G3516

GAS ENGINE TECHNICAL DATA

CATERPILLAR®

PRELIMINARY

ENGINE SPEED:	1200	FUEL:	LOW ENERGY
COMPRESSION RATIO:	11.3:1	FUEL SYSTEM:	DELTEC
AFTERCOOLER - MAX. INLET (°F):	130	WITH CUSTOMER SUPPLIED AIR FUEL RATIO CONTROL	
JACKET WATER - MAX. OUTLET (°F):	230	FUEL PRESS. RANGE (PSIG):	1.5 - 5.0
ASPIRATION:	TA	MIN. METHANE NUMBER:	130
COOLING SYSTEM:	JW, OC+AC	RATED ALTITUDE (FT):	2500
IGNITION SYSTEM:	EIS	AT AIR TO TURBO. TEMP. (°F):	77
EXHAUST MANIFOLD:	DRY	NOx EMISSION LEVEL:	1.0 g/bhp-hr
COMBUSTION:	LOW EMISSION	FUEL LHV (BTU/SCF):	569
		APPLICATION:	60 Hz GENSET

RATING AND EFFICIENCY		NOTES	LOAD	100%
ENGINE POWER	(WITHOUT FAN)	(1)	BHP	1412
GENERATOR POWER	(WITHOUT FAN)	(2)	EKW	1015
ENGINE EFFICIENCY	**(ISO 3046/1)**	**(3)**	**%**	**37.5**
ENGINE EFFICIENCY	(NOMINAL)	(3)	%	36.7
THERMAL EFFICIENCY	(NOMINAL)	(4)	%	36.3
TOTAL EFFICIENCY	(NOMINAL)	(5)	%	73.0

ENGINE DATA				
FUEL CONSUMPTION	**(ISO 3046/1)**	**(6)**	**BTU/bhp-hr**	**6795**
FUEL CONSUMPTION	(NOMINAL)	(6)	BTU/bhp-hr	6927.0
AIR FLOW (77 °F, 14.7 psi)		(7)	SCFM	2664
AIR FLOW		(7)	lb/hr	11810
COMPRESSOR OUT PRESSURE			in. HG (abs)	84.4
COMPRESSOR OUT TEMPERATURE			°F	327
AFTERCOOLER AIR OUT TEMPERATURE			°F	135
INLET MAN. PRESSURE		(8)	in. HG (abs)	77.6
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°F	142
TIMING		(10)	°BTDC	24
EXHAUST STACK TEMPERATURE		(11)	°F	914
EXHAUST GAS FLOW (@ stack temp.)		(12)	CFM	7381
EXHAUST MASS FLOW		(12)	lb/hr	13051

EMISSIONS DATA			
NOx (as NO2)	(13)	g/bhp-hr	1
CO	(14)	g/bhp-hr	4.77
THC (molecular weight of 15.84)	(14)	g/bhp-hr	8.42
NMHC (molecular weight of 15.84)	(14)	g/bhp-hr	1.26
EXHAUST O2	(15)	% DRY	6.3
LAMBDA	(15)		1.51

HEAT BALANCE DATA			
LHV INPUT	(16)	BTU/min	163028
HEAT REJECTION TO JACKET (JW)	(17)	BTU/min	25904
HEAT REJECTION TO ATMOSPHERE	(18)	BTU/min	6009
HEAT REJECTION TO LUBE OIL (OC)	(19) (22)	BTU/min	5335
HEAT REJECTION TO EXHAUST (LHV to 77°F)	(20)	BTU/min	54256
HEAT REJECTION TO EXHAUST (LHV to 350°F)	(20)	BTU/min	33205
HEAT REJECTION TO A/C (AC)	(21) (22)	BTU/min	10663
HEAT REJECTION TO ENGINE PUMPS		BTU/min	977.2

CONDITIONS AND DEFINITIONS

THE ENGINE TECHNICAL PERFORMANCE DATA LISTED ABOVE IS PRELIMINARY IN NATURE AND CAN CHANGE AS THE DEVELOPMENT PROGRAM FOR THIS NEW PRODUCT PROGRESSES. THIS DATA REPRESENTS CATERPILLAR'S BEST KNOWLEDGE TO DATE ON THE PRODUCT BUT CARRIES NO GUARANTEE OR WARRANTY, EITHER EXPRESSED OR IMPLIED. THIS DATA WILL BE SUPERSEDED BY THE FINAL PRODUCTION DATA WHEN THE PRODUCT COMPLETES THE DEVELOPMENT PROGRAM AND THE PRODUCTION DATA IS PUBLISHED IN TMI. THIS DATA SHOULD NOT BE USED FOR FINAL DESIGNS, SIZINGS, PURCHASE OF EQUIPMENT OR FINANCIAL CALCULATIONS AS IT IS SUBJECT TO CHANGE.

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1STD. REF. CONDITIONS OF 77°F, 29.6 IN HG BAROMETRIC PRESSURE, 500 FT ALTITUDE). NO OVERLOAD PERMITTED AT RATING SHOWN. CONSULT ALTITUDE CHARTS FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE.

EMISSION LEVELS ARE BASED ON THE ENGINE OPERATING AT STEADY STATE CONDITIONS AND ADJUSTED TO THE SPECIFIED NOx LEVEL AT 100% LOAD. EMISSION TOLERANCES SPECIFIED ARE DEPENDANT UPON FUEL QUALITY. METHANE NUMBER CANNOT VARY MORE THAN ± 3. PUBLISHED PART LOAD DATA REQUIRES CUSTOMER SUPPLIED AIR FUEL RATIO CONTROL.

ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS.

FOR NOTES INFORMATION CONSULT PAGE THREE.

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.30	1.35	1.41	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
120	1.23	1.28	1.33	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
110	1.16	1.21	1.26	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
100	1.08	1.14	1.19	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
90	1.01	1.06	1.12	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
80	1.00	1.00	1.04	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

ALTITUDE (FEET ABOVE SEA LEVEL)

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative. They are not to be added together. The same is true for the Relative Power Capability and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Relative Power Capability are cumulative; and they must be added together in the method shown below. To determine the actual power available, take the lowest rating between 1) and 2).

1) (Altitude/Temperature Deration) + (Relative Power Capability)
2) Fuel Usage Guide Deration

Note: For NA's always add the Relative Power Capability to the Altitude/Temperature deration. For TA engines only add the Relative Power Capability to the Altitude/Temperature deration whenever the Altitude/Temperature deration is less than 1.0 (100%). This will give the actual rating for the engine at the conditions specified.

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF):

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant air inlet manifold temperature, as the air to turbo temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor (ACHRF) to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

NOTES

1 ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS. TOLERANCE IS ± 3% OF FULL LOAD.

2 GENERATOR POWER DETERMINED WITH AN ASSUMED GENERATOR EFFICIENCY OF 96.4% AND POWER FACTOR OF 1. [GENERATOR POWER = ENGINE POWER x GENERATOR EFFICIENCY]

3 ISO 3046/1 ENGINE EFFICIENCY TOLERANCE IS (+)0, (-)5% OF FULL LOAD % EFFICIENCY VALUE. NOMINAL ENGINE EFFICIENCY TOLERANCE IS ± 3% OF FULL LOAD % EFFICIENCY VALUE.

4 THERMAL EFFICIENCY: JACKET HEAT + EXH. HEAT TO 350°F.

5 TOTAL EFFICIENCY = ENGINE EFF. + THERMAL EFF. TOLERANCE IS ± 10% OF FULL LOAD DATA.

6 ISO 3046/1 FUEL CONSUMPTION TOLERANCE IS (+)5, (-)0% OF FULL LOAD DATA. NOMINAL FUEL CONSUMPTION TOLERANCE IS ± 3 % OF FULL LOAD DATA.

7 UNDRIED AIR. FLOW TOLERANCE IS ± 5 %

8 INLET MANIFOLD PRESSURE TOLERANCE IS ± 5 %

9 INLET MANIFOLD TEMPERATURE TOLERANCE IS ± 9°F.

10 TIMING INDICATED IS FOR USE WITH THE MINIMUM FUEL METHANE NUMBER SPECIFIED. CONSULT THE APPROPRIATE FUEL USAGE GUIDE FOR TIMING AT OTHER METHANE NUMBERS.

11 EXHAUST STACK TEMPERATURE TOLERANCE IS (+)63°F, (-)54°F.

12 WET EXHAUST. FLOW TOLERANCE IS ± 6 %

13 NOX VALUES ARE SET POINTS AND WILL VARY WITH OPERATING CONDITIONS.

14 CO, CO2, THC, and NMHC VALUES ARE "NOT TO EXCEED".

15 O2% TOLERANCE IS ± 0.5; LAMBDA TOLERANCE IS ± 0.05. LAMBDA AND O2 LEVEL ARE THE RESULT OF ADJUSTING THE ENGINE TO OPERATE AT THE SPECIFIED NOX LEVEL.

16 LHV INPUT TOLERANCE IS ± 3%.

17 HEAT REJECTION TO JACKET TOLERANCE IS ± 10 % OF FULL LOAD DATA, BASED ON TREATED WATER.

18 HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ± 50% OF FULL LOAD DATA, BASED ON TREATED WATER.

19 HEAT REJECTION OF LUBE OIL TOLERANCE IS ± 20% OF FULL LOAD DATA, BASED ON TREATED WATER.

20 HEAT REJECTION TO EXHAUST TOLERANCE IS ± 10% OF FULL LOAD DATA, BASED ON TREATED WATER.

21 HEAT REJECTION TO A/C TOLERANCE IS ± 5 % OF FULL LOAD DATA, BASED ON TREATED WATER.

SITE SPECIFIC COOLING SYSTEM SIZING EQUATIONS (WITH TOLERANCES)

22 TOTAL AFTERCOOLER CIRCUIT (AC+OC) = (AC x ACHRF x 1.05) + (OC x 1.2).