

ENGINE SPEED (rpm):	1500	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	11.3:1	APPLICATION:	GENSET
AFTERCOOLER TYPE:	SCAC	RATING LEVEL:	CONTINUOUS
AFTERCOOLER - STAGE 2 INLET (°F):	130	FUEL:	NAT GAS
AFTERCOOLER - STAGE 1 INLET (°F):	198	FUEL SYSTEM:	CAT LOW PRESSURE
JACKET WATER OUTLET (°F):	210		WITH AIR FUEL RATIO CONTROL
ASPIRATION:	TA	FUEL PRESSURE RANGE (psig):	0.5-5.0
COOLING SYSTEM:	JW+OC+1AC, 2AC	FUEL METHANE NUMBER:	80
CONTROL SYSTEM:	ADEM3 W/ IM	FUEL LHV (Btu/scf):	905
EXHAUST MANIFOLD:	DRY	ALTITUDE CAPABILITY AT 77°F INLET AIR TEMP. (ft):	5499
COMBUSTION:	LOW EMISSION	POWER FACTOR:	0.8
NOx EMISSION LEVEL (mg/Nm3 NOx):	500	VOLTAGE(V):	400-11000
ANCILLARY LOAD (ekW):	80		

RATING	NOTES	LOAD	100%	75%	50%
GENSET POWER (WITH ANCILLARY LOAD)	(1)(2)	ekW	1475	1106	737
GENSET POWER (WITH ANCILLARY LOAD)	(1)(2)	kVA	1843	1382	922
ENGINE POWER (WITHOUT FAN)	(2)	bhp	2175	1660	1150
GENERATOR EFFICIENCY	(1)	%	95.8	95.8	95.3
GENSET EFFICIENCY(@ 1.0 Power Factor) (ISO 3046/1)	(3)	%	38.0	36.6	33.7
THERMAL EFFICIENCY	(4)	%	46.1	46.7	48.1
TOTAL EFFICIENCY (@ 1.0 Power Factor)	(5)	%	84.1	83.3	81.8

ENGINE DATA					
GENSET FUEL CONSUMPTION (ISO 3046/1)	(6)	Btu/ekW-hr	9062	9398	10186
GENSET FUEL CONSUMPTION (NOMINAL)	(6)	Btu/ekW-hr	9283	9628	10434
ENGINE FUEL CONSUMPTION (NOMINAL)	(6)	Btu/bhp-hr	6293	6414	6691
AIR FLOW (77°F, 14.7 psia) (WET)	(7)	ft3/min	4297	3330	2375
AIR FLOW (WET)	(7)	lb/hr	19051	14767	10532
FUEL FLOW (60°F, 14.7 psia)		scfm	252	196	142
COMPRESSOR OUT PRESSURE		in Hg(abs)	103.7	82.4	61.2
COMPRESSOR OUT TEMPERATURE		°F	380	312	234
AFTERCOOLER AIR OUT TEMPERATURE		°F	133	132	133
INLET MAN. PRESSURE	(8)	in Hg(abs)	89.1	69.0	49.6
INLET MAN. TEMPERATURE (MEASURED IN PLENUM)	(9)	°F	135	135	137
TIMING	(10)	°BTDC	28	28	28
EXHAUST TEMPERATURE - ENGINE OUTLET	(11)	°F	865	899	931
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(12)	ft3/min	11419	9083	6635
EXHAUST GAS MASS FLOW (WET)	(12)	lb/hr	19741	15304	10919
MAX INLET RESTRICTION	(13)	in H2O	10.04	6.23	3.07
MAX EXHAUST RESTRICTION	(13)	in H2O	20.07	9.69	1.93

EMISSIONS DATA - ENGINE OUT					
NOx (as NO2)	(14)(15)	g/bhp-hr	1.00	1.02	1.06
CO	(14)(16)	g/bhp-hr	2.03	2.00	1.99
THC (mol. wt. of 15.84)	(14)(16)	g/bhp-hr	5.05	5.62	6.52
NMHC (mol. wt. of 15.84)	(14)(16)	g/bhp-hr	0.76	0.84	0.98
NMNEHC (VOCs) (mol. wt. of 15.84)	(14)(16)(17)	g/bhp-hr	0.51	0.56	0.65
HCHO (Formaldehyde)	(14)(16)	g/bhp-hr	0.53	0.53	0.55
CO2	(14)(16)	g/bhp-hr	428	437	456
EXHAUST OXYGEN	(14)(18)	% DRY	10.0	9.9	9.7
LAMBDA	(14)(18)		1.73	1.73	1.70

ENERGY BALANCE DATA					
LHV INPUT	(19)	Btu/min	228129	177451	128211
HEAT REJECTION TO JACKET WATER (JW)	(20)(28)	Btu/min	30726	25566	21080
HEAT REJECTION TO ATMOSPHERE	(21)	Btu/min	6546	5513	4490
HEAT REJECTION TO LUBE OIL (OC)	(22)(28)	Btu/min	5612	5034	4338
HEAT REJECTION TO EXHAUST (LHV TO 77°F)	(23)(24)	Btu/min	71113	58088	43700
HEAT REJECTION TO EXHAUST (LHV TO 248°F)	(23)	Btu/min	50406	41563	31410
HEAT REJECTION TO A/C - STAGE 1 (1AC)	(25)(28)	Btu/min	14027	6785	1530
HEAT REJECTION TO A/C - STAGE 2 (2AC)	(26)(29)	Btu/min	6644	4855	3101
PUMP POWER	(27)	Btu/min	1218	1218	1218

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 77°F, 29.60 in Hg barometric pressure.) No overload permitted at rating shown. Consult the altitude deration factor chart for applications that exceed the rated altitude or temperature.

Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions, adjusted to the specified NOx level at 100% load. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than ± 3.

For notes information consult page three.

FUEL USAGE GUIDE												
CAT METHANE NUMBER	30	35	40	45	50	55	60	65	70	75	80	100
SET POINT TIMING	-	-	-	-	-	20	22	24	28	28	28	28
DERATION FACTOR	0	0	0	0	0	0.90	0.91	0.93	1	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED														
INLET AIR TEMP °F	130	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	120	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	110	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	100	1	1	1	0.96	0.89	0.81	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	90	1	1	1	1	0.98	0.92	0.87	0.81	0.76	No Rating	No Rating	No Rating	No Rating
	80	1	1	1	1	1	0.98	0.93	0.88	0.83	0.78	0.67	No Rating	No Rating
	70	1	1	1	1	1	1	0.95	0.90	0.85	0.79	0.73	0.62	No Rating
	60	1	1	1	1	1	1	0.96	0.90	0.85	0.80	0.74	0.65	0.56
	50	1	1	1	1	1	1	0.96	0.91	0.85	0.80	0.74	0.67	0.60
			0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
ALTITUDE (FEET ABOVE SEA LEVEL)														

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)														
INLET AIR TEMP °F	130	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	120	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	110	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	100	1.12	1.17	1.21	1.26	1.31	1.35	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating	No Rating
	90	1.06	1.10	1.15	1.19	1.24	1.28	1.28	1.28	1.28	No Rating	No Rating	No Rating	No Rating
	80	1	1.04	1.08	1.13	1.17	1.22	1.22	1.22	1.22	1.22	1.22	No Rating	No Rating
	70	1	1	1.02	1.06	1.11	1.15	1.15	1.15	1.15	1.15	1.15	1.15	No Rating
	60	1	1	1	1	1.04	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
	50	1	1	1	1	1	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
			0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000
ALTITUDE (FEET ABOVE SEA LEVEL)														

FUEL USAGE GUIDE:

This table shows the derate factor and full load set point timing required for a given fuel. Note that deration and set point timing reduction may be required 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:

To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).

AFTERCOOLER HEAT REJECTION FACTORS(ACHRF):

To maintain a constant air inlet manifold temperature, as the inlet air 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 inlet air temp and altitude conditions. See notes 28 and 29 for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

INLET AND EXHAUST RESTRICTIONS FOR ALTITUDE CAPABILITY:

The altitude derate chart is based on the maximum inlet and exhaust restrictions provided on page 1. Contact factory for restrictions over the specified values. Heavy Derates for higher restrictions will apply.

NOTES:

- Generator efficiencies, power factor, and voltage are based on standard generator. [Genset Power (ekW) is calculated as: (Engine Power (bkW) x Generator Efficiency) - Ancillary Load (ekW)], [Genset Power (kVA) is calculated as: ((Engine Power (bkW) x Generator Efficiency) - Ancillary Load (ekW))/ Power Factor]
- Rating is with two engine driven water pumps. Tolerance is (+)3, (-)0% of full load.
- ISO 3046/1 Genset efficiency tolerance is (+)0, (-)5% of full load % efficiency value based on a 1.0 power factor.
- Thermal Efficiency is calculated based on energy recovery from the jacket water, lube oil, 1st stage aftercooler, and exhaust to 248°F with engine operation at ISO 3046/1 Genset Efficiency, and assumes unburned fuel is converted in an oxidation catalyst.
- Total efficiency is calculated as: Genset Efficiency + Thermal Efficiency. Tolerance is ±10% of full load data.
- ISO 3046/1 Genset fuel consumption tolerance is (+)5, (-)0% of full load data. Nominal genset and engine fuel consumption tolerance is ± 2.5% of full load data.
- Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.
- Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.
- Inlet manifold temperature is a nominal value with a tolerance of ± 9°F.
- Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
- Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
- Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 6 %.
- Inlet and Exhaust Restrictions are maximum allowed values at the corresponding loads. Increasing restrictions beyond what is specified will result in a significant engine derate.
- Emissions data is at engine exhaust flange prior to any after treatment.
- NOx tolerances are ± 18% of specified value.
- CO, CO₂, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes.
- VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
- Exhaust Oxygen tolerance is ± 0.5; Lambda tolerance is ± 0.05. Lambda and Exhaust Oxygen level are the result of adjusting the engine to operate at the specified NOx level.
- LHV rate tolerance is ± 2.5%.
- Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is ± 10% of full load data.
- Heat rejection to atmosphere based on treated water. Tolerance is ± 50% of full load data.
- Lube oil heat rate based on treated water. Tolerance is ± 20% of full load data.
- Exhaust heat rate based on treated water. Tolerance is ± 10% of full load data.
- Heat rejection to exhaust (LHV to 77°F) value shown includes unburned fuel and is not intended to be used for sizing or recovery calculations.
- Heat rejection to A/C - Stage 1 based on treated water. Tolerance is ±5% of full load data.
- Heat rejection to A/C - Stage 2 based on treated water. Tolerance is ±5% of full load data.
- Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.
- Total Jacket Water Circuit heat rejection is calculated as: (JW x 1.1) + (OC x 1.2) + (1AC x 1.05) + [0.92 x (1AC + 2AC) x (ACHRF - 1) x 1.05]. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.
- Total Second Stage Aftercooler Circuit heat rejection is calculated as: (2AC x 1.05) + [(1AC + 2AC) x 0.08 x (ACHRF - 1) x 1.05]. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.

FREE FIELD MECHANICAL & EXHAUST NOISE

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1475	100	2175	113.7	79.3	79.9	85.7	87.8	91.8	92.2	95.2	99.6	98.2	98.1
1106	75	1660	111.0	77.5	77.0	83.6	85.7	88.4	89.5	92.2	97.7	96.6	97.0
737	50	1150	109.5	75.4	75.3	80.9	83.1	86.1	87.8	90.7	96.4	96.0	96.1

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1475	100	2175	102.4	101.3	101.4	100.3	100.7	99.4	99.4	99.8	101.7	110.1	96.4
1106	75	1660	101.1	100.8	99.7	98.9	99.6	98.1	98.3	99.0	103.5	97.9	93.9
737	50	1150	100.4	100.1	98.8	98.2	99.0	97.4	97.1	99.2	97.6	93.8	93.4

EXHAUST: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1475	100	2175	127.3	114.9	117.7	117.8	115.8	111.1	107.7	113.9	117.2	106.2	108.9
1106	75	1660	125.7	114.1	117.3	117.0	115.8	109.0	107.6	111.4	114.5	104.5	107.2
737	50	1150	123.8	114.6	117.3	114.5	113.2	107.0	106.7	108.2	110.8	103.0	105.4

EXHAUST: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1475	100	2175	100.7	107.7	107.5	108.8	111.2	113.5	113.9	115.4	115.1	116.0	114.0
1106	75	1660	99.0	105.6	104.8	106.2	109.6	111.8	112.4	113.4	114.2	113.4	109.8
737	50	1150	98.7	101.9	102.3	105.1	108.0	109.5	109.5	110.3	110.9	109.4	105.9

SOUND PARAMETER DEFINITION:

Sound Power Level Data - DM8702-02

Sound power is defined as the total sound energy emanating from a source irrespective of direction or distance. Sound power level data is presented under two index headings:

Sound power level -- Mechanical

Sound power level -- Exhaust

Mechanical: Sound power level data is calculated in accordance with ISO 6798. The data is recorded with the exhaust sound source isolated.

Exhaust: Sound power level data is calculated in accordance with ISO 6798 Annex A. Exhaust data is post-catalyst on gas engine ratings labeled as "Integrated Catalyst".

Measurements made in accordance with ISO 6798 for engine and exhaust sound level only. No cooling system noise is included unless specifically indicated. Sound level data is indicative of noise levels recorded on one engine sample in a survey grade 3 environment.

How an engine is packaged, installed and the site acoustical environment will affect the site specific sound levels. For site specific sound level guarantees, sound data collection needs to be done on-site or under similar conditions.