



## Engine Performance Data

Cummins Inc

Columbus, Indiana 47202-3005  
http://www.cummins.com

Power Generation

**QSK38-G5**

**FR 6797**

Configuration  
**D233042GX03**

CPL Code  
**3573**

Revision  
**25 AUG 14**

Compression Ratio: **15:1**  
Fuel System: **Cummins MCERS**  
Emission Certification: **U.S. EPA Tier 2**

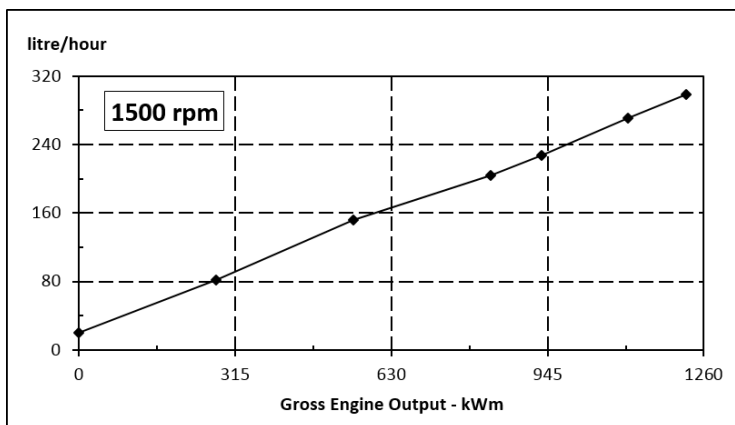
Displacement: **2,301 in3 (37.7 L)**  
Aspiration: **Turbocharged and Aftercooled**

### Engine Ratings:

Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	bhp	kWm	bhp	kWm	bhp	kWm
1,500	1,641	1,224	1,484	1,107	1,250	933
1,800	1,715	1,279	1,425	1,063	1,195	891

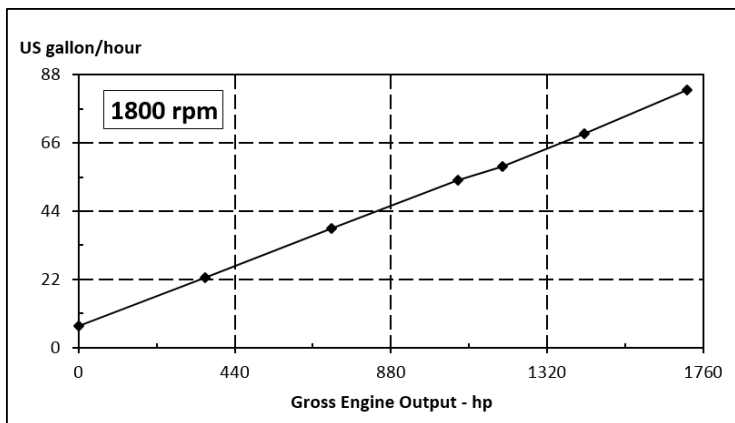
### Engine Fuel Consumption @1,500 RPM

Output Power			Fuel Consumption			
%	bhp	kWm	lb/ bhp-h	kg/ kWm-h	gal/hr	l/hr
<b>Standby Power</b>						
100	1,641	1,224	0.342	0.208	79	299
<b>Prime Power</b>						
100	1,484	1,107	0.342	0.208	71.6	271
75	1,113	830	0.343	0.208	53.7	204
50	742	554	0.383	0.233	40	152
25	371	277	0.415	0.253	21.7	82
<b>Continuous Power</b>						
100	1,250	933	0.341	0.207	60	227



### Engine Fuel Consumption @1,800 RPM

Output Power			Fuel Consumption			
%	bhp	kWm	lb/ bhp-h	kg/ kWm-h	gal/hr	l/hr
<b>Standby Power</b>						
100	1,715	1,279	0.344	0.209	83.2	315
<b>Prime Power</b>						
100	1,425	1,063	0.343	0.209	68.9	261
75	1,069	797	0.359	0.218	54.1	205
50	713	532	0.382	0.232	38.3	145
25	356	266	0.451	0.274	22.6	86
<b>Continuous Power</b>						
100	1,195	891	0.347	0.211	58.5	222



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 fan, optional equipment and driven components.

Data Status: Final

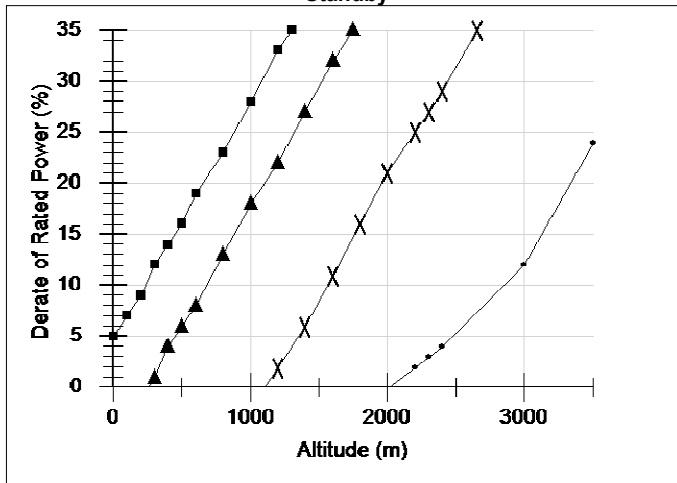
Data Tolerance: +/- 5 %

CHIEF ENGINEER: Cary J Marston

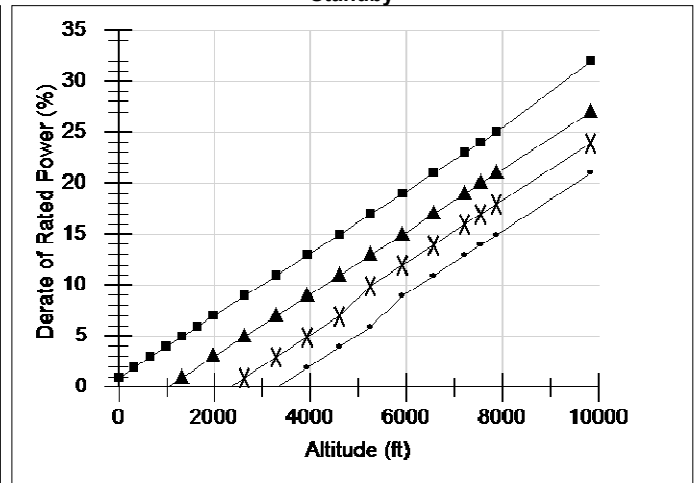
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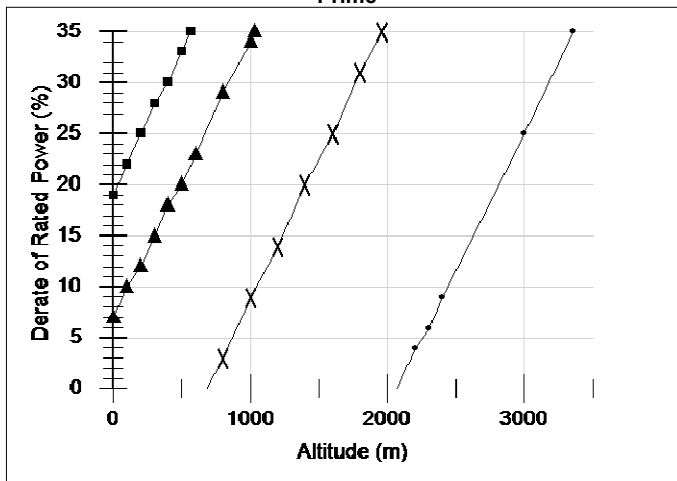
**1,500 RPM Power Derate Curves**  
**Standby**



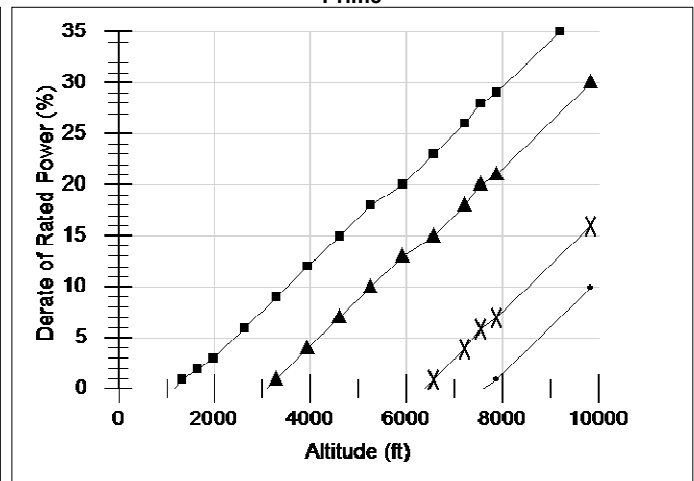
**1,800 RPM Power Derate Curves**  
**Standby**



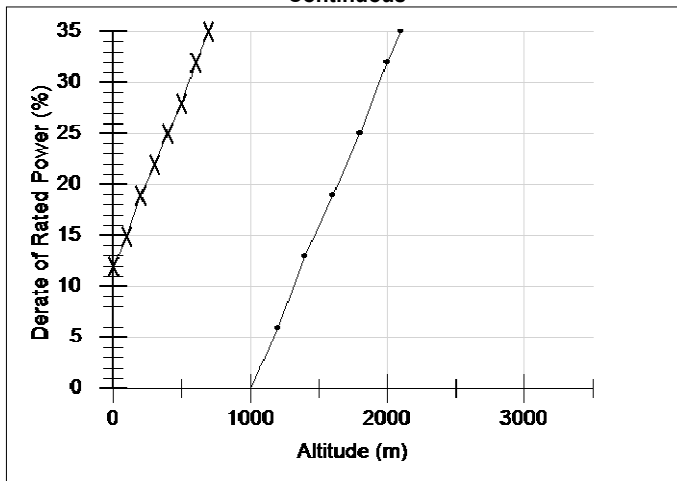
**Prime**



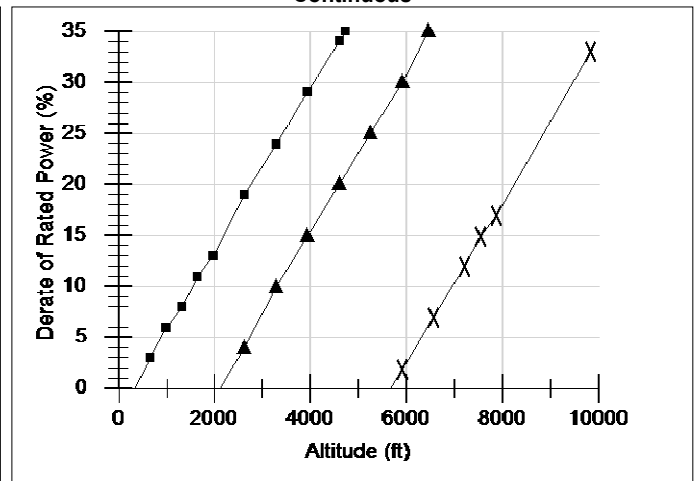
**Prime**



**Continuous**



**Continuous**



**Operation at Elevated Temperature and Altitude:**

For Standby operation above these conditions, derate by an additional 8 % per 1,000 ft (305 m), and 23 % per 18 delta deg F (10 delta deg C)

For Prime operation above these conditions, derate by an additional 8 % per 1,000 ft (305 m), and 26 % per 18 delta deg F (10 delta deg C)

For Continuous operation above these conditions, derate by an additional 10 % per 1,000 ft (305 m), and 32 % per 18 delta deg F (10 delta deg C)

—●— 77 deg F (25 deg C)

—X— 104 deg F (40 deg C)

—▲— 122 deg F (50 deg C)

—■— 131 deg F (55 deg C)

**Operation at Elevated Temperature and Altitude:**

For Standby operation above these conditions, derate by an additional 6 % per 1,000 ft (305 m), and 19 % per 18 delta deg F (10 delta deg C)

For Prime operation above these conditions, derate by an additional 6 % per , and 21 % per

For Continuous above these conditions, derate by an additional 7 % per , and 24 % per

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**General Engine Data**

Installation Diagram Number	4954124	
Type	Four cycle; Vee; 12 Cylinder	
Aspiration	Turbocharged and Aftercooled	
Bore x Stroke	6.25 x 6.25 in	159 x 159 mm
Displacement	2,301 in3	37.7 L
Compression Ratio	15:1	
Moment of Inertia of Rotating Components		
with FW6074 Flywheel	93 in-lbf-sec <sup>2</sup>	10.4 kg-m <sup>2</sup>
with FW6077 Flywheel	184 in-lbf-sec <sup>2</sup>	20.8 kg-m <sup>2</sup>
Center of Gravity		
from rear face of block	31.54 in	801 mm
above crankshaft centerline	6.8 in	173 mm
Maximum Static Loading at Rear Main Bearing	2,000 lbm	907 kg

**Engine Mounting**

Maximum Bending Moment at Rear Face of Block	4,500 lb-ft	6,101 N-m
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**Exhaust System**

Maximum back pressure at Standby Power	2 in-Hg	7 kPa
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**Air Induction System**

Maximum Intake Air Restriction		
with Dirty Filter Element	25 in H <sub>2</sub> O	6.2 kPa
with Normal Duty Air Cleaner and Clean Filter Element	15 in H <sub>2</sub> O	3.7 kPa

**Cooling System****Jacket Water Circuit Requirements**

Coolant Capacity		
Engine	112 quarts	106 L
Aftercoolers	24 quarts	22.7 L
Minimum pressure cap rating at sea level	11 psi	76 kPa
Maximum static head of coolant above crankshaft centerline	60 ft	18.3 m
Maximum Coolant Temperature (Max Top Tank Temp) for Standby/Prime power	220 / 212 deg F	104 / 100 deg C
Thermostat (Modulating) Range	180 - 202 deg F	82 - 94 deg C
Maximum Coolant Friction Head External to Engine - 1,500/1,800 RPM	10 / 10 psi	68.9 / 68.9 kPa

**Aftercooler Circuit Requirements**

Maximum Coolant Friction Head External to Engine - 1,500/1,800 RPM	10 / 10 psi	68.9 / 68.9 kPa
Maximum coolant temperature into the aftercooler @ 25C (77F) ambient	120 deg F	49 deg C
Maximum coolant temperature into aftercooler @ Limiting Ambient conditions for Standby/Prime power	160 / 150 deg F	71 / 66 deg C
Thermostat (Modulating) Range	115 - 135 deg F	46 - 57 deg C

**Lubrication System**

Oil Pressure		
@ Minimum low idle	20 psi	138 kPa
@ Governed speed	50 - 70 psi	344.7 - 482.6 kPa
Maximum Oil Temperature	248 deg F	120 deg C
Oil Capacity with OP 6125 Oil Pan: Low-High	37 - 44 gal	140.1 - 166.6 L
Total System Capacity (with Combo Filter)	45 gal	170.3 L

**Fuel System**

Type Injection System	Cummins MCERS	
Maximum fuel supply restriction at fuel pump inlet		
with clean fuel filter element(s) at maximum fuel flow	5 in-Hg	16.9 kPa
with dirty fuel filter element(s) at maximum fuel flow	10 in-Hg	34 kPa
Maximum fuel inlet temperature	160 deg F	71 deg C
Maximum supply fuel flow	159 gal/hr	602 L/hr
Maximum return fuel flow	94 gal/hr	356 L/hr

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**Electrical System**

System voltage	<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)	1,800 CCA
cold soak at -18 to 0 deg C (0 to 32 deg F)	
Maximum starting circuit resistance	0.002 Ohm

**Cold start capability****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 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;

Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft);  
1,500/1,800 RPM 99.4 / 99.4 dBA

Exhaust Noise at Rated 1 m Horizontally From Centerline of Exhaust Pipe Outlet  
Upwards at 45%; 1,500/1,800 RPM 96.3 / 96.3 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 PowerOutput	hp (kW)	1,715 (1,279)	1,641 (1,224)	1,425 (1,063)	1,484 (1,107)
Brake Mean EffectivePressure	psi (kPa)	328 (2,262)	377 (2,597)	316 (2,179)	341 (2,348)
Piston Speed	ft/min (m/s)	1,562 (7.9)	1,562 (7.9)	1,562 (7.9)	1,562 (7.9)
Friction Horsepower	hp (kW)	115 (86)	115 (86)	115 (86)	115 (86)
Engine Jacket Water Flow at Stated Friction Head external to Engine					
- 5 psi-2.5 psi FrictionHead	gpm (L/min)	274 (1,037)	274 (1,037)	274 (1,037)	274 (1,037)
- Maximum FrictionHead	gpm (L/min)	209 (791)	209 (791)	209 (791)	209 (791)
<u>Engine Data</u>					
Intake Air Flow	ft <sup>3</sup> /min (L/s)	4,259 (2,010)	3,446 (1,627)	3,797 (1,793)	3,204 (1,512)
Exhaust Gas Temp - DryStack	deg F (deg C)	750 (400)	894 (479)	708 (376)	891 (478)
Exhaust Gas Flow	ft <sup>3</sup> /min (L/s)	9,136 (4,312)	8,538 (4,030)	8,154 (3,849)	7,987 (3,770)
Air to Fuel ratio		30.9:1	26.4:1	33.3:1	27.0:1
Heat Rejection to Ambient	BTU/min (kW)	7,204 (127)	6,840 (121)	5,964 (105)	6,199 (109)
Heat Rejection to JacketCoolant	BTU/min (kW)	25,783 (453)	25,381 (446)	21,804 (384)	23,893 (420)
Heat Rejection to Exhaust	BTU/min (kW)	50,176 (882)	49,971 (878)	41,725 (734)	45,424 (799)
Heat Rejection to Fuel*	BTU/min (kW)	414 (8)	379 (7)	414 (8)	379 (7)
<u>2P2L</u>					
Heat Rejection toAftercooler Coolant	BTU/min (kW)	23,777 (418)	18,825 (331)	18,753 (330)	16,142 (284)
Aftercooler Water Flow at Stated Friction Head external to Engine					
- 2 psi-2.5 psi FrictionHead	gpm (L/min)	168 (636)	137 (519)	168 (636)	137 (519)
- Maximum FrictionHead	gpm (L/min)	150 (568)	116 (439)	150 (568)	116 (439)

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

**End of Report**

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