

ENGINE SPEED:	1500	FUEL:	NAT GAS
COMPRESSION RATIO:	8:1	FUEL SYSTEM:	LPG IMPCO
AFTERCOOLER - MAX. INLET (°C):	32		
JACKET WATER - MAX. OUTLET (°C):	99	FUEL PRESS. RANGE (KPAg):	10.0 - 34.5
COOLING SYSTEM:	JW+OC, AC	MIN. METHANE NUMBER:	80
IGNITION SYSTEM:	EIS	RATED ALTITUDE (m):	1067
EXHAUST MANIFOLD:	ASWC	AT AIR TO TURBO. TEMP. (°C):	25
COMBUSTION:	LOW EMISSION	NOx EMISSION LEVEL:	800.0 mg/Nm3
		FUEL LHV (MJ/Nm3):	35.6
		APPLICATION:	50 Hz GENSET

RATING AND EFFICIENCY		NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN)	(1)	KW	1070	803	535
GENERATOR POWER	(WITHOUT FAN)	(2)	EKW	1030	773	515
ENGINE EFFICIENCY	(ISO 3046/1)	(3)	%	33.2	32.6	30.8
ENGINE EFFICIENCY	(NOMINAL)	(3)	%	32.5	32.0	30.2
THERMAL EFFICIENCY	(NOMINAL)	(4)	%	52.1	53.9	57.0
TOTAL EFFICIENCY	(NOMINAL)	(5)	%	84.7	85.9	87.2

ENGINE DATA						
FUEL CONSUMPTION	(ISO 3046/1)	(6)	MJ/bkW-hr	10.86	11.04	11.68
FUEL CONSUMPTION	(NOMINAL)	(6)	MJ/bkW-hr	11.07	11.25	11.91
AIR FLOW (0 °C, 101.3 kPa)		(7)	Nm3/bkW-hr	4.27	4.07	4.27
AIR FLOW		(7)	kg/bkW-hr	5.51	5.26	5.51
COMPRESSOR OUT PRESSURE			kPa (abs)	258	231	171
COMPRESSOR OUT TEMPERATURE			°C	151	135	95
AFTERCOOLER AIR OUT TEMPERATURE			°C	42	37	31
INLET MAN. PRESSURE		(8)	KPAa	230	171	125
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°C	47	44	41
TIMING		(10)	°BTDC	35	35	35
EXHAUST STACK TEMPERATURE		(11)	°C	483	480	480
EXHAUST GAS FLOW (0 °C, 101.3 kPa)		(12)	Nm3/bkW-hr	4.59	4.39	4.61
EXHAUST MASS FLOW		(12)	kg/bkW-hr	5.75	5.5	5.77

EMISSIONS DATA						
NOx (as NO2) (corr. 5% O2)		(13)	mg/Nm3 (dry)	800	2038	1322
CO (corr. 5% O2)		(14)	mg/Nm3 (dry)	663	741	744
THC (corr. 5% O2), molecular weight of 15.84)		(14)	mg/Nm3 (dry)	905	615	742
NMHC (corr. 5% O2, molecular weight of 15.84)		(14)	mg/Nm3 (dry)	136	93	112
EXHAUST O2		(15)	% DRY	7.6	6.6	6.5
LAMBDA		(15)		1.44	1.35	1.34

HEAT BALANCE DATA						
LHV INPUT		(16)	KW	3291	2508	1770
HEAT REJECTION TO JACKET		(17)	KW	880	738	571
HEAT REJECTION TO ATMOSPHERE		(18)	KW	100	83	67
HEAT REJECTION TO LUBE OIL		(19)	KW	131	110	85
HEAT REJECTION TO EXHAUST (LHV to 25°C)		(20)	KW	893	627	436
HEAT REJECTION TO EXHAUST (LHV to 120°C)		(20)	KW	704	503	352
HEAT REJECTION TO A/C		(21)	KW	199	129	58
HEAT REJECTION TO ENGINE PUMPS			KW	18	18	18

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1 (STD. REF. CONDITIONS OF 25°C, 100 KPA BAROMETRIC PRESSURE, 152 m 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

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 to 100
IGNITION TIMING	-	21	23	24	25	26	28	29	30	32	33	35
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 (°C)	50	1.00	1.00	0.99	0.96	0.93	0.90	0.87	0.85	0.82	0.79	0.77	0.74	0.72
	45	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.83	0.80	0.78	0.75	0.73
	40	1.00	1.00	1.00	0.99	0.96	0.93	0.90	0.87	0.84	0.82	0.79	0.77	0.74
	35	1.00	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.83	0.80	0.78	0.75
	30	1.00	1.00	1.00	1.00	0.99	0.96	0.93	0.90	0.87	0.84	0.82	0.79	0.76
	25	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.83	0.80	0.78
	20	1.00	1.00	1.00	1.00	1.00	0.99	0.96	0.93	0.90	0.87	0.85	0.82	0.79
	15	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.83	0.80
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93	0.90	0.88	0.85	0.82
			0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750

ALTITUDE (METERS ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS														
AIR TO TURBO (°C)	50	1.30	1.34	1.39	1.43	1.48	1.49	1.49	1.49	1.49	1.49	1.49	1.49	
	45	1.23	1.28	1.32	1.37	1.41	1.43	1.43	1.43	1.43	1.43	1.43	1.43	
	40	1.17	1.21	1.26	1.30	1.35	1.36	1.36	1.36	1.36	1.36	1.36	1.36	
	35	1.10	1.15	1.19	1.23	1.28	1.29	1.29	1.29	1.29	1.29	1.29	1.29	
	30	1.04	1.08	1.12	1.17	1.21	1.22	1.22	1.22	1.22	1.22	1.22	1.22	
	25	1.00	1.02	1.06	1.10	1.14	1.16	1.16	1.16	1.16	1.16	1.16	1.16	
	20	1.00	1.00	1.00	1.03	1.08	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
	15	1.00	1.00	1.00	1.00	1.01	1.02	1.02	1.02	1.02	1.02	1.02	1.02	
	10	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	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750

ALTITUDE (METERS ABOVE SEA LEVEL)

FREE FIELD MECHANICAL & EXHAUST NOISE											
100% Load Data			dB(A)					(dB)			
Free Field Mechanical	DISTANCE FROM THE ENGINE (METERS)	1	98.1	93.8	95.3	91.5	90.0	93.1	92.8	88.8	83.2
		7	88.5	84.2	85.7	81.9	80.4	83.5	83.2	79.2	73.6
		15	83.2	78.9	80.4	76.6	75.1	78.2	77.9	73.9	68.3
Free Field Exhaust	DISTANCE FROM THE ENGINE (METERS)	1.5	113.5	102.9	105.5	109.5	105.6	106.9	106.6	107.1	104.0
		7	100.1	88.1	94.6	94.9	91.6	94.3	93.2	93.8	89.1
		15	93.5	81.5	87.9	88.2	84.9	87.6	86.6	87.2	82.5
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:

Aftercooler heat rejection is given for standard conditions of 25°C and 152 m 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 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 96.3% 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 $\pm 3\%$ OF FULL LOAD % EFFICIENCY VALUE.
- 4 THERMAL EFFICIENCY: JACKET HEAT + LUBE OIL HEAT + EXH. HEAT TO 120°C.
- 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 UNDRYED AIR. FLOW TOLERANCE IS $\pm 5\%$
- 8 INLET MANIFOLD PRESSURE TOLERANCE IS $\pm 5\%$
- 9 INLET MANIFOLD TEMPERATURE TOLERANCE IS $\pm 5^{\circ}\text{C}$.
- 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 (+)35°C, (-)30°C.
- 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 RATE TOLERANCE IS $\pm 3\%$.
- 17 TOTAL JW HEAT (based on treated water) = JACKET HEAT + LUBE OIL HEAT. TOLERANCE IS $\pm 10\%$ OF FULL LOAD DATA.
- 18 RADIATION HEAT RATE BASED ON TREATED WATER. TOLERANCE IS $\pm 50\%$ OF FULL LOAD DATA.
- 19 LUBE OIL HEAT RATE BASED ON TREATED WATER. TOLERANCE IS $\pm 20\%$ OF FULL LOAD DATA.
- 20 EXHAUST HEAT RATE BASED ON TREATED WATER. TOLERANCE IS $\pm 10\%$ OF FULL LOAD DATA.
- 21 A/C HEAT (based on treated water) = A/C HEAT x A/C HEAT REJ. FACTOR. TOLERANCE IS $\pm 5\%$ OF FULL LOAD DATA.