PERFORMANCE DATA[EM0599]

May 6, 2016

Performance Number: EM0599 **Change Level: 00**

SALES MODEL:	3516C	**COMBUSTION:**	DI
ENGINE POWER (BKW):	2,416.0	**ENGINE SPEED (RPM):**	1,500
GEN POWER WITH FAN (EKW):	2,200.0	**HERTZ:**	50
COMPRESSION RATIO:	14	**FAN POWER (KW):**	100.0
RATING LEVEL:	MISSION CRITICAL STANDBY	**ASPIRATION:**	TA
PUMP QUANTITY:	1	**AFTERCOOLER TYPE:**	ATAAC
FUEL TYPE:	DIESEL	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	**INLET MANIFOLD AIR TEMP (C):**	57
GOVERNOR TYPE:	ADEM3	**JACKET WATER TEMP (C):**	99
ELECTRONICS TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
CAMSHAFT TYPE:	STANDARD	**TURBO QUANTITY:**	4
IGNITION TYPE:	CI	**TURBOCHARGER MODEL:**	GT5733BN-46T-1.07
INJECTOR TYPE:	EUI	**COMBUSTION STRATEGY:**	LOW BSFC
FUEL INJECTOR:	3920216	**CRANKCASE BLOWBY RATE (M3/HR):**	91.7
UNIT INJECTOR TIMING (MM):	64.34	**FUEL RATE (RATED RPM) NO LOAD (L/HR):**	45.0
REF EXH STACK DIAMETER (MM):	305	**PISTON SPD @ RATED ENG SPD (M/SEC):**	10.8
MAX OPERATING ALTITUDE (M):	900		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data

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	ENGINE OUTLET TEMP
EKW	%	BKW	KPA	G/BKW-HR	L/HR	KPA	DEG C	DEG C	DEG C
2,200.0	100	2,399	2,458	200.2	572.5	284.6	57.2	636.5	477.8
1,980.0	90	2,166	2,219	200.4	517.4	255.5	55.6	619.0	465.1
1,760.0	80	1,935	1,983	202.2	466.4	226.5	54.4	604.4	457.3
1,650.0	75	1,821	1,865	201.6	437.6	207.5	53.7	595.0	452.8
1,540.0	70	1,706	1,748	200.6	407.9	188.5	53.0	585.1	448.2
1,320.0	60	1,478	1,514	199.1	350.7	151.1	51.7	564.9	440.4
1,100.0	50	1,251	1,281	201.8	300.8	117.7	51.2	544.7	439.4
880.0	40	1,026	1,051	206.8	253.0	87.9	50.7	520.4	434.6
660.0	30	801	821	215.1	205.5	61.6	50.2	487.4	421.6
550.0	25	688	705	221.6	181.6	49.9	49.9	462.8	406.0
440.0	20	573	587	230.6	157.5	39.1	49.5	432.4	383.9
220.0	10	339	348	266.3	107.7	20.4	48.3	346.4	308.0

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	ENGINE OUTLET WET EXH VOL FLOW RATE (0 DEG C AND 101 KPA)	ENGINE OUTLET DRY EXH VOL FLOW RATE (0 DEG C AND 101 KPA)
EKW	%	BKW	KPA	DEG C	M3/MIN	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MIN
2,200.0	100	2,399	309	219.5	183.7	484.2	12,980.1	13,460.3	176.1	160.0
1,980.0	90	2,166	277	205.2	170.2	441.1	11,620.7	12,054.8	163.2	148.3
1,760.0	80	1,935	248	191.0	156.7	402.1	10,481.5	10,872.9	150.4	136.6
1,650.0	75	1,821	228	180.3	147.6	376.5	9,773.4	10,140.5	141.7	128.7
1,540.0	70	1,706	208	169.6	138.5	351.2	9,035.9	9,378.0	133.0	120.8
1,320.0	60	1,478	165	148.3	120.5	301.7	7,674.8	7,969.0	115.5	104.9
1,100.0	50	1,251	130	128.0	103.9	260.0	6,605.8	6,858.1	99.7	90.6
880.0	40	1,026	98	108.3	88.8	221.2	5,590.8	5,803.0	85.4	77.6
660.0	30	801	70	89.1	75.5	184.3	4,568.5	4,740.8	72.5	65.9
550.0	25	688	58	79.7	69.8	166.3	4,030.2	4,182.6	66.9	60.8
440.0	20	573	46	70.5	64.6	148.6	3,482.9	3,615.0	61.8	56.1
220.0	10	339	27	54.4	56.3	114.0	2,362.2	2,452.6	53.6	48.7

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXH RECOVERY TO 177C	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BKW	KW	KW	KW	KW	KW	KW	KW	KW	KW
2,200.0	100	2,399	757	147	2,168	1,166	285	594	2,399	5,708	6,080
1,980.0	90	2,166	718	141	1,949	1,031	258	508	2,166	5,158	5,495
1,760.0	80	1,935	679	137	1,760	921	232	432	1,935	4,650	4,953
1,650.0	75	1,821	656	134	1,645	854	218	383	1,821	4,362	4,647
1,540.0	70	1,706	632	131	1,524	786	203	331	1,706	4,066	4,331
1,320.0	60	1,478	585	125	1,297	663	175	234	1,478	3,496	3,724
1,100.0	50	1,251	539	120	1,121	570	150	161	1,251	2,999	3,195
880.0	40	1,026	492	114	946	479	126	103	1,026	2,522	2,687
660.0	30	801	443	107	769	384	103	58.8	801	2,048	2,182
550.0	25	688	415	102	680	329	90.5	41.5	688	1,811	1,929
440.0	20	573	385	97.0	589	274	78.1	27.1	573	1,570	1,673
220.0	10	339	315	86.1	397	149	54.1	6.1	339	1,074	1,144

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1500 RPM

GENSET POWER WITH FAN		EKW	2,200.0	1,650.0	1,100.0	550.0	220.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BKW	2,399	1,821	1,251	688	339
TOTAL NOX (AS NO2)		G/HR	20,284	14,776	13,907	8,453	4,754
TOTAL CO		G/HR	2,192	3,298	3,836	2,041	1,984
TOTAL HC		G/HR	70	136	233	198	202
PART MATTER		G/HR	86.9	94.1	134.8	87.4	59.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,090.9	2,958.1	4,062.2	4,088.5	3,858.1
TOTAL CO	(CORR 5% O2)	MG/NM3	334.1	660.2	1,120.7	987.3	1,612.7
TOTAL HC	(CORR 5% O2)	MG/NM3	10.8	27.0	68.1	95.6	164.5
PART MATTER	(CORR 5% O2)	MG/NM3	13.3	18.9	39.3	42.3	48.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,505	1,472	1,984	1,992	1,880
TOTAL CO	(CORR 5% O2)	PPM	268	572	864	797	1,293
TOTAL HC	(CORR 5% O2)	PPM	17	48	110	153	268
TOTAL NOX (AS NO2)		G/HP-HR	6.31	6.05	8.29	9.17	10.45
TOTAL CO		G/HP-HR	0.68	1.35	2.29	2.21	4.36
TOTAL HC		G/HP-HR	0.02	0.06	0.14	0.21	0.44
PART MATTER		G/HP-HR	0.03	0.04	0.08	0.09	0.13
TOTAL NOX (AS NO2)		LB/HR	44.72	32.57	30.66	18.64	10.48
TOTAL CO		LB/HR	4.83	7.27	8.46	4.50	4.37
TOTAL HC		LB/HR	0.16	0.30	0.51	0.44	0.45
PART MATTER		LB/HR	0.19	0.21	0.30	0.19	0.13

RATED SPEED NOMINAL DATA: 1500 RPM

GENSET POWER WITH FAN		EKW	2,200.0	1,650.0	1,100.0	550.0	220.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BKW	2,399	1,821	1,251	688	339
TOTAL NOX (AS NO2)		G/HR	16,904	12,313	11,589	7,044	3,962
TOTAL CO		G/HR	1,218	1,832	2,131	1,134	1,102
TOTAL HC		G/HR	53	102	175	149	152
TOTAL CO2		KG/HR	1,481	1,126	775	463	270
PART MATTER		G/HR	62.1	67.2	96.3	62.4	42.2
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,575.8	2,465.1	3,385.2	3,407.1	3,215.1
TOTAL CO	(CORR 5% O2)	MG/NM3	185.6	366.8	622.6	548.5	895.9
TOTAL HC	(CORR 5% O2)	MG/NM3	8.1	20.3	51.2	71.9	123.7
PART MATTER	(CORR 5% O2)	MG/NM3	9.5	13.5	28.1	30.2	34.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,254	1,227	1,653	1,660	1,566
TOTAL CO	(CORR 5% O2)	PPM	149	318	480	443	719
TOTAL HC	(CORR 5% O2)	PPM	13	36	83	115	202
TOTAL NOX (AS NO2)		G/HP-HR	5.25	5.04	6.91	7.64	8.70
TOTAL CO		G/HP-HR	0.38	0.75	1.27	1.23	2.42
TOTAL HC		G/HP-HR	0.02	0.04	0.10	0.16	0.33

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PART MATTER	G/HP-HR	0.02	0.03	0.06	0.07	0.09
TOTAL NOX (AS NO2)	LB/HR	37.27	27.15	25.55	15.53	8.73
TOTAL CO	LB/HR	2.69	4.04	4.70	2.50	2.43
TOTAL HC	LB/HR	0.12	0.22	0.39	0.33	0.34
TOTAL CO2	LB/HR	3,266	2,482	1,708	1,021	595
PART MATTER	LB/HR	0.14	0.15	0.21	0.14	0.09
OXYGEN IN EXH	%	10.1	10.7	10.9	12.0	14.4
DRY SMOKE OPACITY	%	1.1	1.5	2.5	2.4	1.8
BOSCH SMOKE NUMBER		0.40	0.51	0.90	0.85	0.60

Regulatory Information

NON-CERTIFIED	1970 - 2100
THIS ENGINE RATING IS NOT EMISSIONS CERTIFIED BY ANY DOMESTIC OR FOREIGN AGENCY.	

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BKW)

AMBIENT OPERATING TEMP (C)	0	5	10	15	20	25	30	35	40	45	50	55	60	NORMAL
ALTITUDE (M)														
0	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,368	2,416
250	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,407	2,370	2,335	2,416
500	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,411	2,373	2,336	2,300	2,266	2,416
750	2,416	2,416	2,416	2,416	2,416	2,416	2,416	2,377	2,339	2,302	2,267	2,232	2,150	2,416
1,000	2,389	2,389	2,389	2,389	2,389	2,384	2,344	2,306	2,269	2,234	2,199	2,166	1,957	2,389
1,250	2,321	2,321	2,321	2,321	2,321	2,312	2,274	2,237	2,201	2,167	2,133	1,981	1,812	2,321
1,500	2,256	2,256	2,256	2,256	2,256	2,242	2,205	2,170	2,135	2,102	2,069	1,836	1,667	2,256
1,750	2,193	2,193	2,193	2,193	2,193	2,174	2,139	2,104	2,070	2,038	2,006	1,691	1,522	2,193
2,000	2,132	2,132	2,132	2,132	2,132	2,108	2,073	2,040	2,007	1,976	1,945	1,546	1,401	2,132
2,250	2,073	2,073	2,073	2,073	2,073	2,043	2,010	1,977	1,946	1,915	1,885	1,425	1,256	2,073
2,500	2,015	2,015	2,015	2,015	2,014	1,980	1,948	1,916	1,886	1,856	1,827	1,280	1,136	2,015
2,750	1,960	1,960	1,960	1,960	1,952	1,919	1,887	1,857	1,827	1,798	1,771	1,160	1,015	1,960
3,000	1,906	1,906	1,906	1,906	1,891	1,859	1,828	1,799	1,770	1,742	1,715	1,039	918	1,906
3,250														
3,500														
3,750														
4,000														
4,250														
4,500														

Cross Reference

Engine Arrangement			
Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
4378095	DD500001	GS716	-
5063101	SBK02000	GS336	-

Test Specification Data						
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
4369478	GG0868	DD500001	4378095			
4369478	GG0868	SBK02000	5063101			

Supplementary Data

Type	Classification	Performance Number
SOUND	SOUND PRESSURE	DM8779

General Notes

General Notes EM0599 - 00
SOUND PRESSURE DATA FOR THIS RATING CAN BE FOUND IN PERFORMANCE NUMBER - DM8779

Performance Parameter Reference

Parameters Reference:DM9600-08

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.

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 29 (84.2), where the density is 838.9 G/Liter (7.001 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.

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

EMISSIONS DEFINITIONS:
Emissions : DM1176

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 : 7/7/15