



**CUMMINS INC.**  
 Charleston, SC 29405  
 Marine Performance Curves  
[marine.cummins.com](http://marine.cummins.com)

Basic Engine Model  
**QSL**

Curve Number:  
**M-94505**

Engine Configuration  
**D563023MX03**

CPL Code:  
**4254**

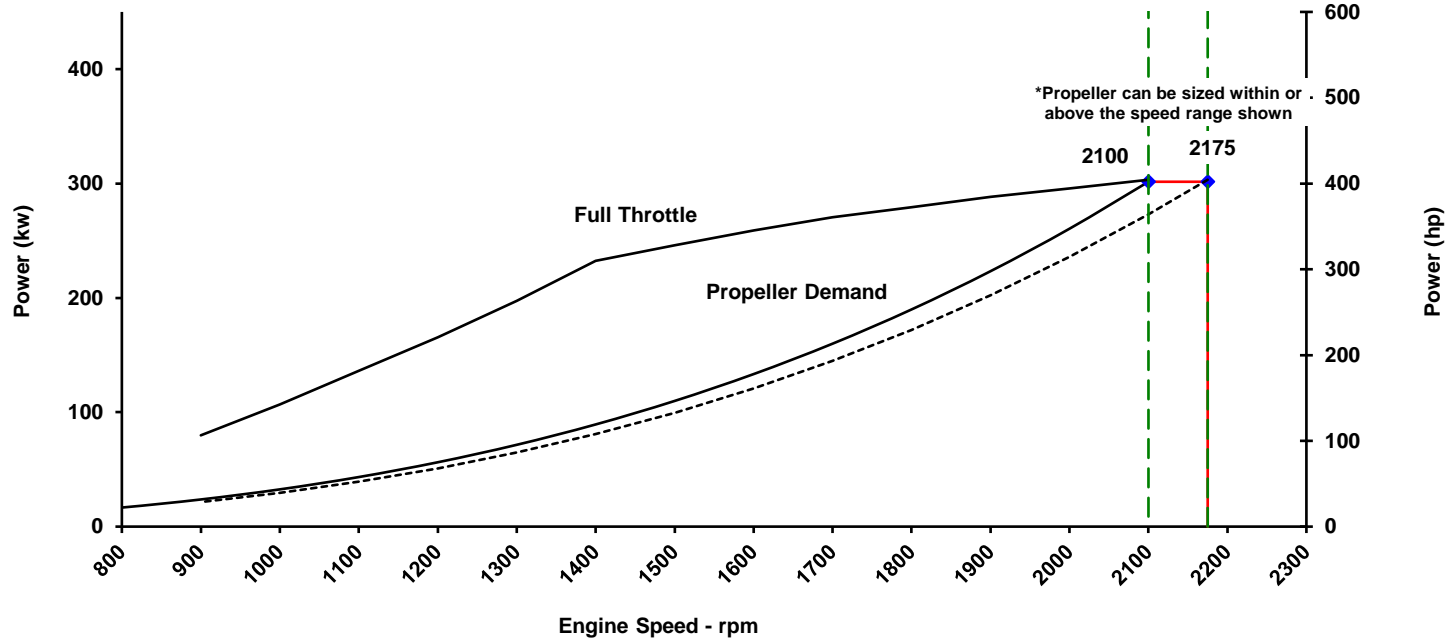
Date:  
**22-Feb-17**

Displacement: **8.9 liter [542 in³]**  
 Bore: **114 mm [4.49 in]**  
 Stroke: **145 mm [5.71 in]**  
 Cylinders: **6**  
 Fuel System: **Cummins High Pressure Common Rail**

Rated Power: **302 kw [404 bhp, 410 mhp]**  
 Rated Speed: **2100 rpm**  
 Rating Type: **High Output**  
 Aspiration: **Turbocharged / Sea Water Aftercooled**

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
- RCD2 - meets the requirements of the Recreational Craft Directive 2013/53/EU in accordance with ISO 8178-1



Speed	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)
2175	302	(404)	1324	(976)						
2100	302	(404)	1371	(1011)	302	(404.3)	1371	(1,011.2)	78.7	(20.8)
2000	294	(394)	1403	(1035)	264	(354.4)	1262	(930.7)	66.6	(17.6)
1900	287	(384)	1440	(1062)	230	(308.6)	1157	(853.0)	56.8	(15.0)
1800	278	(372)	1473	(1086)	199	(266.7)	1055	(778.1)	49.9	(13.2)
1700	269	(361)	1511	(1114)	170	(228.5)	957	(706.1)	43.2	(11.4)
1600	257	(345)	1536	(1133)	145	(194.0)	864	(636.9)	35.3	(9.3)
1500	244	(328)	1556	(1148)	122	(163.0)	774	(570.7)	30.7	(8.1)
1400	231	(310)	1576	(1162)	101	(135.3)	688	(507.6)	26.6	(7.0)
1300	196	(263)	1442	(1064)	83	(110.8)	607	(447.5)	17.6	(4.7)
1200	164	(221)	1309	(965)	67	(89.2)	530	(390.6)	13.4	(3.5)
1100	135	(182)	1175	(867)	53	(70.6)	457	(336.9)	13.8	(3.6)
1000	106	(143)	1015	(749)	41	(54.5)	388	(286.5)	10.6	(2.8)
900	79	(106)	842	(621)	31	(41.0)	325	(239.5)	8.2	(2.2)
800	59	(80)	708	(522)	22	(29.9)	266	(196.0)	6.2	(1.6)
700	45	(60)	610	(450)	16	(20.8)	212	(156.2)	4.6	(1.2)
600	33	(44)	520	(384)	10	(13.7)	163	(120.2)	3.4	(0.9)

**\* 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.

TECHNICAL DATA DEPT.

CHIEF ENGINEER

# Propulsion Marine Engine Performance Data

Curve No. M-94505  
 DS: D56-MX-1  
 CPL: 4254  
 DATE: 22-Feb-17

## General Engine Data

Engine Model .....	QSL
Rating Type .....	High Output
Rated Engine Power .....	302 [404]
Rated Engine Speed .....	2100
Rated Power Production Tolerance .....	5
Rated Engine Torque .....	1371 [1011]
Peak Engine Torque @ 1400 rpm.....	1575 [1162]
Brake Mean Effective Pressure .....	1940 [281]
Indicated Mean Effective Pressure.....	2209 [320]
Maximum Allowable Engine Speed .....	2200

## Maximum Continuous Torque Capacity from Front of Crank Specifications

Maximum Torque Capacity from Front of Crank <sup>2</sup> .....	705 [520]
Compression Ratio .....	16.6:1
Piston Speed .....	10.2 [1998]
Firing Order .....	1-5-3-6-2-4
Weight (Dry) - Engine With Heat Exchanger System - Average.....	977 [2153]

## Governor Settings

Default Droop Value.....	Refer to MAB 2.04.00-03/23/2006 for Droop explanation	0%
High Speed Governor Break Point.....	rpm	2175
Minimum Idle Speed Setting .....	rpm	600
Normal Idle Speed Variation .....	±rpm	10
High Idle Speed Range Minimum .....	rpm	2175
High Idle Speed Range Maximum .....	rpm	2195

## Noise and Vibration

Average Noise Level - Top	(Idle).....	dBa @ 1m	84
	(Rated) .....	dBa @ 1m	96
Average Noise Level - Right Side	(Idle).....	dBa @ 1m	84
	(Rated) .....	dBa @ 1m	96
Average Noise Level - Left Side	(Idle).....	dBa @ 1m	84
	(Rated) .....	dBa @ 1m	96
Average Noise Level - Front	(Idle).....	dBa @ 1m	84
	(Rated) .....	dBa @ 1m	96

## Fuel System<sup>1</sup>

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle .....	l/hr [gal/hr]	53.5 [14.1]
Avg. Fuel Consumption - ISO 8178 E5 Standard Test Cycle .....	l/hr [gal/hr]	27.5 [7.3]
Fuel Consumption at Rated Speed .....	l/hr [gal/hr]	78.6 [20.8]
Approximate Fuel Flow to Pump .....	l/hr [gal/hr]	129.5 [34.2]
Maximum Allowable Fuel Supply to Pump Temperature .....	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank .....	l/hr [gal/hr]	50.9 [13.5]
Approximate Fuel Return to Tank Temperature .....	°C [°F]	61.7 [143]
Maximum Heat Rejection to Drain Fuel .....	kW [Btu/min]	0.5 [29]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge .....	kPa [psi]	1151 [167]

TBD= To Be Determined

N/A = Not Applicable

N.A. = Not Available

- <sup>1</sup> Unless otherwise specified, all data is at rated power conditions and can vary ± 5%.
- <sup>2</sup> 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.
- <sup>3</sup> 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.
- <sup>4</sup> Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.

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 COLUMBUS, INDIANA

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**Air System<sup>1</sup>**

Intake Manifold Pressure .....	kPa [in Hg]	176 [52]
Intake Air Flow .....	l/sec [cfm]	353 [749]
Heat Rejection to Ambient .....	kW [Btu/min]	24 [1346.245]

**Exhaust System<sup>1</sup>**

Exhaust Gas Flow .....	l/sec [cfm]	863 [1,829]
Exhaust Gas Temperature (Turbine Out) .....	°C [°F]	492 [917]
Exhaust Gas Temperature (Manifold) .....	°C [°F]	669 [1,236]

**Emissions (in accordance with ISO 8178 Cycle E3)**

NOx (Oxides of Nitrogen) .....	g/kw-hr [g/hp-hr]	4.82 [3.59]
HC (Hydrocarbons) .....	g/kw-hr [g/hp-hr]	0.20 [0.15]
CO (Carbon Monoxide) .....	g/kw-hr [g/hp-hr]	0.86 [0.64]
PM (Particulate Matter) .....	g/kw-hr [g/hp-hr]	0.06 [0.04]

**Emissions (in accordance with ISO 8178 Cycle E5)**

NOx (Oxides of Nitrogen) .....	g/kw-hr [g/hp-hr]	4.84 [3.61]
HC (Hydrocarbons) .....	g/kw-hr [g/hp-hr]	0.20 [0.15]
CO (Carbon Monoxide) .....	g/kw-hr [g/hp-hr]	0.49 [0.37]
PM (Particulate Matter) .....	g/kw-hr [g/hp-hr]	0.06 [0.04]

**Cooling System<sup>1</sup>**

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]

**Engines without Low Temperature Aftercooling (LTA )**

**Sea Water Aftercooled Engine (SWAC)**

Coolant Flow to Engine Heat Exchanger .....	l/min [gal/min]	N/A [N.A.]
Standard Thermostat Operating Range (Start to Open) .....	°C [°F]	71 [160]
Standard Thermostat Operating Range (Full Open) .....	°C [°F]	82 [180]
Heat Rejection to Engine Coolant <sup>3</sup> .....	kW [Btu/min]	N/A [N.A.]

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