

ENGINE SPEED:	1800	FUEL:	NAT GAS
COMPRESSION RATIO:	10.3:1	FUEL SYSTEM:	LPG IMPCO
JACKET WATER - MAX. OUTLET (°F):	210	WITH CUSTOMER SUPPLIED AIR FUEL RATIO	
COOLING SYSTEM:	JW+OC	FUEL PRESS. RANGE (PSIG):	1.5 - 5.0
IGNITION SYSTEM:	CDIS	MIN. METHANE NUMBER:	80
EXHAUST MANIFOLD:	WC	RATED ALTITUDE (FT):	500
COMBUSTION:	STANDARD/CATALYST	AT AIR TO TURBO. TEMP. (°F):	77
		EXHAUST O2 EMISSION LEVEL:	0.5 %O2
		FUEL LHV (BTU/SCF):	905
		APPLICATION:	60 Hz GENSET

RATING AND EFFICIENCY		NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN)	(1)	BHP	231	173	115
GENERATOR POWER	(WITHOUT FAN)	(2)	EKW	160	120	80
ENGINE EFFICIENCY	(ISO 3046/1)	(3)	%	32.7	30.2	26.5
ENGINE EFFICIENCY	(NOMINAL)	(3)	%	32.7	30.2	26.4
THERMAL EFFICIENCY	(NOMINAL)	(4)	%	56.5	59.0	62.8
TOTAL EFFICIENCY	(NOMINAL)	(5)	%	89.2	89.3	89.3

ENGINE DATA						
FUEL CONSUMPTION	(ISO 3046/1)	(6)	BTU/bhp-hr	7780	8420	9620
FUEL CONSUMPTION	(NOMINAL)	(6)	BTU/bhp-hr	7780	8420	9620
AIR FLOW (77 °F, 14.7 psi)		(7)	SCFM	321	259	199
AIR FLOW		(7)	lb/hr	1422	1147	882
INLET MAN. PRESSURE		(8)	in. HG (abs)	27.1	23.5	18.5
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°F	91	88	90
TIMING		(10)	°BTDC	24	24	24
EXHAUST STACK TEMPERATURE		(11)	°F	1182	1148	1099
EXHAUST GAS FLOW (@ stack temp.)		(12)	CFM	1103	872	650
EXHAUST MASS FLOW		(12)	lb/hr	1512	1220	938

EMISSIONS DATA						
NOx (as NO2)		(13)	g/bhp-hr	12.39	12.22	12.33
CO		(14)	g/bhp-hr	12.37	12.2	12.31
THC (molecular weight of 15.84)		(14)	g/bhp-hr	1.37	1.4	1.47
NMHC (molecular weight of 15.84)		(14)	g/bhp-hr	0.21	0.21	0.23
EXHAUST O2		(15)	% DRY	0.5	0.5	0.5
LAMBDA				0.98	0.97	0.98

HEAT BALANCE DATA						
LHV INPUT		(16)	BTU/min	29908	24277	18491
HEAT REJECTION TO JACKET (JW)		(17) (21)	BTU/min	10944	8409	7175
HEAT REJECTION TO ATMOSPHERE		(18)	BTU/min	1196	971	740
HEAT REJECTION TO EXHAUST (LHV to 77°F)		(20)	BTU/min	7986	6231	4552
HEAT REJECTION TO EXHAUST (LHV to 350°F)		(20)	BTU/min	5946	4593	3304

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. 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 1 ENGINE DRIVEN JACKET WATER PUMP.

FOR NOTES INFORMATION CONSULT PAGE THREE.

FUEL USAGE GUIDE

CAT METHANE NUMBER	30	35	40	45	50	55	60	65	70	75	80	85-100
IGNITION TIMING	16	17	18	19	20	21	22	23	24	25	26	26
DERATION FACTOR	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 DERATION FACTORS

AIR TO TURBO (°F)	130	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.65	0.63	0.60	0.58
	120	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.64	0.61	0.59
	110	0.96	0.92	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.68	0.65	0.62	0.60
	100	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.63	0.61
	90	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.65	0.62
	80	1.00	0.98	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.69	0.66	0.63
	70	1.00	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.64
	60	1.00	1.00	0.98	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.68	0.66
	50	1.00	1.00	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67
			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	94.0	73.8	79.3	82.8	88.8	89.8	87.3	84.3	81.3	
		22.9	84.0	68.5	72.5	76.5	77.5	80.5	77.5	73.5	68.9	
		49.2	78.0	66.4	77.4	71.4	66.9	74.4	71.9	67.9	62.4	
Free Field Exhaust	DISTANCE FROM THE ENGINE (FEET)	4.9	107.0	105.7	107.7	105.7	97.7	100.7	101.2	98.7	95.6	
		22.9	93.7	92.1	94.6	87.6	83.1	85.6	87.1	88.1	84.2	
		49.2	87.0	86.8	89.8	84.3	77.3	79.3	79.8	81.3	76.3	
			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.

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 1 ENGINE DRIVEN JACKET WATER PUMP. TOLERANCE IS $\pm 3\%$ OF FULL LOAD.
- 2 GENERATOR POWER DETERMINED WITH AN ASSUMED GENERATOR EFFICIENCY OF 93% AND POWER FACTOR OF 0.8 [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 $\pm 5\%$ 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 $\pm 5\%$ 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 "NOT TO EXCEED".
- 14 CO, CO₂, THC, and NMHC VALUES ARE "NOT TO EXCEED".
- 15 O₂% TOLERANCE IS ± 0.5 .
- 16 LHV INPUT TOLERANCE IS $\pm 5\%$.
- 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.

SITE SPECIFIC COOLING SYSTEM SIZING EQUATIONS (WITH TOLERANCES)

- 21 TOTAL JACKET CIRCUIT (JW+OC) = (JW x 1.1) + (OC x 1.2).