

## DATA SHEET

DIESEL GENERATOR 310KW

MODEL#FDK-CG310/H2

60HZ/1800RPM

CUMMINS MODEL: QSL9-G5



### General Features:

- ♦ All qualified generator sets are subjected to a comprehensive performance test which includes 50% load, 70% load, 100% load, 110% load and to check, verify that all control systems, alarm and shut-down protection.
- ♦ Equipped with battery charger and 24V high performance maintenance-free lead-acid starting batteries and connecting cables.
- ♦ Stainless galvanized zinc plates with strong corrosion-proof.
- ♦ Vibration isolators between the engine/alternator and base frame.
- ♦ Equipped with industrial silencer and flexible exhaust hose.
- ♦ Designed to comply with ISO8528/GB2820.
- ♦ Powered by Cummins engine and coupled with Stamford alternator.
- ♦ Water jacket preheater, oil heater and double air cleaner, etc. are available.

### FDK Diesel Generator Set Data

Genset Model	FDK-CG310/H2
Prime Power	280KW/350KVA
Standby Power	310KW/388KVA
Output Frequency / Rated speed	60Hz/1800rpm
Rated Voltage	230V/400V

Engine Make	Cummins
Engine Model	QSL9-G5
Alternator model	Stamford HCI444D
Control System	DSE7320
Phase	Three

(1) **Prime power:** The rating is available for an unlimited of annual operating hours in variable load applications, in accordance with ISO8528-1.A 10% overload is available for a period of 1 hour within 12-hour period of operation, in accordance with ISO 3046-1.

(2) **Standby power:** The rating is applicable for supplying emergency power in variable load applications for up to 200 hours per year in accordance with ISO8528-1. Overload is not allowed.

(3) **Rated voltage:** available with customer requirement.

### Engine Specifications (DETAILED in APPENDIX)

Engine Model	QSL9-G5
Engine Manufacturer	Cummins (Onan USA)
Cylinder quantity	6
Cylinder Arrangement	In-line
Cycle	4

Aspiration	Turbo-charged
Bore x Stroke (mm x mm)	114x145
Displacement	8.8L
Compression Ratio	16.8:1
Prime power / Speed (KW/RPM)	307/1800
Standby power/ Speed (KW/RPM)	355/1800



ISO9001:2008

FDK reserves the right to change the specifications and designs without notice.

Type Injection System	Bosch HPCR	Fuel Consumption at 100% load (g/KWh)	208 at 1800rpm
Piston Speed	8.7m/s	Starter motor	24V
Friction Energy Output	35kw	Alternator	24V
Total Lubrication System Capacity (L)	26.7	Low idle	700-900rpm
Coolant Capacity (L)	11		

## Alternator Specifications

Alternator model	HCI444D	Number of phase	3
Alternator manufacturer	STAMFORD	Rated voltage	440V (Available with custom requirements)
Exciter type	Single bearing, Brushless, Self-excited	Power factor	0.8
Rated output prime power	360KVA	Voltage regulation NL-FL	≤±1%
Rated speed	1800 rpm	Insulation grade	H
Rated frequency	60Hz	Protection grade	IP23

**Alternator option: Leroy Somer, MECC, Marathon, Engga, Faraday**

## Control System DSE7320 (DETAILED in INSTRUCTION)

DSE7320 is an advanced control module based on micro-processor, containing all necessary functions for protection of the genset and the breaker control. It can monitor the mains supply, breaker control and automatically start the engine when the mains are abnormal. Accurately measure various operational parameters and display all values and alarms information on the LCD. In addition, the control module can automatically shut down the engine and indicate the engine failure.

### FEATURES

- Microprocessor control, with high stability and credibility.
- Monitoring and measuring operational parameters of the mains supply and genset.
- Indicating operation status, fault conditions, all parameters and alarms.
- Multiple protections; multiple parameters display, like pressure, temp. etc.
- Manual, automatic and remote work mode selectable.
- Real time clock for time and date display, overall runtime display, 250 log entries.
- Overall power output display.
- Integral speed/frequency detecting, telling status of start, rated operation, overspeed etc.
- Communication with PC via RS485 OR RS232 interface, using MODBUS protocol.

## Soundproof Enclosure Specification

FDK silent generator is designed by professional acoustic engineers based on years of experience. Now we can make the noise of the generator less than 80-85dB(A) at 1m, or 70-75dB(A) at 7m, 60-65dB(A) at 15m.

### FEATURES

- Multi-way air intake and exhaust guarantee the power performance of the generator.
- Large-scale impedance combined type silencer effectively reduce noise of the generator.
- Internal high performance rubber damper and flexible materials reduce vibration.
- Base mounted fuel tank supports the generator running for 8 hours.



ISO9001:2008

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## Optional

Generator set	Alternator	Low environment Temp	ATS
<input type="checkbox"/> Open generator set <input type="checkbox"/> Silent generator set <input type="checkbox"/> Trailer generator set <input type="checkbox"/> ABB MCCB circuit breaker	<input type="checkbox"/> Stamford <input type="checkbox"/> Marathon <input type="checkbox"/> Mecc Alte <input type="checkbox"/> Leroy Somer <input type="checkbox"/> Farady <input type="checkbox"/> Engga	<input type="checkbox"/> Water heater <input type="checkbox"/> Oil heater <input type="checkbox"/> Battery heater	<input type="checkbox"/> CHINT <input type="checkbox"/> SCHNEIDER <input type="checkbox"/> ABB
Fuel system	Control system	Voltage	Synchronized system
<input type="checkbox"/> 12hrs base tank <input type="checkbox"/> 24hrs base tank <input type="checkbox"/> Dual wall base fuel tank <input type="checkbox"/> Outside fuel tank	<input type="checkbox"/> AMF function <input type="checkbox"/> ATS control cabinet <input type="checkbox"/> DSE7320 <input type="checkbox"/> DSE7510 <input type="checkbox"/> GU620A	<input type="checkbox"/> 415/240V <input type="checkbox"/> 400/230V <input type="checkbox"/> 380/220V <input type="checkbox"/> 220/127V <input type="checkbox"/> 200/115V	<input type="checkbox"/> CHINT Cabinet <input type="checkbox"/> SCHNEIDER Cabinet <input type="checkbox"/> DSE8610 Module <input type="checkbox"/> COMAQ Module <input type="checkbox"/> DEIF Module

## Dimension & Weight

### Open

Overall Size: LxWxH (mm)	3150 x1100x1920
Weight (kg)	2400

### Soundproof Version

Overall Size: LxWxH (mm)	5000x1900x2250
Weight (kg)	4200

## Sales Promises

- ◆ FDK provides a full line of brand new and high quality products. Each and every unit is strictly factory tested before shipment.
- ◆ Quality warranty is according to our standard conditions: 12 months from BL date or 1000 running hours, whichever comes first.
- ◆ Service and parts are available from FDK or distributors in your location.
- ◆ FDK guarantee use **BRAND NEW & GENUINE MACHINE.**





# Cummins Inc.

Columbus, Indiana 47201

## Engine Data Sheet

Basic Engine Model:  
**QSL9-G5**

Engine Critical Parts List:  
**CPL: 8693**

Curve Number:  
**FR-92129**

Date:  
**11 Dec 06**

*G-DRIVE*  
**QSL**  
**1**

Displacement : **8.8 litre (543 in<sup>3</sup>)**

Bore : **114 mm (4.49 in.)** Stroke : **145 mm (5.69 in.)**

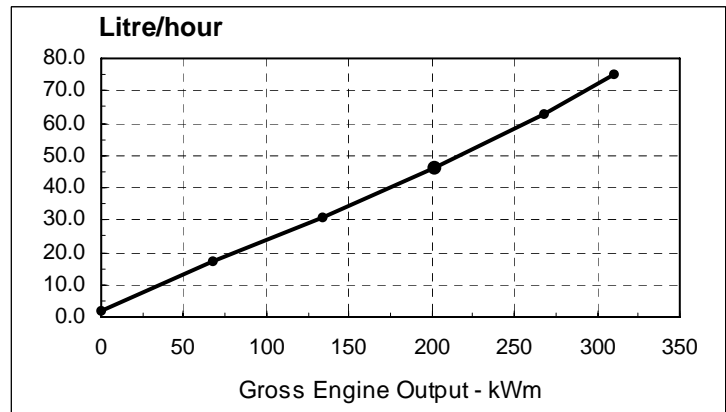
No. of Cylinders : **6**

Aspiration : **Turbocharged and Charge Air Cooled**

Engine Speed RPM	Standby Power		Prime Power		Continuous Power	
	kWm	BHP	kWm	BHP	kWm	BHP
1500	310	415	268	359	228	305
1800	355	476	307	412	261	350

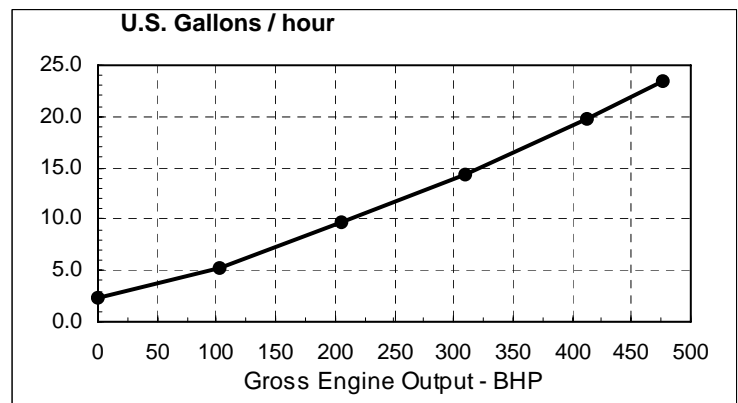
### Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm-h	lb/ BHP-h	litre/ hour	U.S. Gal/ hour
<b>STANDBY POWER</b>						
100	310	415	0.206	0.338	75	19.8
<b>PRIME POWER</b>						
100	268	359	0.199	0.328	63	16.6
75	201	269	0.194	0.319	46	12.1
50	134	180	0.196	0.323	31	8.2
25	67	90	0.213	0.351	17	4.4
<b>CONTINUOUS POWER</b>						
100	228	305	0.196	0.323	53	13.9



### 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	355	476	0.214	0.352	89	23.6
<b>PRIME POWER</b>						
100	307	412	0.208	0.342	75	19.9
75	231	309	0.201	0.331	55	14.4
50	154	206	0.202	0.332	36	9.6
25	77	103	0.221	0.363	20	5.3
<b>CONTINUOUS POWER</b>						
100	261	350	0.204	0.335	63	16.5



**CONVERSIONS:**(litres = U.S. Gal x 3.785) (U.S.Gal = litres x 0.2642)

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 H<sub>2</sub>O 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: --Limited Production--

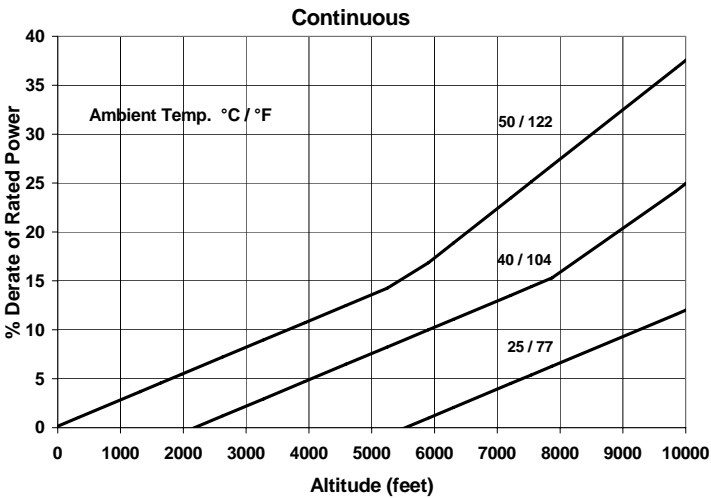
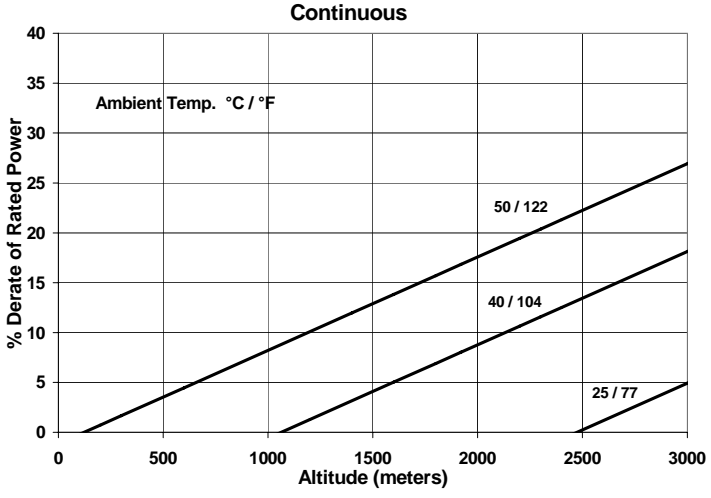
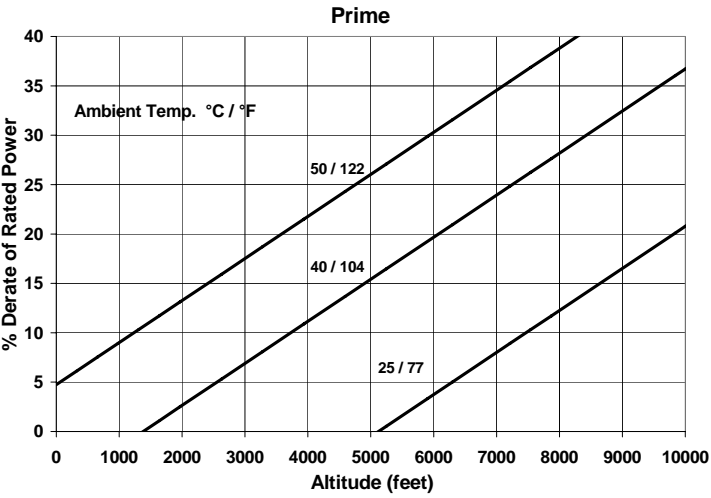
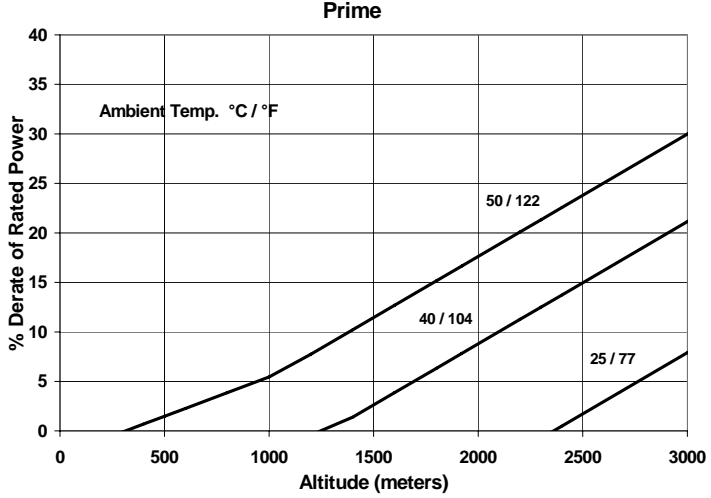
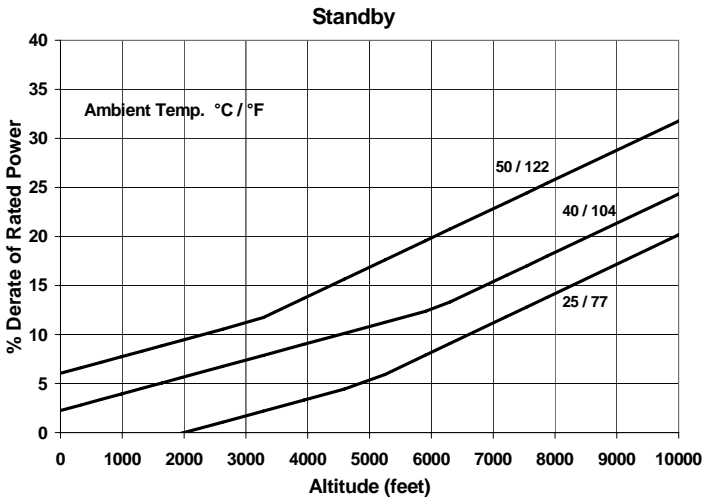
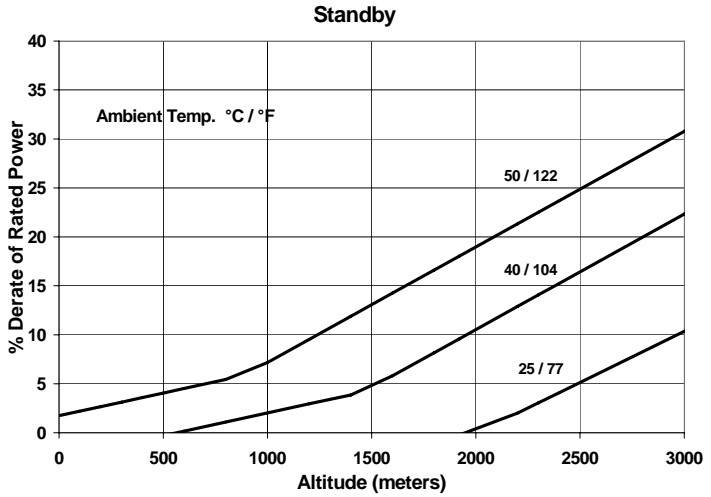
Data Tolerance: ± 5%

Chief Engineer:

*C. J. [Signature]*  
[www.tdkenergy.com](http://www.tdkenergy.com)

**1500 RPM Derate Curves**

**1800 RPM Derate Curves**



**Operation At Elevated Temperature And Altitude:**  
 For **Standby operation** above these conditions, derate by an additional 4% per 300 m (1000 ft), and 4% per 10° C (18° F).  
 For **Prime operation** above these conditions, derate by an additional 5% per 300 m (1000 ft), and 8% per 10° C (18° F).

**Operation At Elevated Temperature And Altitude:**  
 For **Standby operation** above these conditions, derate by an additional 3.0% per 300 m (1000 ft), and 5% per 10° C (18° F).  
 For **Prime operation** above these conditions, derate by an additional 5.0% per 300 m (1000 ft), and 10% per 10° C (18° F).

**Cummins Inc.**  
**Engine Data Sheet**

**ENGINE MODEL : QSL9-G5**

**CONFIGURATION NUMBER : D563007GX03**

**DATA SHEET : DS91545**

**DATE : 11Dec06**

**PERFORMANCE CURVE : FR-91545**

**INSTALLATION DIAGRAM**

• Fan to Flywheel : 3170696

**CPL NUMBER**

• Engine Critical Parts List : 8693

**GENERAL ENGINE DATA**

Type .....	4-Cycle; In-line; 6-Cylinder Diesel
Aspiration .....	Turbocharged and Charge Air Cooled
Bore x Stroke .....	4.49 x 5.69 (114 x 145)
Displacement .....	543 (8.8)
Compression Ratio .....	16.8 : 1
Dry Weight	
Fan to Flywheel Engine .....	1575 (714)
Wet Weight	
Fan to Flywheel Engine .....	1627 (738)
Moment of Inertia of Rotating Components	
• with FW 9520 Flywheel .....	TBD (TBD)
• with FW 9525 Flywheel .....	TBD (TBD)
Center of Gravity from Rear Face of Block .....	16.89 (429)
Center of Gravity Above Crankshaft Centerline .....	8.35 (212)
Maximum Static Loading at Rear Main Bearing .....	TBD (TBD)

**ENGINE MOUNTING**

Maximum Bending Moment at Rear Face of Block .....	1000 (1356)
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**EXHAUST SYSTEM**

Maximum Back Pressure .....	3 (76)
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**AIR INDUCTION SYSTEM**

Maximum Intake Air Restriction	
• with Dirty Filter Element .....	25 (635)
• with Clean Filter Element .....	15 (381)

**COOLING SYSTEM**

**Jacket Water Circuit Requirements**

Coolant Capacity — Engine Only .....	2.9 (11)
Maximum Static Head of Coolant Above Engine Crank Centerline .....	60 (18.3)
Standard Thermostat (Modulating) Range .....	180 - 199 (82 - 93)
Minimum Pressure Cap .....	15 (103)
Maximum Top Tank Temperature for Standby / Prime Power .....	230 / 219 (110 / 104)
Maximum Coolant Friction Head External to Engine .....	
— 1800 rpm .....	5 (35)
— 1500 rpm .....	4 (28)

**Air-to-Air Core Requirements**

Maximum Temp. Rise Between Engine Air Intake and Intake Manifold .....	45 (25)
Maximum Air Pressure Drop from Turbo Air outlet to Intake Manifold— 1800 rpm .....	4 (102)
— 1500 rpm .....	2.5 (63.5)
Maximum Intake Manifold Temperature @ 77°F (25 °C) ambient .....	122 (50)
Maximum Intake Manifold Temperature for engine protection (Warning Threshold) .....	200 (93)

**LUBRICATION SYSTEM**

Oil Pressure @ Idle Speed .....	15 (103)
@ Governed Speed .....	40 - 60 (276 - 414)
Maximum Oil Temperature .....	250 (121)
Oil Capacity with OP 9451 Oil Pan : High - Low .....	6 (22.7)
Total System Capacity (Including Combo Filter) .....	7 (26.5)
Angularity of OP 9451 Oil Pan — Front Down .....	45°
— Front Up .....	45°
— Side to Side .....	45°

**FUEL SYSTEM**

Type Injection System.....	Bosch HPCR	
Maximum Restriction at Lift Pump .....	6	(152)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) .....	10	(254)
Maximum Fuel Flow to Injection Pump.....	43	(165)
Maximum Fuel Return Flow .....	8	(30)
Maximum Fuel Inlet Temperature.....	160	(70)

**ELECTRICAL SYSTEM**

Cranking Motor (Heavy Duty, Positive Engagement).....	12	24
Battery Charging System, Negative Ground.....	100	70
Maximum Allowable Resistance of Cranking Circuit.....	0.001	0.002
Minimum Recommended Battery Capacity		
Cold Soak @ 50-F (10-C) and Above.....	TBD	(TBD)
Cold Soak @ 32 to 50-F (0 to 10-C) .....	TBD	(TBD)
Cold Soak @ 0 to 32-F (-18 to 0-C).....	1500	(750)

**COLD START CAPABILITY**

Minimum Ambient Temperature for Aided (with Coolant Heater) Cold Start within 10 seconds.....	40	(4)
Minimum Ambient Temperature for Unaided Cold Start.....	10	(-12)

**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;		
Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); 1800 rpm.....	— dBA	118.8
Exhaust Noise at 1 m Horizontal from Centerline of Exhaust Pipe Outlet Upwards at 45 ° 1800 rpm.....	-- dBA	119.5

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:	
• 2.5 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>
Governed Engine Speed .....	1800	1500	1800	1500
Engine Idle Speed.....	700 - 900	700 - 900	700 - 900	700 - 900
Gross Engine Power Output.....	476 (355)	415 (310)	412 (307)	359 (268)
Brake Mean Effective Pressure.....	387 (2668)	404 (2785)	335 (2309)	350 (2413)
Piston Speed .....	1707 (8.7)	1422 (7.2)	1707 (8.7)	1422 (7.2)
Friction Horsepower.....	47 (35)	35 (26)	47 (35)	35 (26)
Engine Water Flow at Stated Friction Head External to Engine:				
• 2.5 psi Friction Head.....	64 (4.0)	52 (3.3)	64 (4.0)	52 (3.3)
• Maximum Friction Head .....	60 (3.8)	47 (3.0)	60 (3.8)	47 (3.0)
Intake Air Flow .....	870 (410)	715 (340)	820 (390)	660 (310)
Exhaust Gas Temperature .....	1070 (580)	1040 (560)	945 (500)	930 (500)
Exhaust Gas Flow .....	2300 (1080)	1870 (880)	1980 (930)	1585 (750)
Air to Fuel Ratio .....	22.1 : 1	21.7:1	24.8 : 1	23.8:1
Radiated Heat to Ambient .....	2070 (40)	1720 (35)	1745 (35)	1455 (30)
Heat Rejection to Jacket Coolant.....	7705 (140)	6610 (120)	6425 (115)	5550 (100)
Heat Rejection to Exhaust .....	17175 (305)	13385 (240)	14120 (250)	11125 (200)
Heat Rejection to Fuel.....	65 (1.1)	65 (1.1)	65 (1.1)	65 (1.1)
Heat Rejected to Aftercooler.....	4535 (80)	3580 (65)	3765 (70)	2865 (55)
Charge Air Flow.....	60 (27)	51 (23)	57 (26)	46 (21)
Turbocharger Compressor Outlet Pressure.....	75 (2006)	77 (1950)	71 (1815)	63 (1600)
Turbocharger Compressor Outlet Temperature.....	437 (225)	426 (219)	401 (205)	381 (194)

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

Cummins Inc.

**ENGINE MODEL : QSL9-G5**

**DATA SHEET : DS-91545**

**DATE : 10Oct06**

**CURVE NO. : FR-91545**

[www.fdkenergy.com](http://www.fdkenergy.com)

Columbus Indiana 47202-3005