

G3304B

GAS ENGINE TECHNICAL DATA



ENGINE SPEED (rpm):	1800	FUEL:	Nat Gas
COMPRESSION RATIO:	10.5:1	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):	0.5		

RATING	NOTES	LOAD	100%	75%	50%
ENGINE POWER (WITHOUT FAN)	(1)	bhp	95	71	48
ENGINE EFFICIENCY (ISO 3046/1)	(2)	%	32.3	31.2	26.8
ENGINE EFFICIENCY (NOMINAL)	(2)	%	32.3	31.2	26.8

ENGINE DATA						
FUEL CONSUMPTION (ISO 3046/1)	(3)	Btu/bhp-hr	7875	8163	9510	
FUEL CONSUMPTION (NOMINAL)	(3)	Btu/bhp-hr	7875	8163	9510	
AIR FLOW (77°F, 14.7 psia) (WET)	(4) (5)	scfm	142	115	89	
AIR FLOW (WET)	(4) (5)	lb/hr	628	509	395	
INLET MAN. PRESSURE	(6)	in Hg(abs)	26.8	22.6	18.5	
INLET MAN. TEMPERATURE (MEASURED IN PLENUM)	(7)	°F	92	95	98	
TIMING	(8)	°BTDC	30	30	30	
EXHAUST TEMPERATURE - ENGINE OUTLET	(9)	°F	1043	999	940	
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(10) (5)	ft ³ /min	443	348	259	
EXHAUST GAS MASS FLOW (WET)	(10) (5)	lb/hr	665	538	417	

EMISSIONS DATA - CATALYST OUT						
NOx (as NO2)	(11)(12)	g/bhp-hr	0.50	0.50	0.50	
CO	(11)(13)	g/bhp-hr	2.00	2.00	2.00	
THC (mol. wt. of 15.84)	(11)(13)	g/bhp-hr	1.96	2.44	2.95	
NMHC (mol. wt. of 15.84)	(11)(13)	g/bhp-hr	0.29	0.37	0.44	
NMNEHC (VOCs) (mol. wt. of 15.84)	(11)(13)(14)	g/bhp-hr	0.20	0.24	0.30	
HCHO (Formaldehyde)	(11)(13)	g/bhp-hr	0.28	0.31	0.33	
CO2	(11)(13)	g/bhp-hr	515	561	655	
EXHAUST OXYGEN	(11)(15)	% DRY	0.0	0.0	0.0	
LAMBDA	(11)(15)		1.04	1.09	1.08	

ENERGY BALANCE DATA						
LHV INPUT	(16)	Btu/min	12496	9716	7545	
HEAT REJECTION TO JACKET WATER (JW)	(17)(21)	Btu/min	4241	3406	3037	
HEAT REJECTION TO ATMOSPHERE	(18)	Btu/min	500	389	302	
HEAT REJECTION TO LUBE OIL (OC)	(19)(21)	Btu/min	640	514	458	
HEAT REJECTION TO EXHAUST (LHV TO 77°F)	(20)	Btu/min	3078	2379	1730	
HEAT REJECTION TO EXHAUST (LHV TO 350°F)	(20)	Btu/min	2156	1622	1140	

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

CAT METHANE NUMBER	30	35	40	45	50	55	60	65	70	75	80	100
SET POINT TIMING	19	20	21	22	23	24	25	27	28	29	30	30
DERATION FACTOR	1	1	1	1	1	1	1	1	1	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED

INLET AIR TEMP °F	130	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66	0.63	0.60	0.58
	120	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.69	0.67	0.64	0.61	0.59
	110	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.65	0.63	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	0.64	0.61
	90	1	0.96	0.92	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.68	0.65	0.62
	80	1	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.63
	70	1	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.65
	60	1	1	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.74	0.71	0.69	0.66
	50	1	1	1	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	12000

ALTITUDE (FEET ABOVE SEA LEVEL)

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

INLET AIR TEMP °F	130	970	1010	1050	1090	1130	1180	1220	1270	1320	1380	1440	1500	1560
	120	960	990	1030	1070	1110	1150	1200	1250	1300	1350	1410	1470	1530
	110	940	980	1010	1050	1090	1140	1180	1230	1280	1330	1390	1440	1510
	100	930	960	1000	1030	1080	1120	1160	1210	1250	1310	1360	1420	1480
	90	910	940	980	1020	1060	1100	1140	1180	1230	1280	1340	1390	1450
	80	900	930	960	1000	1040	1080	1120	1160	1210	1260	1310	1370	1430
	70	900	910	940	980	1020	1060	1100	1140	1190	1240	1290	1340	1400
	60	900	900	930	960	1000	1040	1080	1120	1170	1210	1260	1320	1370
	50	900	900	910	940	980	1020	1060	1100	1140	1190	1240	1290	1350
		0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000

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, CO₂, 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 ± 0.2 ; Lambda tolerance is ± 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.