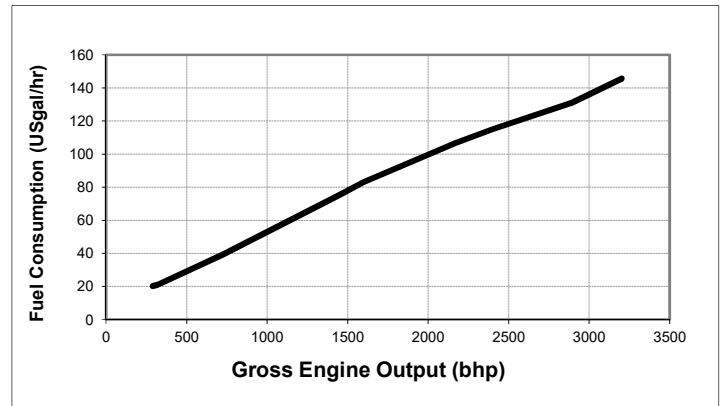
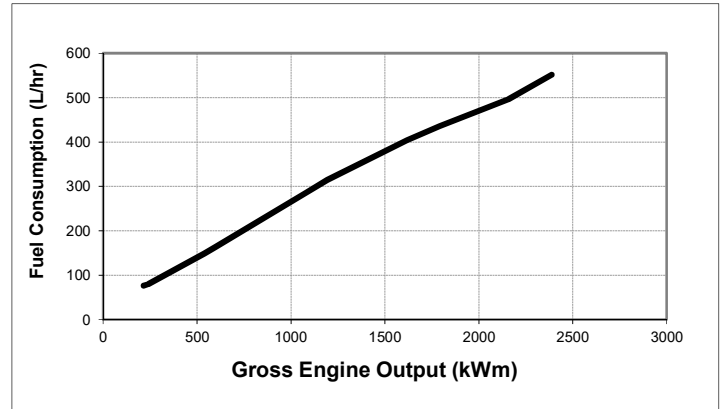
	<b>Engine Performance Data</b> <b>Cummins Inc.</b> Columbus, Indiana 47202-3005 <a href="http://www.cummins.com">http://www.cummins.com</a>	<b>G-Drive</b>  <b>QSK60-23</b>  <b>FR60532</b>	<b>Date</b> 15-Mar-19		
			<b>Configuration</b> D593008GX03	<b>CPL</b> 4816	<b>Revision</b> 1
	<b>Compression Ratio</b> 14.5:1	<b>Displacement</b> 60.2 L (3672 in³)	<b>Fuel System</b> Cummins MCRC		
<b>Fuel System</b> Cummins MCRC	<b>Aspiration</b> Turbocharged and Low Temperature Aftercooled	<b>Emission Compliance</b> EPA Tier 2	<b>Aftertreatment</b> N/A		

Engine Speed		Standby Power		Prime Power		Continuous Power	
rpm		kWm	bhp	kWm	bhp	kWm	bhp
1500		2388	3202	2157	2893	N/A	N/A

### Engine Fuel Consumption @ 1500 rpm

Output Power			Fuel Consumption			
%	kWm	bhp	kg/kWm-hr	lb/bhp-hr	L/hr	US gal/hr
<b>Standby Power</b>						
100	2388	3202	0.196	0.323	551.4	145.7
75	1791	2402	0.207	0.340	435.7	115.1
50	1194	1601	0.224	0.368	314.7	83.1
25	597	801	0.233	0.382	163.4	43.2
10	239	320	0.284	0.467	79.8	21.1
<b>Prime Power</b>						
100	2157	2893	0.196	0.322	496.5	131.2
75	1618	2170	0.212	0.349	404.2	106.8
50	1079	1447	0.225	0.369	284.9	75.3
25	539	723	0.234	0.385	148.6	39.3
<b>Continuous Power</b>						
100	N/A	N/A	N/A	N/A	N/A	N/A



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 Max of an 80% average load factor and 500 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 CEB00150 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.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.850 kg/L. 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 : Preliminary

Tolerance : +/- 5%

Chief Engineer : Tom McGibbon

## 1500 rpm Power Derate Tables

### Standby

Altitude Corrected Standby Power Capability (kWm)										
Ambient Operating Temp. (°F)	77.0	86.0	95.0	104.0	108.5	113.0	117.5	122.0	126.5	131.0
Ambient Operating Temp. (°C)	25.0	30.0	35.0	40.0	42.5	45.0	47.5	50.0	52.5	55.0
Altitude (ft)	Altitude (m)									
0	0	2388	2388	2388	2388	2370	2303	2236	2169	2102
328	100	2388	2388	2388	2388	2356	2289	2221	2154	2087
656	200	2388	2388	2388	2388	2341	2274	2207	2140	2072
984	300	2388	2388	2388	2388	2326	2259	2192	2125	2058
1312	400	2388	2388	2388	2379	2312	2245	2177	2110	2043
1640	500	2388	2388	2388	2364	2297	2230	2163	2096	2029
1969	600	2388	2388	2388	2350	2283	2215	2148	2081	2014
2297	700	2388	2388	2388	2335	2268	2201	2134	2066	1999
2625	800	2388	2388	2388	2320	2253	2186	2119	2052	1985
2953	900	2388	2388	2388	2294	2235	2172	2104	2037	1970
3281	1000	2388	2388	2385	2268	2209	2150	2090	2033	1975
3937	1200	2388	2388	2333	2216	2157	2098	2039	1980	1922
4593	1400	2388	2379	2281	2164	2105	2046	1987	1929	1870
5249	1600	2365	2340	2229	2112	2053	1994	1935	1877	1818

### Prime

Altitude Corrected Prime Power Capability (kWm)										
Ambient Operating Temp. (°F)	77.0	86.0	95.0	104.0	108.5	113.0	117.5	122.0	126.5	131.0
Ambient Operating Temp. (°C)	25.0	30.0	35.0	40.0	42.5	45.0	47.5	50.0	52.5	55.0
Altitude (ft)	Altitude (m)									
0	0	2157	2134	1936	1737	1638	1539	1440	1341	1242
328	100	2157	2112	1914	1716	1616	1517	1418	1319	1220
656	200	2157	2090	1892	1694	1595	1496	1396	1297	1198
984	300	2157	2068	1870	1672	1573	1474	1375	1275	1176
1312	400	2058	1838	1618	1398	1288	1179	1069	959	849
1640	500	1578	1359	1139	919	809	699	589	479	369
1969	600	1099	879	659	439	329	219	109	-1	-111
2297	700	619	399	179	-41	-151	-261	-371	-481	-591
2625	800	139	-81	-301	-521	-631	-741	-851	-961	-1071
2953	900	-341	-561	-781	-1001	-1111	-1221	-1331	-1441	-1551
3281	1000	-821	-1041	-1261	-1481	-1591	-1701	-1811	-1921	-2031
3937	1200	-1781	-2001	-2221	-2440	-2550	-2660	-2770	-2880	-2990
4593	1400	-2740	-2960	-3180	-3400	-3510	-3620	-3730	-3840	-3950
5249	1600	-3700	-3920	-4140	-4360	-4470	-4580	-4690	-4800	-4910

Altitude derate data is based on a 2.2°C air temperature rise over ambient at the compressor inlet. Please contact Application Engineering if the air temperature rise over ambient exceeds this value.

Please contact Application Engineering for operation above table temperature or altitude values.

SAE AS210 Table A15 was referenced for standard day temperature and barometric pressure versus altitude.

**General Engine Data**

Installation Drawing Number	3170634		
Type	Four Cycle		
Aspiration	Turbocharged and Low Temperature Aftercooled		
Bore x Stroke	in x in (mm x mm)	6.25 x 7.48	(159 x 190)
Displacement	in <sup>3</sup> (L)	3672	(60.2)
Compression Ratio	14.5:1		
Dry Weight (Approximate)	lbm (kg)	17460	(7920)
Wet Weight (Approximate)	lbm (kg)	18893	(8570)
Aftertreatment Weight (Approximate)	lbm (kg)	0	(N/A)
Moment of Inertia of Rotating Components			
with FW6080 Flywheel, SAE 00	lbm • ft <sup>2</sup> (kg • m <sup>2</sup> )	186.9	(7.9)
Center of Gravity from Rear Face of Block	in (mm)	39.4	(1000.8)
Center of Gravity Above Crankshaft Centerline	in (mm)	8.6	(218.4)

**Engine Mounting**

Max Bending Moment at Rear Face of Block	lb • ft (N • m)	7634	(10350)
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**Exhaust System**

Max Allowable Static Bending Moment @ Exhaust Outlet Flange	lb • ft (N • m)	7	(9)
Max Back Pressure at Standby Power (Exhaust Outlet)	in Hg (kPa)	2.0	(6.8)

**Air Induction System**

Max Air Temperature Rise Over Ambient At Compressor Inlet	°F (°C)	7	(4)
Max Intake Air Restriction			
With Normal Duty Air Cleaner and Clean Filter Element	in H <sub>2</sub> O (kPa)	6.0	(1.5)
With Heavy Duty Air Cleaner and Clean Filter Element	in H <sub>2</sub> O (kPa)	N/A	#VALUE!
With Dirty Filter Element	in H <sub>2</sub> O (kPa)	25.0	(6.2)

**Cooling System****Jacket Water/ High Temperature Circuit Requirements**

Max Coolant Friction Head External to Engine (1500 rpm)	psi (kPa)	7.0	(48.3)
Engine Water Flow at Stated Friction Head External to Engine:			
5 psi Friction Head (1500 rpm)	US gpm (L/m)	0	(N/A)
Maximum Friction Head (1500 rpm)	US gpm (L/m)	0	(N/A)
Coolant Capacity - Engine High Temperature Circuit	US gal (L)	42.0	(159)
Minimum Pressure Cap Rating at Sea Level	psi (kPa)	11.0	(75.8)
Max Static Head of Coolant Above Crankshaft Centerline	ft (m)	60.0	(18.3)
Max Coolant (Top Tank) Temperature for Standby/Prime Power	°F (°C)	230 / 0	(110 / N/A)
Thermostat (Modulating) Range	°F (°C)	180 - 202	(82 - 94)

**Low Temperature Circuit (LTC) Requirements**

Max Coolant Friction Head External to Engine (1500 rpm)	psi (kPa)	5.0	(34.5)
Aftercooler Water Flow at Stated Friction Head External to Engine:			
5 psi Friction Head (1500 rpm)	US gpm (L/m)	0	(N/A)
Maximum Friction Head (1500 rpm)	US gpm (L/m)	0	(N/A)
Max Coolant Temp into LTC @ 77°F (25°C) Ambient	°F (°C)	120	(49)
Max Coolant Temperature into LTC @			
Limiting Ambient Conditions for Standby/Prime Power	°F (°C)	160 / 158	(71 / 70)
Thermostat (Modulating) Range	°F (°C)	115 - 130	(46 - 54)
Coolant Capacity - Engine Low Temperature Circuit	US gal (L)	9.0	(34.1)

**Charge Air Cooler Requirements**

Max Allowable Pressure Drop Across Charge Air Cooler and OEM CAC piping (1800 rpm)	in Hg (kPa)	N/A	(N/A)
Max Charge Air Cooler Outlet to Ambient at 77°F (25°C)(CAC dT)	Δ°F (Δ°C)	N/A	(N/A)

## Lubrication System

Oil Pressure at Minimum Idle Speed	psi (kPa)	20	(138)
Oil Pressure at Governed Speed	psi (kPa)	60 - 70	(414 - 483)
Max Oil Temperature	°F (°C)	250	(121)
Oil Capacity : Low - High	US gal (L)	92 - 100	(348 - 379)
Total System Capacity (with Spin-On Filters)	US gal (L)	105	(397)

## Fuel System

Max Allowable Fuel Supply Restriction at Stage 1 Filter Inlet	in Hg (kPa)	5.0	(16.9)
Max Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head)	in Hg (kPa)	10.0	(33.8)
Max Fuel Inlet Temperature	°F (°C)	160	(71)
Max Supply Fuel Flow	US gph (L/hr)	263	(996)
Max Return Fuel Flow	US gph (L/hr)	116	(439)

## Electrical System

System Voltage	volts	24	
Minimum Recommended Battery Capacity Cold Soak @ 0 °F (-18 °C)	CCA	1800	
Max Starting Circuit Resistance	ohm	0.000	
Max Current Draw of the System	amps	N/A	

## Cold Start Capability

Unaided Cold Start			
Minimum Cranking Speed	rpm	150	
Minimum Ambient Temp for Unaided Cold Start	°F (°C)	10	(-12)

## Performance Data

Minimum Low Idle Speed	rpm	700	
Maximum Low Idle Speed	rpm	900	

		STANDBY	PRIME	CONTINUOUS
		50 Hz	50 Hz	50 Hz
Governed Engine Speed	rpm	1500	1500	N/A (N/A)
Gross Engine Power Output	bhp (kWm)	3202 (2388)	2893 (2157)	N/A (N/A)
Brake Mean Effective Pressure	psi (kPa)	462 (3186)	417 (2876)	N/A (N/A)
Friction Power	hp (kWm)	196 (146)	196 (146)	N/A (N/A)
Intake Air Flow	ft <sup>3</sup> /min (L/sec)	5783 (2730)	5363 (2532)	N/A (N/A)
Exhaust Gas Temp	°F (°C)	896 (480)	865 (463)	N/A (N/A)
Exhaust Gas Flow	ft <sup>3</sup> /min (L/sec)	14307 (6753)	13053 (6161)	N/A (N/A)
Air:Fuel Ratio		24:1	24.7:1	N/A
Radiated Heat to Ambient	BTU/min (kWm)	12605 (222)	11350 (200)	N/A (N/A)
Heat to JW Radiator	BTU/min (kWm)	37937 (668)	35523 (625)	N/A (N/A)
Heat to Exhaust	BTU/min (kWm)	97939 (1723)	86941 (1529)	N/A (N/A)
* Heat to Fuel	BTU/min (kWm)	475 (8.4)	475 (8.4)	N/A (N/A)
Heat to Aftercooler Radiator	BTU/min (kWm)	36118 (636)	31160 (548)	N/A (N/A)
Charge Air Flow	lb/min (kg/min)	414 (188)	383 (174)	N/A (N/A)
Turbo Comp Outlet Pressure	psi (kPa)	49.6 (342)	45 (311)	N/A (N/A)
Turbo Comp Outlet Temp	°F (°C)	479 (249)	451 (233)	N/A (N/A)

\* This is the maximum heat rejection to fuel.

## Noise Emissions

Frequency (Hz)		31.5	63	125	250	500	1000	2000	4000	8000	16000	Overall
Sound Power dB(A) <sup>123</sup>												
1500 rpm	Engine <sup>4</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50 Hz	Exhaust <sup>5</sup>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1. The test figures quoted are from a single gen-set test and do not constitute a guarantee of performance for any particular engine. The data is subject to instrumentation, measurement, and engine to engine variability.

2. Test reference procedures ISO 3744 and ANSI S12.34-1998 as applicable.

3. All data are "A" weighted and are rounded to the nearest dB.

4. Engine with "typical Radiator and fan", Sound Power (dB).

5. Engine Exhaust at 1 Meter from open stack, Sound Pressure (dB).

## Emissions Data

**ATTENTION:** This data was taken from a single engine test according to the Test Methods and Conditions specified. This data is subject to instrumentation, measurement, and engine-to-engine variability. Field emissions test data is not guaranteed to these levels. For air permit programs, please contact Application Engineering for expected site variation.

### Nominal Exhaust Emissions Data @ 1500 rpm

Component	STANDBY			PRIME			CONTINUOUS		
	g/bhp-hr	mg/Nm <sup>3</sup>	PPM	g/bhp-hr	mg/Nm <sup>3</sup>	PPM	g/bhp-hr	mg/Nm <sup>3</sup>	PPM
HC (Total Unburned Hydrocarbons)	0.03	13	21	0.03	15	24	N/A	N/A	N/A
NO <sub>x</sub> (Oxides of Nitrogen as NO <sub>2</sub> )	6.12	3101	1511	5.78	2966	1445	N/A	N/A	N/A
CO (Carbon Monoxide)	0.13	66	53	0.14	70	56	N/A	N/A	N/A
PM (Particulate Matter)	0.02	1	N/A	N/A	1	N/A	N/A	#VALUE!	N/A
SO <sub>2</sub> (Sulfur Dioxide)	0.004	1.8	0.8	0.004	1.8	0.8	N/A	N/A	N/A
CO <sub>2</sub> (Carbon Dioxide)	448	226600	115406	443	227219	115721	N/A	N/A	N/A

**Note:** mg/Nm<sup>3</sup> and PPM numbers are measured dry and corrected to 5% O<sub>2</sub> content.

mg/Nm<sup>3</sup> values are normalized to standard temperature and pressure (0°C, 101.325 kPa).

#### Test Methods and Conditions:

Steady-State emissions recorded per ISO8178-1 during operation at rated engine speed (+/- 2%) and stated constant load (+/-2%) with engine temperatures, pressures, and emission rates stabilized.

#### Fuel Specification:

52-54 Cetane Number (EU), 42-48 Cetane Number (EPA), 0.0015 Max. Wt. % Sulfur as referenced by directive 97/68/EC.

#### Reference:

25 °C (77°F) Air inlet Temperature, 40 °C (104°F) Fuel inlet Temperature, 100 kPa (29.53 in Hg) Barometric Pressure; 10.7 g/kg (75 grains H<sub>2</sub>O/lb) of dry air Humidity (required for NO<sub>x</sub> correction): Intake Restriction set to Max allowable limit for clean filter; Exhaust Back Pressure set to Max allowable limit.