

PERFORMANCE DATA [516DRK2]

DECEMBER 03, 2020

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Perf No: EM5400

Change Level: 00

General

Heat Rejection

Emissions

Regulatory

Altitude Derate

Cross Reference

Perf Param Ref

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SALES MODEL:	3516E	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
ENGINE POWER (BHP):	4,043	HERTZ:	60
GEN POWER WITH FAN (EKW):	2,750.0	FAN POWER (HP):	160.9
COMPRESSION RATIO:	14.7	ASPIRATION:	TA
RATING LEVEL:	STANDBY	AFTERCOOLER TYPE:	ATAAC
PUMP QUANTITY:	1	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
FUEL TYPE:	DIESEL	INLET MANIFOLD AIR TEMP (F):	122
MANIFOLD TYPE:	DRY	JACKET WATER TEMP (F):	219.2
GOVERNOR TYPE:	ADEM5	TURBO CONFIGURATION:	PARALLEL
ELECTRONICS TYPE:	ADEM5	TURBO QUANTITY:	4
IGNITION TYPE:	CI	TURBOCHARGER MODEL:	GTB6051N-44T-1.25
INJECTOR TYPE:	EUI	CERTIFICATION YEAR:	2017
FUEL INJECTOR:	3920221	CRANKCASE BLOWBY RATE (FT3/HR):	4,039.5
UNIT INJECTOR TIMING (IN):	64.34	FUEL RATE (RATED RPM) NO LOAD (GAL/HR):	15.6
REF EXH STACK DIAMETER (IN):	12	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,539.4
MAX OPERATING ALTITUDE (FT):	2,461		

INDUSTRY	SUB INDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

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**Note(s)**  
THE INLET MANIFOLD AIR TEMP LISTED IN THE HEADER, AND IN THE GENERAL PERFORMANCE DATA, IS THE AVERAGE INLET MANIFOLD TEMP FRONT TO REAR ON THE ENGINE.  
THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A STANDARD PRIME OR CONTINUOUS RATING IS NOT PERMITTED.

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,750.0	100	4,043	373	0.338	192.9	89.7	120.9	1,247.2	69.7	896.1
2,475.0	90	3,655	337	0.334	172.3	79.9	102.0	1,177.6	61.5	857.1
2,200.0	80	3,266	302	0.338	155.6	71.9	98.5	1,145.5	54.8	848.2
2,062.5	75	3,072	284	0.340	147.3	67.8	97.4	1,131.8	51.5	846.4
1,925.0	70	2,878	266	0.343	139.1	63.6	96.2	1,118.6	48.2	844.6
1,650.0	60	2,490	230	0.351	123.2	55.3	93.9	1,093.3	42.0	841.3
1,375.0	50	2,102	194	0.363	107.5	46.9	91.1	1,067.7	36.0	838.3
1,100.0	40	1,714	158	0.373	90.1	36.6	89.9	1,032.0	28.7	832.3
825.0	30	1,325	122	0.384	71.8	25.4	88.2	974.3	21.2	811.3
687.5	25	1,131	104	0.394	62.9	20.4	87.3	934.9	17.9	791.9
550.0	20	937	87	0.409	54.1	16.0	86.6	884.2	15.0	762.1
275.0	10	549	51	0.467	36.1	8.0	84.6	714.9	9.7	636.4

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	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	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,750.0	100	4,043	96	465.2	8,332.4	22,051.6	36,608.0	37,975.1	7,997.3	7,319.2
2,475.0	90	3,655	86	428.6	7,853.4	20,133.0	34,488.6	35,710.8	7,517.4	6,906.2
2,200.0	80	3,266	77	401.0	7,346.5	18,607.4	32,131.3	33,232.9	6,995.3	6,441.4
2,062.5	75	3,072	73	387.5	7,067.4	17,824.4	30,845.3	31,888.9	6,710.2	6,183.4
1,925.0	70	2,878	69	374.0	6,782.6	17,045.8	29,542.6	30,529.2	6,425.6	5,925.8
1,650.0	60	2,490	60	346.7	6,233.4	15,564.7	27,073.1	27,946.5	5,882.4	5,438.9
1,375.0	50	2,102	51	316.6	5,678.9	14,065.9	24,551.5	25,313.7	5,328.0	4,936.7
1,100.0	40	1,714	40	275.0	4,977.5	12,157.1	21,327.5	21,966.5	4,626.4	4,295.6
825.0	30	1,325	28	227.7	4,151.9	9,893.9	17,669.9	18,179.6	3,827.4	3,562.6
687.5	25	1,131	23	205.6	3,769.2	8,812.6	16,008.2	16,454.6	3,462.1	3,227.8
550.0	20	937	18	185.1	3,431.9	7,819.9	14,554.5	14,938.7	3,146.9	2,941.1
275.0	10	549	10	144.3	2,823.3	5,742.8	11,937.6	12,194.1	2,576.0	2,431.3

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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
2,750.0	100	4,043	50,827	9,124	162,025	87,978	22,342	53,492	171,445	419,468	446,839
2,475.0	90	3,655	46,700	8,321	141,538	76,477	19,956	47,423	154,983	374,677	399,125
2,200.0	80	3,266	43,252	7,985	129,537	69,793	18,018	40,903	138,521	338,278	360,350
2,062.5	75	3,072	41,519	7,846	123,724	66,690	17,061	37,707	130,290	320,314	341,215

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Units Filter 

All Units

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER PERCENT LOAD	EKW BHP %	2,750.0 4,043 100	2,062.5 3,072 75	1,375.0 1,102 50	687.5 1,131 25	275.0 549 10
TOTAL NOX (AS NO2)	G/HR	24,002	14,715	7,618	4,207	4,659
TOTAL CO	G/HR	4,637	1,698	1,187	1,894	1,876
TOTAL HC	G/HR	405	379	352	324	251
PART MATTER	G/HR	289.7	159.8	156.1	167.3	115.3
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,783.0	2,246.6	1,602.5	1,525.6	3,274.4
TOTAL CO (CORR 5% O2)	MG/NM3	536.7	259.4	249.6	703.4	1,151.5
TOTAL HC (CORR 5% O2)	MG/NM3	40.8	50.1	64.1	102.9	130.2
PART MATTER (CORR 5% O2)	MG/NM3	28.1	20.7	28.2	52.2	62.0
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,356	1,094	781	743	1,595
TOTAL CO (CORR 5% O2)	PPM	429	208	200	563	921
TOTAL HC (CORR 5% O2)	PPM	76	94	120	192	243
TOTAL NOX (AS NO2)	G/HP-HR	6.00	4.83	3.65	3.73	8.51
TOTAL CO	G/HP-HR	1.16	0.56	0.57	1.68	3.43
TOTAL HC	G/HP-HR	0.10	0.12	0.17	0.29	0.46
PART MATTER	G/HP-HR	0.07	0.05	0.07	0.15	0.21
TOTAL NOX (AS NO2)	LB/HR	52.91	32.44	16.79	9.27	10.27
TOTAL CO	LB/HR	10.22	3.74	2.62	4.17	4.13
TOTAL HC	LB/HR	0.89	0.84	0.78	0.71	0.55
PART MATTER	LB/HR	0.64	0.35	0.34	0.37	0.25

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER PERCENT LOAD	EKW BHP %	2,750.0 4,043 100	2,062.5 3,072 75	1,375.0 1,102 50	687.5 1,131 25	275.0 549 10
TOTAL NOX (AS NO2)	G/HR	20,001	12,263	6,348	3,506	3,883
TOTAL CO	G/HR	2,776	1,017	711	1,134	1,123
TOTAL HC	G/HR	305	285	264	243	189

GENSET POWER WITH FAN		EKW	2,750.0	2,062.5	1,375.0	687.5	275.0
ENGINE POWER		BHP	4,043	3,072	2,102	1,131	549
PERCENT LOAD		%	100	75	50	25	10
TOTAL CO2		KG/HR	1,954	1,489	1,082	626	359
PART MATTER		G/HR	206.9	114.2	111.5	119.5	82.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,319.2	1,872.1	1,335.4	1,271.3	2,728.6
TOTAL CO	(CORR 5% O2)	MG/NM3	321.4	155.3	149.5	421.2	689.5
TOTAL HC	(CORR 5% O2)	MG/NM3	30.7	37.7	48.2	77.4	97.9
PART MATTER	(CORR 5% O2)	MG/NM3	20.0	14.8	20.1	37.3	44.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,130	912	650	619	1,329
TOTAL CO	(CORR 5% O2)	PPM	257	124	120	337	552
TOTAL HC	(CORR 5% O2)	PPM	57	70	90	144	183
TOTAL NOX (AS NO2)		G/HP-HR	5.00	4.03	3.04	3.11	7.09
TOTAL CO		G/HP-HR	0.69	0.33	0.34	1.01	2.05
TOTAL HC		G/HP-HR	0.08	0.09	0.13	0.22	0.34
PART MATTER		G/HP-HR	0.05	0.04	0.05	0.11	0.15
TOTAL NOX (AS NO2)		LB/HR	44.09	27.03	13.99	7.73	8.56
TOTAL CO		LB/HR	6.12	2.24	1.57	2.50	2.48
TOTAL HC		LB/HR	0.67	0.63	0.58	0.54	0.42
TOTAL CO2		LB/HR	4,307	3,282	2,386	1,381	792
PART MATTER		LB/HR	0.46	0.25	0.25	0.26	0.18
OXYGEN IN EXH		%	9.7	10.7	11.5	12.4	14.4
DRY SMOKE OPACITY		%	2.7	1.8	2.1	3.0	2.3
BOSCH SMOKE NUMBER			0.98	0.58	0.70	1.07	0.75

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EPA EMERGENCY STATIONARY		2011 - ----		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII 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: 6.4 PM: 0.20

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Note(s)
THE TEMPERATURES LISTED IN THE CHART ARE AMBIENT TEMPERATURES. THE FOLLOWING DERATE CHART WAS CALCULATED ASSUMING A 5 DEG C RISE IN AIR TEMPERATURE BETWEEN AMBIENT AND THE TURBOCHARGER INLET.

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	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	3,991	4,043
1,000	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,016	3,914	4,043
2,000	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	4,043	3,988	3,874	3,729	4,043
3,000	3,907	3,906	3,905	3,904	3,904	3,901	3,809	3,675	3,532	3,458	3,456	3,453	3,904
4,000	3,786	3,784	3,783	3,781	3,780	3,742	3,629	3,483	3,375	3,346	3,343	3,340	3,781
5,000	3,679	3,678	3,675	3,673	3,671	3,628	3,511	3,386	3,276	3,251	3,249	3,246	3,673
6,000	3,572	3,570	3,568	3,566	3,564	3,515	3,415	3,289	3,164	3,135	3,131	3,128	3,567
7,000	3,451	3,449	3,447	3,445	3,443	3,398	3,295	3,141	2,983	2,960	2,957	2,954	3,446
8,000	3,333	3,331	3,329	3,327	3,325	3,275	3,140	2,951	2,795	2,780	2,777	2,774	3,329
9,000	3,201	3,199	3,197	3,195	3,193	3,115	2,957	2,770	2,630	2,622	2,620	2,617	3,198
10,000	3,051	3,049	3,047	3,045	3,043	2,957	2,798	2,623	2,486	2,483	2,481	2,478	3,048
11,000	2,943	2,941	2,939	2,937	2,935	2,842	2,693	2,514	2,399	2,397	2,395	2,392	2,941
12,000	2,839	2,837	2,835	2,834	2,832	2,741	2,589	2,417	2,347	2,346	2,344	2,342	2,838
13,000	2,748	2,747	2,746	2,744	2,742	2,643	2,486	2,363	2,293	2,292	2,290	2,289	2,748
14,000	2,634	2,634	2,632	2,631	2,630	2,523	2,398	2,289	2,217	2,216	2,216	2,214	2,635
15,000	2,485	2,484	2,483	2,482	2,481	2,408	2,306	2,182	2,091	2,090	2,090	2,089	2,485

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Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
5644195	LL2331	5898066	PG266	-	JD700379	
5644195	LL9660	5898066	PG266	-	JD700379	

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<p><b>Parameters Reference: DM9600 - 12</b></p> <p><b>PERFORMANCE DEFINITIONS</b></p> <p><b>PERFORMANCE DEFINITIONS DM9600</b></p> <p><b>APPLICATION:</b> 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.</p> <p><b>PERFORMANCE PARAMETER TOLERANCE FACTORS:</b> 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. These values do not apply to C280/3600. For these models, see the tolerances listed below.</p> <p><b>C280/3600 HEAT REJECTION TOLERANCE FACTORS:</b> Heat rejection +/- 10% Heat rejection to Atmosphere +/- 50% Heat rejection to Lube Oil +/- 20% Heat rejection to Aftercooler +/- 5%</p> <p><b>TEST CELL TRANSDUCER TOLERANCE FACTORS:</b> 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.</p> <p><b>REFERENCE ATMOSPHERIC INLET AIR FOR 3500 ENGINES AND SMALLER</b> 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. <b>FOR 3600 ENGINES</b> 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.</p> <p><b>MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE</b> Location for air temperature measurement air cleaner inlet at stabilized operating conditions.</p> <p><b>REFERENCE EXHAUST STACK DIAMETER</b> 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.</p> <p><b>REFERENCE FUEL <u>DIESEL</u></b> 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). <b><u>GAS</u></b> 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.</p> <p><b>ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD</b> 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.</p> <p><b>ALTITUDE CAPABILITY</b> 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.</p> <p><b>REGULATIONS AND PRODUCT COMPLIANCE</b> 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.</p> <p><b>EMISSION CYCLE LIMITS:</b> Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.</p> <p><b>EMISSIONS DEFINITIONS:</b> Emissions : DM1176</p> <p><b>EMISSION CYCLE DEFINITIONS</b></p>
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- 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 : 07/10/19