



# MAIN DIESEL GENERATOR PACKAGES

## Genset Performance Curves

10095-CAT-MEC-FLD-1004-00

Revision	Date of Document	Reason for Issue
A - For Approval F - Final C - Canceled B - As built I - For Information		

**VDRS Code:** - - - -

**Originator Document No.:**

**Project Name:**

**Project No.:**

**Customer:**

**P.O. No.:**

**Equip. Tag Number(s):**

## Genset Performance Curves

### 1) Genset Performance Table

See attached DM8418\_03 (2 pages)

### 1) Genset Noise and Vibration

#### 12.4) Noise and Vibration

The following is to be completed by Seller of all reciprocating machinery, fans for ventilation or cooling and all rotation machinery.

i. At rated load, noise pressure level SPL<sub>max</sub> at a distance 1m from equipment is \_\_\_\_\_ dB(A) and Octave Band Frequency, Hz.

Note: See item (1), page 2, in this document.

ii. Stiffness value of vibration isolator (where provided) is \_\_\_\_\_

Note: See document 10095-CAT-MEC-MMC-1003, Genset Calculation - Foundation Loads.

iii. Vendors to provide the data sheets of vibration levels of the equipment supplied by them, preliminary information at the quotation stage and the actual data sheets after FAT's of the respective equipment.

Note: No specific vibration testing will be performed. The vibration limits, in accordance to Cat ET 186 vibration testing, are not to exceed the following values:

- An Overall velocity no greater than 26.7 mm/s (1.05 in/sec) 0-pk, 300 Hz bandwidth
- An Overall displacement no greater than 177.8 microns (7.0 mils) pk-pk, 300 Hz bandwidth
- A displacement less than or equal to 127 microns (5 mils) pk-pk for individual frequency peaks below 2500 cpm (41.7 Hz)
- A velocity less than or equal to 16.5 mm/s (0.65 in/sec) 0-pk for individual frequency peaks above 2500 cpm (41.7 Hz)
- A displacement less than or equal to 2.5 mils pk-pk for non-resonance conditions at ½ and 1st order

These goals apply to all Caterpillar designed packages, for all mounting configurations (e.g. hard, soft) and for all target load and speed conditions. The non-resonance 2.5 mils pk-pk displacement limit at ½ and 1st order exists as a watch for two different types of conditions, namely a misfire condition in the case of a ½ order response and an out of balance condition in the case of a 1st order response.

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# C280-16

## DIESEL ENGINE TECHNICAL DATA



<b>Genset</b>	<b>60 Hz</b>	<b>RATING:</b>	Marine Aux - Prime
ENGINE SPEED (rpm):	900	<b>CERTIFICATION:</b>	IMO II/EPA MARINE TIER II
COMPRESSION RATIO:	13:1	<b>TURBOCHARGER PART #:</b>	284-8281
AFTERCOOLER WATER (°C):	32	<b>FUEL TYPE:</b>	Distillate
JACKET WATER INLET (°C):	90	<b>RATED ALTITUDE @ 25°C (m):</b>	150
IGNITION SYSTEM:	EUI	<b>ASSUMED GENERATOR EFFICIENCY (%):</b>	96
EXHAUST MANIFOLD:	DRY	<b>ASSUMED GENERATOR POWER FACTOR:</b>	0.8
FIRING PRESSURE, MAXIMUM (kPa)	17300	<b>MEAN PISTON SPEED (m/s):</b>	9

RATING		NOTES	LOAD	110%	100%	75%	50%
ENGINE POWER		(2)	bkW	5566	5060	3795	2530
GENERATOR POWER		(2)	ekW	5324	4840	3630	2420
BMEP			kPa	2512	2283	1712	1142
ENGINE EFFICIENCY	(ISO 3046/1)	(1)	%	44.2%	43.6%	42.9%	41.2%
ENGINE EFFICIENCY	(NOMINAL)	(1)	%	42.8%	42.3%	41.6%	39.9%

ENGINE DATA				110%	100%	75%	50%
FUEL CONSUMPTION	(ISO 3046/1)	(1)	g/bkW-hr	191.8	194.0	197.5	205.5
FUEL CONSUMPTION	(NOMINAL)	(1)	g/bkW-hr	195.5	197.8	201.4	209.5
FUEL CONSUMPTION	(90% CONFIDENCE)	(1)	g/bkW-hr	197.6	200.0	203.9	212.3
AIR FLOW (@ 25°C, 101.3 kPaa)			Nm3/min	517.4	477.8	369.5	235.5
AIR MASS FLOW			kg/hr	34629	31982	24728	15764
INLET MANIFOLD PRESSURE			kPa (abs)	390.5	358.6	278.0	180.6
INLET MANIFOLD TEMPERATURE			°C	48.6	44.9	38.0	36.0
EXHAUST STACK TEMPERATURE			°C	368.7	362.1	393.4	452.7
EXHAUST GAS FLOW (@ stack temp, 101.3 kPa)			m3/min	1113.9	1022.9	776.7	495.6
EXHAUST GAS MASS FLOW			kg/hr	35690	32957	25492	16295

EMISSIONS "NOT TO EXCEED DATA"				110%	100%	75%	50%
NOx (as NO2) + THC (molecular weight of 15.84)			g/bkW-hr	12.06	9.54	10.50	10.42
NOx (as NO2)			g/bkW-hr	11.45	8.95	9.87	9.56
CO			g/bkW-hr	0.39	0.46	0.52	1.33
THC (molecular weight of 15.84)			g/bkW-hr	0.61	0.59	0.63	0.85
Particulates			g/bkW-hr	0.15	0.24	0.28	0.43

EMISSIONS "NOMINAL DATA"				110%	100%	75%	50%
Nox as NO2 + THC (molecular weight of 15.84)			g/bkW-hr	10.42	8.24	9.06	8.97
Nox as NO2			g/bkW-hr	9.95	7.78	8.58	8.31
CO			g/bkW-hr	0.30	0.35	0.40	1.02
THC (molecular weight of 15.84)			g/bkW-hr	0.47	0.46	0.48	0.66
Particulates			g/bkW-hr	0.11	0.17	0.20	0.31

ENERGY BALANCE DATA				110%	100%	75%	50%
FUEL INPUT ENERGY (LHV)	(NOMINAL)	(1)	KW	12996	11951	9127	6337
HEAT REJ. TO JACKET WATER	(NOMINAL)	(3)	KW	1094	1029	866	685
HEAT REJ. TO ATMOSPHERE	(NOMINAL)	(4)	KW	260	239	183	127
HEAT REJ. TO OIL COOLER	(NOMINAL)	(5)	KW	540	511	442	373
HEAT REJ. TO EXH. (LHV to 25°C)	(NOMINAL)	(3)	KW	3881	3571	2919	2207
HEAT REJ. TO EXH. (LHV to 177°C)	(NOMINAL)	(3)	KW	3076	2932	2051	1216
HEAT REJ. TO AFTERCOOLER	(NOMINAL)	(6) (7)	KW	1627	1516	902	400

**CONDITIONS AND DEFINITIONS**  
 ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1 AND SAE J1995 JAN90 STANDARD REFERENCE CONDITIONS OF 25°C, 100 KPA, 30% RELATIVE HUMIDITY AND 150M ALTITUDE AT THE STATED AFTERCOOLER WATER TEMPERATURE.  
 CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE.  
 PERFORMANCE AND FUEL CONSUMPTION ARE BASED ON 35 API, 16°C FUEL HAVING A LOWER HEATING VALUE OF 42.780 KJ/KG USED AT 29°C WITH A DENSITY OF 838.9 G/LITER.

**NOTES**

- 1) FUEL CONSUMPTION TOLERANCE. ISO 3046/1 IS 0, + 5% OF FULL LOAD DATA. NOMINAL IS ± 3 % OF FULL LOAD DATA.
- 2) ENGINE POWER TOLERANCE IS ± 3 % OF FULL LOAD DATA.
- 3) HEAT REJECTION TO JACKET AND EXHAUST TOLERANCE IS ± 10% OF FULL LOAD DATA. (heat rate based on treated water)
- 4) HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ±50% OF FULL LOAD DATA. (heat rate based on treated water)
- 5) HEAT REJECTION TO LUBE OIL TOLERANCE IS ± 20% OF FULL LOAD DATA. (heat rate based on treated water)
- 6) HEAT REJECTION TO AFTERCOOLER TOLERANCE IS ± 5% OF FULL LOAD DATA. (heat rate based on treated water)
- 7) TOTAL AFTERCOOLER HEAT = AFTERCOOLER HEAT x ACHRf (heat rate based on treated water)
- 8) FUEL CONSUMPTION DATA IS WITHOUT SEA WATER PUMP.

ALTITUDE DERATION FACTORS														
AIR TO TURBO  (°C)	50	0.94	0.91	0.88	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.69	0.67	0.65
	45	0.95	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75	0.73	0.70	0.68	0.66
	40	0.97	0.94	0.91	0.89	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.69	0.67
	35	0.98	0.96	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75	0.73	0.70	0.68
	30	1.00	0.97	0.94	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74	0.71	0.69
	25	1.00	0.99	0.96	0.93	0.90	0.88	0.85	0.82	0.80	0.77	0.75	0.73	0.70
	20	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74	0.72
	15	1.00	1.00	0.99	0.96	0.93	0.91	0.88	0.85	0.83	0.80	0.78	0.75	0.73
	10	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.87	0.84	0.82	0.79	0.77	0.74
			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	1.23	1.27	1.30	1.34	1.38	1.42	1.45	1.49	1.53	1.56	1.60	1.64	1.67
	45	1.18	1.22	1.25	1.29	1.32	1.36	1.39	1.43	1.46	1.50	1.53	1.57	1.61
	40	1.13	1.17	1.20	1.23	1.27	1.30	1.34	1.37	1.40	1.44	1.47	1.50	1.54
	35	1.08	1.12	1.15	1.18	1.21	1.24	1.28	1.31	1.34	1.37	1.41	1.44	1.47
	30	1.03	1.06	1.10	1.13	1.16	1.19	1.22	1.25	1.28	1.31	1.34	1.37	1.40
	25	1.00	1.01	1.04	1.07	1.10	1.13	1.16	1.19	1.22	1.25	1.28	1.31	1.34
	20	1.00	1.00	1.00	1.02	1.05	1.07	1.10	1.13	1.16	1.19	1.21	1.24	1.27
	15	1.00	1.00	1.00	1.00	1.00	1.02	1.04	1.07	1.10	1.12	1.15	1.18	1.20
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.04	1.06	1.09	1.11	1.14
			0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750

ALTITUDE (METERS ABOVE SEA LEVEL)

FREE FIELD MECHANICAL NOISE														
		SOUND PRESSURE LEVEL												
		dB(A)												
DISTANCE FROM THE ENGINE (M)	15M	94	82.2	88.2	87.7	88.3	87.3	85.3	84	81.6				
	7M	98	87.7	93.7	93.2	93.8	92.8	90.8	89.5	87.1				
	1M	109	98.7	104.7	104.2	104.8	103.8	101.8	100.5	98.1				
		Overall	63	125	250	500	1000	2000	4000	8000				
		Octave Band (Hz)												
Nox as NO2														

FREE FIELD EXHAUST NOISE														
		SOUND PRESSURE LEVEL												
		dB(A)												
DISTANCE FROM THE ENGINE (M)	15M	99	109.6	106.7	98.4	93.1	88.7	89.2	87.3	81.9				
	7M	105	117.4	114.0	104.7	99.9	95.0	96.0	94.6	89.2				
	1.5M	119	129.9	128.5	118.3	113.5	109.1	110.5	108.1	102.3				
		Overall	63	125	250	500	1000	2000	4000	8000				
		Octave Band (Hz)												

**TOTAL DERATION FACTORS:**

This table shows the deration required for various air inlet temperatures and altitudes. Use this information to help determine actual engine power for your site. The total deration factor includes deration due to altitude and ambient temperature, and air inlet manifold temperature deration.

**AFTERCOOLER HEAT REJECTION FACTORS:**

Aftercooler heat rejection is given for standard conditions of 25°C and 150 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.

**GENERATOR EFFICIENCY:**

Generator power determined with an assumed generator efficiency of 96% [generator power = engine power x 0.96]. If the actual generator efficiency is less than 96% [and greater than 94.5%], the generator power [kW] listed in the technical data can still be achieved. The BSFC values must be increased by a factor.

8) FUEL CONSUMPTION DATA IS WITHOUT SEA WATER PUMP.

**SOUND DATA:**

Data determined by methods according to TM7080.