

ENGINE SPEED:	1200	FUEL:	NAT GAS
COMPRESSION RATIO:	8:1	FUEL SYSTEM:	HPG IMPCO
AFTERCOOLER - MAX. INLET (°F):	130		
JACKET WATER - MAX. OUTLET (°F):	210	FUEL PRESS. RANGE (PSIG):	35.0 - 40.0
ASPIRATION:	TA	MIN. METHANE NUMBER:	80
COOLING SYSTEM:	JW+OC, AC	RATED ALTITUDE (FT):	3600
IGNITION SYSTEM:	EIS	AT AIR TO TURBO. TEMP. (°F):	77
EXHAUST MANIFOLD:	ASWC	NOx EMISSION LEVEL:	2.0 g/bhp-hr
COMBUSTION:	LOW EMISSION	FUEL LHV (BTU/SCF):	905
		APPLICATION:	60 Hz GENSET

RATING AND EFFICIENCY		NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN)	(1)	BHP	814	611	407
GENERATOR POWER	(WITHOUT FAN)	(2)	EKW	570	427	285
ENGINE EFFICIENCY	(ISO 3046/1)	(3)	%	35.0	34.1	31.8
ENGINE EFFICIENCY	(NOMINAL)	(3)	%	34.4	33.4	31.1
THERMAL EFFICIENCY	(NOMINAL)	(4)	%	46.0	48.7	53.2
TOTAL EFFICIENCY	(NOMINAL)	(5)	%	80.4	82.1	84.4

ENGINE DATA						
FUEL CONSUMPTION	(ISO 3046/1)	(6)	BTU/bhp-hr	7266	7462	8014
FUEL CONSUMPTION	(NOMINAL)	(6)	BTU/bhp-hr	7407	7607	8170
AIR FLOW (77 °F, 14.7 psi)		(7)	SCFM	1721	1251	846
AIR FLOW		(7)	lb/hr	7630	5549	3752
COMPRESSOR OUT PRESSURE			in. HG (abs)	70.1	60.3	45.2
COMPRESSOR OUT TEMPERATURE			°F	306	266	191
AFTERCOOLER AIR OUT TEMPERATURE			°F	133	131	129
INLET MAN. PRESSURE		(8)	in. HG (abs)	62.4	47.6	33.4
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°F	142	142	142
TIMING		(10)	°BTDC	33	33	33
EXHAUST STACK TEMPERATURE		(11)	°F	802	797	790
EXHAUST GAS FLOW (@ stack temp.)		(12)	CFM	4382	3185	2150
EXHAUST MASS FLOW		(12)	lb/hr	7933	5783	3920

EMISSIONS DATA						
NOx (as NO2)		(13)	g/bhp-hr	2	3.7	7.1
CO		(14)	g/bhp-hr	1.57	1.67	1.8
THC (molecular weight of 15.84)		(14)	g/bhp-hr	2.93	2.67	2.72
NMHC (molecular weight of 15.84)		(14)	g/bhp-hr	0.44	0.4	0.41
CO2		(14)	g/bhp-hr	517	522	563
EXHAUST O2		(15)	% DRY	8.3	7.6	6.6
LAMBDA		(15)		1.57	1.48	1.40

HEAT BALANCE DATA						
LHV INPUT		(16)	BTU/min	100486	77404	55420
HEAT REJECTION TO JACKET (JW)		(17) (22)	BTU/min	26292	22690	18916
HEAT REJECTION TO ATMOSPHERE		(18)	BTU/min	3643	3036	2429
HEAT REJECTION TO LUBE OIL (OC)		(19) (22)	BTU/min	3921	3384	2821
HEAT REJECTION TO EXHAUST (LHV to 77°F)		(20)	BTU/min	25813	18409	12081
HEAT REJECTION TO EXHAUST (LHV to 350°F)		(20)	BTU/min	16039	11589	7754
HEAT REJECTION TO A/C (AC)		(21) (23)	BTU/min	5320	3018	936
HEAT REJECTION TO ENGINE PUMPS			BTU/min	977.2	977.2	977.2

CONDITIONS AND DEFINITIONS

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 MAY REQUIRE ENGINE ADJUSTMENT.

ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS.

FOR NOTES INFORMATION CONSULT PAGE THREE.

FUEL USAGE GUIDE												
CAT METHANE NUMBER	30	30	35	40	45	50	55	60	65	70	75	80-100
IGNITION TIMING	-	19	21	22	23	24	26	27	28	30	31	33
DERATION FACTOR	0	0.90	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

ALTITUDE DERATION FACTORS														
AIR TO TURBO (°F)	130	1.00	1.00	0.97	0.93	0.90	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.65
	120	1.00	1.00	0.98	0.95	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.69	0.66
	110	1.00	1.00	1.00	0.96	0.93	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.67
	100	1.00	1.00	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.77	0.74	0.71	0.68
	90	1.00	1.00	1.00	1.00	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70
	80	1.00	1.00	1.00	1.00	0.98	0.94	0.91	0.87	0.84	0.80	0.77	0.74	0.71
	70	1.00	1.00	1.00	1.00	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70
	60	1.00	1.00	1.00	1.00	0.98	0.94	0.90	0.87	0.83	0.80	0.77	0.74	0.71
	50	1.00	1.00	1.00	1.00	1.00	0.96	0.92	0.89	0.85	0.82	0.78	0.75	0.72
			0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)														
AIR TO TURBO (°F)	130	1.40	1.47	1.54	1.61	2	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
	120	1.32	1.39	1.46	1.53	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
	110	1.24	1.30	1.37	1.44	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
	100	1.16	1.22	1.29	1.36	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
	90	1.08	1.14	1.20	1.27	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31
	80	1.00	1.06	1.12	1.19	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
	70	1.00	1.00	1.04	1.10	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
	60	1.00	1.00	1.00	1.02	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
	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
			0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000

ALTITUDE (FEET ABOVE SEA LEVEL)

FREE FIELD MECHANICAL & EXHAUST NOISE												
100% Load Data			dB(A)		(dB)							
Free Field Mechanical	DISTANCE FROM THE ENGINE (FEET)	3.2	95.3	94.5	91.1	85.3	86.3	89.0	90.6	87.4	79.0	
		22.9	85.4	84.6	81.2	75.4	76.4	79.1	80.7	77.5	69.1	
		49.2	79.6	78.8	75.4	69.6	70.6	73.3	74.9	71.7	63.3	
Free Field Exhaust	DISTANCE FROM THE ENGINE (FEET)	4.9	110.6	98.8	102.6	104.7	101.2	102.0	104.1	105.9	99.3	
		22.9	97.3	88.5	90.8	92.2	88.6	91.0	90.8	91.2	84.2	
		49.2	90.6	81.9	84.2	85.6	82.0	84.4	84.2	84.6	77.5	
Overall SPL			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		

Octave Band Center Frequency (OBCF)

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

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 Low Energy Fuel deration (reference the Caterpillar Methane Number Program) and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Low Energy Fuel deration 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) + (Low Energy Fuel Deration)
- 2) Fuel Usage Guide Deration

Note: For NA's always add the Low Energy Fuel deration to the Altitude/Temperature deration. For TA engines only add the Low Energy Fuel deration 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.

SOUND DATA:

Data determined by methods similar to ISO Standard DIS-8528-10. Accuracy Grade 3. SPL = Sound Pressure Level.

NOTES

- 1 ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS. TOLERANCE IS $\pm 3\%$ OF FULL LOAD.
 - 2 GENERATOR POWER DETERMINED WITH AN ASSUMED GENERATOR EFFICIENCY OF 93.9% AND POWER FACTOR OF 0.8 [GENERATOR POWER = ENGINE POWER \times GENERATOR EFFICIENCY].
 - 3 ISO 3046/1 ENGINE EFFICIENCY TOLERANCE IS (+)0, (-)5% OF FULL LOAD % EFFICIENCY VALUE. NOMINAL ENGINE EFFICIENCY TOLERANCE IS $\pm 3\%$ OF FULL LOAD % EFFICIENCY VALUE.
 - 4 THERMAL EFFICIENCY: JACKET HEAT + LUBE OIL HEAT + EXH. HEAT TO 350°F.
 - 5 TOTAL EFFICIENCY = ENGINE EFF. + THERMAL EFF. TOLERANCE IS $\pm 10\%$ OF FULL LOAD DATA.
 - 6 ISO 3046/1 FUEL CONSUMPTION TOLERANCE IS (+)5, (-)0% OF FULL LOAD DATA. NOMINAL FUEL CONSUMPTION TOLERANCE IS $\pm 3\%$ OF FULL LOAD DATA.
 - 7 UNDRIED AIR. FLOW TOLERANCE IS $\pm 5\%$
 - 8 INLET MANIFOLD PRESSURE TOLERANCE IS $\pm 5\%$
 - 9 INLET MANIFOLD TEMPERATURE TOLERANCE IS $\pm 9^\circ\text{F}$.
 - 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 $\pm 6\%$
 - 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 $\pm 3\%$.
 - 17 HEAT REJECTION TO JACKET TOLERANCE IS $\pm 10\%$ OF FULL LOAD DATA, BASED ON TREATED WATER.
 - 18 HEAT REJECTION TO ATMOSPHERE TOLERANCE IS $\pm 50\%$ OF FULL LOAD DATA, BASED ON TREATED WATER.
 - 19 HEAT REJECTION OF LUBE OIL TOLERANCE IS $\pm 20\%$ OF FULL LOAD DATA, BASED ON TREATED WATER.
 - 20 HEAT REJECTION TO EXHAUST TOLERANCE IS $\pm 10\%$ OF FULL LOAD DATA, BASED ON TREATED WATER.
 - 21 HEAT REJECTION TO A/C TOLERANCE IS $\pm 5\%$ OF FULL LOAD DATA, BASED ON TREATED WATER.
- SITE SPECIFIC COOLING SYSTEM SIZING EQUATIONS (WITH TOLERANCES)**
- 22 TOTAL JACKET CIRCUIT (JW+OC) = (JW \times 1.1) + (OC \times 1.2).
 - 23 TOTAL AFTERCOOLER CIRCUIT (AC) = AC \times ACHRF \times 1.05.