

CUMMINS ENGINE COMPANY, INC

Columbus, Indiana 47201

ENGINE PERFORMANCE CURVE

Basic Engine Model: **KTA38-G3**

Curve Number: FR-6123

Date:

Page No.

Engine Critical Parts List:

19May98

CPL: 1541 19M

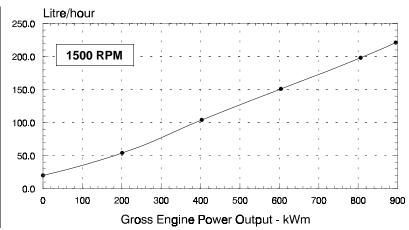
Displacement : **37.8** litre (**2300** in³) Bore : **159** mm (**6.25** in.) Stroke : **159** mm (**6.25** in.)

No. of Cylinders : 12 Aspiration : Turbocharged and Aftercooled

Engine Speed	Standby Power		Prime	Prime Power		Continuous Power	
RPM	kWm	ВНР	kWm	ВНР	kWm	ВНР	
1500	895	1200	806	1080	656	880	
1800	1000	1340	910	1220	776	1040	

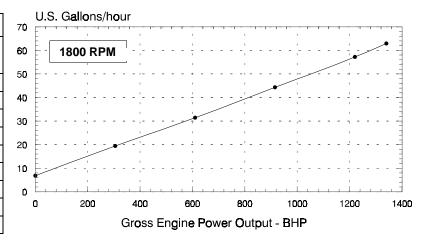
Engine Performance Data @ 1500 RPM

OUT	PUT PO	WER	FUEL CONSUMPTION						
%	kWm	ВНР	kg/ kWm∙h	lb/ BHP∙h	litre/ hour	U.S. Gal/ hour			
STAN	STANDBY POWER								
100	895	1200	0.210	0.345	221	58.3			
PRIME	PRIME POWER								
100	806	1080	0.209	0.344	198	52.3			
75	604	810	0.213	0.350	151	39.9			
50	403	540	0.219	0.360	104	27.3			
25	201	270	0.230 0.378		54	14.3			
CONTINUOUS POWER									
100	656	880	0.212	0.349	164	43.3			



Engine Performance Data @ 1800 RPM

OUTPUT POWER			FUEL CONSUMPTION				
%	kWm	ВНР	kg/ kWm∙h	lb/ BHP∙h	litre/ hour	U.S. Gal/ hour	
STAN	DBY PO	WER					
100	1000	1340	0.202 0.333		238	62.9	
PRIME POWER						•	
100	100 910 1220 75 683 915 50 455 610		0.203	0.333	217	57.2	
75			0.209	0.344	168	44.3	
50			0.222	0.365	119	31.4	
25	228	305	0.272 0.452		73	19.4	
CONT	CONTINUOUS POWER						
100	776	1040	0.208	0.342	190	50.1	



CONVERSIONS:

(Litres = U.S. Gal x 3.785)

 $(kWm = BHP \times 0.746)$

(U.S. Gal = Litres x 0.2642)

(BHP = Engine kWm x 1.34)

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. See reverse side for application rating guidelines.

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.

TECHNICAL DATA DEPT.

CERTIFIED WITHIN 5%

CHIEF ENGINEER

POWER RATING APPLICATION GUIDELINES FOR GENERATOR DRIVE ENGINES

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. Generator drive engines are not designed for and shall not be used in variable speed D.C. generator set applications.

STANDBY POWER RATING is 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.

CONTINUOUS POWER RATING is 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.

PRIME POWER RATING is 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

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.

Reference Standards:

BS-5514 and DIN-6271 standards are based on ISO-3046.

Operation At Elevated Temperature And Altitude:

The engine may be operated at:

1800 RPM up to 5,000 ft (1525 m) and $104^{\rm o}$ F ($40^{\rm o}$ C) without power deration.

1500 RPM up to 5,000 ft (1525 m) and 104° F (40° C) without power deration.

For sustained operation above these conditions, derate by 4% per 1,000 ft (300 m), and 1% per 10° F (2% per 11° C).

Cummins Engine Company, Inc.

Engine Data Sheet

DATA SHEET: DS-4574-B
DATE: 19May98
PERFORMANCE CURVE: FR-6123 ENGINE MODEL: KTA38-G3 **CONFIGURATION NUMBER:** D233030DX02

INSTALLATION DIAGRAM CPL NUMBER

Fan to Flywheel

: 3383897

• Engine Critical Parts List : 1541

Maximum Bending Moment at Rear Face of Block — Ib • ft (N • m) 4500 (6100) EXHAUST SYSTEM Maximum Back Pressure at Standby Power — 1800 rpm — in Hg (mm Hg) 3 (76) AIR INDUCTION SYSTEM Maximum Intake Air Restriction — in H₂O (mm H₂O) 25 (635) • with Dirry Filter Element — in H₂O (mm H₂O) 10 (254) • with Normal Duty Air Cleaner and Clean Filter Element — in H₂O (mm H₂O) 15 (381) COOLING SYSTEM COOLING SYSTEM Coolant Capacity — Engine Only — US gal (liter) 32.7 (124) — with HX 6076 Heat Exchanger — US gal (liter) 52.7 (199) Maximum Coolant Friction Head External to Engine — 1800 rpm — psi (kPa) 10 (69) — 1500 rpm — psi (kPa) 7 (48) Maximum Static Head of Coolant Above Engine Crank Centerline — ft (m) 60 (18.3) Standard Thermostat (Modulating) Range — °F (°C) 180 - 200 (82 - 93) Minimum Pressure Cap — psi (kPa) 10 (69) Maximum Top Tank Temperature fo	GENERAL ENGINE DATA		
Borne x Stroke	Type	4-Cycle; 60°	Vee; 12-Cylinder Die
Displacement	Aspiration	Turbocharg	ed and Aftercooled
Dry Weight	Bore x Stroke — in x in (m	m x mm) 6.25 x 6.25 ((159 x 159)
Dry Weight	Displacement	in ³ (liter) 2300 (37.8)	
Fan to Flywheel Engine	Compression Ratio	13.9 : 1	
Heat Exchanger Cooled Engine	Dry Weight		
Wet Weight Fan to Flywheel Engine —	Fan to Flywheel Engine	— lb (kg) 926	31 (4200)
Fan To Flywheel Engine	Heat Exchanger Cooled Engine	— lb (kg) 970)2 (4400)
Fan To Flywheel Engine	Wet Weight	, 5,	
Heat Exchanger Cooled Engine — lb (kg) 10381 (4708)	<u> </u>	— lb (kg) 978	31 (4436)
• with FW 6001 Flywheel — Ibm • ft² (kg • m²) 248 (10.4) • with FW 6011 Flywheel — Ibm • ft² (kg • m²) 248 (10.4) • with FW 6011 Flywheel — Ibm • ft² (kg • m²) 493 (20.8) Center of Gravity from Rear Face of Flywheel Housing (FH 6024) — in (mm) 38.6 (980) Maximum Static Loading at Rear Main Bearing — lb • ft (N • m) 2000 (908) SIGINE MOUNTING — lb • ft (N • m) 4500 (6100) Awaimum Bending Moment at Rear Face of Block — lb • ft (N • m) 4500 (6100) EXHAUST SYSTEM — in Hg (mm Hg) 3 (76) Maximum Back Pressure at Standby Power — 1800 rpm — in Hg (mm Hg) 3 (76) VIX INDUCTION SYSTEM Maximum Intake Air Restriction — in Hg (mm Hg) 25 (635) • with Dirty Filter Element — in Hg (mm Hg) 10 (254) • with Hawy Duty Air Cleaner and Clean Filter Element — in Hg (mm Hg) 15 (381) COLING SYSTEM — US gal (liter) 32.7 (124) COLING SYSTEM — US gal (liter) <t< td=""><td>Heat Exchanger Cooled Engine</td><td>— lb (kg) 1038</td><td>81 (4708)</td></t<>	Heat Exchanger Cooled Engine	— lb (kg) 1038	81 (4708)
• with FW 6011 Flywheel — Ib _m • ft² (kg • m²) 493 (20.8) Center of Gravity from Rear Face of Flywheel Housing (FH 6024) — In (mm) 38.6 (980) Center of Gravity above Crankshaft Centerlrine — In (mm) 11.0 (279) Maximum Static Loading at Rear Main Bearing — Ib • ft (N • m) 4500 (6100) ENGINE MOUNTING Maximum Bending Moment at Rear Face of Block — Ib • ft (N • m) 4500 (6100) EXHAUST SYSTEM Maximum Back Pressure at Standby Power — 1800 rpm — in Hg (mm Hg) 3 (76) AIR INDUCTION SYSTEM Maximum Intake Air Restriction — in H₂O (mm H₂O) 25 (635) • with Dirty Filter Element — in H₂O (mm H₂O) 15 (381) • with Normal Duty Air Cleaner and Clean Filter Element — in H₂O (mm H₂O) 15 (381) • COOLING SYSTEM Coolant Capacity — Engine Only — US gal (liter) 32.7 (124) • with Na 6076 Heat Exchanger — US gal (liter) 32.7 (124) • Coolant Capacity — Engine Only — US gal (liter) 52.7 (199) Maximum Coolant Friction Head Exte	Moment of Inertia of Rotating Components		
Center of Gravity from Rear Face of Flywheel Housing (FH 6024). — in (mm) 38.6 (980)	• with FW 6001 Flywheel — lb _m • ft ²	$(kg \cdot m^2)$ 24	18 (10.4)
Center of Gravity from Rear Face of Flywheel Housing (FH 6024). — in (mm) 38.6 (980)			93 (20.8)
Center of Gravity above Crankshaft Centerline.			.6 (980)
Maximum Static Loading at Rear Main Bearing			` '
Maximum Bending Moment at Rear Face of Block — Ib • ft (N • m) 4500 (6100) EXHAUST SYSTEM Maximum Back Pressure at Standby Power — 1800 rpm — in Hg (mm Hg) 3 (76) AIR INDUCTION SYSTEM Maximum Intake Air Restriction — in H₂O (mm H₂O) 25 (635) • with Dirry Filter Element — in H₂O (mm H₂O) 10 (254) • with Normal Duty Air Cleaner and Clean Filter Element — in H₂O (mm H₂O) 15 (381) COOLING SYSTEM COOLING SYSTEM Coolant Capacity — Engine Only — US gal (liter) 32.7 (124) — with HX 6076 Heat Exchanger — US gal (liter) 52.7 (199) Maximum Coolant Friction Head External to Engine — 1800 rpm — psi (kPa) 10 (69) — 1500 rpm — psi (kPa) 7 (48) Maximum Static Head of Coolant Above Engine Crank Centerline — ft (m) 60 (18.3) Standard Thermostat (Modulating) Range — °F (°C) 180 - 200 (82 - 93) Minimum Pressure Cap — psi (kPa) 10 (69) Maximum Top Tank Temperature fo	•	, ,	
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• with Normal Duty Air Cleaner and Clean Filter Element			OF (COF)
• with Heavy Duty Air Cleaner and Clean Filter Element			` '
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UBRICATION SYSTEM Oil Pressure @ Idle Speed)8 (409)
Oil Pressure @ Idle Speed — psi (kPa) 20 (138) @ Governed Speed — psi (kPa) 45 - 65 (310 - 448) Maximum Oil Temperature — °F (°C) 250 (121) Oil Capacity with OP6023 Oil Pan : High - Low — US gal (liter) 30 - 23 (114 - 87) Total System Capacity (Including Bypass Filter) — US gal (liter) 35.7 (135) Angularity of OP 6023 Oil Pan — Front Down 30° — Front Up 30°	Maximum Raw Water Inlet Pressure at HX 6076 Heat Exchanger —	psi (kPa)	50 (345)
Oil Pressure @ Idle Speed — psi (kPa) 20 (138) @ Governed Speed — psi (kPa) 45 - 65 (310 - 448) Maximum Oil Temperature — °F (°C) 250 (121) Oil Capacity with OP6023 Oil Pan : High - Low — US gal (liter) 30 - 23 (114 - 87) Total System Capacity (Including Bypass Filter) — US gal (liter) 35.7 (135) Angularity of OP 6023 Oil Pan — Front Down 30° — Front Up 30°	LUBRICATION SYSTEM		
@ Governed Speed — psi (kPa) 45 - 65 (310 - 448) Maximum Oil Temperature — °F (°C) 250 (121) Oil Capacity with OP6023 Oil Pan : High - Low — US gal (liter) 30 - 23 (114 - 87) Total System Capacity (Including Bypass Filter) — US gal (liter) 35.7 (135) Angularity of OP 6023 Oil Pan — Front Down 30° — Front Up 30°		psi (kPa)	20 (138)
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Total System Capacity (Including Bypass Filter)	·	` '	,
Angularity of OP 6023 Oil Pan — Front Down			,
— Front Up			,
	5 ,		
Sido to Sido	— Fiont Op		30°

FUEL SYSTEM

Type Injection System	Direct Injection	Cummins PT
Maximum Restriction at PT Fuel Injection Pump — with Clean Fuel Filter — in Hg (mm Hg)	4.0	(102)
— with Dirty Fuel Filter — in Hg (mm Hg)	8.0	(203)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head)	6.5	(165)
Maximum Fuel Flow to Injection Pump — US gph (liter / hr)	120	(454)
ELECTRICAL SYSTEM		
Cranking Motor (Heavy Duty, Positive Engagement)	24	
Battery Charging System, Negative Ground — ampere	35	
Maximum Allowable Resistance of Cranking Circuit	0.002	
Minimum Recommended Battery Capacity		
• Cold Soak @ 50 °F (10 °C) and Above	1200	
• Cold Soak @ 32 °F to 50 °F (0 °C to 10 °C)	1280	
• Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C)	1800	
COLD START CAPABILITY		
Minimum Ambient Temperature for Aided (with Coolant Heater) Cold Start within 10 seconds °F (°C)	50	(10)
Minimum Ambient Temperature for Unaided Cold Start	45	(7)

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%

Governed Engine Speed — rpm
Engine Idle Speed — rpm
Gross Engine Power Output—BHP (kW _m)
Brake Mean Effective Pressure— psi (kPa)
Piston Speed—ft / min (m / s)
Friction Horsepower — HP (kW _m)
Engine Water Flow at Stated Friction Head External to Engine:
• 4 psi Friction Head US gpm (liter / s)
Maximum Friction Head US gpm (liter / s)
Engine Data with Dry Type Exhaust Manifold
Intake Air Flow— cfm (liter / s)
Exhaust Gas Temperature — °F (°C)
Exhaust Gas Flow — cfm (liter / s)
Air to Fuel Ratio— air : fuel

<u>STANDBY</u>				PRIME POWER				
60 hz		50) hz	6	0 hz	50 hz		
1	1800 1500		1800		1500			
725	5 - 775	725	- 775			725	5 - 775	
1340	(1000)	1200	(895)	1220	(910)	1080	(806)	
256	(1765)	275	(1896)	233	(1606)	248	(1710)	
1875	(9.5)	1562	(7.9)	1875	(9.5)	1562	(7.9)	
170	(127)	115	(86)	170	(127)	115	(86)	
390	(24.6)	310	(19.6)	390	(24.6)	310	(19.6)	
340	(21.4)	280	(17.7)	340	(21.4)	280	(17.7)	
2850	(1340)	2120	(1000)	2680	(1265)	1960	(925)	
896	` ,		` ,	878	` ,	1040	` ,	
	(480)	1060	(570)		(470)		(560)	
6900	(3270)	5900	(2780)	6440	(3040)	5340	(2522)	
26.0 : 1		21.4 : 1		26.8 : 1		22.0 : 1		
8000	(140)	7500	(130)	7500	(130)	6000	(110)	
31000	(550)	31000	(550)	28000	(490)	28000	(490)	
40000	(700)	38000	(670)	37000	(650)	35000	(610)	

N.A. - Data is Not AvailableN/A - Not Applicable to this EngineTBD - To Be Determined

ENGINE MODEL: KTA38-G3 DATA SHEET: DS-4574-B

DATE: 19May98 **CURVE NO**.: FR-6123