CUMMINS INC. Columbus, IN 47201	Basic Engine Model	Curve Number:	
Marine Performance Curves	QSK50-M Tier 2	M-6594	
	Engine Configuration	CPL Code:	Date:
	D283041MX03	CPL 1158	17-Mar-09

Displacement:	**50.0 liter**	**[3051 in³]**	Rated Power:	**1342 kw**	**[1800 bhp]**
Bore:	**159 mm**	**[6.25 in]**	Rated Speed:	**1900 rpm**	
Stroke:	**159 mm**	**[6.25 in]**	Rating Type:	**Heavy Duty**	
Fuel System:	**MCRS**		Aspiration:	**Turbocharged / Low Temperature Aftercooled**	
Cylinders:	**16**				

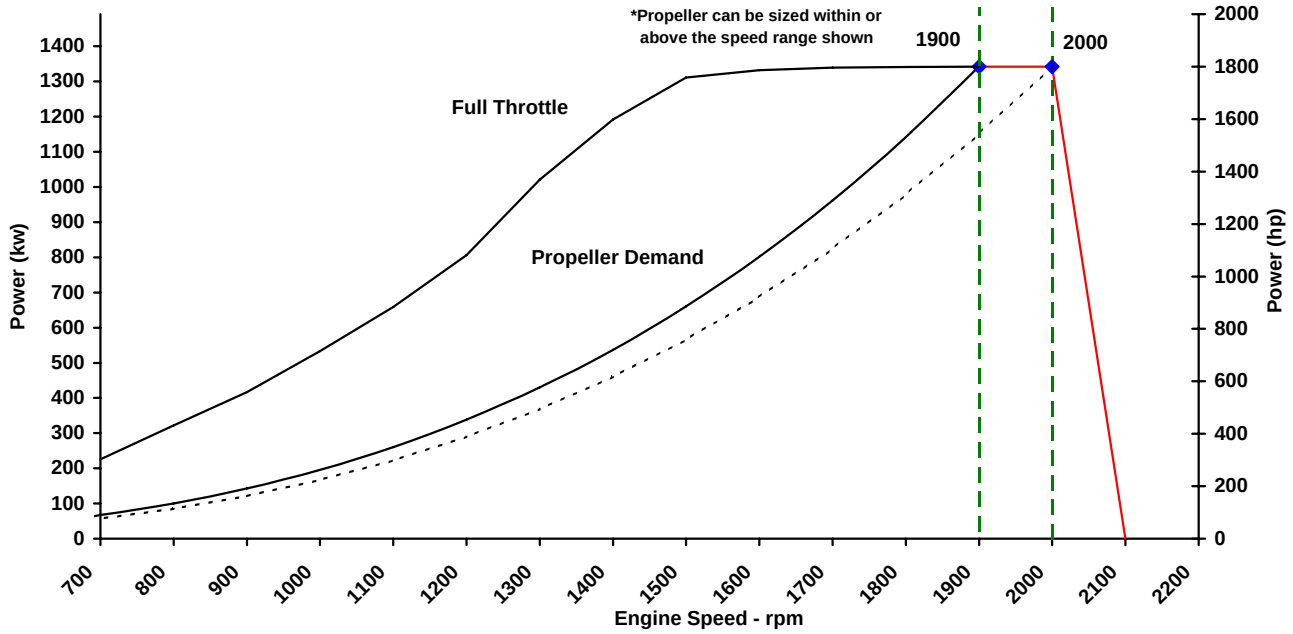
CERTIFIED: This diesel engine complies with or is certified to the following agencies requirements:

IMO - NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13

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

Rhine Ships Inspection Regulations as adopted by the Central Commision for Rhine navigation (CCNR)

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



Speed	Full Throttle- Power		Full Throttle- Torque		Fuel Cons.- Prop. Curve 3.0 Exp.	
rpm	kw	(hp)	N·m	(ft-lb)	L/hr	(gal/hr)
2000	1342	(1800)	6747	(4976)		
1900	1342	(1800)	6747	(4976)	363.1	(95.9)
1800	1342	(1799)	7116	(5248)	305.4	(80.7)
1700	1340	(1796)	7521	(5548)	259.7	(68.6)
1600	1333	(1787)	7952	(5865)	221.6	(58.6)
1500	1311	(1758)	8345	(6155)	189.3	(50.0)
1400	1192	(1598)	8129	(5996)	156.4	(41.3)
1300	1022	(1370)	7501	(5533)	128.0	(33.8)
1200	807	(1081)	6415	(4732)	103.1	(27.2)
1100	659	(883)	5715	(4215)	81.7	(21.6)
1000	533	(715)	5089	(3753)	61.9	(16.3)
900	417	(559)	4426	(3264)	47.0	(12.4)
800	322	(432)	3843	(2835)	34.7	(9.2)
700	226	(303)	3084	(2275)	24.3	(6.4)

* 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 draggers, 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 humidy. Power is in accordance with IMCI procedure. Member NMMA. Unless otherwise specified, all data is at rated power conditions and can vary ± 5%.

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.

CHIEF ENGINEER

Propulsion Marine Engine Performance Data

Curve No.	**M-6594**
DS :	**D28-MX-1**
CPL :	**CPL 1158**
DATE:	**17-Mar-09**

General Engine Data

Engine Model		QSK50-M Tier 2
Rating Type		Heavy Duty
Rated Engine Power	kW [hp]	1342 [1800]
Rated Engine Speed	rpm	1900
Rated Power Production Tolerance	±%	3
Rated Engine Torque	N·m [lb·ft]	6746 [4976]
Peak Engine Torque @ 1500 rpm	N·m [lb·ft]	8345 [6155]
Brake Mean Effective Pressure	kPa [psi]	1695 [246]
Indicated Mean Effective Pressure	kPa [psi]	N.A. [N.A.]
Maximum Allowable Engine Speed	rpm	2375
Maximum Torque Capacity from Front of Crank[2]	N·m [lb·ft]	2998 [2211]
Compression Ratio		15:1
Piston Speed	m/sec [ft/min]	10.1 [1979]
Firing Order		2-1-6-5-4-3-10-7-16-15-12-11-14-13-8-9
Weight (Dry) - Engine Only - Average	kg [lb]	6615 [14584]
Weight (Dry) - Engine With Heat Exchanger System - Average	kg [lb]	6946 [15313]
Weight Tolerance (Dry) Engine Only	3xStd Dev(±%)	6.9

Governor Settings

Default Droop Value	Refer to MAB 2.04.00-03/23/2006 for Droop explanation	5%
Minimum Droop Allowed		0%
Maximum Droop Allowed		16%
High Speed Governor Break Point	rpm	2000
Minimum Idle Speed Setting	rpm	650
Normal Idle Speed Variation	±rpm	10
High Idle Speed Range Minimum	rpm	2000
Maximum	rpm	2100

Noise and Vibration

Average Noise Level - Top	(Idle)	dBA @ 1m	TBD
	(Rated)	dBA @ 1m	TBD
Average Noise Level - Right Side	(Idle)	dBA @ 1m	TBD
	(Rated)	dBA @ 1m	TBD
Average Noise Level - Left Side	(Idle)	dBA @ 1m	TBD
	(Rated)	dBA @ 1m	TBD
Average Noise Level - Front	(Idle)	dBA @ 1m	TBD
	(Rated)	dBA @ 1m	TBD

Fuel System[1]

Avg. Fuel Consumption - ISO 8178 E3 Standard Test Cycle	l/hr [gal/hr]	252.1 [68.1]
Fuel Consumption at Rated Speed	l/hr [gal/hr]	363.1 [95.9]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	762.0 [201.3]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60.0 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	398.9 [105.4]
Approximate Fuel Return to Tank Temperature	°C [°F]	53.3 [128]
Maximum Heat Rejection to Drain Fuel	kW [Btu/min]	2.7 [154]
Fuel Pressure - Pump Out/Rail . INSITE Reading	kPa [psi]	140044 [20,312]

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-6594**
DS :	**D28-MX-1**
CPL :	**CPL 1158**
DATE:	**17-Mar-09**

Air System[1]		
Intake Manifold Pressure	kPa [in Hg]	262 [77]
Intake Air Flow	l/sec [cfm]	2263 [4796]
Heat Rejection to Ambient	kW [Btu/min]	52 [2974]
Exhaust System[1]		
Exhaust Gas Flow	l/sec [cfm]	4187 [8,872]
Exhaust Gas Temperature (Turbine Out)	°C [°F]	334 [633]
Exhaust Gas Temperature (Manifold)	°C [°F]	517 [963]
Emissions (in accordance with ISO 8178 Cycle E3)		
NOx (Oxides of Nitrogen)	g/kw·hr [g/hp·hr]	6.54 [4.88]
HC (Hydrocarbons)	g/kw·hr [g/hp·hr]	0.18 [0.14]
CO (Carbon Monoxide)	g/kw·hr [g/hp·hr]	0.70 [0.52]
PM (Particulate Matter)	g/kw·hr [g/hp·hr]	0.08 [0.06]
Cooling System[1]		
Sea Water Pump Specifications	MAB 0.08.17-07/16/2001	
Pressure Cap Rating (With Heat Exchanger Option)	kPa [psi]	103 [15]
Engines with Low Temperature Aftercooling (LTA)		
Two Loop LTA (For both 1 & 2 pump systems)		
Main Engine Circuit		
Coolant Flow to Main Cooler (with blocked open thermostat)	l/min [gal/min]	2324 [614]
Standard Thermostat Operating Range — Start to open	°C [°F]	82 [180]
Standard Thermostat Operating Range — Full open	°C [°F]	95 [202]
Heat Rejection to Engine Coolant[3]	kW [Btu/min]	721 [41067]
Aftercooler (LTA) Circuit		
Coolant Flow to LTA Cooler (with blocked open thermostat)	l/min [gal/min]	632 [167]
LTA Thermostat Operating Range — Start to open	°C [°F]	46 [115]
LTA Thermostat Operating Range — Full open	°C [°F]	57 [135]
Heat Rejection to Engine Coolant[3]	kW [Btu/min]	385 [21892]
Maximum Coolant Inlet Temperature from LTA Cooler	°C [°F]	49 [120]

TBD= To Be Determined **N/A = Not Applicable** **N.A. = Not Available**

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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.**

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