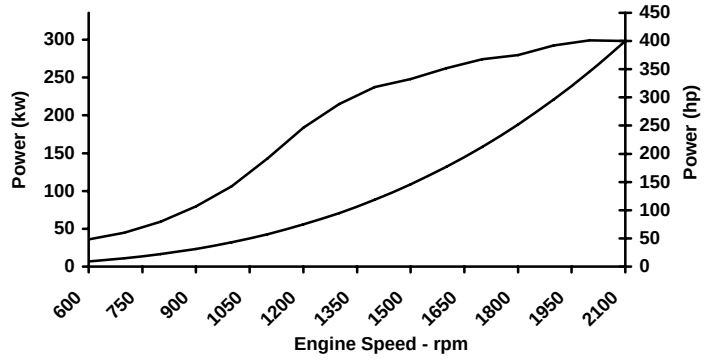
CUMMINS MERCRUISER DIESEL Charleston, SC 29405 Marine Performance Curves	Basic Engine Model QSL9-405 HO	Curve Number: M-91396	
	Engine Configuration D563005MX03	CPL Code: 8419	Date: 26-Mar-09

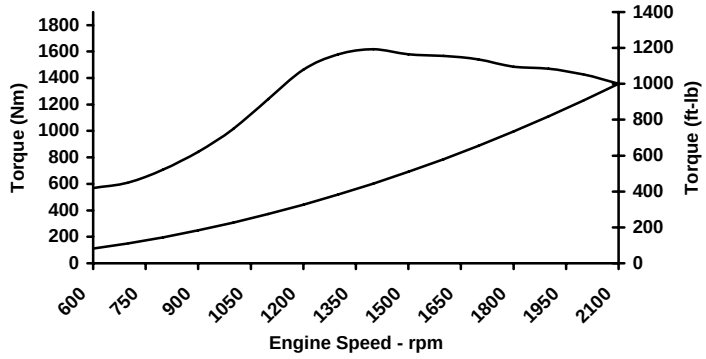
Displacement:	**8.9 liter**	**[542 in^3]**	kW [bhp, mhp] @ rpm	
Bore:	**114 mm**	**[4.49 in]**	Advertised Power:	**298 [400, 405] @ 2100**
Stroke:	**145 mm**	**[5.71 in]**		
Fuel System:	**HPCR**		Aspiration:	**Turbocharged / Aftercooled**
Cylinders:	**6**		Rating Type:	**High Output**

CERTIFIED: This marine diesel engine is certified to the model year requirements of EPA Marine Tier 2 per 40 CFR 94 and conforms with the NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13 as applicable.



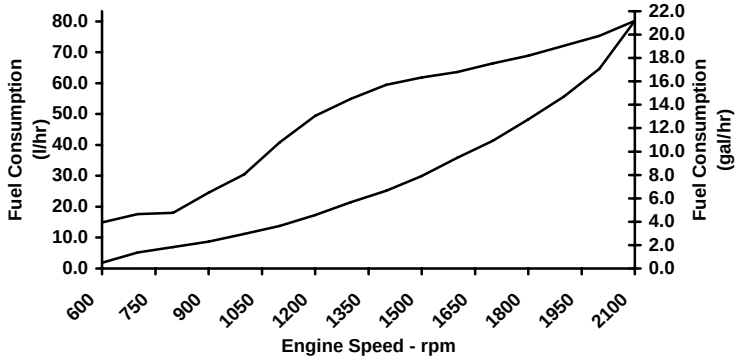
RATED POWER OUTPUT CURVE

rpm	kw	bhp
2100	298	400
1900	293	392
1700	274	368
1600	262	352
1400	237	318
1300	215	288
1200	184	247
1100	143	192
1000	106	143
800	59	80
600	45	60



FULL LOAD TORQUE CURVE

rpm	N-m	ft-lb
2100	1356	1000
1900	1470	1084
1700	1540	1136
1600	1566	1155
1400	1619	1194
1300	1578	1164
1200	1463	1079
1100	1241	915
1000	1015	749
800	708	522
600	569	420



FUEL CONSUMPTION - PROP CURVE

rpm	l/hr	gal/hr
2100	80.2	21.2
1900	55.6	14.7
1700	41.4	10.9
1600	35.9	9.5
1400	25.1	6.6
1300	21.4	5.7
1200	17.3	4.6
1100	13.8	3.6
1000	11.1	2.9
800	6.9	1.8
600	1.9	0.5

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 humidy. 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 2.7 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. 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 (1) hour out of every eight (8) 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.

James D Kahlenberg

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No. **M-91396**
DS : **4960**
CPL : **8419**
DATE: **26-Mar-09**

General Engine Data

Engine Model		QSL9-405 HO
Rating Type		High Output
Rated Engine Power	kW [hp]	298 [400]
Rated Engine Speed	rpm	2100
Rated Power Production Tolerance	±%	5
Rated Engine Torque	N·m [lb·ft]	1356 [1000]
Peak Engine Torque @ 1400 rpm	N·m [lb·ft]	1619 [1194]
Brake Mean Effective Pressure	kPa [psi]	1919 [278]
Indicated Mean Effective Pressure	kPa [psi]	214 [31]
Minimum Idle Speed Setting	rpm	600
Normal Idle Speed Variation	rpm	10
High Idle Speed Range Minimum	rpm	2165
Maximum	rpm	2185
Maximum Allowable Engine Speed	rpm	2185
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]	10.2 [1998]
Firing Order		1-5-3-6-2-4
Weight (Dry) - Engine Only - Average	kg [lb]	N.A. [N.A.]
Weight (Dry) - Engine With Heat Exchanger System - Average	kg [lb]	977 [2153]
Weight Tolerance (Dry) Engine Only	3xStd Dev(±%)	N.A.

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]	53.0 [14.0]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	80.2 [21.2]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	117.3 [31.0]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	37.2 [9.8]
Approximate Fuel Return to Tank Temperature	°C [°F]	85.1 [185]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	0.9 [49]
Fuel Transfer Pump Pressure Range	kPa [psi]	517.1 [75]
Fuel Pressure - Pump Out/Rail . Mechanical Gauge	kPa [psi]	N/A [N/A]
INSITE Reading	kPa [psi]	139998 [20305]

Air System[1]

Intake Manifold Pressure	kPa [in Hg]	177 [52]
Intake Air Flow	l/sec [cfm]	363 [769]
Heat Rejection to Ambient	kW [Btu/min]	79 [4500]

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.**

CUMMINS ENGINE COMPANY, INC

COLUMBUS, INDIANA

Propulsion Marine Engine Performance Data

Curve No.	**M-91396**
DS :	**4960**
CPL :	**8419**
DATE:	**26-Mar-09**

Exhaust System[1]

Exhaust Gas Flow ……l/sec [cfm]	831 [1760]
Exhaust Gas Temperature (Turbine Out) ….°C [°F]	449 [839]
Exhaust Gas Temperature (Manifold) ….°C [°F]	623 [1152]

Emissions (in accordance with ISO 8178 Cycle E3)

NOx (Oxides of Nitrogen) ……g/kw·hr [g/hp·hr]	6.36 [4.74]
HC (Hydrocarbons) ……g/kw·hr [g/hp·hr]	0.09 [0.07]
CO (Carbon Monoxide) ..…g/kw·hr [g/hp·hr]	0.58 [0.43]
PM (Particulate Matter) ….g/kw·hr [g/hp·hr]	0.10 [0.07]

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]	178 [47]
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]	264 [15000]
Maximum Coolant Inlet Temperature from LTA Cooler……°C [°F]	54 [130]

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