



**CUMMINS MERCURISER DIESEL**  
**Charleston, SC 29405**  
**Marine Performance Curves**

Basic Engine Model:  
**4.2L ES 320**

Curve Number:  
**BC 9119**

Engine Configuration:  
**D913001MX03**

**Sterndrive**

Date:  
**15-Oct-04**

Displacement: **4.2 liter** [254 in<sup>3</sup>]  
 Bore: **94 mm** [3.7 in]  
 Stroke: **100 mm** [3.94 in]  
 Fuel System: **Bosch VP37**  
 Cylinders: **6**

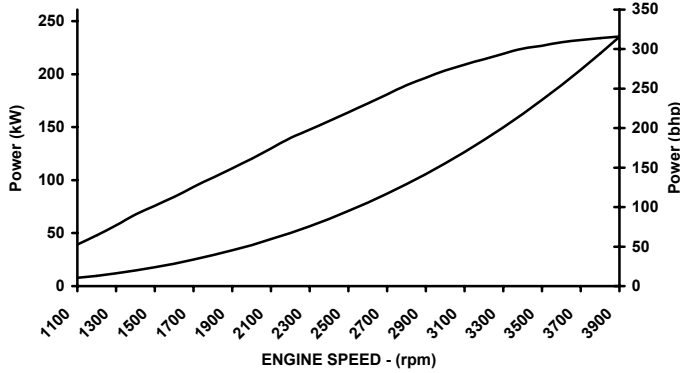
Advertised Power: **236 [316, 320] @ 3900**  
 kW [bhp, mhp] @ rpm

Aspiration: **Turbocharged / Sea Water Aftercooled**  
 Rating Type: **High Output**

CERTIFIED: This marine diesel engine conforms with the NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13 as applicable.

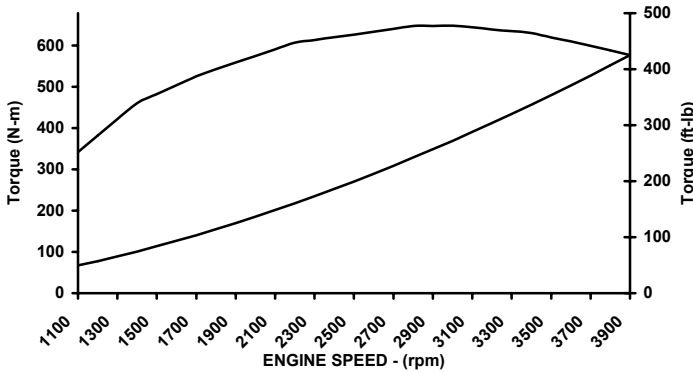
**Preliminary**

**RATED POWER OUTPUT CURVE**



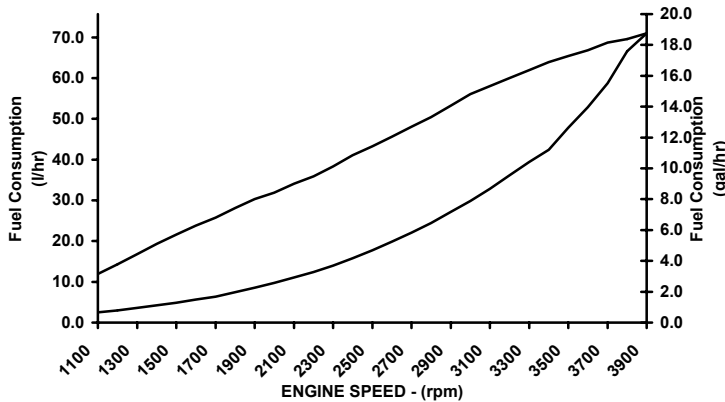
rpm	kW	bhp
3900	236	316
3600	230	308
3400	224	301
3200	214	287
3000	203	273
2800	190	254
2600	172	231
2400	156	209
2200	140	187
2000	120	161
1800	102	137
1500	76	102
1000	32	42

**FULL LOAD TORQUE CURVE**



rpm	N-m	ft-lb
3900	576	425
3600	610	450
3400	629	464
3200	639	471
3000	647	478
2800	647	477
2600	633	467
2400	619	457
2200	606	447
2000	574	424
1800	542	400
1500	482	356
1000	302	223

**FUEL CONSUMPTION - PROP CURVE**



rpm	l/hr	gal/hr
3900	71.0	18.8
3600	52.8	14.0
3400	42.4	11.2
3200	36.1	9.5
3000	29.9	7.9
2800	24.4	6.4
2600	19.8	5.2
2400	15.8	4.2
2200	12.4	3.3
2000	9.7	2.6
1800	7.5	2.0
1500	4.9	1.3
1000	2.1	0.6

Rated Conditions: Ratings are based upon ISO 8665 and SAE J1228 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.

Rated Curves (upper) represents rated power at the crankshaft for mature gross engine performance capabilities obtained and corrected in accordance with ISO 3046. 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 Rating:** This Rating is 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 operations must be at or below 200 RPM of the maximum rated RPM. This rating is for pleasure/non-revenue generating applications that operate 300 hours per year.

*James D. Kahlisch*

CHIEF ENGINEER

# Marine Engine Performance Data

Preliminary

Curve No.: BC9119

DATE: 15Oct04

## General Engine Data

Engine Model.....		4.2L ES 320
Rating Type .....		High Output
Rated Engine Power..... kW [bhp]		236 [316]
Rated Engine Speed..... rpm		3900
Rated HP Production Tolerance .....	±%	5
Rated Engine Torque..... N•m [ft•lb]		576 [425]
Peak Engine Torque @ 2800 rpm .....		647 [477]
Brake Mean Effective Pressure .....	kPa [psi]	1740 [252]
Indicated Mean Effective Pressure .....	kPa [psi]	N/A
Minimum Idle Speed Setting..... rpm		600
Normal Idle Speed Variation.....	±rpm	50
High Idle Speed Range		
Minimum .....	rpm	4220
Maximum .....	rpm	4280
Maximum Allowable Engine Speed .....	rpm	4280
Maximum Torque Capacity from Front of Crank <sup>2</sup> .....	N•m [ft•lb]	0
Compression Ratio .....		17:1
Piston Speed .....	m/sec [ft/min]	13 [2559]
Firing Order.....		1-5-3-6-2-4
Weight (Dry) Engine With Heat Exchanger System - Average.....	kg [lb]	460 [1015]

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

Fuel Consumption @ Rated Speed.....	l/hr [gal/hr]	71.0 [18.8]
Approximate Fuel Flow to Pump.....	l/hr [gal/hr]	N.A.
Maximum Allowable Fuel Supply to Pump Temperature.....	°C [°F]	60 [140]
Approximate Fuel Flow Return to Tank.....	l/hr [gal/hr]	N.A.
Approximate Fuel Return to Tank Temperature .....	°C [°F]	70 [158]
Maximum Heat Rejection to Drain Fuel <sup>5</sup> .....	kW [Btu/min]	2 [120]
Fuel Transfer Pump Pressure Range.....	kPa [psi]	N.A.

## Air System<sup>1</sup>

Intake Manifold Pressure .....	kPa [in Hg]	190 [56]
Intake Air Flow.....	l/sec [cfm]	286 [606]
Heat Rejection to Ambient .....	kW [Btu/min]	35 [1992]
Maximum Air Cleaner Inlet Temperature Rise Over Ambient.....	°C [°F]	17 [30]

## Exhaust System<sup>1</sup>

Exhaust Gas Flow.....	l/sec [cfm]	623 [1321]
Exhaust Gas Temperature		
Turbine Out.....	°C [°F]	560 [1040]
Manifold .....	°C [°F]	N.A.

## Cooling System<sup>1</sup>

Sea Water Pump Specifications	Restriction.....	kPa [in.Hg]	17 [5]
	Flow .....	l/min [gal/min]	114 [30]
Pressure Cap Rating (With Heat Exchanger Option) .....		kPa [psi]	103 [15]
Coolant Flow to Engine Heat Exchanger/Keel Cooler .....		l/min [gal/min]	300 [79]
Standard Thermostat Operating Range	Start to Open.....	°C [°F]	80 [176]
	Full Open .....	°C [°F]	95 [202]
Heat Rejection to Engine Coolant <sup>3</sup> .....		kW [Btu/min]	223 [12695]

TBD = To Be Decided

N/A = Not Applicable

N.A. = Not Available

<sup>1</sup>All Data at Rated Conditions

<sup>2</sup>Consult Installation Direction Booklet for Limitations

<sup>3</sup>Heat rejection 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.

<sup>5</sup>May not be at rated load and speed. Maximum heat rejection may occur at other than rated conditions.

CUMMINS ENGINE COMPANY, INC.  
COLUMBUS, INDIANA

All Data is Subject to Change Without Notice - Consult the following Cummins intranet site for most recent data:

<http://www.cummins.com>