



Engine Performance Data

Cummins Inc

Columbus, Indiana 47202-3005

http://www.cummins.com

Power Generation

QSB5-G6 NR3

FR92672

Configuration
D323007GX03

CPL Code
3172

Revision
17-Jun-2009

Compression Ratio: **17.3:1**
Fuel System: **Bosch Electronic**
Emission Certification: **U.S. EPA Tier 3, EU Stage IIIA**

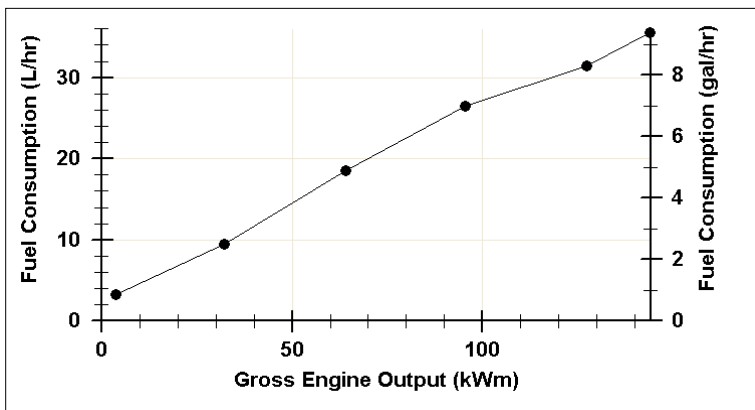
Displacement: **272 in3 (4.5 L)**
Aspiration: **Turbocharged and Charge Air Cooled**

Engine Ratings:

Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	bhp	kWm	bhp	kWm	bhp	kWm
1,500	193	144	171	128	105	78
1,800	208	155	183	136	97	72

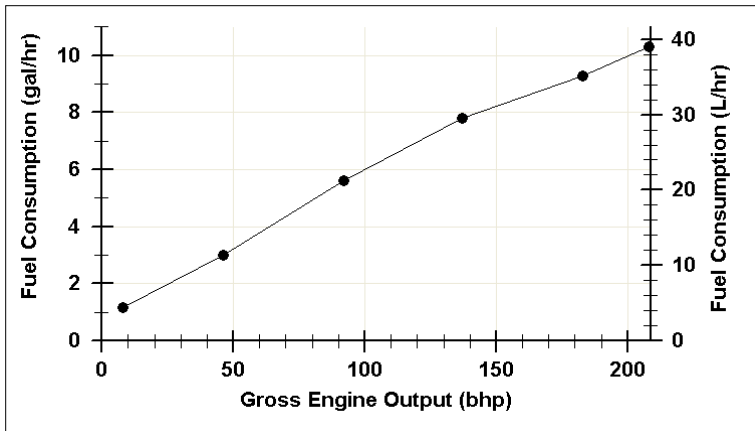
Engine Fuel Consumption @1,500 RPM

Output Power			Fuel Consumption			
%	bhp	kWm	lb/ bhp-h	kg/ kWm-h	gal/hr	l/hr
Standby Power						
100	193	144	0.347	0.211	9.4	36
Prime Power						
100	171	128	0.343	0.209	8.3	31
75	128	95	0.385	0.234	7	26
50	86	64	0.405	0.246	4.9	19
25	43	32	0.411	0.250	2.5	9
Continuous Power						
100	105	78	0.403	0.245	6	23



Engine Fuel Consumption @1,800 RPM

Output Power			Fuel Consumption			
%	bhp	kWm	lb/ bhp-h	kg/ kWm-h	gal/hr	l/hr
Standby Power						
100	208	155	0.351	0.214	10.3	39
Prime Power						
100	183	136	0.360	0.219	9.3	35
75	137	102	0.405	0.246	7.8	30
50	92	69	0.436	0.265	5.6	21
25	46	34	0.464	0.282	3	11
Continuous Power						
100	97	72	0.438	0.266	6	23



Rating Type:

Data Subject to Change Without Notice

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. **STANDBY POWER RATING:** 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:** 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:** Limited Time 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. **CONTINUOUS POWER RATING:** Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

Reference AEB 10.47 for determining Electrical Output.
Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. Derates shown are based on 15 in H2O air intake restriction and 2 in Hg exhaust back pressure.

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.

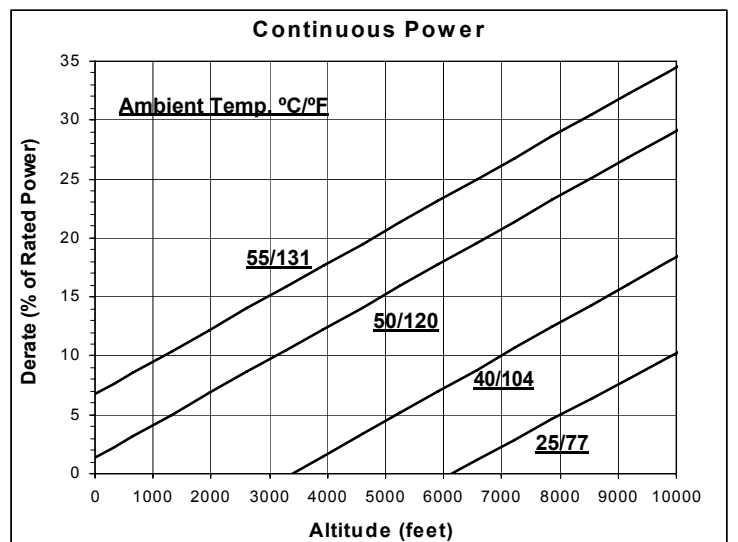
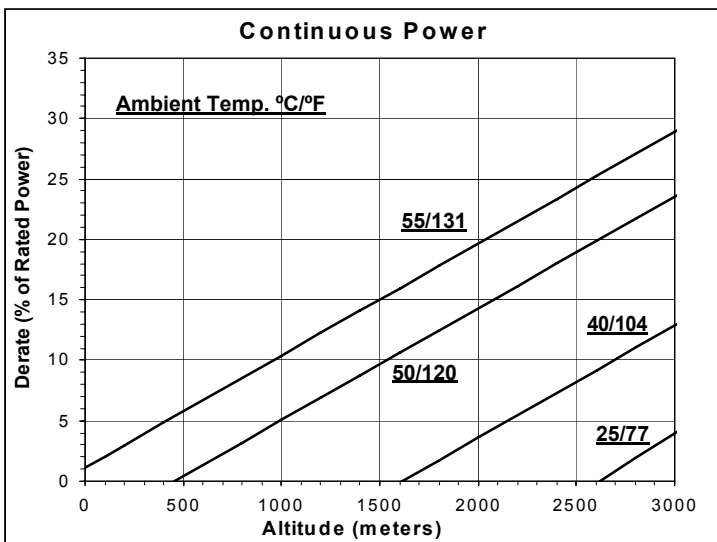
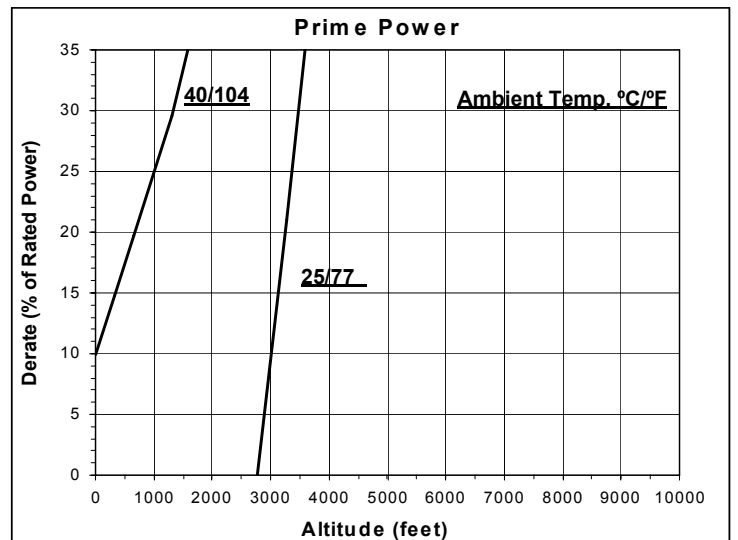
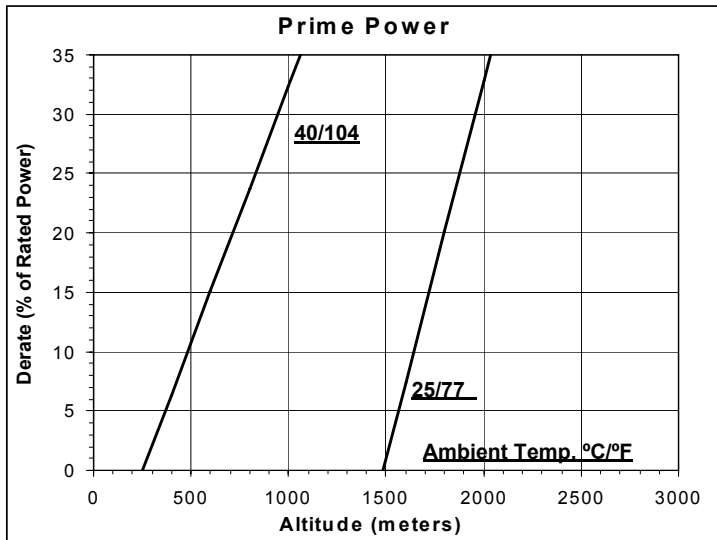
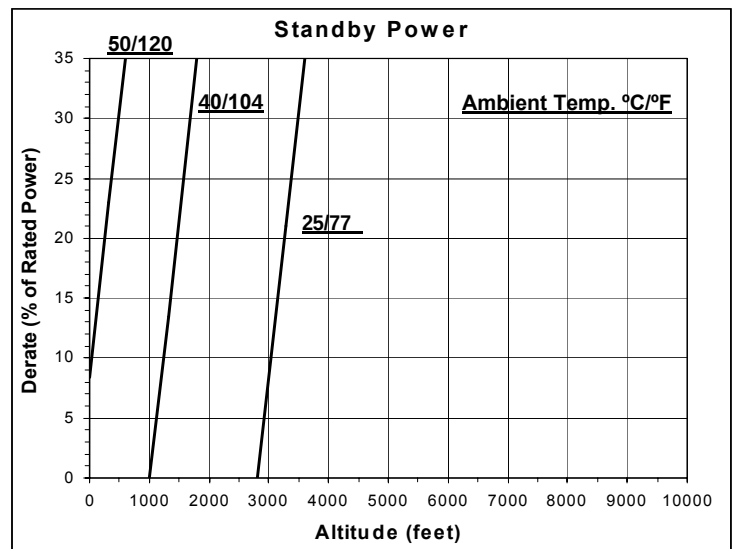
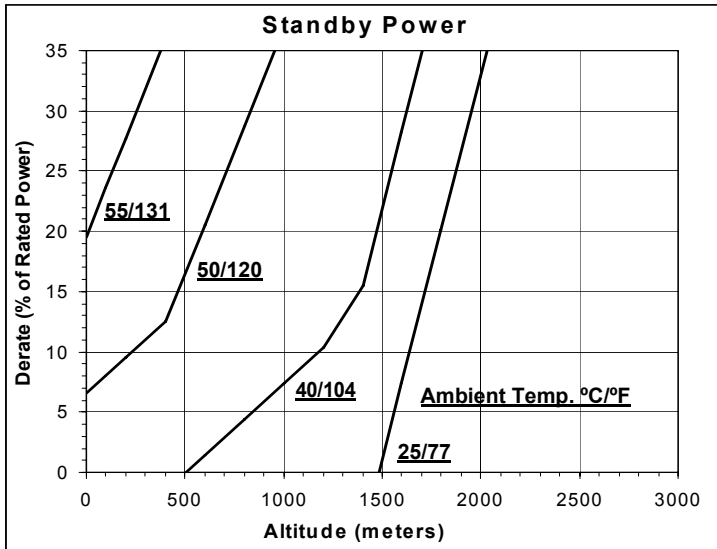
Data Status: Beta- (Measured data)

Data Tolerance: +/- 5 %

CHIEF ENGINEER: Cary J Marston

1500 rpm Derate Curves

1800 rpm Derate Curves



Operation At Elevated Temperature And Altitude:

For **Standby Operation** above these conditions, derate by an additional 19% per 300 m (1000 ft), and 48% per 10° C (18° F).

For **Prime Operation** above these conditions, derate by an additional 19% per 300 m (1000 ft), and 50% per 10° C (18° F).

For **Continuous Operation** above these conditions, derate by an additional 3% per 300 m (1000 ft), and 11% per 10° C (18° F).

Operation At Elevated Temperature And Altitude:

For **Standby Operation** above these conditions, derate by an additional 44% per 300 m (1000 ft), and 53% per 10° C (18° F).

For **Prime Operation** above these conditions, derate by an additional 44% per 300 m (1000 ft), and 58% per 10° C (18° F).

For **Continuous Operation** above these conditions, derate by an additional 3% per 300 m (1000 ft), and 11% per 10° C (18° F).

General Engine Data

Type	Four cycle; Inline; 4 Cylinder	
Aspiration	Turbocharged and Charge Air Cooled	
Bore x Stroke	4.21 x 4.88 in	107 x 124 mm
Displacement	272 in ³	4.5 L
Compression Ratio	17.3:1	
Approximate engine weight (dry)	776 lbm	352 kg
Approximate engine weight (wet)	818 lbm	371 kg
Moment of Inertia of Rotating Components		
with FW 9857 Flywheel	6 in-lbf-sec**2	0.7 kg-m**2
with FW 9878 Flywheel	11 in-lbf-sec**2	1.2 kg-m**2
Center of Gravity		
from front face of block		
above crankshaft centerline	6.4 in	163 mm

Engine Mounting

Maximum Bending Moment at Rear Face of Block	1,000 lb-ft	1,356 N-m
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Exhaust System

Maximum back pressure at Standby Power	3 in-Hg	10 kPa
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Air Induction System

Maximum Intake Air Restriction		
with Dirty Filter Element	25 in H ₂ O	6 kPa
with Normal Duty Air Cleaner and Clean Filter Element	15 in H ₂ O	4 kPa

Cooling System

Coolant Capacity		
Engine	9 quarts	8.5 L
Minimum pressure cap rating at sea level	15 psi	103 kPa
Maximum static head of coolant above crankshaft centerline	60 ft	18.3 m

Jacket Water Circuit Requirements

Maximum Coolant Friction Head External to Engine - 1,500/1,800 RPM	5 / 5 psi	34.5 / 34.5 kPa
Maximum Coolant Temperature (Max Top Tank Temp) for standby/prime power	233 / 225 deg F	112 / 107 deg C
Thermostat (Modulating) Range	180 - 203 deg F	82 - 95 deg C

Charge Air Cooler Requirements

Maximum Intake Manifold Temperature Differential (Ambient to IMT) (IMTD) - 1,500/1,800 RPM	45 / 45 delta deg F	25 / 25 delta deg C
Maximum allowable pressure drop across charge air cooler and OEM CAC piping (IMPD) - 1,500/1,800 RPM	2.5 / 4 in-Hg	8 / 14 kPa
Maximum Intake Manifold Temperature for Engine Protection	210 deg F	99 deg C

Lubrication System

Oil Pressure		
@ Minimum low idle	10 psi	69 kPa
@ Governed speed	50 - 72 psi	344.7 - 496.4 kPa
Maximum Oil Temperature	280 deg F	138 deg C
Oil Capacity with OP 9458 Oil Pan: Low-High	2.4 - 2.9 gal	9.1 - 11 L
Total System Capacity (with Combo Filter)	3.2 gal	12.1 L

Fuel System

Type Injection System	Bosch Electronic	
Maximum fuel supply restriction at fuel pump inlet		
with clean fuel filter element(s) at maximum fuel flow	5 in-Hg	17 kPa
with dirty fuel filter element(s) at maximum fuel flow	10 in-Hg	35 kPa
Maximum fuel inlet temperature	158 deg F	70 deg C
Maximum supply fuel flow	25 gal/hr	95 L/hr
Maximum return fuel flow	14 gal/hr	53 L/hr

Electrical System

System voltage	<u>12 V</u>	<u>24 V</u>
Minimum Recommended Battery Capacity		
cold soak at 10 deg C (50 deg F) and above		
cold soak at 0 to 10 deg C (32 to 50 deg F)	1,300 CCA	650 CCA
cold soak at -18 to 0 deg C (0 to 32 deg F)	1,300 CCA	650 CCA
Maximum starting circuit resistance	0.001 Ohm	0.002 Ohm

Cold start capability

Unaided Cold Start		
Minimum cranking speed		120 RPM
Minimum ambient temperature for unaided cold start	10 deg F	-12.2 deg C
Aided Cold Start		
Minimum ambient temperature with coolant and lube heater only	10 deg F	-12 deg C
Cold starting aids available		Block Heater
Min Amb Temp for NFPA 110 Cold Start (90 deg F min coolant temp)	32 deg F	0 deg C

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.
 - ISO 3046, Part 1, Standard Reference Conditions of:

Barometric Pressure :	100 kPa (29.53 in Hg)	Air Temperature:	25 °C (77 °F)
Altitude:	110 m (361 ft)	Relative Humidity:	30%

Steady State Stability Band at any constant load (+/-)	0.25 %
Estimated Free Field Sound Pressure Level of a Typical Generator Set; 1,800 RPM	88 dBa
Exhaust Noise at Rated 1 m Horizontally From Centerline of Exhaust Pipe Outlet Upwards at 45%; 1,800 RPM	109 dBa

		Standby Power		Prime Power	
		1,800	1,500	1,800	1,500
Governed Engine Speed	RPM				
Engine Idle Speed	RPM	700 - 900	700 - 900	700 - 900	700 - 900
Gross Engine Power Output	hp (kW)	208 (155)	193 (144)	183 (136)	171 (128)
Brake Mean Effective Pressure	psi (kPa)	336 (2,317)	371 (2,558)	296 (2,041)	330 (2,275)
Piston Speed	ft/min (m/s)	1,464 (7.4)	1,220 (6.2)	1,464 (7.4)	1,220 (6.2)
Friction Horsepower	hp (kW)	16 (12)	10 (8)	16 (12)	10 (8)
Engine Jacket Water Flow at Stated Friction Head external to Engine					
- 5 psi Friction Head	gpm (L/min)	39 (148)	30 (114)	39 (148)	30 (114)
- Maximum Friction Head	gpm (L/min)	35 (132)	25 (95)	35 (132)	25 (95)
Engine Data					
Intake Air Flow	ft ³ /min (L/s)	368 (174)	319 (151)	370 (175)	313 (148)
Intake Manifold Pressure	in-Hg (kPa)	66 (223)	67 (226)	65 (219)	64 (216)
Exhaust Gas Temp - Dry Stack	deg F (deg C)	982 (528)	991 (533)	913 (489)	896 (480)
Exhaust Gas Flow	ft ³ /min (L/s)	903 (426)	789 (372)	861 (406)	721 (340)
Air to Fuel ratio		21.3:1	20:1	23.7:1	22.4:1
Heat Rejection to Ambient	BTU/min (kW)	890 (16)	819 (14)	802 (14)	720 (13)
Heat Rejection to Jacket Coolant	BTU/min (kW)	2,873 (51)	2,752 (48)	2,521 (44)	2,403 (42)
Heat Rejection to Exhaust	BTU/min (kW)	7,746 (136)	7,050 (124)	7,068 (124)	5,994 (105)
Heat Rejection to Fuel*	BTU/min (kW)	21 (0.4)	21 (0.4)	18 (0.3)	15 (0.3)
ATA CAC					
Heat Rejection to Aftercooler	BTU/min (kW)	1,899 (33)	1,630 (29)	1,894 (33)	1,569 (28)
Charge Air Flow	lb/min (kg/min)	26 (12)	22 (10)	26 (12)	22 (10)
Turbocharger Compressor Outlet	in-Hg (kPa)	70 (236)	70 (236)	69 (233)	67 (226)
Turbocharger Compressor Outlet	deg F (deg C)	421 (216)	425 (218)	417 (214)	410 (210)

*This is the maximum heat rejection, not specified to the load listed.

End of Report