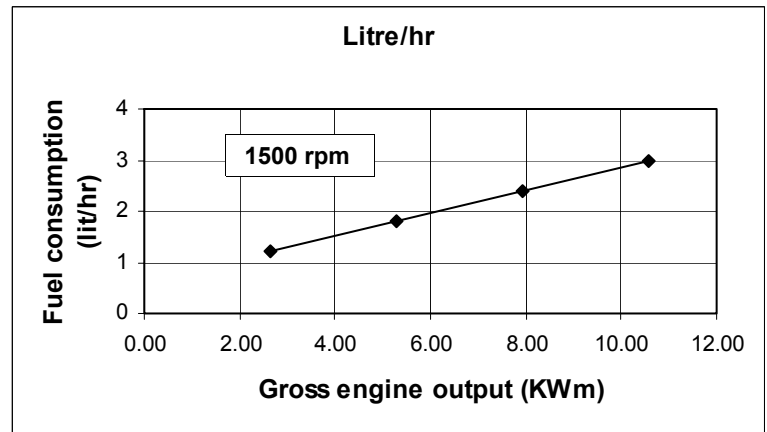
	Cummins India Limited Power Generation Business Unit Engine Data Sheet	Basic Engine Model: X1.3 G2	Curve Number:	G-DRIVE X1.3 1
		Engine Critical Parts List:	Date: 20 July 09	
Displacement : 1.290litre (78.72in³)		Bore : 95.0mm (3.74 in.) Stroke : 91.0mm (3.58 in.)		
No. of Cylinders : 2		Aspiration : Naturally Aspirated		

Engine Speed rpm	Standby Power		Prime Power		Continuous Power	
	kWm	hp	kWm	hp	kWm	hp
1500	11.8	15.8	10.6	14.2	8.3	11.1

Engine Performance Data @ 1500 rpm

litre/hour

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm-h	lb/ hp-h	litre/ hour	US gal/ hour
STANDBY POWER						
100	11.8	15.8	0.246	0.405	3.4	0.9
PRIME POWER						
100	10.6	14.2	0.243	0.400	3.0	0.8
75	7.94	10.65	0.260	0.428	2.4	0.6
50	5.30	7.1	0.290	0.477	1.8	0.5
25	2.65	3.55	0.400	0.658	1.2	0.3
CONTINUOUS POWER						
100	8.3	11.1	0.259	0.426	2.5	0.7



Preliminary Data Sheet

CONVERSIONS:(litres = US Gal x 3.785) (US 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

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 H₂O air intake restriction and 2 in Hg exhaust back pressure.

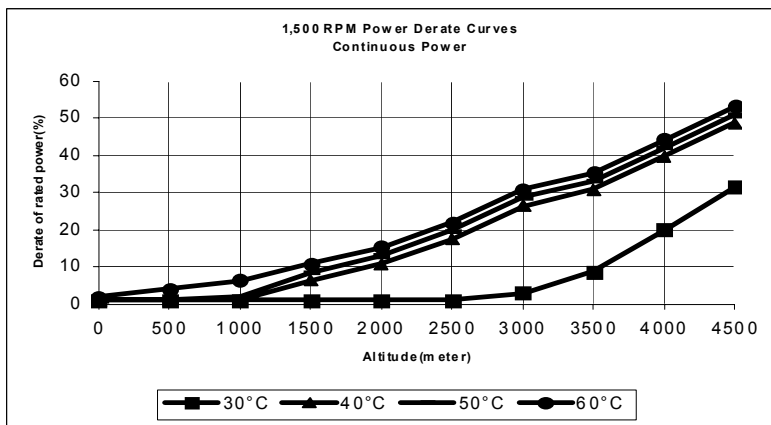
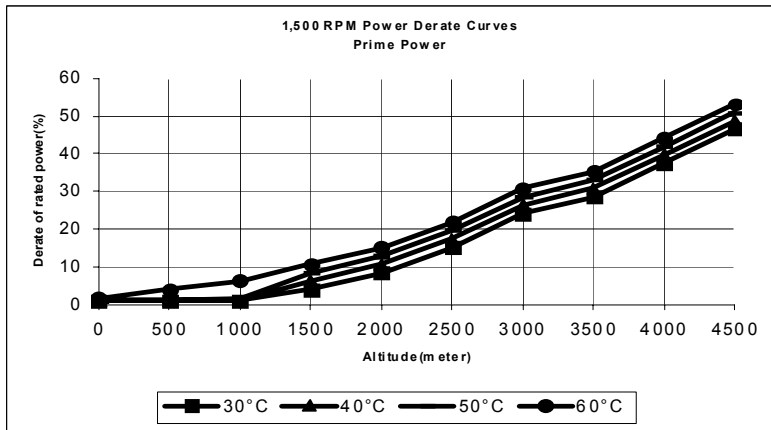
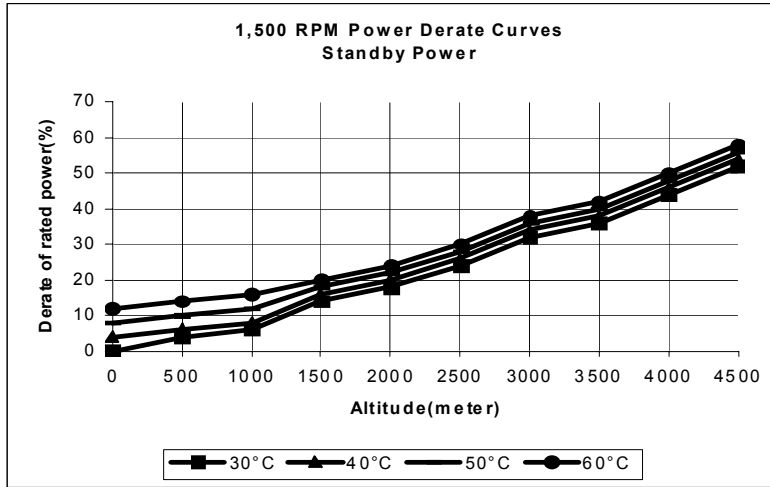
Data Status: Limited Production

Data Tolerance: ± 5%

Chief Engineer:



1500 RPM Power Derate Curves



Operation At Elevated Temperature And Altitude:

For **Standby Operation** above these conditions, derate by an additional 10% per 300 m (1000 ft), and 3.5% per 10 °C (18 °F).

For **Prime Operation** above these conditions, derate by an additional 7% per 300 m (1000 ft), and 2% per 10 °C (18 °F).

For **Continuous Operation** above these conditions, derate by an additional 3.5% per 300 m (1000 ft), and 1.75% per 10 °C (18 °F).

Cummins Inc. Engine Data Sheet

ENGINE MODEL : X 1.3G2

DATA SHEET : DS-X1.3
CONFIGURATION NUMBER : _____ **DATE :** 20July09
PERFORMANCE CURVE : _____

INSTALLATION DIAGRAM

CPL NUMBER

GENERAL ENGINE DATA

Type	Inline 4-Cylinder Diesel		
Aspiration	Naturally Aspirated		
Bore x Stroke	3.74 x 3.58 (95.0 X 91.0)		
Displacement	78.72 (1.290)		
Compression Ratio	18.5 : 1		
Dry Weight (Approximate), Fan to Flywheel Engine	— lb (kg)	396	(180)
Wet Weight (Approximate), Fan to Flywheel Engine	— lb (kg)	414	(188)
Moment of Inertia of Rotating Components			
• with standard Flywheel	— lb _m • ft ² (kg • m ²)	5.60	(0.236)
• with _____ Flywheel	— lb _m • ft ² (kg • m ²)	N/A	(N/A)
Center of Gravity from Rear Face of Block	— in (mm)	8.44	(214.5)
Center of Gravity Above Crankshaft Centerline	— in (mm)	2.6	(66)
Maximum Static Loading at Rear Main Bearing	— lb (kg)	N.A	N.A

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block	— lb • ft (N • m)	N.A	(N.A)
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EXHAUST SYSTEM

Maximum Back Pressure	— in Hg (kPa)	1.2239	(4.13)
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AIR INDUCTION SYSTEM

Maximum Intake Air Restriction:			
• with Clean Filter Element (Normal Duty Air Cleaner)	— in H ₂ O (kPa)	10	(2.5)
• with Clean Filter Element (Heavy Duty Air Cleaner)	— in H ₂ O (kPa)	15	(4)
• with Dirty Filter Element (Heavy Duty Air Cleaner)	— in H ₂ O (kPa)	25	(6.2)

COOLING SYSTEM

Jacket Water Circuit Requirements

Coolant Capacity — Engine Only	— US gal (litre)	0.610	(2.31)
Maximum Static Head of Coolant Above Engine Crank Centerline	— ft (m)	46	(14)
Standard Thermostat (Modulating) Range	— °F (°C)	167-192	(75-89)
Minimum Pressure Cap	— psi (kPa)	7	(48.26)
Maximum Top Tank Temperature for Standby / Prime Power	— °F (°C)	219/212	(104/100)
Maximum Coolant Friction Head External to Engine	— psi (kPa)	5	(36)

Charge Air Cooler Requirements

Maximum Temp. Rise Between Engine Air Intake and Aftercooler Air Outlet- 1500/1800 rpm	— °F (°C)	N/A	(N/A)
Maximum Air Pressure Drop from Turbo Air outlet to Intake Manifold - 1500/1800 rpm	— in Hg (kPa)	N/A	(N/A)
Maximum Intake Manifold Temperature @ 77 °F (25 °C) ambient - 1500/1800 rpm	— °F (°C)	N/A	(N/A)
Maximum Compressor Outlet Temperature	— °F (°C)	N/A	(N/A)
Maximum Intake Manifold Temperature for engine protection (Shut Down Threshold)	— °F (°C)	N/A	(N/A)

LUBRICATION SYSTEM

Oil Pressure @ Idle Speed (minimum)	— psi (kPa)	64	(441)
@ Governed Speed	— psi (kPa)	50	(346)
Maximum Oil Temperature	— °F (°C)	250	(121)
Oil Capacity with std Oil Pan : Low - High	— US gal (litre)	(1.06-0.79)	(4.0-3.0)
Total System Capacity (With Combo Filters)	— US gal (litre)	1.19	(4.5)

FUEL SYSTEM

Type Injection System.....		MICO Inline A-type
Maximum Restriction at Lift Pump(clean/dirty filter).....	— in Hg (kPa)	2.9/N.A. (9.8/N.A.)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head).....	— in Hg (kPa)	11 (37.2)
Maximum Fuel Flow to Injector Pump.....	— US gph (litre/hr)	10.5 (40)
Maximum Return Fuel Flow.....	— US gph (litre/hr)	N.A. (N.A.)
Maximum Fuel Inlet Temperature.....	— °F (°C)	140 (60)

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement).....	— volt	12
Battery Charging System, Negative Ground.....	— ampere	36
Maximum Allowable Resistance of Cranking Circuit.....	— ohm	0.002
Minimum Recommended Battery Capacity		
• Cold Soak @ -12 °C to 0 °C (10 °F to 32 °F).....	— 0°F CCA	638

COLD START CAPABILITY

Minimum Ambient Temperature for Cold Start with 300 watt Coolant Heater to Rated Speed.....	— °F (°C)	1.4 (-17)
Minimum Ambient Temperature for Unaided Cold Start to Idle Speed.....	— °F (°C)	32 (0)
Minimum Ambient Temperature for NFPA 110 Cold Start (90° F Minimum Coolant Temperature).....	— °F (°C)	40 (4.4)

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 : 100 m (300 ft)	Relative Humidity : 30%
Air Intake Restriction : N.A. mm H ₂ O (N.A. in H ₂ O)	Exhaust Restriction : N.A. kPa (N.A. in Hg)

Steady State Stability Band at any Constant Load.....	— %	+/- 0.5
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	105
Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45°.....	— dBA	N.A.

Governed Engine Speed.....	rpm	1500
Engine Idle Speed.....	rpm	950
Gross Engine Power Output.....	hp (kW)	16 (12)
Brake Mean Effective Pressure.....	psi (kPa)	105.49 (727.31)
Piston Speed.....	ft/min (m/s)	1499 (7.62)
Friction Horsepower.....	hp (kW)	2.6 (2.0)
Engine Water Flow at Stated Friction Head External to Engine:		
• 1 psi Friction Head.....	US gpm (litre/min)	1.5 (1380)
• Maximum Friction Head.....	US gpm (litre/min)	1.2 (1140)

	STANDBY POWER		PRIME POWER	
	50 hz	60 hz	50 hz	60 hz
Governed Engine Speed.....	1500	N/A	1500	N/A
Engine Idle Speed.....	950	N/A	850	N/A
Gross Engine Power Output.....	16 (12)	N/A	14 (11)	N/A
Brake Mean Effective Pressure.....	105.49 (727.31)	N/A	96.70 (666.71)	N/A
Piston Speed.....	1499 (7.62)	N/A	1499 (7.62)	N/A
Friction Horsepower.....	2.6 (2.0)	N/A	2.6 (2.0)	N/A
Engine Water Flow at Stated Friction Head External to Engine:				
• 1 psi Friction Head.....	1.5 (1380)	N/A	1.5 (1380)	N/A
• Maximum Friction Head.....	1.2 (1140)	N/A	1.2 (1140)	N/A
Intake Air Flow.....	28.35 (13.38)	N/A	28.35 (13.38)	N/A
Exhaust Gas Temperature.....	1202 (650)	N/A	1166 (630)	N/A
Exhaust Gas Flow.....	29.71 (14.02)	N/A	29.71 (14.02)	N/A
Air to Fuel Ratio.....	20.4:1	N/A	19.2 : 1	N/A
Radiated Heat to Ambient.....	N.A. (N.A)	N/A	N.A. (N.A)	N/A
Heat Rejection to Jacket Coolant.....	655 (11.5)	N/A	655 (11.5)	N/A
Heat Rejection to Exhaust.....	N.A. (N.A)	N/A	N.A. (N.A)	N/A
Heat Rejected to Fuel.....	N.A. (N.A.)	N/A	N.A. (N.A.)	N/A
Charge Air Cooler Heat Rejection.....	N/A. (N/A.)	N/A	N/A. (N/A.)	N/A
Turbocharger Compressor Outlet Pressure.....	N/A. (N/A.)	N/A	N/A. (N/A.)	N/A
Turbocharger Compressor Outlet Temperature.....	N/A. (N/A.)	N/A	N/A. (N/A.)	N/A

Engine Data

Intake Air Flow.....	cfm (litre/s)	28.35 (13.38)
Exhaust Gas Temperature.....	°F (°C)	1202 (650)
Exhaust Gas Flow.....	cfm (litre/s)	29.71 (14.02)
Air to Fuel Ratio.....	air : fuel	20.4:1
Radiated Heat to Ambient.....	BTU/min (kW)	N.A. (N.A)
Heat Rejection to Jacket Coolant.....	BTU/min (kW)	655 (11.5)
Heat Rejection to Exhaust.....	BTU/min (kW)	N.A. (N.A)
Heat Rejected to Fuel.....	BTU/min (kW)	N.A. (N.A.)
Charge Air Cooler Heat Rejection.....	BTU/min (kW)	N/A. (N/A.)
Turbocharger Compressor Outlet Pressure.....	psi (kPa)	N/A. (N/A.)
Turbocharger Compressor Outlet Temperature.....	°F (°C)	N/A. (N/A.)

*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 : X1.3G2
DATA SHEET : DS-X1.3
DATE : 20 July 09
CURVE NO. :