

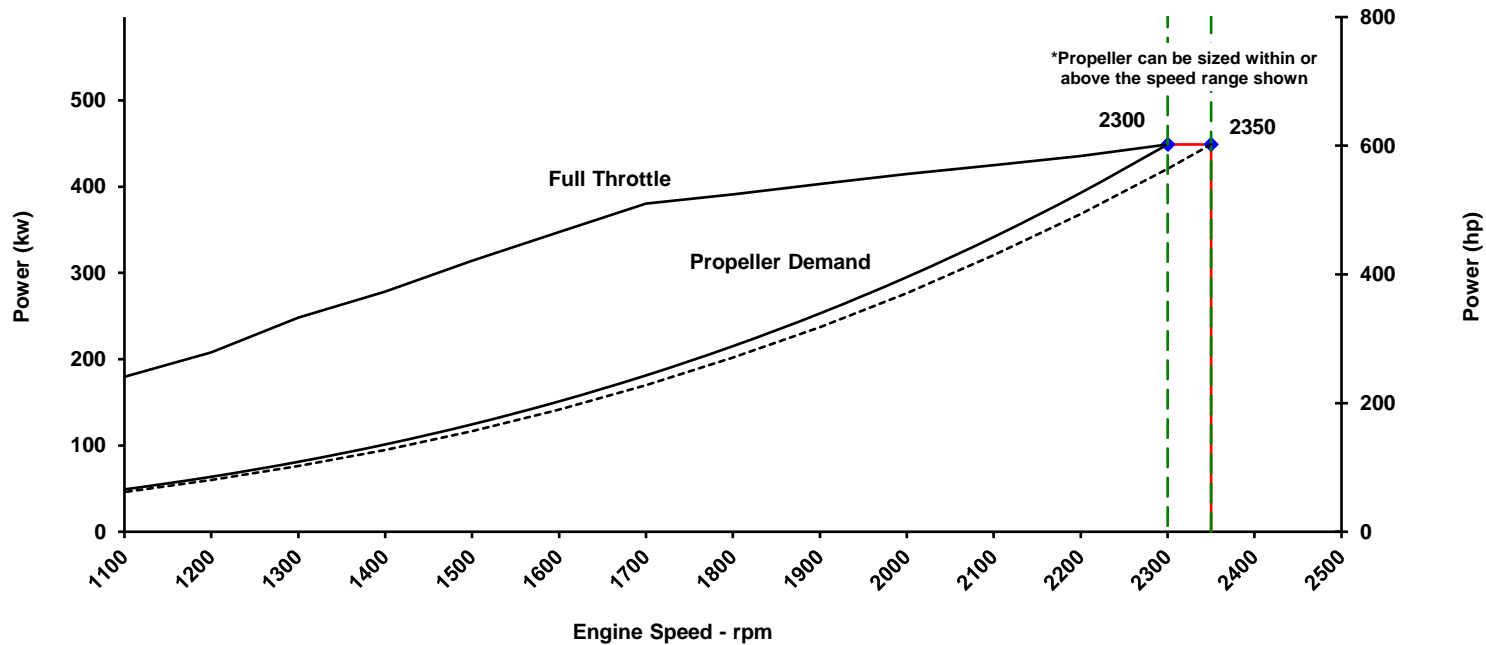


CUMMINS INC.
 Charleston, SC 29405
 Marine Performance Curves
marine.cummins.com

Basic Engine Model QSM11-M	Curve Number: M-20577	
Engine Configuration D353013MX03	CPL Code: 1794	Date: 26-Sep-14

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: Intermittent Duty
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



Speed rpm	Full Throttle				Propeller Demand				Fuel Consumption	
	Power		Torque		Power		Torque		L/hr	(gal/hr)
	kw	(hp)	N·m	(ft·lb)	kw	(hp)	N·m	(ft·lb)		
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
- 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. 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].

Intermittent Duty (INT): Intended for intermittent use in variable load applications where full power is limited to two hours out of every eight hours of operation. Also, reduced power operations must be at or below 200 rpm of the maximum rated rpm. This rating is an ISO 15550 fuel stop power rating and is for applications that operate less than 1,500 hours per year.

Propulsion Marine Engine Performance Data

Curve No. M-20577
DS: DS3021
CPL: 1794
DATE: 26-Sep-14

Air System¹

Intake Manifold Pressure	kPa [in Hg]	280 [83]
Intake Air Flow	l/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)

NO _x (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]

Cooling System¹

Sea Water Pump Specifications	MAB 0.08.17-07/16/2001	
Pressure Cap Rating	kPa [psi]	103 [15]
Max. Coolant Outlet Pressure from the Engine.....	kPa [psi]	414 [60]
Max. Pressure Drop Across Any External Cooling System Circuit	kPa [psi]	34 [5]

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.

CUMMINS INC.
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All Data is Subject to Change Without Notice - Consult the following Cummins website for the most recent data:

<http://marine.cummins.com>