

ENGINE SPEED (rpm):	1800	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	10.5	APPLICATION:	GAS COMPRESSION
JACKET WATER OUTLET (°C):	99	RATING LEVEL:	CONTINUOUS
ASPIRATION:	NA	FUEL:	NATURAL GAS
COOLING SYSTEM:	JW+OC	FUEL SYSTEM:	LPG IMPCO
CONTROL SYSTEM:	ADEM4		WITH AIR FUEL RATIO CONTROL
EXHAUST MANIFOLD:	WC	FUEL PRESSURE RANGE(kPag): (See note 1)	10-69
COMBUSTION:	INTEGRATED CATALYST	FUEL METHANE NUMBER:	80
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5	FUEL LHV (MJ/Nm3):	35.64
		ALTITUDE CAPABILITY AT 25°C INLET AIR TEMP. (m):	152

RATING	NOTES	LOAD	100%	75%	50%
ENGINE POWER (WITHOUT FAN)	2	bkW	108	81	54
ENGINE EFFICIENCY (ISO 3046/1)	3	%	32.7	30.6	26.8
ENGINE EFFICIENCY (NOMINAL)	3	%	32.7	30.6	26.8

ENGINE DATA

FUEL CONSUMPTION (ISO 3046/1)	4	MJ/bkW-hr	11	11.76	13.45
FUEL CONSUMPTION (NOMINAL)	4	MJ/bkW-hr	11	11.76	13.45
AIR FLOW (0°C, 101.3 kPa) (WET)	5, 6	Nm3/bkW-hr	3.01	3.24	3.72
AIR FLOW (WET)	5, 6	kg/bkW-hr	3.89	4.19	4.81
FUEL FLOW (0°C, 101.3 kPa)		Nm3/hr	33	27	20
INLET MAN. PRESSURE	7	kPa(abs)	91	75	60
INLET MAN. TEMPERATURE (MEASURED IN PLENUM)	8	°C	33	34	35
TIMING	9	°BTDC	30	30	30
EXHAUST TEMPERATURE - ENGINE OUTLET	10	°C	609	582	552
EXHAUST GAS FLOW (0 °C, 101.3 kPa) (WET)	11, 6	Nm3/bkW-hr	3.33	3.58	4.11
EXHAUST GAS MASS FLOW (WET)	11, 6	kg/bkW-hr	4.13	4.45	5.10

EMISSIONS DATA - CATALYST OUT

NOx (as NO2) (corr. to 5% O2)	12,13	mg/Nm3 DRY	188	174	152
CO (corr. to 5% O2)	12,14	mg/Nm3 DRY	752	697	607
THC (mol. wt. of 15.84) (corr. to 5% O2)	12,14	mg/Nm3 DRY	753	814	880
NMHC (mol. wt. of 15.84) (corr. to 5% O2)	12,14	mg/Nm3 DRY	113	122	132
NMNEHC (VOCs) (mol. wt. of 15.84) (corr. to 5% O2)	12,14,15	mg/Nm3 DRY	75	81	88
HCHO (Formaldehyde) (corr. to 5% O2)	12,14	mg/Nm3 DRY	128	125	110
CO2 (corr. to 5% O2)	12,14	g/Nm3 DRY	184	184	183
EXHAUST OXYGEN	12,16	% DRY	0.0	0.0	0.0
LAMBDA	12,16		1.03	1.03	1.04

ENERGY BALANCE DATA

LHV INPUT	17	kW	330	265	202
HEAT REJECTION TO JACKET WATER (JW)	18,23	kW	106	92	79
HEAT REJECTION TO ATMOSPHERE	19	kW	13	11	8
HEAT REJECTION TO LUBE OIL (OC)	20,23	kW	16	14	12
HEAT REJECTION TO EXHAUST (LHV TO 25°C)	21,22	kW	87	67	49
HEAT REJECTION TO EXHAUST (LHV TO 177°C)	21	kW	63	48	34

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 25°C, 100 kPa 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 and corrected to 5 % exhaust oxygen. 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	<8	8	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	100
SET POINT TIMING	-	17	17	17	17	17	17	18	19	20	21	23	24	26	27	28	30	30
DERATION FACTOR	0	0.56	0.60	0.70	0.80	0.90	1	1	1	1	1	1	1	1	1	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED

INLET AIR TEMP °C	50	0.94	0.91	0.88	0.86	0.83	0.8	0.78	0.75	0.73	0.71	0.68	0.66	0.64
	45	0.95	0.93	0.9	0.87	0.84	0.82	0.79	0.77	0.74	0.72	0.69	0.67	0.65
	40	0.97	0.94	0.91	0.88	0.86	0.83	0.8	0.78	0.75	0.73	0.71	0.68	0.66
	35	0.99	0.96	0.93	0.9	0.87	0.84	0.82	0.79	0.77	0.74	0.72	0.69	0.67
	30	1	0.97	0.94	0.91	0.88	0.86	0.83	0.8	0.78	0.75	0.73	0.71	0.68
	25	1	0.99	0.96	0.93	0.9	0.87	0.84	0.82	0.79	0.77	0.74	0.72	0.69
	20	1	1	0.97	0.94	0.92	0.89	0.86	0.83	0.81	0.78	0.75	0.73	0.71
	15	1	1	0.99	0.96	0.93	0.9	0.87	0.85	0.82	0.79	0.77	0.74	0.72
	10	1	1	1	0.98	0.95	0.92	0.89	0.86	0.83	0.81	0.78	0.76	0.73
		0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
ALTITUDE (METERS ABOVE SEA LEVEL)														

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

INLET AIR TEMP °C	50	1000	1000	1020	1060	1090	1120	1160	1200	1240	1280	1320	1360	1410
	45	1000	1000	1010	1040	1070	1110	1140	1180	1220	1260	1300	1340	1390
	40	1000	1000	1000	1020	1060	1090	1120	1160	1200	1240	1280	1320	1370
	35	1000	1000	1000	1010	1040	1070	1110	1140	1180	1220	1260	1300	1350
	30	1000	1000	1000	1000	1020	1060	1090	1120	1160	1200	1240	1280	1320
	25	1000	1000	1000	1000	1000	1040	1070	1110	1140	1180	1220	1260	1300
	20	1000	1000	1000	1000	1000	1020	1050	1090	1120	1160	1200	1240	1280
	15	1000	1000	1000	1000	1000	1000	1030	1070	1100	1140	1180	1220	1260
	10	1000	1000	1000	1000	1000	1000	1020	1050	1080	1120	1160	1200	1240
		0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
ALTITUDE (METERS 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 adjustment 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.

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. The derate factors shown do not account for the external cooling system capacity. The derate factors provided assume the external cooling system can maintain the specified cooling water temperatures at site conditions.

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. Fuel pressure range specified is to the engine fuel pressure regulator. Additional fuel train components should be considered in pressure and flow calculations.
2. Engine rating is with one engine driven jacket water pump. Tolerance is $\pm 3\%$ of full load.
3. 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.
4. 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.
5. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of $\pm 5\%$.
6. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.
7. Inlet manifold pressure is a nominal value with a tolerance of $\pm 5\%$.
8. Inlet manifold temperature is a nominal value with a tolerance of $\pm 5^\circ\text{C}$.
9. Timing indicated is for use with the minimum fuel methane number specified. Consult the appropriate fuel usage guide for timing at other methane numbers.
10. Exhaust temperature is a nominal value with a tolerance of $(+35^\circ\text{C}, -)30^\circ\text{C}$.
11. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of $\pm 6\%$.
12. Emissions data is post Caterpillar provided catalyst. Values are dependent on proper engine and catalyst maintenance.
13. NOx values are the maximum values expected under steady state conditions.
14. CO, CO₂, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes.
15. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
16. Exhaust Oxygen tolerance is ± 0.2 ; Lambda tolerance is ± 0.05 .
17. LHV rate tolerance is $\pm 5.0\%$.
18. 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.
19. Heat rejection to atmosphere based on treated water. Tolerance is $\pm 50\%$ of full load data.
20. Lube oil heat rate based on treated water. Tolerance is $\pm 20\%$ of full load data.
21. Exhaust heat rate based on treated water. Tolerance is $\pm 10\%$ of full load data.
22. Heat rejection to exhaust (LHV to 25°C) value shown includes unburned fuel and is not intended to be used for sizing or recovery calculations.
23. 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 & 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
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	108	103.3	70.6	66.5	70.0	78.3	86.0	82.9	84.4	89.5	91.0	91.8
75	81	102.6	72.2	67.7	69.5	74.2	83.2	80.9	84.0	88.9	90.2	91.7
50	54	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
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	108	92.9	97.9	94.6	92.9	92.7	89.2	87.4	86.0	82.3	79.4	75.7
75	81	93.2	96.6	93.5	92.1	92.6	88.8	87.7	86.0	81.7	78.5	75.1
50	54	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
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	108	106.1	93.0	93.6	84.2	96.8	100.3	93.2	93.0	92.8	91.3	90.7
75	81	105.2	93.0	94.0	91.0	97.6	97.5	89.9	92.9	92.9	90.8	89.8
50	54	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
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	108	93.1	95.6	96.3	93.1	83.2	84.5	75.8	67.4	55.2	52.9	49.4
75	81	92.5	95.0	94.7	90.3	81.6	82.7	73.2	63.8	55.5	51.1	47.1
50	54	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 - DM8702-03

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 3747. 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 3747 and ISO 6798 for mechanical and exhaust sound level only. Frequency bands outside the displayed ranges are not measured, due to physical test, and environmental conditions that affect the accuracy of the measurement. 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.