

ENGINE SPEED (rpm):	1800	FUEL:	Nat Gas
<b>COMPRESSION RATIO:</b>	<b>10.5:1</b>	FUEL SYSTEM:	LPG IMPCO
JACKET WATER OUTLET (°F):	210		WITH AIR FUEL RATIO CONTROL
ASPIRATION:	NA	FUEL PRESSURE RANGE(psig):	1.5-10.0
COOLING SYSTEM:	JW+OC	FUEL METHANE NUMBER:	80
IGNITION SYSTEM:	ADEM4	FUEL LHV (Btu/scf):	905
EXHAUST MANIFOLD:	WC	ALTITUDE CAPABILITY AT 77°F INLET AIR TEMP. (ft):	500
COMBUSTION:	Integrated Catalyst	APPLICATION:	Gas Compression
NOx EMISSION LEVEL (g/bhp-hr NOx):	1.0		

RATING	NOTES	LOAD	100%	75%	50%
ENGINE POWER (WITHOUT FAN)	(1)	bhp	145	109	72
ENGINE EFFICIENCY (ISO 3046/1)	(2)	%	32.7	30.6	26.8
ENGINE EFFICIENCY (NOMINAL)	(2)	%	32.7	30.6	26.8

ENGINE DATA						
FUEL CONSUMPTION (ISO 3046/1)	(3)	Btu/bhp-hr	7775	8318	9509	
FUEL CONSUMPTION (NOMINAL)	(3)	Btu/bhp-hr	7775	8318	9509	
AIR FLOW (77°F, 14.7 psia) (WET)	(4) (5)	scfm	209	169	129	
AIR FLOW (WET)	(4) (5)	lb/hr	926	749	573	
INLET MAN. PRESSURE	(6)	in Hg(abs)	26.9	22.3	17.8	
INLET MAN. TEMPERATURE (MEASURED IN PLENUM)	(7)	°F	92	93	96	
TIMING	(8)	°BTDC	30	30	30	
EXHAUST TEMPERATURE - ENGINE OUTLET	(9)	°F	1129	1080	1025	
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(10) (5)	ft <sup>3</sup> /min	693	542	400	
EXHAUST GAS MASS FLOW (WET)	(10) (5)	lb/hr	983	794	607	

EMISSIONS DATA - CATALYST OUT						
NOx (as NO <sub>2</sub> )	(11)(12)	g/bhp-hr	1.00	1.00	1.00	
CO	(11)(13)	g/bhp-hr	2.00	2.00	2.00	
THC (mol. wt. of 15.84)	(11)(13)	g/bhp-hr	2.00	2.34	2.90	
NMHC (mol. wt. of 15.84)	(11)(13)	g/bhp-hr	0.30	0.35	0.43	
NMNEHC (VOCs) (mol. wt. of 15.84)	(11)(13)(14)	g/bhp-hr	0.20	0.23	0.29	
HCHO (Formaldehyde)	(11)(13)	g/bhp-hr	0.34	0.36	0.36	
CO <sub>2</sub>	(11)(13)	g/bhp-hr	489	526	603	
EXHAUST OXYGEN	(11)(15)	% DRY	0.0	0.0	0.0	
LAMBDA	(11)(15)		1.03	1.03	1.04	

ENERGY BALANCE DATA						
LHV INPUT	(16)	Btu/min	18768	15059	11477	
HEAT REJECTION TO JACKET WATER (JW)	(17)(21)	Btu/min	6007	5233	4495	
HEAT REJECTION TO ATMOSPHERE	(18)	Btu/min	751	602	459	
HEAT REJECTION TO LUBE OIL (OC)	(19)(21)	Btu/min	896	780	670	
HEAT REJECTION TO EXHAUST (LHV TO 77°F)	(20)	Btu/min	4973	3836	2781	
HEAT REJECTION TO EXHAUST (LHV TO 350°F)	(20)	Btu/min	3600	2717	1916	

### 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 the Caterpillar provided catalyst outlet. Values are based on engine operation at steady state conditions. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than ± 3.

For notes information consult page three.

**FUEL USAGE GUIDE**

<b>CAT METHANE NUMBER</b>	<b>30</b>	<b>35</b>	<b>40</b>	<b>45</b>	<b>50</b>	<b>55</b>	<b>60</b>	<b>65</b>	<b>70</b>	<b>75</b>	<b>80</b>	<b>100</b>
SET POINT TIMING	17	18	19	20	21	23	24	26	27	28	30	30
DERATION FACTOR	1	1	1	1	1	1	1	1	1	1	1	1

**ALTITUDE DERATION FACTORS AT RATED SPEED**

<b>INLET AIR TEMP °F</b>	<b>130</b>	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
	<b>120</b>	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.64	0.61	0.59
	<b>110</b>	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
	<b>100</b>	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
	<b>90</b>	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
	<b>80</b>	1	0.98	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.69	0.66	0.63
	<b>70</b>	1	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.64
	<b>60</b>	1	1	0.98	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.68	0.66
	<b>50</b>	1	1	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67
			<b>0</b>	<b>1000</b>	<b>2000</b>	<b>3000</b>	<b>4000</b>	<b>5000</b>	<b>6000</b>	<b>7000</b>	<b>8000</b>	<b>9000</b>	<b>10000</b>	<b>11000</b>

ALTITUDE (FEET ABOVE SEA LEVEL)

**MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM)**

<b>INLET AIR TEMP °F</b>	<b>130</b>	1000	1010	1050	1090	1140	1180	1230	1280	1330	1380	1440	1500	1560
	<b>120</b>	1000	1000	1030	1070	1120	1160	1210	1250	1310	1360	1420	1470	1540
	<b>110</b>	1000	1000	1020	1060	1100	1140	1180	1230	1280	1330	1390	1450	1510
	<b>100</b>	1000	1000	1000	1040	1080	1120	1160	1210	1260	1310	1370	1420	1480
	<b>90</b>	1000	1000	1000	1020	1060	1100	1140	1190	1240	1290	1340	1400	1460
	<b>80</b>	1000	1000	1000	1000	1040	1080	1120	1170	1220	1270	1320	1370	1430
	<b>70</b>	1000	1000	1000	1000	1020	1060	1100	1150	1190	1240	1290	1350	1400
	<b>60</b>	1000	1000	1000	1000	1000	1040	1080	1130	1170	1220	1270	1320	1380
	<b>50</b>	1000	1000	1000	1000	1000	1020	1060	1100	1150	1200	1240	1300	1350
			<b>0</b>	<b>1000</b>	<b>2000</b>	<b>3000</b>	<b>4000</b>	<b>5000</b>	<b>6000</b>	<b>7000</b>	<b>8000</b>	<b>9000</b>	<b>10000</b>	<b>11000</b>

ALTITUDE (FEET ABOVE SEA LEVEL)

**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:**

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 factor and RPC (reference the Caterpillar Methane Program) are added together to establish air system limitations. To determine the actual power available, take the lowest rating between 1) and 2).

- 1) Fuel Usage Guide Deration
- 2)  $1 - ((1 - \text{Altitude/Temperature Deration}) + (1 - \text{RPC}))$

**MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM):**

This table shows the minimum allowable engine turndown speed where the engine will maintain the Rated Speed's Torque for the given ambient conditions.

**NOTES:**

1. Engine rating is with one engine driven jacket water pump. Tolerance is  $\pm 3\%$  of full load.
2. ISO 3046/1 engine efficiency tolerance is (+)0, (-)5% of full load % efficiency value. Nominal engine efficiency tolerance is  $\pm 5.0\%$  of full load % efficiency value.
3. ISO 3046/1 fuel consumption tolerance is (+)5, (-)0% of full load data. Nominal fuel consumption tolerance is  $\pm 5.0\%$  of full load data.
4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of  $\pm 5\%$ .
5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
6. Inlet manifold pressure is a nominal value with a tolerance of  $\pm 5\%$ .
7. Inlet manifold temperature is a nominal value with a tolerance of  $\pm 9^\circ\text{F}$ .
8. Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
9. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
10. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of  $\pm 6\%$ .
11. Emissions data is post Caterpillar provided catalyst. Values are dependent on proper engine and catalyst maintenance.
12. NOx values are "Not to Exceed".
13. CO, CO<sub>2</sub>, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes.
14. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
15. Exhaust Oxygen tolerance is  $\pm 0.2$ ; Lambda tolerance is  $\pm 0.05$ .
16. LHV rate tolerance is  $\pm 5.0\%$ .
17. Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is  $\pm 10\%$  of full load data.
18. Heat rejection to atmosphere 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. Total Jacket Water Circuit heat rejection is calculated as:  $(\text{JW} \times 1.1) + (\text{OC} \times 1.2)$ . 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 &amp; EXHAUST NOISE

## MECHANICAL: Sound Power (1/3 Octave Frequencies)

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
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	145	103.3	70.6	66.5	70.0	78.3	86.0	82.9	84.4	89.5	91.0	91.8
75	109	102.6	72.2	67.7	69.5	74.2	83.2	80.9	84.0	88.9	90.2	91.7
50	72	102.1	74.7	67.5	69.6	75.6	80.5	78.5	81.6	85.2	88.6	90.8

## MECHANICAL: Sound Power (1/3 Octave Frequencies)

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
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	145	92.9	97.9	94.6	92.9	92.7	89.2	87.4	86.0	82.3	79.4	75.7
75	109	93.2	96.6	93.5	92.1	92.6	88.8	87.7	86.0	81.7	78.5	75.1
50	72	92.5	96.5	93.6	91.7	92.3	88.4	87.7	86.1	81.3	77.6	74.1

## EXHAUST: Sound Power (1/3 Octave Frequencies)

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
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	145	106.1	93.0	93.6	84.2	96.8	100.3	93.2	93.0	92.8	91.3	90.7
75	109	105.2	93.0	94.0	91.0	97.6	97.5	89.9	92.9	92.9	90.8	89.8
50	72	104.7	93.2	93.4	92.2	98.9	97.3	90.1	92.4	91.8	89.3	88.0

## EXHAUST: Sound Power (1/3 Octave Frequencies)

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
%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	145	93.1	95.6	96.3	93.1	83.2	84.5	75.8	67.4	55.2	52.9	49.4
75	109	92.5	95.0	94.7	90.3	81.6	82.7	73.2	63.8	55.5	51.1	47.1
50	72	89.8	91.9	91.2	86.5	76.9	78.1	68.8	60.9	54.6	51.3	50.3

**SOUND PARAMETER DEFINITION:**

Sound Power Level Data - DM8702-01

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.

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.