

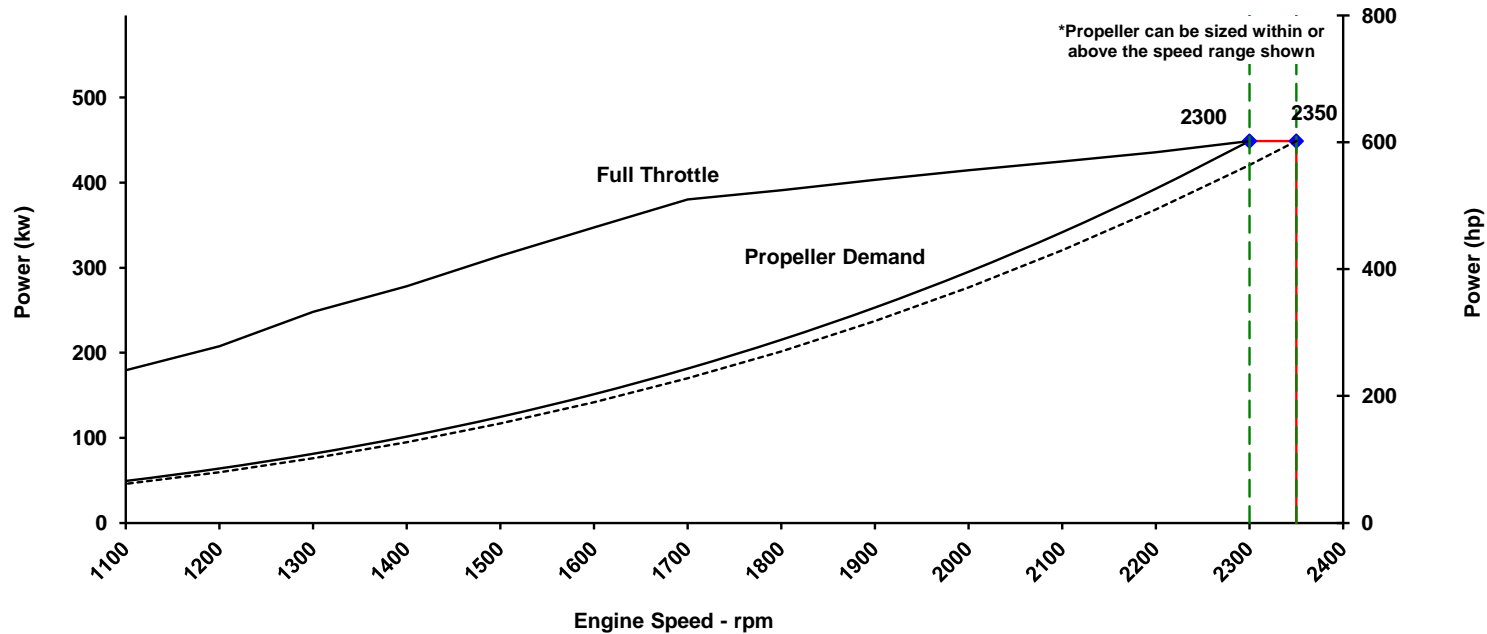


CUMMINS INC.
 Charleston, SC 29405
 Marine Performance Curves
marine.cummins.com

Basic Engine Model QSM11-M	Curve Number: M-20576	
Engine Configuration D353013MX03	CPL Code: 1794	Date: 5-Aug-13

Displacement: 10.8 liter [661 in³]	Rated Power: 449 Kw [602 bhp, 610 mhp]
Bore: 125 mm [4.92 in]	Rated Speed: 2300 rpm
Stroke: 147 mm [5.79 in]	Rating Type: High Output
Cylinders: 6	Aspiration: Turbocharged / Sea Water Aftercooled
Fuel System: CELECT	

CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:
 EPA Tier 3 - Model year requirements of the EPA marine regulation (40CFR1042)
 IMO Tier II (Two) NOx requirements of International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13
 RCD - meets the requirements of the Recreational Craft Directive 94/25/EC as amended by 2003/44/EC in accordance with ISO 8178-1



Speed rpm	Full Throttle				Propeller Demand					
	Power		Torque		Power		Torque		Fuel Consumption	
	kw	(hp)	N·m	(ft·lb)	kw	(hp)	N·m	(ft·lb)	L/hr	(gal/hr)
2350	449	(602)	1824	(1345)						
2300	449	(602)	1864	(1375)	449	(602.0)	1864	(1,374.7)	112.5	(29.7)
2200	436	(584)	1891	(1395)	393	(526.8)	1705	(1,257.7)	96.7	(25.5)
2100	425	(570)	1932	(1425)	342	(458.2)	1554	(1,146.0)	82.6	(21.8)
2000	415	(556)	1979	(1460)	295	(395.8)	1409	(1,039.4)	71.2	(18.8)
1900	403	(541)	2027	(1495)	253	(339.4)	1272	(938.1)	61.2	(16.2)
1800	391	(524)	2074	(1530)	215	(288.6)	1142	(841.9)	52.2	(13.8)
1700	380	(510)	2135	(1575)	181	(243.1)	1018	(751.0)	45.4	(12.0)
1600	348	(466)	2074	(1530)	151	(202.7)	902	(665.2)	44.6	(11.8)
1500	314	(421)	2000	(1475)	125	(167.0)	793	(584.7)	37.9	(10.0)
1400	278	(373)	1898	(1400)	101	(135.8)	691	(509.3)	31.4	(8.3)
1300	248	(333)	1824	(1345)	81	(108.7)	595	(439.2)	25.7	(6.8)
1200	208	(279)	1654	(1220)	64	(85.5)	507	(374.2)	20.9	(5.5)
1100	180	(241)	1559	(1150)	49	(65.9)	426	(314.4)	16.6	(4.4)
1000	143	(192)	1369	(1010)	37	(49.5)	352	(259.9)	13.2	(3.5)
900	109	(147)	1159	(855)	27	(36.1)	285	(210.5)	10.4	(2.7)
800	80	(107)	956	(705)	19	(25.3)	225	(166.3)	8.0	(2.1)
700	70	(94)	956	(705)	13	(17.0)	173	(127.3)	6.1	(1.6)
600	55	(73)	868	(640)	8	(10.7)	127	(93.5)	4.6	(1.2)

*** Cummins Full Throttle Requirements:**

- Engine achieves or exceeds rated rpm at full throttle under any steady operating condition
- 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. 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 [7.001 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.

Propulsion Marine Engine Performance Data

Curve No. M-20576
 DS: DS-3021
 CPL: 1794
 DATE: 5-Aug-13

General Engine Data

Engine Model	QSM11-M
Rating Type	High Output
Rated Engine Power	449 [602]
Rated Engine Speed	2300
Rated Power Production Tolerance	5
Rated Engine Torque	1864 [1375]
Peak Engine Torque @ 1500 rpm.....	2135 [1575]
Brake Mean Effective Pressure	2164 [314]
Indicated Mean Effective Pressure.....	2398 [348]
Maximum Allowable Engine Speed	2360

Maximum Continuous Torque Capacity from Front of Crank Specifications

Maximum Torque Capacity from Front of Crank ²	0 [0]
Compression Ratio	16.3:1
Piston Speed	11.3 [2219]
Firing Order	1-5-3-6-2-4
Weight (Dry) - Engine With Heat Exchanger System - Average.....	1188 [2620]

Governor Settings

Default Droop Value.....	Refer to MAB 2.04.00-03/23/2006 for Droop explanation	0%
High Speed Governor Break Point.....		2350
Minimum Idle Speed Setting		600
Normal Idle Speed Variation		10
High Idle Speed Range Minimum		2350
High Idle Speed Range Maximum		2370

Noise and Vibration

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

Fuel System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	75.8 [20.0]
Avg. Fuel Consumption - ISO 8178 E5 Standard Test Cycle	l/hr [gal/hr]	38.5 [10.2]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	787.4 [208.0]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	280.1 [74.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	159.0 [42.0]
Approximate Fuel Return to Tank Temperature	°C [°F]	93.4 [200]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	4.3 [247]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	1151 [167]

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.

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COLUMBUS, INDIANA

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Propulsion Marine Engine Performance Data

Curve No. M-20576
 DS: DS-3021
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Air System¹

Intake Manifold PressurekPa [in Hg]	280 [83]
Intake Air Flowl/sec [cfm]	678 [1436]
Heat Rejection to Ambient .....	.....kW [Btu/min]	35 [1996]

Exhaust System¹

Exhaust Gas Flow .....	.....l/sec [cfm]	1549 [3,283]
Exhaust Gas Temperature (Turbine Out) .....	.....°C [°F]	496 [924]
Exhaust Gas Temperature (Manifold) .....	.....°C [°F]	661 [1,220]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen) .....	.....g/kw-hr [g/hp-hr]	4.19 [3.13]
HC (Hydrocarbons) .....	.....g/kw-hr [g/hp-hr]	0.20 [0.15]
CO (Carbon Monoxide) .....	.....g/kw-hr [g/hp-hr]	0.52 [0.39]
PM (Particulate Matter) .....	.....g/kw-hr [g/hp-hr]	0.08 [0.06]
CO ₂ (Carbon dioxide) .....	.....g/kw-hr [g/hp-hr]	620.00 [462.33]

Emissions (in accordance with ISO 8178 Cycle E5)

NOx (Oxides of Nitrogen) .....	.....g/kw-hr [g/hp-hr]	4.51 [3.36]
HC (Hydrocarbons) .....	.....g/kw-hr [g/hp-hr]	0.20 [0.15]
CO (Carbon Monoxide) .....	.....g/kw-hr [g/hp-hr]	0.58 [0.43]
PM (Particulate Matter) .....	.....g/kw-hr [g/hp-hr]	0.08 [0.06]
CO ₂ (Carbon dioxide) .....	.....g/kw-hr [g/hp-hr]	626.00 [466.81]

Cooling System¹

Sea Water Pump Specifications .....	.....MAB 0.08.17-07/16/2001	
Pressure Cap RatingkPa [psi]	103 [15]
Max. Coolant Outlet Pressure from the Engine.....kPa [psi]	414 [60]

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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.
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