	<b>Cummins Inc.</b> Columbus, Indiana 47201 <b>ENGINE PERFORMANCE CURVE</b>	Basic Engine Model: <b>4B3.3-G1</b>	Curve Number: <b>FR-30006</b>	<i>G-DRIVE</i> <b>B3.3</b> <b>1</b>
		Engine Critical Parts List <b>CPL: 2827</b>	Date: <b>18Oct04</b>	
Displacement : <b>3.3 litre (199 in<sup>3</sup>)</b>		Bore : <b>95mm (3.74 in.)</b> Stroke : <b>115mm (4.53 in.)</b>		
No. of Cylinders : <b>4</b>		Aspiration : <b>Naturally Aspirated</b>		

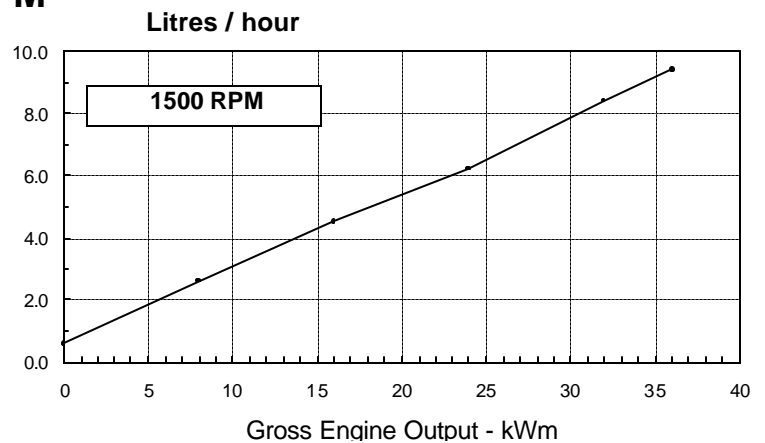
**•• PRELIMINARY ••**

Engine Speed RPM	Standby Power		Prime Power		Continuous Power	
	kWm	BHP	kWm	BHP	kWm	BHP
1500	36	48	32	43	N/A	N/A
1800	42	56	38	51	N/A	N/A

**Emissions Certification:** This engine complies with certain emissions requirements established by US EPA/CARB in accordance with the OEM TPEM provision of 40CFR89.102 for Tier 1 emission limits. See Exhaust Emissions Data Sheet for conformance specifications.  
**1800 RPM Only**

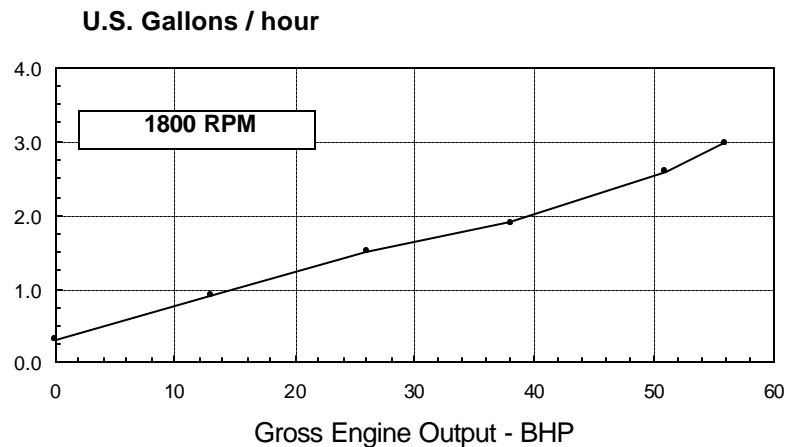
### Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm-h	lb/ BHP-h	litre/ hour	U.S. Gal/ hour
<b>STANDBY POWER</b>						
100	36	48	0.221	0.364	9.4	2.5
<b>PRIME POWER</b>						
100	32	43	0.219	0.360	8.4	2.2
75	24	32	0.216	0.356	6.2	1.6
50	16	22	0.226	0.371	4.5	1.2
25	8	11	0.258	0.424	2.6	0.7



### Engine Performance Data @ 1800 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm-h	lb/ BHP-h	litre/ hour	U.S. Gal/ hour
<b>STANDBY POWER</b>						
100	42	56	0.229	0.377	11.3	3.0
<b>PRIME POWER</b>						
100	38	51	0.216	0.356	9.7	2.6
75	29	38	0.213	0.350	7.1	1.9
50	19	26	0.224	0.369	5.7	1.4
25	10	13	0.280	0.461	3.3	0.9



**CONVERSIONS:**    (litres = U.S. Gal x 3.785)    (kWm = BHP x 0.746)    (U.S. Gal = litres x 0.2642)    (BHP = Engine kWm x 1.34)

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with SAE J1995 conditions of 100 kPa (29.61 in Hg) barometric pressure [90 m (300 ft) altitude], 25°C (77°F) air inlet temperature, and 1 kPa (0.30 in Hg) water vapor pressure with No 2 diesel or a fuel corresponding to ASTM D2.

See reverse side for application rating guidelines.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/U.S. gal).

Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

## POWER RATING APPLICATION GUIDELINES FOR GENERATOR DRIVE ENGINES

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. Generator drive engines are not designed for and shall not be used in variable speed D.C. generator set applications.

**STANDBY POWER RATING** is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating.

This rating should be applied where reliable utility power is available. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency.

**PRIME POWER RATING** is applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories:

**UNLIMITED TIME RUNNING PRIME POWER**

Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours.

The total operating time at 100% Prime Power shall not exceed 500 hours per year.

A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

**LIMITED TIME RUNNING PRIME POWER**

Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating.

**Reference Standards:**

BS-5514 and DIN-6271 standards are based on ISO-3046.

**Operation At Elevated Temperature And Altitude:**

The engine may be operated at:

1800 RPM up to 3280 ft. (1000 m) and 104°F (40°C) without power deration.

1500 RPM up to 3280 ft. (1000 m) and 104°F (40°C) without power deration.

For sustained operation above these conditions, derate by 0.7% per 328 ft. (100 m), and 1% per 18°F (1% per 10°C).

**ENGINE MODEL : 4B3.3-G1**

**CONFIGURATION NUMBER : D781003GX03**

**DATA SHEET : DS-30006**  
**DATE : 18Oct04**  
**PERFORMANCE CURVE : FR-30006**

**INSTALLATION DIAGRAM**

• Fan to Flywheel : 3170477

**CPL NUMBER**

• Engine Critical Parts List : 2827

**GENERAL ENGINE DATA**

Type.....	4-Cycle; In-line; 4-Cylinder Diesel
Aspiration .....	Natural
Bore x Stroke.....	3.74 x 4.53 (95 x 115)
Displacement.....	199 (3.3)
Compression Ratio.....	18.2 : 1
<b>Dry Weight</b>	
Fan to Flywheel Engine.....	550 (250)
Wet Weight	
Fan to Flywheel Engine.....	566 (257)
<b>Moment of Inertia of Rotating Components</b>	
• with FW 30001 Flywheel.....	29.8 (1.25)
Center of Gravity from Front Face of Block.....	10.07 (256)
Center of Gravity above Crankshaft Centerline.....	4.33 (110)
Maximum Bending Moment at Rear Main Bearing.....	275 (38)

**ENGINE MOUNTING**

Maximum Bending Moment at Rear Face of Block.....	918 (1245)
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**EXHAUST SYSTEM**

Maximum Back Pressure.....	3 (75)
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**AIR INDUCTION SYSTEM**

<b>Maximum Intake Air Restriction</b>	
• with Dirty Filter Element.....	30 (762)
• with Normal Duty Air Cleaner and Clean Filter Element.....	12 (300)
• with Heavy Duty Air Cleaner and Clean Filter Element.....	12 (300)

**COOLING SYSTEM**

Coolant Capacity — Engine Only.....	1.2 (4.5)
Maximum Coolant Friction Head External to Engine — 1800 rpm.....	5 (35)
— 1500 rpm.....	4 (28)
Maximum Static Head of Coolant Above Engine Crank Centerline.....	26 (8)
Standard Thermostat (Modulating) Range.....	180-203 (82-95)
Minimum Pressure Cap.....	7 (50)
Maximum Top Tank Temperature for Standby / Prime Power.....	212 (100)

**LUBRICATION SYSTEM**

Oil Pressure @ Idle Speed.....	31 (216)
@ Governed Speed.....	58 (402)
Maximum Oil Temperature.....	248 (120)
Oil Capacity with OP 30002 Oil Pan : High - Low.....	1.9 (7.0)
Total System Capacity (with Full Flow Filter).....	2.1 (7.5)
Angularity of OP 30002 Oil Pan — Front Down.....	35°
— Front Up.....	35°
— Side to Side.....	35°

**B3.3**

**4**

**FUEL SYSTEM**

Type Injection System .....	Zexel A Direct Injection
Maximum Inlet Restriction at Injection Pump .....	— in Hg (mm Hg) 2.9 (73)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) .....	— in Hg (mm Hg) 15 (381)
Maximum Fuel Flow to Injection Pump .....	— US gph (litre / hr) 3.3 (12.5)
Fuel Flow to LiftPump @ 43 psi (3 kg/cm <sup>2</sup> ).....	— US gph (litre / hr) 10.5 (40)

**ELECTRICAL SYSTEM**

Cranking Motor (Heavy Duty, Positive Engagement).....	— volt 12
Battery Charging System, Negative Ground.....	— ampere 63
Maximum Allowable Resistance of Cranking Circuit.....	— ohm 0.00075
Minimum Recommended Battery Capacity	
• Cold Soak @ 0 °F (-18 °C) and Above.....	— °F CCA 550

**COLD START CAPABILITY**

Minimum Ambient Temperature for Aided (with Coolant Heater) Cold Start within 10 seconds.....	— °F (°C) -13 (-25)
Minimum Ambient Temperature for Unaided Cold Start .....	— °F (°C) 25 (-4)

**PERFORMANCE DATA**

- All data is based on:
- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
  - Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
  - SAE J1995, Standard Reference Conditions of:
 

Barometric Pressure	: 100 kPa (29.61 in Hg)	Air Temperature	: 25 °C (77 °F)
Altitude	: 90 m (300 ft)	Relative Humidity	: 1 kPa (0.30 in Hg) vapor pressure

Steady State Stability Band at any Constant Load .....	— % +/- 0.5
Estimated Free Field Sound Pressure Level of a Typical Generator Set;	
Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); 1800 rpm / 1500 rpm.....	— dBA 100 / 97
Exhaust Noise (open) at 1 m; 1800 rpm / 1500 rpm.....	— dBA 119 / 118

Governed Engine Speed.....	— rpm
Engine Idle Speed.....	— rpm
Gross Engine Power Output.....	— BHP (kW <sub>m</sub> )
Brake Mean Effective Pressure.....	— psi (kPa)
Piston Speed.....	— ft / min (m / s)
Friction Horsepower.....	— HP (kW <sub>m</sub> )
Engine Water Flow at Stated Friction Head External to Engine:	
• 1 psi Friction Head.....	— US gpm (litre / s)
• Maximum Friction Head.....	— US gpm (litre / s)

	<b>STANDBY</b>		<b>PRIME POWER</b>	
	<b>60 hz</b>	<b>50 hz</b>	<b>60 hz</b>	<b>50 hz</b>
	1800	1500	1800	1500
	750 - 850	750 - 850	750 - 850	750 - 850
Gross Engine Power Output.....	56 (42)	48 (36)	51 (38)	43 (32)
Brake Mean Effective Pressure.....	124 (856)	127 (876)	113 (780)	114 (787)
Piston Speed.....	1359 (6.9)	1133 (5.8)	1359 (6.9)	1133 (5.8)
Friction Horsepower.....	6.7 (5.0)	4.0 (3.0)	6.7 (5.0)	4.0 (3.0)
Engine Water Flow at Stated Friction Head External to Engine:				
• 1 psi Friction Head.....	23 (1.5)	21 (1.3)	23 (1.5)	21 (1.3)
• Maximum Friction Head.....	15 (0.9)	13 (0.8)	15 (0.9)	13 (0.8)
<b>Engine Data with Dry Type Exhaust Manifold</b>				
Intake Air Flow.....	87 (41)	74 (35)	87 (41)	74 (35)
Exhaust Gas Temperature .....	1092 (589)	928 (498)	860 (460)	838 (448)
Exhaust Gas Flow.....	257 (121)	201 (95)	210 (99)	189 (89)
Air to Fuel Ratio.....	17.6 : 1	19.0 : 1	20.6 : 1	21.3 : 1
Radiated Heat to Ambient .....	489 (8.6)	412 (7.2)	410 (7.2)	360 (6.3)
Heat Rejection to Coolant.....	1395 (24.5)	1230 (21.6)	1295 (22.8)	1180 (20.7)
Heat Rejection to Exhaust.....	1480 (26.1)	1260 (22.2)	1375 (24.2)	1205 (21.2)

**N.A.** - Data is Not Available  
**N/A** - Not Applicable to this Engine  
**TBD** - To Be Determined

**ENGINE MODEL : 4B3.3-G1**  
**DATA SHEET : DS-30006**  
**DATE : 18Oct04**  
**CURVE NO. : FR-30006**