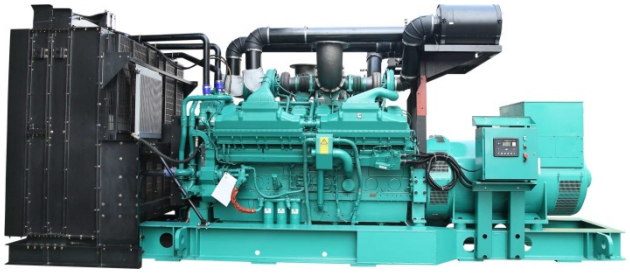
FDK ENERGY
SHENZHEN FUDIANKANG ENERGY CO., LTD
GUANGZHOU SANQ DIESEL GENERATOR SET CO., LTD
Tel:86-13729889887 Fax:86-20-84550026
Web: www.fdkenergy.com Email: info@fdkenergy.com

DATA SHEET

DIESEL GENERATOR 820KW
MODEL#FDK-CG820/H2
60HZ/1800RPM
CUMMINS MODEL: QSK23-G3



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-CG820/H2	Engine Make	Cummins Original
Prime Power	730KW/910KVA	Engine Model	QSK23-G3
Standby Power	820KW/1025KVA	Alternator model	Stamford LVI634C
Output Frequency / Rated speed	60Hz/1800rpm	Control System	DSE7320
Rated Voltage	230V/400V	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	QSK23-G3	Aspiration	Turbo-charged
Engine Manufacturer	Cummins ORIGINAL	Bore x Stroke (mm x mm)	170×170
		Displacement	23.15L
Cylinder quantity	6	Compression Ratio	16.0:1
Cylinder Arrangement	In-line	Prime power / Speed (KW/RPM)	809kw/1800
Cycle	4	Standby power/ Speed (KW/RPM)	895kw/1800

CE ISO9001:2008 FDK reserves the right to change the specifications and designs without noice.

Type Injection System	Cummins HPI-PT	Fuel Consumption at 100% load (g/KWh)	199 at 1800rpm
Piston Speed	10.3m/s	Starter motor	24V
Friction Energy Output	93kw	Low idle	750pm
Total Lubrication System Capacity (L)	103	Coolant Capacity (L)	46.5

Alternator Specifications

Alternator model	LVI634C	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	916KVA	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.

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Optional

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

Dimension & Weight

Open

Overall Size: L×W×H (mm)	3800×1818×2350
Weight (kg)	7000

Soundproof Version

Overall Size: L×W×H (mm)	5800×2000×2550
Weight (kg)	9300

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.	Basic Engine Model: QSK23-G3	Curve Number: FR-50011	G-DRIVE QSK 1
Columbus, Indiana 47201	Engine Critical Parts List: CPL: 8352	Date: 16Jan06	
Engine Data Sheet			

Displacement : **23.15** litre (**1413** in^3)	Bore : **170** mm (**6.69** in.) Stroke : **170** mm (**6.69** in.)
No. of Cylinders : **6**	Aspiration : **Turbocharged and Air to Air Aftercooled**

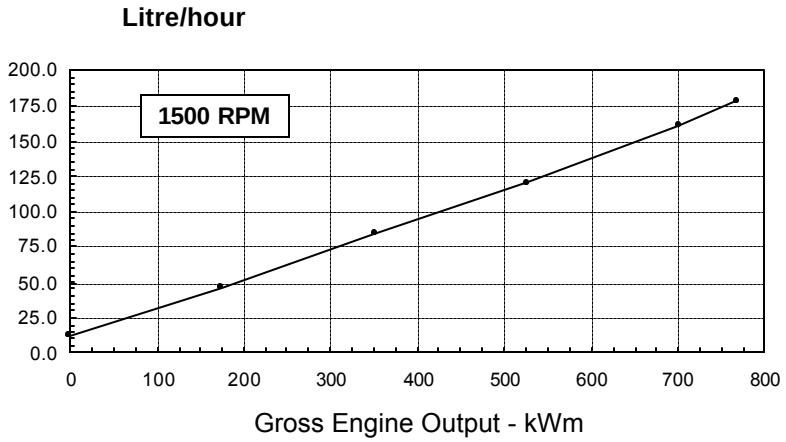
Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	kWm	BHP	kWm	BHP	kWm	BHP
1500	768	1030	701	940	537	720
1800	895	1200	809	1085	652	875

Emissions Certification (1800 RPM Only)

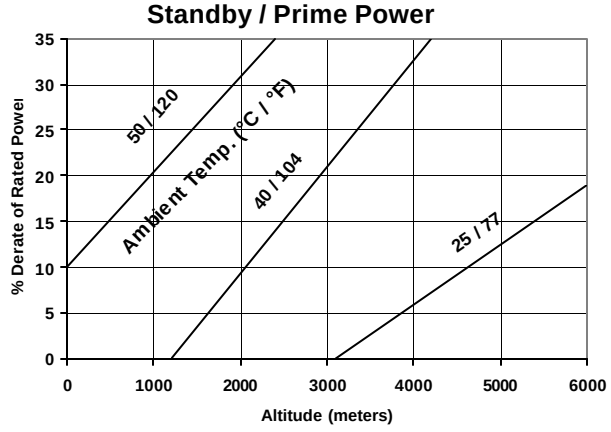
"For mobile applications in the U.S. and Canada, this rating may only be sold in accordance with the OEM TPEM provisions of 40 CFR 89.102.
For stationary applications in the U.S. (except California), this rating may be sold through 2006 under the NSPS provisions of 40 CFR Part 60."

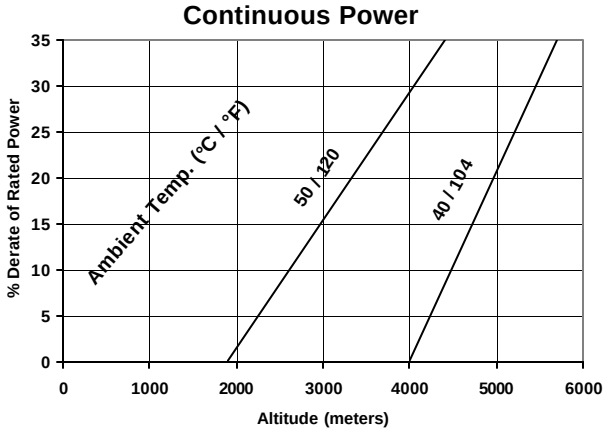
Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm·h	lb/ BHP·h	litre/ hour	U.S. Gal/ hour
STANDBY POWER						
100	768	1030	0.197	0.323	178	46.9
PRIME POWER						
100	701	940	0.195	0.321	161	42.5
75	526	705	0.196	0.322	121	32.0
50	351	470	0.206	0.338	85	22.4
25	175	235	0.223	0.370	46	12.2
CONTINUOUS POWER						
100	537	720	0.198	0.326	125	33.1



Power Derate Curves @ 1500 RPM





Operation At Elevated Temperature And Altitude:

For sustained operation above these conditions, derate by an additional 3.4% per 300 m (1000 ft), and 20% per 10° C (18° F).

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_20 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:

Cummins Inc.	Basic Engine Model: QSK23-G3	Curve Number: FR-50011	G-DRIVE QSK 2
Columbus, Indiana 47201	Engine Critical Parts List: CPL: 8352	Date: 16Jan06	
Engine Data Sheet			

Displacement : **23.15** litre (**1413** in^3)	Bore : **170** mm (**6.69** in.) Stroke : **170** mm (**6.69** in.)
No. of Cylinders : **6**	Aspiration : **Turbocharged and Air to Air Aftercooled**

Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	kWm	BHP	kWm	BHP	kWm	BHP
1500	768	1030	701	940	537	720
1800	895	1200	809	1085	652	875

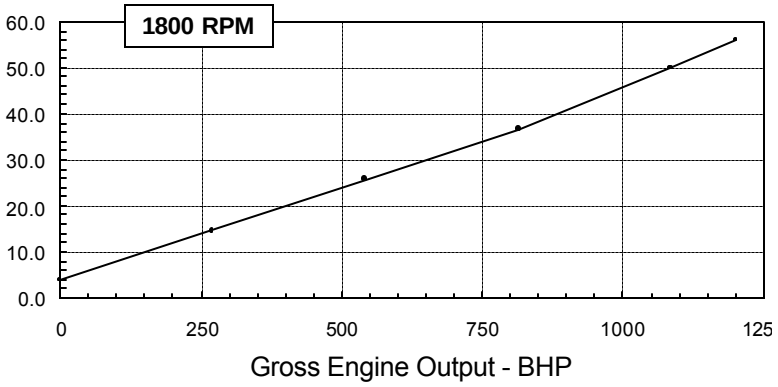
Emissions Certification (1800 RPM Only)

"For mobile applications in the U.S. and Canada, this rating may only be sold in accordance with the OEM TPEM provisions of 40 CFR 89.102.
For stationary applications in the U.S. (except California), this rating may be sold through 2006 under the NSPS provisions of 40 CFR Part 60."

Engine Performance Data @ 1800 RPM

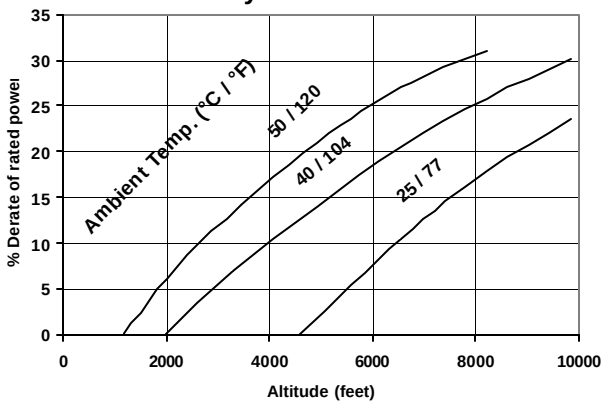
OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm·h	lb/ BHP·h	litre/ hour	U.S. Gal/ hour
STANDBY POWER						
100	895	1200	0.201	0.332	212	56.1
PRIME POWER						
100	809	1085	0.199	0.326	189	49.8
75	607	814	0.195	0.320	139	36.7
50	405	543	0.204	0.336	97	25.7
25	202	271	0.236	0.385	56	14.7
CONTINUOUS POWER						
100	653	875	0.194	0.320	149	39.4

U.S. Gallons / hour

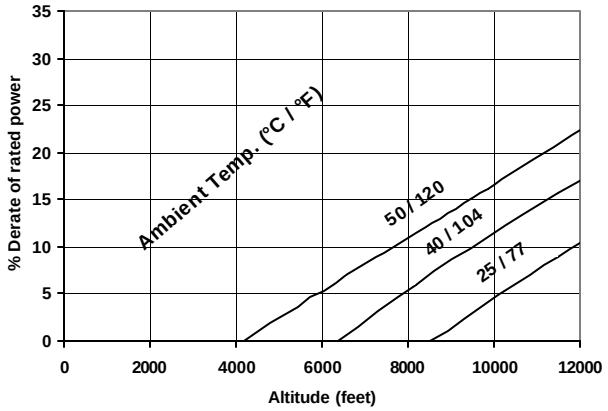


Power Derate Curves @ 1800 RPM

Standby / Prime Power



Continuous Power



Operation At Elevated Temperature And Altitude:

For sustained operation above these conditions, derate by an additional 5.0% per 300 m (1000 ft), and 7% per 10° C (18° F).

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Derates shown are based on 15 in H_20 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: D K. Lunkwood

Cummins Inc.
Engine Data Sheet

ENGINE MODEL : **QSK23-G3** **CONFIGURATION NUMBER :** D893001GX03

DATA SHEET : LP-50011
DATE : 16Jan06
PERFORMANCE CURVE : FR-50011

INSTALLATION DIAGRAM
• Fan to Flywheel : 3170553

CPL NUMBER
• Engine Critical Parts List : 8352

GENERAL ENGINE DATA

Type		Inline 6-Cylinder Diesel	
Aspiration		Turbocharged and Low Temperature Aftercooled	
Bore x Stroke	— mm x mm (in x in)	170 x 170 (6.69 x 6.69)	
Displacement	— litre (in^3)	23.15 (1413)	
Compression Ratio		16.0:1	
Dry Weight			
Fan to Flywheel Engine	— kg (lb)	2755	(6060)
Wet Weight			
Fan to Flywheel Engine	— kg (lb)	2805	(6170)
Moment of Inertia of Rotating Components			
• with (SAE 0)	— kg • m^2 (lb_m • ft^2)	11.6	(270)
Center of Gravity from Front Face of Block	— mm (in)	725	(28.5)
Center of Gravity Above Crankshaft Centerline	— mm (in)	240	(9.5)
Maximum Static Loading at Rear Main Bearing	— kg (lb)	990	(2160)

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block	— N • m (lb • ft)	3205	(2340)

EXHAUST SYSTEM

Maximum Back Pressure	— mm Hg (in Hg)	76.2	(3)

AIR INDUCTION SYSTEM

Maximum Intake Air Restriction:			
• with Dirty Filter Element	— mm H_2O (in H_2O)	635	(25)
• with Clean Filter Element	— mm H_2O (in H_2O)	381	(15)

COOLING SYSTEM

Coolant Capacity — Engine Only	— litre (US gal)	46.5	(12.3)
Minimum Pressure Cap	— kPa (psi)	69	(10)

Jacket Water Circuit Requirements

Maximum Static Head of Coolant Above Engine Crank Centerline	— m (ft)	18.3	(60)
Standard Thermostat (Modulating) Range	— °C (°F)	76.5-90	(170 - 194)
Maximum Top Tank Temperature for Standby . Prime Power	— °C (°F)	104 - 100	(220 - 212)
Maximum Coolant Friction Head External to the Engine - 1800 RPM	— kPa (psi)	48	(7)
-1500 RPM	— kPa (psi)	34	(5)

Air-to-Air Core Requirements

Maximum Temp. Rise Between Engine Air Intake and Intake Manifold —1500 / 1800 rpm	— °C (°F)	33	(60)
Maximum Air Press. Drop from Turbo Air Outlet to Intake Manifold — 1500 / 1800 rpm	— mm Hg (in Hg)	102	(4)

LUBRICATION SYSTEM

Oil Pressure @ Idle Speed	— kPa (psi)	145	(21)
@ Governed Speed	— kPa (psi)	345 - 448	(50 - 65)
Maximum Oil Temperature	— °C (°F)	120	(248)
Oil Capacity with OP TBD Oil Pan : Low - High	— litre (US gal)	66 - 95	(17 - 25)
Total System Capacity (With Combo Filters)	— litre (US gal)	74 - 103	(19 - 27)

FUEL SYSTEM

Type Injection System			Cummins HPI-PT
Maximum Restriction at Fuel Injection Pump	— with Clean Fuel Filter — mm Hg (in Hg)	120	(4.0)
	— with Dirty Fuel Filter — mm Hg (in Hg)	203	(8.0)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) — mm Hg (in Hg)		229	(9.0)
Maximum Inlet Temperature — °C (°F)		70	(160)
Maximum Fuel Flow to Injection Pump — litre / hr (US gph)		684	(181)
Maximum Drain Flow — litre / hr (US gph)		662	(175)

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement) — volt	24
Battery Charging System, Negative Ground — ampere	35
Maximum Allowable Resistance of Cranking Circuit — ohm	0.002
Minimum Recommended Battery Capacity	
• Cold Soak @ 10 °C (50 °F) and Above — 0°F CCA	1200
• Cold Soak @ 0 °C to 10 °C (32 °F to 50 °F) — 0°F CCA	1280
• Cold Soak @ -18 °C to 0 °C (0 °F to 32 °F) — 0°F CCA	1800

COLD START CAPABILITY

Minimum Ambient Temperature for Cold Start with 1500 watt Coolant Heater to Rated Speed — °C (°F)	-30	(-22)
Minimum Ambient Temperature for Unaided Cold Start to Idle Speed — °C (°F)	0	(32)
Minimum Ambient Temperature for NFPA 110 Cold Start (90° F Minimum Coolant Temperature) — °C (°F)	10	(50)

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%
Air Intake Restriction	381 mm H_2O (15 in H_2O)	Exhaust Restriction	51 mm Hg (2 in Hg)

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); @1500 rpm — dBA	TBD	
Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45° — dBA	TBD	

	STANDBY POWER 60 hz	STANDBY POWER 50 hz	PRIME POWER 60 hz	PRIME POWER 50 hz
Governed Engine Speed — rpm	1800	1500	1800	1500
Engine Idle Speed — rpm	750	750	750	750
Gross Engine Power Output — kW_m (BHP)	895 (1200)	768 (1030)	809 (1085)	701 (940)
Brake Mean Effective Pressure — kPa (psi)	2600 (377)	2675 (388)	2350 (341)	2441 (354)
Piston Speed — m / s (ft / min)	10.3 (2010)	8.6 (1675)	10.3 (2010)	8.6 (1675)
Friction Horsepower — kW_m (HP)	93 (124)	72 (96)	93 (124)	72 (96)
Engine Jacket Water Flow at Stated Friction Head External to Engine:				
• 3 psi Friction Head — litre / s (US gpm)	10.4 (165)	7.6 (120)	10.4 (165)	7.9 (126)
• Maximum Friction Head — litre / s (US gpm)	10.1 (160)	7.6 (120)	10.1 (160)	7.6 (120)
Engine Data				
Intake Air Flow — litre / s (cfm)	1132 (2398)	888 (1882)	1094 (2318)	815 (1720)
Exhaust Gas Temperature — °C (°F)	514 (957)	543 (1010)	467 (872)	532 (990)
Exhaust Gas Flow — litre / s (cfm)	3056 (6475)	2463 (5218)	2773 (5875)	2259 (4786)
Air-to-Fuel Ratio — air : fuel	25.5 : 1	23.8 : 1	27.6 : 1	25.3 : 1
Radiated Heat to Ambient — kW_m (BTU / min)	85 (4862)	71 (4058)	76 (4313)	65 (3682)
Heat Rejection to Jacket Water Coolant — kW_m (BTU / min)	269 (15305)	222 (12636)	235 (13358)	215 (12252)
Heat Rejection to Exhaust — kW_m (BTU / min)	656 (37334)	570 (32417)	569 (32392)	507 (28877)
Heat Rejection to Fuel* — kW_m (BTU / min)	9.1 (520)	6.8 (387)	9.1 (520)	6.8 (387)
Charge Air Cooler Heat Rejection — kW_m (BTU / min)	223 (12673)	146 (8329)	198 (11270)	122 (6944)
Turbo Compressor Outlet Temperature — °C (°F)	227 (440)	199 (390)	209 (408)	182 (360)
Turbo Compressor Outlet Pressure — kPa (psi)	283 (41)	248 (36)	269 (39)	214 (31)

* This is the maximum heat rejection to fuel, which is at low load

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

ENGINE MODEL : QSK23-G3
DATA SHEET : DS-50011-LP
DATE : 16Jan06
CURVE NO. : PS-50011