

# PERFORMANCE DATA [C13DE50]

NOVEMBER 10, 2021

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Perf No: EM1692

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<b>SALES MODEL:</b>	C13	<b>COMBUSTION:</b>	DIRECT INJECTION
<b>BRAND:</b>	CAT	<b>ENGINE SPEED (RPM):</b>	1,800
<b>ENGINE POWER (BHP):</b>	539	<b>HERTZ:</b>	60
<b>GEN POWER WITH FAN (EKW):</b>	350.0	<b>FAN POWER (HP):</b>	20.1
<b>COMPRESSION RATIO:</b>	16.3	<b>ADDITIONAL PARASITICS (HP):</b>	9.3
<b>RATING LEVEL:</b>	STANDBY	<b>ASPIRATION:</b>	TA
<b>PUMP QUANTITY:</b>	1	<b>AFTERCOOLER TYPE:</b>	ATAAC
<b>FUEL TYPE:</b>	DIESEL	<b>AFTERCOOLER CIRCUIT TYPE:</b>	JW+OC, ATAAC
<b>MANIFOLD TYPE:</b>	DRY	<b>INLET MANIFOLD AIR TEMP (F):</b>	120
<b>GOVERNOR TYPE:</b>	ELEC	<b>JACKET WATER TEMP (F):</b>	192.2
<b>ELECTRONICS TYPE:</b>	ADEM4	<b>TURBO CONFIGURATION:</b>	SINGLE
<b>CAMSHAFT TYPE:</b>	STANDARD	<b>TURBO QUANTITY:</b>	1
<b>IGNITION TYPE:</b>	CI	<b>TURBOCHARGER MODEL:</b>	GTA5002BS 1.60A/R
<b>INJECTOR TYPE:</b>	EUI	<b>CERTIFICATION YEAR:</b>	2015
<b>REF EXH STACK DIAMETER (IN):</b>	5	<b>PISTON SPD @ RATED ENG SPD (FT/MIN):</b>	1,854.3
<b>MAX OPERATING ALTITUDE (FT):</b>	1,640		

INDUSTRY	SUB INDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

## General Performance Data [Top](#)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR
350.0	100	539	311	0.328	24.9
315.0	90	484	279	0.337	23.0
280.0	80	431	248	0.363	22.0
262.5	75	405	234	0.374	21.4
245.0	70	380	219	0.380	20.3
210.0	60	330	190	0.389	18.1
175.0	50	281	162	0.396	15.7
140.0	40	233	134	0.397	13.0

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)
105.0	30	184	106	0.397	10.3
87.5	25	160	92	0.398	9.0
70.0	20	134	78	0.403	7.6
35.0	10	83.0	48	0.443	5.2

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
350.0	100	539	47.8	120.5	1,271.9	31.8	1,062.6	53	326.0
315.0	90	484	44.8	120.8	1,258.4	29.9	1,046.0	49	313.8
280.0	80	431	46.4	123.8	1,254.4	31.2	1,031.0	51	320.2
262.5	75	405	46.1	123.3	1,248.8	31.0	1,021.9	51	319.5
245.0	70	380	43.8	120.1	1,236.3	29.3	1,010.2	48	311.2
210.0	60	330	38.2	113.7	1,198.6	25.6	980.6	42	288.4
175.0	50	281	31.3	107.2	1,144.4	21.4	942.7	35	257.7
140.0	40	233	22.4	100.5	1,073.3	16.3	897.1	25	214.8
105.0	30	184	13.7	93.7	976.6	11.3	834.1	16	170.6
87.5	25	160	9.7	90.2	917.7	9.1	795.4	12	150.2
70.0	20	134	6.4	86.8	850.2	7.3	749.4	8	132.3
35.0	10	83.0	2.6	83.6	670.2	5.3	599.4	4	109.2

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
350.0	100	539	881.1	2,619.7	3,862.0	4,038.9	846.1	761.4
315.0	90	484	855.8	2,508.3	3,729.7	3,893.1	819.1	739.9
280.0	80	431	878.5	2,549.2	3,839.9	3,996.2	840.8	764.1
262.5	75	405	878.6	2,530.2	3,841.4	3,992.9	839.7	765.1
245.0	70	380	857.9	2,439.7	3,742.1	3,886.3	816.0	744.9
210.0	60	330	801.9	2,220.3	3,481.1	3,609.6	758.0	694.1
175.0	50	281	727.0	1,950.9	3,138.9	3,250.2	684.0	628.2
140.0	40	233	622.6	1,616.8	2,672.7	2,765.1	585.9	540.0
105.0	30	184	517.7	1,277.3	2,206.8	2,279.9	485.4	449.0
87.5	25	160	470.9	1,117.8	1,999.7	2,063.2	437.9	405.9
70.0	20	134	431.9	973.5	1,827.1	1,881.3	395.9	367.9
35.0	10	83.0	390.5	759.0	1,643.9	1,680.7	352.4	332.1

## Heat Rejection Data [Top](#)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
350.0	100	539	8,221	2,747	20,731	12,456	2,887	3,178	22,859	54,199	57,735

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
315.0	90	484	7,677	2,692	19,528	11,690	2,665	2,883	20,512	50,027	53,291
280.0	80	431	7,354	2,887	19,493	11,693	2,551	3,019	18,269	47,897	51,023
262.5	75	405	7,140	2,948	19,197	11,505	2,474	3,018	17,180	46,452	49,483
245.0	70	380	6,842	2,890	18,397	10,985	2,355	2,864	16,104	44,213	47,098
210.0	60	330	6,231	2,840	16,468	9,709	2,099	2,436	13,997	39,401	41,972
175.0	50	281	5,606	2,763	14,165	8,183	1,818	1,892	11,926	34,126	36,352
140.0	40	233	5,098	2,565	11,424	6,395	1,509	1,223	9,874	28,335	30,184
105.0	30	184	4,540	2,136	8,708	4,636	1,194	679	7,809	22,410	23,872
87.5	25	160	4,185	1,844	7,473	3,846	1,037	480	6,765	19,475	20,746
70.0	20	134	3,761	1,539	6,355	3,130	885	333	5,703	16,607	17,691
35.0	10	83.0	2,657	1,328	4,333	1,713	600	168	3,518	11,270	12,005

## Emissions Data [Top](#)

Units Filter  ▾

### DIESEL

#### RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		EKW	350.0	262.5	175.0	87.5	35.0
ENGINE POWER		BHP	539	405	281	160	83.0
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	2,428	860	482	497	337
TOTAL CO		G/HR	717	555	540	556	408
TOTAL HC		G/HR	8	15	21	25	42
TOTAL CO2		KG/HR	253	216	158	90	52
PART MATTER		G/HR	52.4	51.5	51.9	27.9	19.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,274.7	918.1	709.9	1,357.9	1,436.0
TOTAL CO	(CORR 5% O2)	MG/NM3	666.9	590.8	791.1	1,557.0	1,739.8
TOTAL HC	(CORR 5% O2)	MG/NM3	6.2	13.7	27.4	58.5	183.6
PART MATTER	(CORR 5% O2)	MG/NM3	39.4	46.6	64.9	58.9	80.5
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,108	447	346	661	699
TOTAL CO	(CORR 5% O2)	PPM	534	473	633	1,246	1,392
TOTAL HC	(CORR 5% O2)	PPM	12	26	51	109	343
TOTAL NOX (AS NO2)		G/HP-HR	4.58	2.14	1.73	3.13	4.07
TOTAL CO		G/HP-HR	1.35	1.38	1.93	3.50	4.93
TOTAL HC		G/HP-HR	0.01	0.04	0.08	0.16	0.50
PART MATTER		G/HP-HR	0.10	0.13	0.19	0.18	0.23
TOTAL NOX (AS NO2)		LB/HR	5.35	1.90	1.06	1.10	0.74
TOTAL CO		LB/HR	1.58	1.22	1.19	1.22	0.90
TOTAL HC		LB/HR	0.02	0.03	0.05	0.06	0.09
TOTAL CO2		LB/HR	559	476	348	198	115
PART MATTER		LB/HR	0.12	0.11	0.11	0.06	0.04
OXYGEN IN EXH		%	7.5	9.4	10.6	12.0	14.5
DRY SMOKE OPACITY		%	2.1	1.9	1.6	3.7	2.2
BOSCH SMOKE NUMBER			1.33	1.27	1.05	1.98	1.39

#### RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	350.0	262.5	175.0	87.5	35.0
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<del>GROSS POWER WITH FAN</del> <del>ENGINE POWER</del> PERCENT LOAD	<del>BKW</del> <del>BHP</del> %	<del>539.0</del> <del>508</del> 100	<del>468.5</del> <del>495</del> 75	<del>285.0</del> <del>381</del> 50	<del>886</del> <del>150</del> 25	<del>85.0</del> <del>83.0</del> 10
TOTAL NOX (AS NO2)	G/HR	2,622	929	521	537	363
TOTAL CO	G/HR	1,341	1,037	1,009	1,039	764
TOTAL HC	G/HR	15	28	41	48	79
PART MATTER	G/HR	102.3	100.4	101.1	54.5	37.3
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,456.7	991.6	766.7	1,466.5	1,550.9
TOTAL CO	(CORR 5% O2) MG/NM3	1,247.2	1,104.7	1,479.3	2,911.7	3,253.4
TOTAL HC	(CORR 5% O2) MG/NM3	11.7	26.0	51.8	110.6	347.1
PART MATTER	(CORR 5% O2) MG/NM3	76.8	90.9	126.6	114.8	157.0
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,197	483	373	714	755
TOTAL CO	(CORR 5% O2) PPM	998	884	1,183	2,329	2,603
TOTAL HC	(CORR 5% O2) PPM	22	48	97	206	648
TOTAL NOX (AS NO2)	G/HP-HR	4.95	2.31	1.86	3.38	4.39
TOTAL CO	G/HP-HR	2.53	2.58	3.61	6.54	9.23
TOTAL HC	G/HP-HR	0.03	0.07	0.15	0.30	0.95
PART MATTER	G/HP-HR	0.19	0.25	0.36	0.34	0.45
TOTAL NOX (AS NO2)	LB/HR	5.78	2.05	1.15	1.18	0.80
TOTAL CO	LB/HR	2.96	2.29	2.22	2.29	1.68
TOTAL HC	LB/HR	0.03	0.06	0.09	0.11	0.17
PART MATTER	LB/HR	0.23	0.22	0.22	0.12	0.08

## Regulatory Information [Top](#)

EPA EMERGENCY STATIONARY		2011 - ----			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART III AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 4.0 PM: 0.20	

## Altitude Derate Data [Top](#)

### STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)													
AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	539	539	539	539	539	539	539	539	539	531	522	513	539
1,000	539	539	539	539	539	539	539	530	520	511	503	494	539
2,000	539	539	539	539	539	529	519	510	501	492	484	476	537
3,000	539	539	539	528	518	509	500	491	482	474	466	458	521
4,000	539	529	518	508	499	490	481	472	464	456	448	441	504
5,000	519	508	499	489	480	471	462	454	446	438	431	424	488
6,000	499	489	479	470	461	453	444	436	429	421	414	407	473
7,000	479	470	461	452	443	435	427	419	412	405	398	391	457
8,000	461	451	443	434	426	418	410	403	396	389	383	376	442

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
9,000	442	434	425	417	409	401	394	387	380	374	367	361	428
10,000	425	416	408	400	393	385	378	372	365	359	353	347	414
11,000	408	399	392	384	377	370	363	357	350	344	338	333	400
12,000	391	383	376	368	361	355	348	342	336	330	325	319	386
13,000	375	367	360	353	347	340	334	328	322	317	311	306	373
14,000	359	352	345	339	332	326	320	314	309	303	298	293	360
15,000	344	337	331	324	318	312	307	301	296	291	286	281	348

## Cross Reference [Top](#)

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K9331	PP7708	4343726	PG045	LS	PW300001	
0K9331	PP7708	5066872	PG045	LS	PW300001	

## Performance Parameter Reference [Top](#)

### Parameters Reference: DM9600 - 14

#### PERFORMANCE DEFINITIONS

#### PERFORMANCE DEFINITIONS DM9600

**APPLICATION:** Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

**PERFORMANCE PARAMETER TOLERANCE FACTORS:** Power +/- 3% Torque +/- 3% Exhaust stack temperature +/- 8% Inlet airflow +/- 5% Intake manifold pressure-gage +/- 10% Exhaust flow +/- 6% Specific fuel consumption +/- 3% Fuel rate +/- 5% Specific DEF consumption +/- 3% DEF rate +/- 5% Heat rejection +/- 5% Heat rejection exhaust only +/- 10% Heat rejection CEM only +/- 10% Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

**C280/3600 HEAT REJECTION TOLERANCE FACTORS:** Heat rejection +/- 10% Heat rejection to Atmosphere +/- 50% Heat rejection to Lube Oil +/- 20% Heat rejection to Aftercooler +/- 5%

**TEST CELL TRANSDUCER TOLERANCE FACTORS:** Torque +/- 0.5% Speed +/- 0.2% Fuel flow +/- 1.0% Temperature +/- 2.0 C degrees Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

**REFERENCE ATMOSPHERIC INLET AIR FOR 3500 ENGINES AND SMALLER** SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 kPa (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water

temp, or inlet manifold temp.

**FOR 3600 ENGINES** Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

**MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE** Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

**REFERENCE EXHAUST STACK DIAMETER** The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

**REFERENCE FUEL DIESEL** Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).

**GAS** Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

**ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD** Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

**ALTITUDE CAPABILITY** Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

**REGULATIONS AND PRODUCT COMPLIANCE** TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

**EMISSION CYCLE LIMITS:** Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

**WET & DRY EXHAUST/EMISSIONS DESCRIPTION:** Wet - Total exhaust flow or concentration of total exhaust flow Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

**EMISSIONS DEFINITIONS:** Emissions : DM1176

#### **EMISSION CYCLE DEFINITIONS**

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

**HEAT REJECTION DEFINITIONS:** Diesel Circuit Type and HHV Balance : DM9500

**HIGH DISPLACEMENT (HD) DEFINITIONS:** 3500: EM1500

**RATING DEFINITIONS:** Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

**SOUND DEFINITIONS:** Sound Power : DM8702  
Sound Pressure : TM7080

**Date Released : 10/27/21**