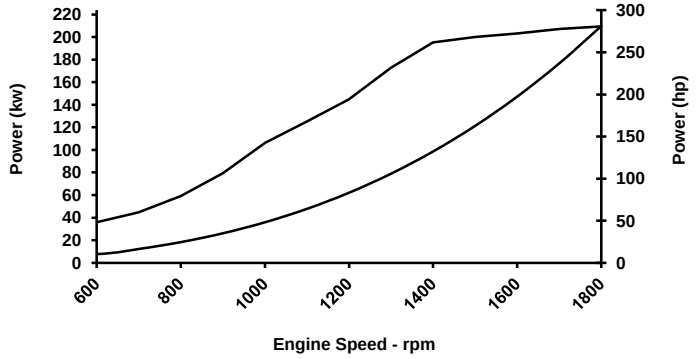
Cummins Inc. Columbus, IN 47201 Marine Performance Curves marine.cummins.com	Basic Engine Model **QSL9-285 CON**	Curve Number: **M-91392**	
	Engine Configuration **D563005MX03**	CPL Code: **8419**	Date: **14-Dec-12**

Displacement:	**8.9 liter**	**[542 in^3]**	Rated Power:	**210 kw**	**[281 bhp, 285 mhp]**
Bore:	**114 mm**	**[4.49 in]**	Rated Speed:	**209 [281, 285] @ 1800**	
Stroke:	**145 mm**	**[5.71 in]**	Rating Type:	**Continuous Duty**	
Fuel System:	**HPCR**		Aspiration:	**Turbocharged / Aftercooled**	
Cylinders:	**6**				

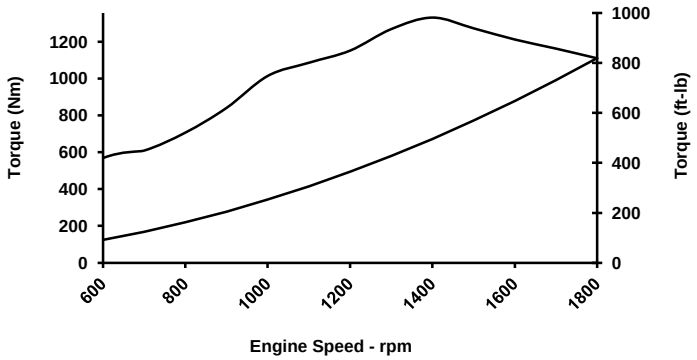
CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:

EPA Tier 2 - Model year requirements of the EPA marine regulation (40CFR94)
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



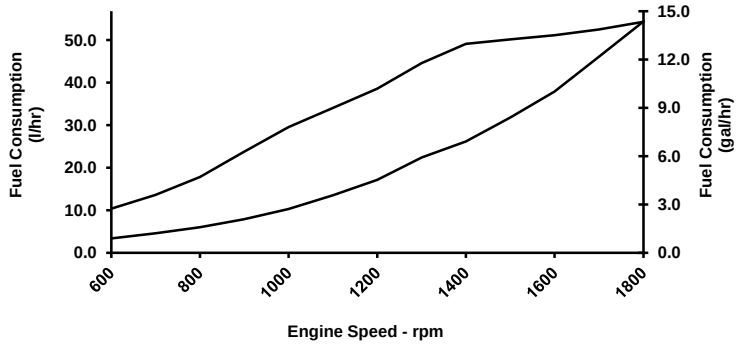
RATED POWER OUTPUT CURVE

rpm	kw	bhp
1800	210	281
1600	203	273
1400	195	262
1300	173	232
1100	125	168
1000	106	143
900	79	106
800	59	80
700	45	60
600	36	48



FULL LOAD TORQUE CURVE

rpm	N-m	ft-lb
1800	1111	820
1600	1213	895
1400	1332	983
1300	1270	937
1100	1087	802
1000	1015	749
900	842	621
800	708	522
700	610	450
600	569	420



FUEL CONSUMPTION - PROP CURVE

rpm	l/hr	gal/hr
1800	54.3	14.4
1600	37.9	10.0
1400	26.2	6.9
1300	22.4	5.9
1100	13.5	3.6
1000	10.3	2.7
900	7.9	2.1
800	6.0	1.6
700	4.6	1.2
600	3.4	0.9

Rated Conditions: Ratings are based upon ISO 15550 reference conditions; air pressure of 100 kPa [29.612 in Hg], air temperature 25 deg. C [77 deg. F] and 30% relative humidity. Power is in accordance with IMCI procedure. Member NMMA. Unless otherwise specified, all data is at rated power conditions and can vary ± 5%.

Rated Curves (upper) represents rated power at the crankshaft for mature gross engine performance capabilities obtained and corrected in accordance with ISO 15550. Propeller Curve (lower) is based on a typical fixed propeller demand curve using a 3.0 exponent. 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. F0 having LHV of 42,780 kj/kg [18390 Btu/lb] and weighing 838.9 g/liter [7.001 lb/U.S. gal].

Continuous Duty (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. **CHIEF ENGINEER**

Propulsion Marine Engine Performance Data

Curve No. M-91392
DS: 3038
CPL: 8419
DATE: 14-Dec-12

General Engine Data

Engine Model		QSL9-285 CON
Rating Type		Continuous Duty
Rated Engine Power	kW [hp]	210 [281]
Rated Engine Speed	rpm	1800
Rated Power Production Tolerance	±%	5
Rated Engine Torque	N·m [lb·ft]	1112 [820]
Peak Engine Torque @ 1400 rpm	N·m [lb·ft]	1333 [983]
Brake Mean Effective Pressure	kPa [psi]	1573 [228]
Indicated Mean Effective Pressure	kPa [psi]	1764 [256]
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	rpm	10
High Idle Speed Range Minimum	rpm	1865
Maximum	rpm	1885
Maximum Allowable Engine Speed	rpm	1885
Maximum Torque Capacity from Front of Crank[2]	N·m [lb·ft]	705 [520]
Compression Ratio		16.6:1
Piston Speed	m/sec [ft/min]	8.7 [1713]
Firing Order		1-5-3-6-2-4
Weight (Dry) - Engine Only - Average	kg [lb]	901 [1987]
Weight (Dry) - Engine With Heat Exchanger System - Average	kg [lb]	977 [2153]

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[1]

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	36.9 [9.8]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	54.3 [14.4]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	92.4 [24.4]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	38.0 [10.0]
Approximate Fuel Return to Tank Temperature	°C [°F]	85.1 [185]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	0.9 [50]
Fuel Transfer Pump Pressure Range	kPa [psi]	N/A
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	N/A
INSITE Reading	kPa [psi]	119996 [17404]

Air System[1]

Intake Manifold Pressure	kPa [in Hg]	144 [43]
Intake Air Flow	l/sec [cfm]	278 [588]
Heat Rejection to Ambient	kW [Btu/min]	54 [3050]

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.**

CUMMIN INC.

COLUMBUS, INDIANA

Propulsion Marine Engine Performance Data

Curve No. M-91392
DS: 3038
CPL: 8419
DATE: 14-Dec-12

Exhaust System[1]	
Exhaust Gas Flow ……l/sec [cfm]	570 [1208]
Exhaust Gas Temperature (Turbine Out) ……°C [°F]	378 [712]
Exhaust Gas Temperature (Manifold) ……°C [°F]	495 [922]
Emissions (in accordance with ISO 8178 Cycle E3)	
NOx (Oxides of Nitrogen) ……g/kw·hr [g/hp·hr]	6.360 [4.743]
HC (Hydrocarbons) ……g/kw·hr [g/hp·hr]	0.084 [0.063]
CO (Carbon Monoxide) ……g/kw·hr [g/hp·hr]	0.658 [0.491]
PM (Particulate Matter) ……g/kw·hr [g/hp·hr]	0.097 [0.072]
Cooling System[1]	
Sea Water After Cooled Engine	
Sea Water Pump Specifications ……MAB 0.08.17-07/16/2001	
Pressure Cap Rating……kPa [psi]	103 [15]
Thermostat Operating Range (Start to Open)……°C [°F]	71 [160]
Thermostat Operating Range(Full Open)……°C [°F]	81 [178]
Engines with Single Loop Keel Cooling	
Coolant Flow to Keel Cooler (with blocked open thermostat)……l/min [gal/min]	152 [40]
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]	183 [10397]
Maximum Coolant Inlet Temperature from LTA Cooler……°C [°F]	54 [130]

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.**