

No. of Cylinders: 6

Displacement : 23.15 litre (1413 in³)

Cummins Inc.

Columbus, Indiana 47201

Engine Data Sheet

Basic Engine Model: **QSK23-G1 NR1**

Engine Critical Parts List:

CPL: 8352

Curve Number:

FR-50007 Date:

5May03

G-DRIVE **QSK**

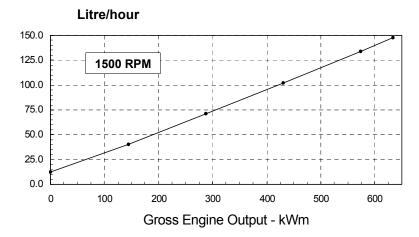
Bore: 170 mm (6.69 in.) Stroke: 170 mm (6.69 in.)

Aspiration: Turbocharged and Air to Air Aftercooled

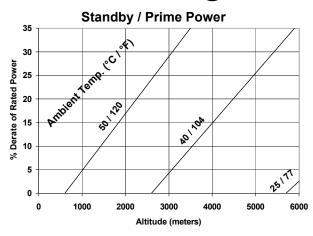
Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	kWm	ВНР	kWm	ВНР	kWm	ВНР
1500	634	850	574	770	433	580
1800	675	905	608	815	504	675

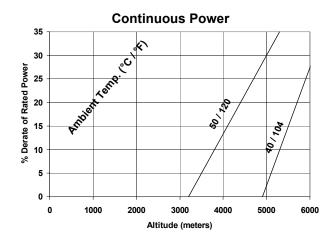
Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION					
%	% kWm BHP		kg/ kWm∙h	lb/ litre/ BHP·h hour		U.S. Gal/ hour		
STAN	STANDBY POWER							
100	634	850	0.198	0.326	148	39.0		
PRIME	PRIME POWER							
100	574	770	0.198	0.327	134	35.5		
75	431	578	0.201	0.330	102	26.9		
50	287	385	0.210	0.345	71	18.7		
25	144	193	0.236	0.390	40	10.6		
CONT	CONTINUOUS POWER							
100	433	580	0.200	0.330	102	27.0		



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)

These quidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set in stallations. 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: <u>UNLIMITED TIME RUNNING PRIME POWE</u>.

ER: 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 <u>CONTINUOUS POWER RATING</u>: 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. Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year an unlimited number of hours per year. No overload capability is available for this rating.

Data Subject to Change Without Notice

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 temper-ature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. Derates shown are based on 15 in H₂0 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:

DK. Trueblood



Displacement : 23.15 litre (1413 in³)

Cummins Inc.

Columbus, Indiana 47201

Basic Engine Model: **QSK23-G1 NR1**

Engine Critical Parts List:

CPL: 8352

Curve Number: FR-50007 Date:

5May03

G-DRIVE **QSK** 2

Engine Data Sheet

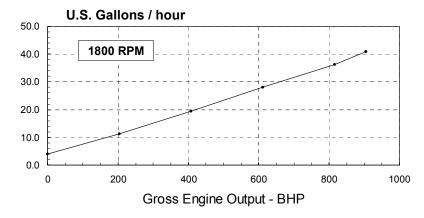
Bore: 170 mm (6.69 in.) Stroke: 170 mm (6.69 in.)

No. of Cylinders: 6 Aspiration: Turbocharged and Air to Air Aftercooled

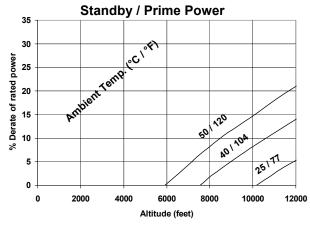
Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	kWm	ВНР	kWm	ВНР	kWm	ВНР
1500	634	850	574	770	433	580
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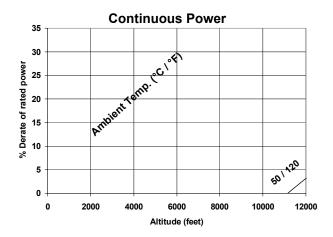
Engine Performance Data @ 1800 RPM

OUTPUT POWER			FUEL CONSUMPTION					
%	kWm	ВНР	kg/ kWm·h	lb/ BHP∙h	litre/ hour	U.S. Gal/ hour		
STAN	STANDBY POWER							
100	675	905	0.195	0.322	155	41.0		
PRIME	PRIME POWER							
100	608	815	0.192	0.316	137	36.3		
75	456	611	0.200	0.328	107	28.2		
50	304	408	0.207	0.340	74	19.5		
25	152	204	0.235	0.390	42	11.2		
CONTINUOUS POWER								
100	504	675	0.191	0.314	113	29.9		



Power Derate Curves @ 1800 RPM





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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Data Status: Limited Production

Data Tolerance: ± 5%

Chief Engineer:

D.K. Irueblood

Cummins Inc. Engine Data Sheet

DATA SHEET: LP50007 ENGINE MODEL: QSK23-G1 NR1 CONFIGURATION NUMBER: D893001GX03 DATE: 5May03
PERFORMANCE CURVE: FR-50007

• Fan to Flywheel : 3170553

<u>CPL NUMBER</u>
• Engine Critical Parts List

: 8352

Type	GENERAL ENGINE DATA		
Aftercooled Aftercooled Aftercooled Aftercooled Displacement 170 x 170 (6.69 x 6.69) 170 (6.69 x 6.69) 23.15 (1413) 16.01 170 (6.69 x 6.69) 23.15 (1413) 16.01 170 (16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01 16.01	Type		
Displacement.	Aspiration		
Displacement.	Bore x Stroke — mm x mm (in x in)	170 x 170 (6.69	x 6.69)
Dry Weight Fan to Flywheel Engine — kg (lb) 2755 (6060)	Displacement—litre (in ³)		,
Fan to Flywheel Engine	·	, ,	
Fan to Flywheel Engine	Dry Weight		
Wet Weight Fan to Flywheel Engine		2755	(6060)
Fan Îo Flywheel Engine	, ,		,
Moment of Inertia of Rotating Components • with (SAE 0)	G	2805	(6170)
- with (SAE 0)	, ,		(5)
Center of Cravity from Front Face of Block		11.6	(270)
Center of Gravity Above Crankshaft Centerline			` '
Maximum Static Loading at Rear Main Bearing			, ,
ENGINE MOUNTING Maximum Bending Moment at Rear Face of Block	· · · · · · · · · · · · · · · · · · ·		, ,
EXHAUST SYSTEM Maximum Back Pressure	Maximum Static Loading at Real Main Bearing	960	(2100)
EXHAUST SYSTEM Maximum Back Pressure	ENGINE MOUNTING		
Maximum Back Pressure	Maximum Bending Moment at Rear Face of Block	3205	(2340)
Maximum Back Pressure	EXHAUST SYSTEM		
Maximum Intake Air Restriction: • with Dirty Filter Element		76.2	(3)
Maximum Intake Air Restriction: • with Dirty Filter Element	AIR INDUCTION SYSTEM		
• with Dirty Filter Element			
• with Clean Filter Element		625	(25)
COOLING SYSTEM Coolant Capacity — Engine Only			
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) 82 - 95 (180 - 203) 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 — mm Hg (in Hg) 102 (4) Maximum Air Press. Drop from Turbo Air Outlet to Intake Manifold —1500 / 1800 rpm — mm Hg (in Hg) 102 (4) Maximum Intake Manifold Temperature at 25° C (77° F) Ambient — °C (°F) 60 (140) LUBRICATION SYSTEM Oil Pressure @ Idle Speed — kPa (psi) 345 - 448 (50 - 65) Maximum Oil Temperature — °C (°F) 120 (248) Oil Capacity with OP TBD Oil Pan :			, ,
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Jacket Water Circuit Requirements Maximum Static Head of Coolant Above Engine Crank Centerline	Coolant Capacity — Engine Only — litre (US gal)	46.5	(12.3)
Maximum Static Head of Coolant Above Engine Crank Centerline	Minimum Pressure Cap	69	(10)
Standard Thermostat (Modulating) Range — °C (°F) 82 - 95 (180 - 203) 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) Maximum Intake Manifold Temperature at 25° C (77° F) Ambient — °C (°F) 60 (140) 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)	Jacket Water Circuit Requirements		
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-1500 RPM		48	<u></u> ;
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@ 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)			(0.1)
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Oil Capacity with OP TBD Oil Pan: Low - High — litre (US gal) 66 - 95 (17 - 25)			,
Total System Capacity (With Filters)	, ,		,
	Total System Capacity (With Filters)	74 - 103	(19 - 27)

FUEL SYSTEM

I OLL STOTLIN			
Type Injection System		Cummir	ns 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		70	(160)
Maximum Fuel Flow to Injection Pump		684	(181)
Maximum Drain Flow		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	0.0	02
Cranking Torque at Minimum Unaided Cold Start Temperature	— Nm (lb/ft)	982	(724)
Minimum Cranking Speed		1	100
Minimum Recommended Battery Capacity	•		
Cold Soak @ 10 °C (50 °F) and Above	0°F CCA	12	200
Cold Soak @ 0 °C to 10 °C (32 °F to 50 °F)		12	280
Cold Soak @ -18 °C to 0 °C (0 °F to 32 °F)		18	800
COLD START CAPABILITY			
Minimum Ambient Temperature for Cold Start with 1500 watt Coolant Heater to Rated Speed		-30	(-22)
Minimum Ambient Temperature for Unaided Cold Start to Idle Speed	` '	0	(32)
Minimum Ambient Temperature for NFPA 110 Cold Start (90° F Minimum Coolant Temperature)		10	(50)
PERFORMANCE DATA	` '		` '
All data is based on: • Engine operating with fuel system, water pump, lubricating oil pump, ai	r cleaner and exhaust		
7 in data to based on. Engine operating with fact system, water pump, labificating on pump, at	ocarior and exhibits		

• 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) : 25 °C (77 °F) Air Temperature

Altitude : 110 m (361 ft) Relative Humidity : 30%

Exhaust Restriction: 51 mm Hg (2 in Hg) Air Intake Restriction : $381 \text{ mm H}_2\text{O} (15 \text{ in H}_2\text{O})$

Estimated Free Field Sound Pressure Level of a Typical Generator Set;

TBD

TBD

Governed Engine Speed — rpm
Engine Idle Speed rpm
Gross Engine Power Output
Brake Mean Effective Pressure
Piston Speed
Friction Horsepower
Engine Jacket Water Flow at Stated Friction Head External to Engine:
• 3 psi Friction Head litre / s (US gpm)
Maximum Friction Head litre / s (US gpm)
Engine Data
Intake Air Flow — litre / s (cfm)
Exhaust Gas Temperature
Exhaust Gas Flow — litre / s (cfm)
Air-to-Fuel Ratio— air : fuel
Radiated Heat to Ambient — kW _m (BTU / min)
Heat Rejection to Jacket Water Coolant— kW _m (BTU / min)
Heat Rejection to Exhaust — kW _m (BTU / min)
Heat Rejection to Fuel*
Charge Air Cooler Heat Rejection
Turbo Compressor Outlet Temperature— °C (°F)
Turbo Compressor Outlet Pressure

STANDBY 60 hz	<u>r POWER</u> 50 hz	PRIME POWER 60 hz 50 hz			
1800	1500	1800	1500		
750	750	750	750		
675 (905)	634 (850)	608 (815)	574 (770)		
1950 (283)	2205 (320)	1765 (256)	1990 (288)		
10.3 (2010)	8.6 (1675)	10.3 (2010)	8.6 (1675)		
93 (124)	72 (96)	93 (124)	72 (96)		
10.4 (165)	7.9 (126)	10.4 (165)	7.9 (126)		
10.1 (160)	7.6 (120)	10.1 (160)	7.6 (120)		
955 (2023)	732 (1552)	897 (1901)	692 (1467)		
448 (839)	572 (1062)	437 (818)	563 (1045)		
2362 (5005)	2145 (4546)	2184 (4627)	1998 (4234)		
25.6 : 1	24.7 : 1	27.0 : 1	25.4 : 1		
62 (3557)	59 (3384)	55 (3144)	54 (3074)		
241 (13712)	227 (12937)	224 (12759)	212 (12052)		
432 (24857)	465 (26465)	365 (20762)	420 (23883)		
9.1 (520)	6.8 (387)	9.1 (520)	6.6 (375)		
138 (7869)	94 (5359)	120 (6820)	84 (4792)		
183 (362)	173 (343)	170 (338)	161 (321)		
221 (32)	186 (27)	193 (28)	159 (23)		

^{*} 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-G1 NR1 DATA SHEET: DS-50007-LP

+/- 0.25

DATE: 5May03 **CURVE NO.:** FR-50007