



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

Basic Engine Model
QSL

Curve Number:
M-94509

Engine Configuration
D563023MX03

CPL Code:
4254

Date:
17-Apr-14

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**

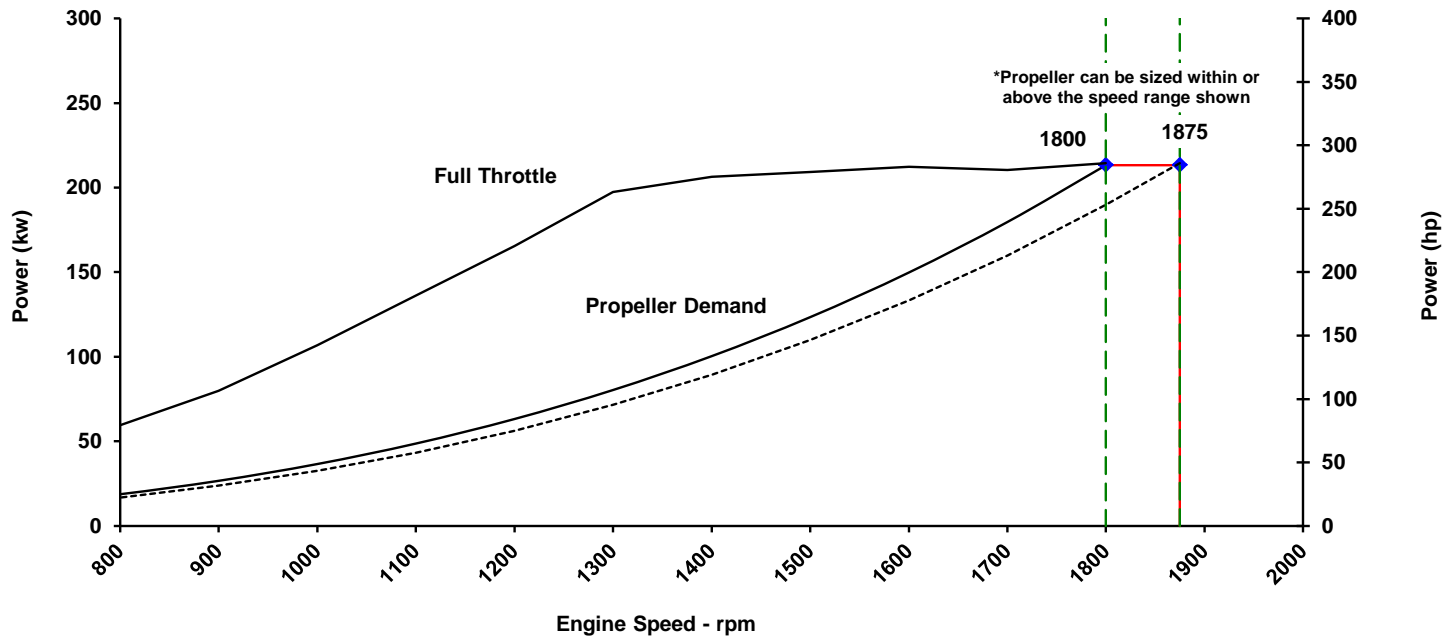
Rated Power: **213 kw [286 bhp, 290 mhp]**
 Rated Speed: **1800 rpm**
 Rating Type: **Continuous Duty**
 Aspiration: **Turbocharged / Sea Water Aftercooled**

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)

EU Stage IIIa - EC Nonroad Mobile Machinery Directive (2004/26/EC)

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)	N-m (ft-lb)	kw (hp)	N-m (ft-lb)	N-m (ft-lb)	L/hr (gal/hr)	L/hr (gal/hr)	
1875	213	(286)	1086	(801)						
1800	213	(286)	1131	(834)	213	(286.0)	1131	(834.5)	53.5	(14.1)
1700	209	(281)	1175	(867)	180	(240.9)	1009	(744.3)	45.9	(12.1)
1600	211	(283)	1260	(929)	150	(200.9)	894	(659.3)	38.0	(10.0)
1500	208	(279)	1325	(977)	123	(165.5)	786	(579.5)	31.8	(8.4)
1400	205	(275)	1400	(1033)	100	(134.6)	684	(504.8)	26.4	(7.0)
1300	196	(263)	1443	(1064)	80	(107.7)	590	(435.3)	21.2	(5.6)
1200	164	(221)	1309	(965)	63	(84.7)	503	(370.9)	17.5	(4.6)
1100	135	(182)	1175	(867)	49	(65.3)	423	(311.6)	13.7	(3.6)
1000	106	(143)	1015	(749)	37	(49.0)	349	(257.6)	9.9	(2.6)
900	79	(106)	842	(621)	27	(35.8)	283	(208.6)	7.3	(1.9)
800	59	(80)	708	(522)	19	(25.1)	223	(164.8)	5.4	(1.4)
700	45	(60)	610	(450)	13	(16.8)	171	(126.2)	3.9	(1.0)
600	33	(44)	520	(384)	8	(10.6)	126	(92.7)	2.8	(0.7)

*** 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].

Continuous Rating (CON): Intended for continuous use in applications requiring uninterrupted service at full power. This rating is an ISO 15550 standard power rating.

TECHNICAL DATA DEPT.

[Signature]
 CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-94509
 DS: D56-MX-1
 CPL: 4254
 DATE: 17-Apr-14

General Engine Data

Engine Model	QSL
Rating Type	Continuous Duty
Rated Engine Power	213 [286]
Rated Engine Speed	1800
Rated Power Production Tolerance	5
Rated Engine Torque	1131 [834]
Peak Engine Torque @ 1300 rpm.....	1443 [1064]
Brake Mean Effective Pressure	1601 [232]
Indicated Mean Effective Pressure.....	1870 [271]
Maximum Allowable Engine Speed	1900

Maximum Continuous Torque Capacity from Front of Crank Specifications

Maximum Torque Capacity from Front of Crank ²	705 [520]
Compression Ratio	16.6:1
Piston Speed	8.7 [1713]
Firing Order	1-5-3-6-2-4
Weight (Dry) - Engine With Heat Exchanger System - Average.....	977 [2153]

Governor Settings

Default Droop Value.....	0%
High Speed Governor Break Point.....	1875
Minimum Idle Speed Setting	600
Normal Idle Speed Variation	10
High Idle Speed Range Minimum	1875
High Idle Speed Range Maximum	1895

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 System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	37.3 [9.9]
Avg. Fuel Consumption - ISO 8178 E5 Standard Test Cycle	0.0 [0.0]
Fuel Consumption at Rated Speed	53.4 [14.1]
Approximate Fuel Flow to Pump	113.6 [30.0]
Maximum Allowable Fuel Supply to Pump Temperature	60.0 [140]
Approximate Fuel Flow Return to Tank	60.2 [15.9]
Approximate Fuel Return to Tank Temperature	61.7 [143]
Maximum Heat Rejection to Drain Fuel	0.6 [35]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	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.

CUMMINS INC.
 COLUMBUS, INDIANA

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<http://marine.cummins.com>

Propulsion Marine Engine Performance Data

Curve No. M-94509
 DS: D56-MX-1
 CPL: 4254
 DATE: 17-Apr-14

Air System¹

Intake Manifold Pressure	kPa [in Hg]	160 [47]
Intake Air Flow	l/sec [cfm]	289 [613]
Heat Rejection to Ambient	kW [Btu/min]	16 [914.6955]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	588 [1,245]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	368 [693]
Exhaust Gas Temperature (Manifold)	°C [°F]	532 [989]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw-hr [g/hp-hr]	4.90 [3.65]
HC (Hydrocarbons)	g/kw-hr [g/hp-hr]	0.20 [0.15]
CO (Carbon Monoxide)	g/kw-hr [g/hp-hr]	0.87 [0.65]
PM (Particulate Matter)	g/kw-hr [g/hp-hr]	0.04 [0.03]
CO ₂ (Carbon dioxide)	g/kw-hr [g/hp-hr]	680.00 [507.08]

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]

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 ³	kW [Btu/min]	N/A [N.A.]

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N/A = Not Applicable

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- ⁴ Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.

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

Basic Engine Model
QSL
 Engine Configuration
D563023MX03

Curve Number:
M-94507
 CPL Code:
4254
 Date:
30-May-14

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 Corr**

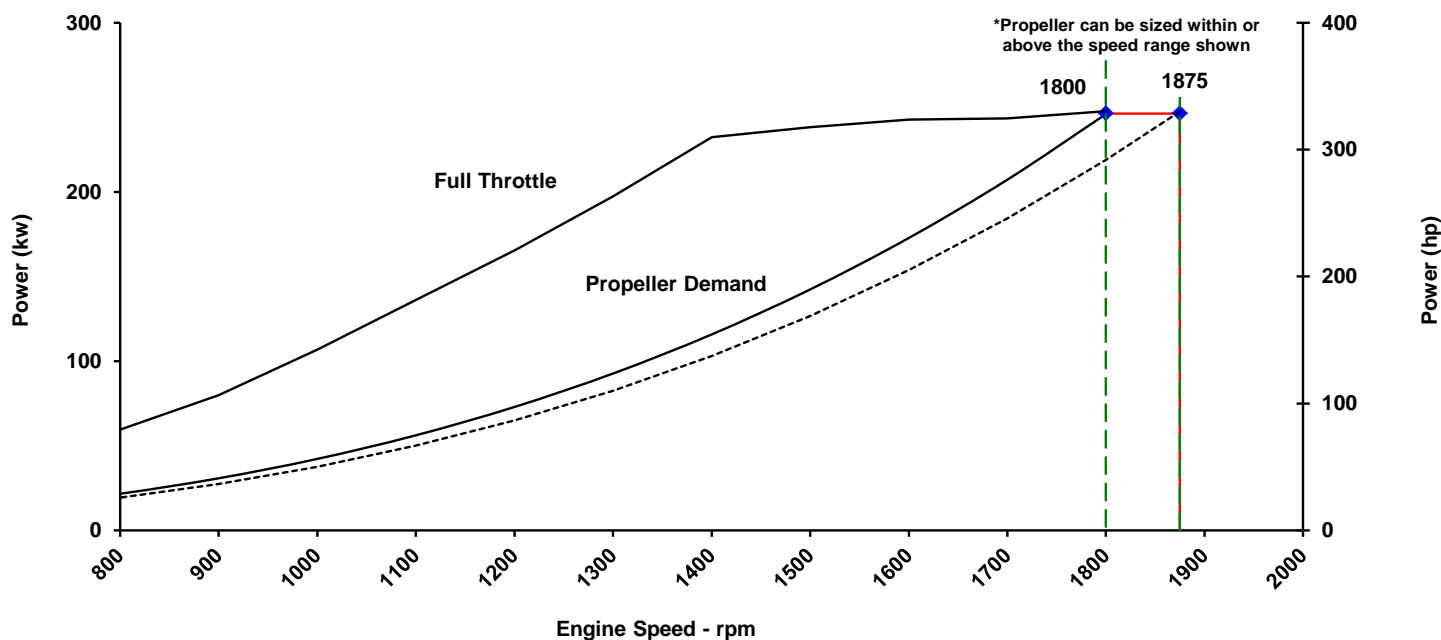
Rated Power: **246 Kw [330 bhp, 335 mhp]**
 Rated Speed: **1800 rpm**
 Rating Type: **Heavy Duty**
 Aspiration: **Turbocharged / Sea Water Aftercooled**

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)

EU Stage IIIa - EC Nonroad Mobile Machinery Directive (2004/26/EC)

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)		
1875	246	(330)	1255	(925)	246	(330.0)	1305	(962.9)	63.2	(16.7)
1800	246	(330)	1307	(964)	246	(330.0)	1305	(962.9)	63.2	(16.7)
1700	242	(325)	1360	(1003)	207	(278.0)	1164	(858.9)	53.2	(14.0)
1600	242	(324)	1441	(1063)	173	(231.8)	1031	(760.8)	43.7	(11.5)
1500	237	(318)	1509	(1113)	142	(191.0)	907	(668.7)	36.3	(9.6)
1400	231	(310)	1576	(1162)	116	(155.3)	790	(582.5)	29.8	(7.9)
1300	196	(263)	1442	(1064)	93	(124.3)	681	(502.2)	24.1	(6.4)
1200	164	(221)	1309	(965)	73	(97.8)	580	(427.9)	19.6	(5.2)
1100	135	(182)	1175	(867)	56	(75.3)	488	(359.6)	14.6	(3.9)
1000	106	(143)	1015	(749)	42	(56.6)	403	(297.2)	11.1	(2.9)
900	79	(106)	842	(621)	31	(41.3)	326	(240.7)	8.2	(2.2)
800	59	(80)	708	(522)	22	(29.0)	258	(190.2)	6.0	(1.6)
700	45	(60)	610	(450)	14	(19.4)	197	(145.6)	4.4	(1.2)
600	33	(44)	520	(384)	9	(12.2)	145	(107.0)	3.0	(0.8)

*** 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].

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.

[Signature]
 CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-94507
 DS: D56-MX-1
 CPL: 4254
 DATE: 30-May-14

General Engine Data

Engine Model	QSL
Rating Type	Heavy Duty
Rated Engine Power	246 [330]
Rated Engine Speed	1800
Rated Power Production Tolerance	±5%
Rated Engine Torque	1305 [963]
Peak Engine Torque @ 1400 rpm.....	1575 [1162]
Brake Mean Effective Pressure	1847 [268]
Indicated Mean Effective Pressure.....	2116 [307]
Maximum Allowable Engine Speed	1900

Maximum Continuous Torque Capacity from Front of Crank Specifications

Maximum Torque Capacity from Front of Crank ²	705 [520]
Compression Ratio	16.6:1
Piston Speed	8.7 [1713]
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	1875
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	±rpm	10
High Idle Speed Range Minimum	rpm	1875
High Idle Speed Range Maximum	rpm	1895

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 System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	43.6 [11.5]
Avg. Fuel Consumption - ISO 8178 E5 Standard Test Cycle	l/hr [gal/hr]	0.0 [0.0]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	63.1 [16.7]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	113.6 [30.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	50.4 [13.3]
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

- 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-94507
 DS: D56-MX-1
 CPL: 4254
 DATE: 30-May-14

Air System¹

Intake Manifold Pressure	kPa [in Hg]	168 [50]
Intake Air Flow	l/sec [cfm]	299 [634]
Heat Rejection to Ambient	kW [Btu/min]	19 [1081.2325]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	670 [1,420]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	433 [810]
Exhaust Gas Temperature (Manifold)	°C [°F]	607 [1,123]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw-hr [g/hp-hr]	5.03 [3.75]
HC (Hydrocarbons)	g/kw-hr [g/hp-hr]	0.20 [0.15]
CO (Carbon Monoxide)	g/kw-hr [g/hp-hr]	0.97 [0.72]
PM (Particulate Matter)	g/kw-hr [g/hp-hr]	0.04 [0.03]
CO ₂ (Carbon dioxide)	g/kw-hr [g/hp-hr]	683.00 [509.31]

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]

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 ³	kW [Btu/min]	N/A [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.
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CUMMINS INC.
 Charleston, SC 29405
 Marine Performance Curves
<https://gce.cummins.com/>

Basic Engine Model QSL8.9	Curve Number: M-94505	
Engine Configuration D563023MX03	CPL Code: 4254	Date: 14-Feb-18

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**

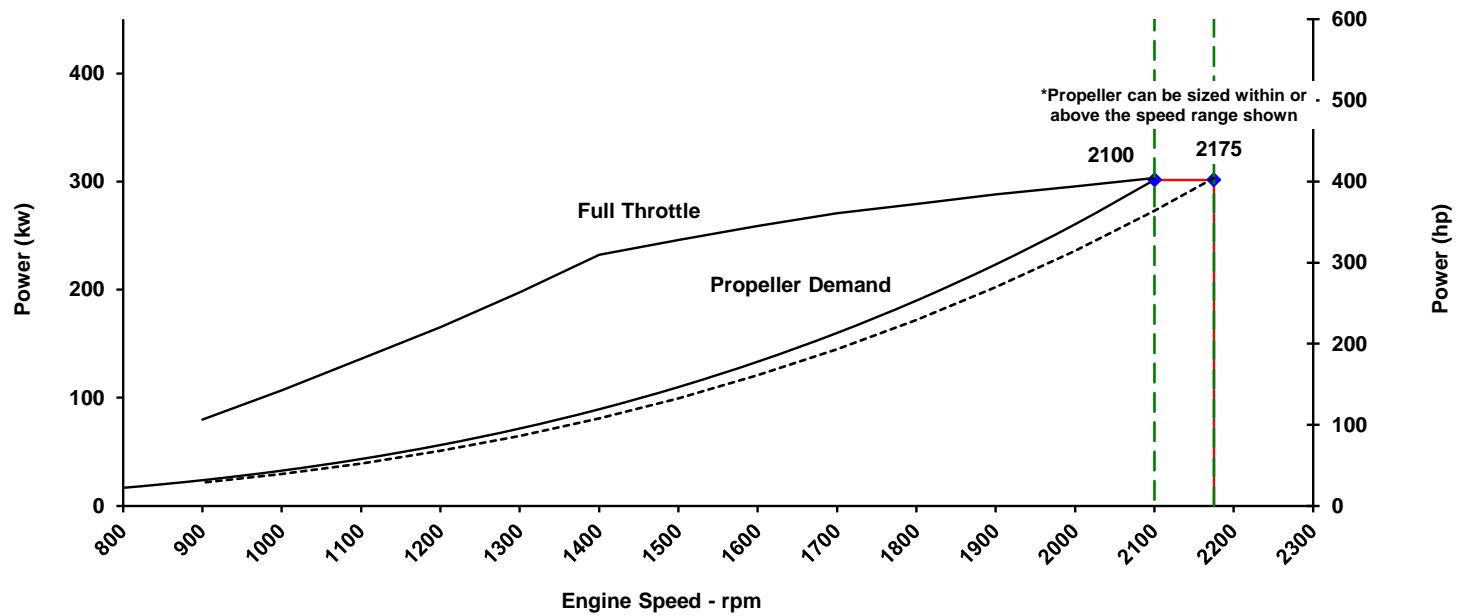
Rated Power: **302 kw [404 bhp, 410 mhp]**
 Rated Speed: **2100 rpm**
 Rating Type: **High Output**
 Aspiration: **Turbocharged / Sea Water Aftercooled**

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 infrequent use in variable load applications with a power factor of 10-30%. Full power is limited to one out of every eight hours of operation. Reduced power operation must be at or below 80% load.

TECHNICAL DATA DEPT.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. M-94505
 DS: D56-MX-1
 CPL: 4254
 DATE: 14-Feb-18

General Engine Data

Engine Model	QSL8.9
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 ²	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.....		2175
Minimum Idle Speed Setting		600
Normal Idle Speed Variation		±10
High Idle Speed Range Minimum		2175
High Idle Speed Range Maximum		2195

Noise and Vibration

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

Fuel System¹

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

TBD= To Be Determined

N/A = Not Applicable

N.A. = Not Available

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- 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.
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- ⁴ Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.

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 COLUMBUS, INDIANA

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<https://gce.cummins.com/>

Propulsion Marine Engine Performance Data

Curve No. M-94505
 DS: D56-MX-1
 CPL: 4254
 DATE: 14-Feb-18

Air System¹

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 System¹

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 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]

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 ³	kW [Btu/min]	N/A [N.A.]

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- ⁴ Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.

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

Basic Engine Model
QSL8.9
 Engine Configuration
D563023MX03

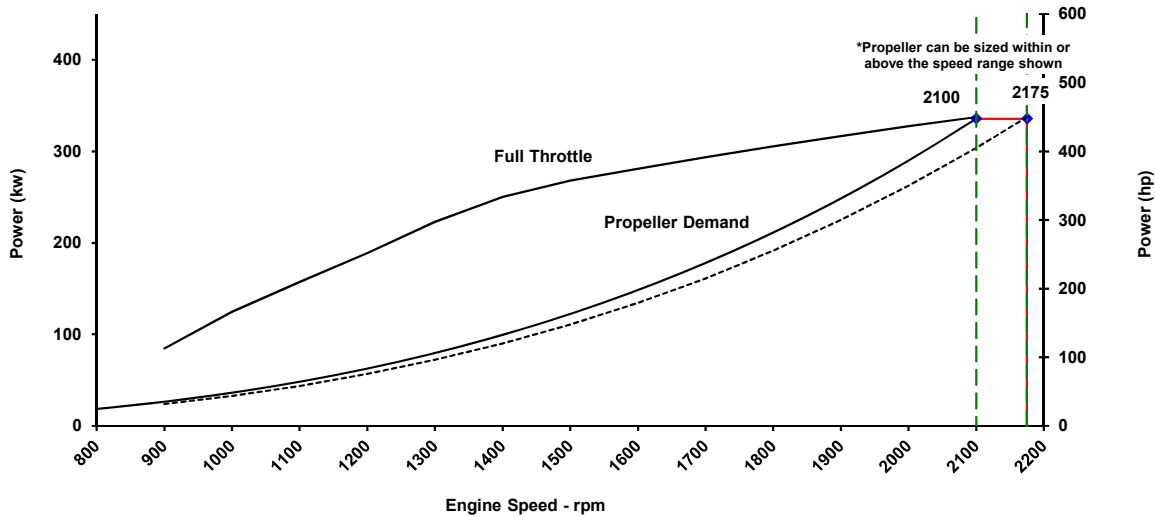
Curve Number:
M-96486
 CPL Code: 4254 Date:
29-Mar-19

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: **336 kw [450 bhp, 456.3 mhp]**
 Rated Speed: **2100 rpm**
 Rating Type: **Medium Continuous Duty**
 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



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)
2175	336	(450)	1473	(1087)	336	(450.0)	1526	(1,125.4)	86.2	(22.8)
2100	336	(450)	1526	(1125)	290	(388.7)	1384	(1,020.8)	75.0	(19.8)
2000	326	(437)	1555	(1147)	249	(333.3)	1249	(921.3)	64.9	(17.1)
1900	315	(422)	1611	(1188)	211	(283.4)	1121	(826.8)	54.7	(14.5)
1800	304	(407)	1640	(1210)	178	(238.7)	1000	(737.5)	46.8	(12.4)
1700	292	(392)	1668	(1230)	148	(199.0)	886	(653.3)	40.2	(10.6)
1600	279	(375)	1696	(1251)	122	(164.0)	778	(574.2)	33.7	(8.9)
1500	266	(357)	1696	(1251)	99	(133.3)	678	(500.2)	28.1	(7.4)
1400	249	(333)	1628	(1201)	80	(106.8)	585	(431.3)	23.7	(6.3)
1300	222	(297)	1493	(1101)	63	(84.0)	498	(367.5)	19.1	(5.0)
1200	188	(252)	1357	(1001)	48	(64.7)	419	(308.8)	15.0	(4.0)
1100	156	(210)	1182	(872)	36	(48.6)	346	(255.2)	12.0	(3.2)
1000	124	(166)	893	(659)	26	(35.4)	280	(206.7)	9.1	(2.4)
900	84	(113)	791	(584)	19	(24.9)	221	(163.3)	6.7	(1.8)
800	66	(89)	688	(508)	12	(16.7)	170	(125.0)	5.0	(1.3)
700	50	(68)	613	(452)	8	(10.5)	125	(91.9)	3.5	(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].

Medium Continuous (MCD): Intended for continuous use in variable load applications with a power factor of 40-60%. Full power is limited to six out of every 12 hours of operation. Reduced power operation must be at or below 80% load.

TECHNICAL DATA DEPT.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. **M-96486**
 DS: **D56-MX-1**
 CPL: **4254**
 DATE: **29-Mar-19**

General Engine Data

Engine Model	QSL8.9
Rating Type	Medium Continuous Duty
Rated Engine Power	336 [450]
Rated Engine Speed	2100
Rated Power Production Tolerance	5
Rated Engine Torque	1526 [1125]
Peak Engine Torque @ 1400 rpm.....	1696 [1251]
Brake Mean Effective Pressure	2159 [313]
Indicated Mean Effective Pressure.....	2428 [352]
Maximum Allowable Engine Speed	2200

Maximum Continuous Torque Capacity from Front of Crank Specifications

Maximum Torque Capacity from Front of Crank ²	1539 [1135]
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)..	84
	(Rated)	96
Average Noise Level - Right Side	(Idle)..	84
	(Rated)	96
Average Noise Level - Left Side	(Idle)..	84
	(Rated)	96
Average Noise Level - Front	(Idle)..	84
	(Rated)	96

Fuel System¹

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	58.9 [15.5]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	86.9 [23.0]
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]	42.7 [11.3]
Approximate Fuel Return to Tank Temperature	°C [°F]	61.7 [143]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	0.4 [25]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	1151 [167]

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Propulsion Marine Engine Performance Data

Curve No. **M-96486**
 DS: **D56-MX-1**
 CPL: **4254**
 DATE: **29-Mar-19**

Air System¹

Intake Manifold Pressure	kPa [in Hg]	196 [58]
Intake Air Flow	l/sec [cfm]	387 [821]
Heat Rejection to Ambient	kW [Btu/min]	26 [1488.325]

Exhaust System¹

Exhaust Gas Flow	l/sec [cfm]	902 [1,911]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	461 [862]
Exhaust Gas Temperature (Manifold)	°C [°F]	661 [1,221]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen)	g/kw-hr [g/hp-hr]	5.04 [3.75]
HC (Hydrocarbons)	g/kw-hr [g/hp-hr]	0.11 [0.08]
CO (Carbon Monoxide)	g/kw-hr [g/hp-hr]	0.31 [0.23]
PM (Particulate Matter)	g/kw-hr [g/hp-hr]	0.03 [0.02]

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]

Engines without Low Temperature Aftercooling (LTA)

Sea Water Aftercooled Engine (SWAC)

Coolant Flow to Engine Heat Exchanger	l/min [gal/min]	318 [84]
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 ³	kW [Btu/min]	227 [12900]

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