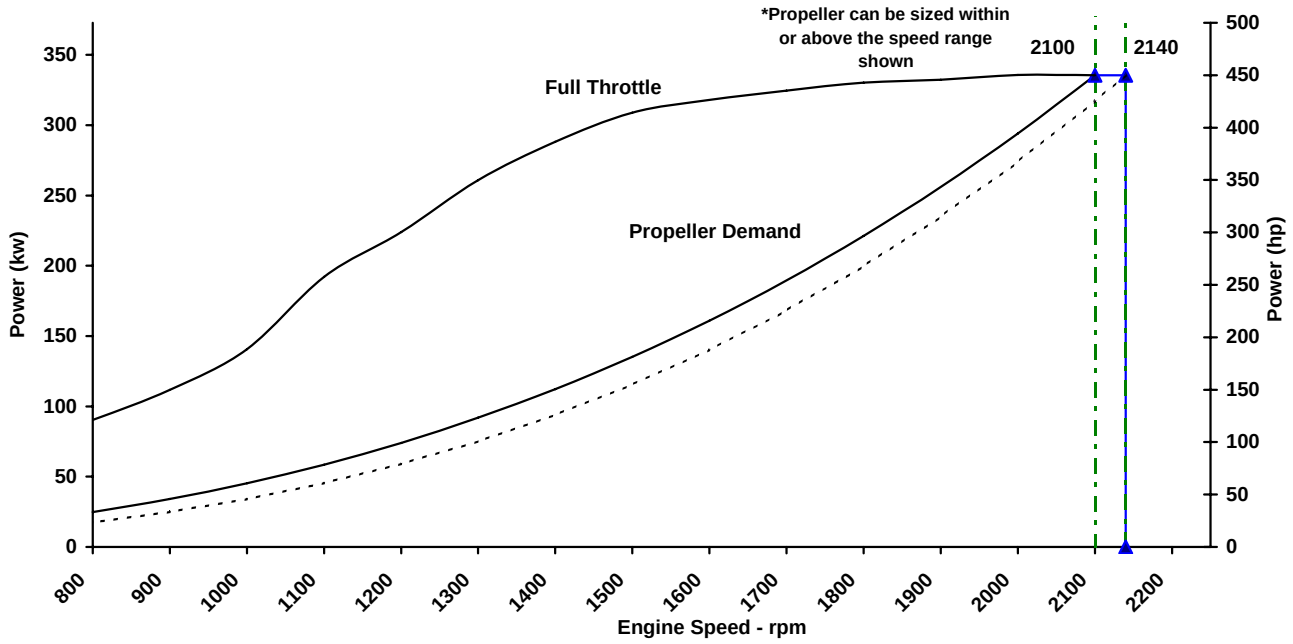
CUMMINS INC. Columbus, IN 47201 Marine Performance Curves	Basic Engine Model QSM11-455 HO	Curve Number: M-20048	
	Engine Configuration D353021MX03	CPL Code: 8590	Date: 12-May-10

Displacement:	**10.8 liter**	**[661 in³]**	Rated Power:	**336 kw**	**[450 bhp, 455 mhp]**
Bore:	**125 mm**	**[4.92 in]**	Rated Speed:	**2100 rpm**	
Stroke:	**147 mm**	**[5.79 in]**	Rating Type:	**High Output**	
Fuel System:	**CELECT**		Aspiration:	**Turbocharged / Jacket 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)
2140	335	(450)	1497	(1104)		
2100	335	(450)	1525	(1125)	87.6	(23.1)
2000	336	(450)	1603	(1182)	74.6	(19.7)
1900	332	(446)	1670	(1232)	64.6	(17.1)
1800	330	(443)	1752	(1292)	55.5	(14.7)
1700	325	(435)	1824	(1345)	48.4	(12.8)
1600	318	(427)	1898	(1400)	41.1	(10.9)
1500	309	(414)	1966	(1450)	35.9	(9.5)
1400	288	(387)	1966	(1450)	29.3	(7.7)
1300	261	(350)	1916	(1413)	23.7	(6.3)
1200	224	(300)	1783	(1315)	19.2	(5.1)
1100	192	(258)	1668	(1230)	16.4	(4.3)

* 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. 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-20048**
DS :	**3075**
CPL :	**8590**
DATE:	**12-May-10**

General Engine Data

Engine Model		QSM11-455 HO
Rating Type		High Output
Rated Engine Power	kW [hp]	336 [450]
Rated Engine Speed	rpm	2100
Rated Power Production Tolerance	±%	5
Rated Engine Torque	N·m [lb·ft]	1526 [1125]
Peak Engine Torque @ 1500 rpm	N·m [lb·ft]	1966 [1450]
Brake Mean Effective Pressure	kPa [psi]	1772 [257]
Indicated Mean Effective Pressure	kPa [psi]	1985 [288]
Maximum Allowable Engine Speed	rpm	2160
Maximum Torque Capacity from Front of Crank[2]	N·m [lb·ft]	847 [625]
Compression Ratio		15.9:1
Piston Speed	m/sec [ft/min]	10.3 [2026]
Firing Order		1-5-3-6-2-4
Weight (Dry) - Engine Only - Average	kg [lb]	1118 [2464]
Weight (Dry) - Engine With Heat Exchanger System - Average	kg [lb]	1184 [2610]
Weight Tolerance (Dry) Engine Only	3xStd Dev(±%)	N.A.

Governor Settings

High Speed Governor Break Point	rpm	2140
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	±rpm	10
High Idle Speed Range Minimum	rpm	2140
Maximum	rpm	2160

Noise and Vibration

Average Noise Level - Top	(Idle)	dBA @ 1m	80
	(Rated)	dBA @ 1m	95
Average Noise Level - Right Side	(Idle)	dBA @ 1m	80
	(Rated)	dBA @ 1m	95
Average Noise Level - Left Side	(Idle)	dBA @ 1m	80
	(Rated)	dBA @ 1m	95
Average Noise Level - Front	(Idle)	dBA @ 1m	80
	(Rated)	dBA @ 1m	95

Fuel System[1]

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	59.3 [15.7]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	87.6 [23.1]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	242.3 [64.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	154.7 [40.9]
Approximate Fuel Return to Tank Temperature	°C [°F]	71.2 [160]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	2.5 [140]
Fuel Transfer Pump Pressure Range	kPa [psi]	N.A.
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	1103 [160]
INSITE Reading	kPa [psi]	N.A.

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-20048**
DS :	**3075**
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DATE:	**12-May-10**

Air System[1]	
Intake Manifold Pressure ……kPa [in Hg]	204 [60]
Intake Air Flow ……l/sec [cfm]	445 [942]
Heat Rejection to Ambient ……kW [Btu/min]	26 [1481]
Exhaust System[1]	
Exhaust Gas Flow ……l/sec [cfm]	960 [2035]
Exhaust Gas Temperature (Turbine Out) ……°C [°F]	407 [764]
Exhaust Gas Temperature (Manifold) ……°C [°F]	601 [1113]
Emissions (in accordance with ISO 8178 Cycle E3)	
NOx (Oxides of Nitrogen) ……g/kw·hr [g/hp·hr]	6.19 [4.62]
HC (Hydrocarbons) ……g/kw·hr [g/hp·hr]	0.22 [0.16]
CO (Carbon Monoxide) ……g/kw·hr [g/hp·hr]	0.36 [0.27]
PM (Particulate Matter) ……g/kw·hr [g/hp·hr]	0.14 [0.11]
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]
Engines without Low Temperature Aftercooling (LTA)	
Sea Water Aftercooled Engine (SWAC)	
Coolant Flow to Engine Heat Exchanger ……l/min [gal/min]	302 [79.8]
Standard Thermostat Operating Range (Start to Open) ……°C [°F]	71 [160]
Standard Thermostat Operating Range (Full Open) ……°C [°F]	80 [175]
Heat Rejection to Engine Coolant[3] ……kW [Btu/min]	358 [20400]
Engines with Low Temperature Aftercooling (LTA)	
Single Loop LTA	
Coolant Flow to Cooler (with blocked open thermostat)……l/min [gal/min]	198 [52]
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]	309 [17607]
Maximum Coolant Inlet Temperature from LTA Cooler……°C [°F]	54 [130]

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