PERFORMANCE DATA[DM9388]

February 29, 2012

Performance Number: DM9388 **Change Level: 01**

SALES MODEL:	3516B	**COMBUSTION:**	DI
ENGINE POWER (BKW):	1,536.0	**ENGINE SPEED (RPM):**	1,500
GEN POWER WITH FAN (EKW):	1,400.0	**HERTZ:**	50
COMPRESSION RATIO:	14	**FAN POWER (KW):**	75.0
APPLICATION:	PACKAGED GENSET	**ASPIRATION:**	TA
RATING LEVEL:	CONTINUOUS	**AFTERCOOLER TYPE:**	SCAC
PUMP QUANTITY:	2	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, AC
FUEL TYPE:	DIESEL	**AFTERCOOLER TEMP (C):**	60
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (C):**	99
GOVERNOR TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
ELECTRONICS TYPE:	ADEM3	**TURBO QUANTITY:**	4
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	BTVA8503-50T-1.08
IGNITION TYPE:	CI	**COMBUSTION STRATEGY:**	LOW BSFC
INJECTOR TYPE:	EUI	**CRANKCASE BLOWBY RATE (M3/HR):**	58.3
FUEL INJECTOR:	2309457	**FUEL RATE (RATED RPM) NO LOAD (L/HR):**	43.0
REF EXH STACK DIAMETER (MM):	305	**PISTON SPD @ RATED ENG SPD (M/SEC):**	9.5
MAX OPERATING ALTITUDE (M):	2,200		

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	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BKW	KPA	G/BKW-HR	L/HR	KPA	DEG C	DEG C	KPA	DEG C
1,400.0	100	1,536	1,781	194.9	357.0	188.9	71.7	589.0	141.8	452.7
1,260.0	90	1,389	1,610	195.6	323.8	164.3	69.8	574.8	123.7	452.0
1,120.0	80	1,243	1,441	196.8	291.4	140.1	68.1	560.5	106.6	451.7
1,050.0	75	1,170	1,356	197.6	275.5	128.2	67.3	552.9	98.3	451.2
980.0	70	1,097	1,272	198.6	259.7	116.7	66.6	544.8	90.5	450.4
840.0	60	953	1,105	201.3	228.5	94.8	65.4	526.3	76.1	447.0
700.0	50	809	938	205.0	197.6	74.4	64.5	504.5	63.1	441.0
560.0	40	666	773	210.5	167.2	56.2	64.0	474.7	51.9	428.1
420.0	30	523	607	219.1	136.7	40.3	63.6	433.3	42.2	403.4
350.0	25	451	523	225.5	121.2	33.1	63.3	408.4	37.8	386.6
280.0	20	378	438	234.3	105.5	26.4	62.9	380.3	33.8	366.2
140.0	10	229	265	269.1	73.3	14.9	61.3	308.1	26.5	301.2

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
1,400.0	100	1,536	146	179.8	116.6	293.1	8,093.2	8,392.6	110.3	100.6
1,260.0	90	1,389	127	165.1	106.9	268.2	7,418.4	7,690.0	101.0	92.2
1,120.0	80	1,243	109	150.2	97.2	243.9	6,753.2	6,997.7	91.9	84.0
1,050.0	75	1,170	100	142.7	92.5	232.0	6,427.1	6,658.2	87.5	79.9
980.0	70	1,097	91	135.0	87.9	220.2	6,106.6	6,324.3	83.1	76.0
840.0	60	953	74	119.6	79.0	197.0	5,491.6	5,683.2	74.7	68.4
700.0	50	809	59	104.3	70.6	174.4	4,908.9	5,074.6	66.7	61.2
560.0	40	666	45	89.6	63.1	152.8	4,383.2	4,523.4	59.5	54.8
420.0	30	523	33	75.3	56.5	131.7	3,920.4	4,034.9	53.2	49.3
350.0	25	451	28	68.4	53.5	121.2	3,710.2	3,811.8	50.2	46.7
280.0	20	378	22	61.6	50.7	110.8	3,514.3	3,602.8	47.4	44.3
140.0	10	229	13	49.9	46.1	90.0	3,189.5	3,251.0	42.8	40.5

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
1,400.0	100	1,536	577	133	1,293	683	190	248	1,536	3,559	3,791
1,260.0	90	1,389	536	129	1,181	624	172	201	1,389	3,228	3,439
1,120.0	80	1,243	495	125	1,071	567	155	158	1,243	2,905	3,095
1,050.0	75	1,170	474	123	1,017	539	146	138	1,170	2,747	2,926
980.0	70	1,097	454	121	963	510	138	119	1,097	2,589	2,758
840.0	60	953	412	117	857	452	121	85.0	953	2,278	2,427
700.0	50	809	369	112	750	394	105	55.8	809	1,970	2,099
560.0	40	666	326	106	644	333	88.8	31.9	666	1,667	1,776
420.0	30	523	279	98.6	535	266	72.6	12.9	523	1,363	1,451
350.0	25	451	255	94.9	479	232	64.4	5.2	451	1,208	1,287
280.0	20	378	230	91.1	423	197	56.0	-1.3	378	1,052	1,121
140.0	10	229	174	83.2	303	115	38.9	-10.8	229	731	778

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Emissions Data

RATED SPEED NOT TO EXCEED DATA: 1500 RPM

GENSET POWER WITH FAN		EKW	1,400.0	1,050.0	700.0	350.0	140.0
ENGINE POWER		BKW	1,536	1,170	809	451	229
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	21,131	16,629	11,301	6,701	3,991
TOTAL CO		G/HR	1,482	1,268	1,081	932	1,130
TOTAL HC		G/HR	364	313	279	236	262
PART MATTER		G/HR	118.7	96.6	101.0	134.4	166.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	5,082.9	5,184.1	4,914.3	4,817.1	4,742.2
TOTAL CO	(CORR 5% O2)	MG/NM3	369.2	408.2	486.6	696.6	1,506.8
TOTAL HC	(CORR 5% O2)	MG/NM3	78.5	87.8	108.7	151.7	299.9
PART MATTER	(CORR 5% O2)	MG/NM3	24.6	25.9	38.4	87.1	194.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	2,476	2,525	2,394	2,346	2,310
TOTAL CO	(CORR 5% O2)	PPM	295	327	389	557	1,205
TOTAL HC	(CORR 5% O2)	PPM	147	164	203	283	560
TOTAL NOX (AS NO2)		G/HP-HR	10.33	10.68	10.50	11.16	13.11
TOTAL CO		G/HP-HR	0.72	0.81	1.00	1.55	3.71
TOTAL HC		G/HP-HR	0.18	0.20	0.26	0.39	0.86
PART MATTER		G/HP-HR	0.06	0.06	0.09	0.22	0.55
TOTAL NOX (AS NO2)		LB/HR	46.59	36.66	24.91	14.77	8.80
TOTAL CO		LB/HR	3.27	2.80	2.38	2.05	2.49
TOTAL HC		LB/HR	0.80	0.69	0.62	0.52	0.58
PART MATTER		LB/HR	0.26	0.21	0.22	0.30	0.37

RATED SPEED NOMINAL DATA: 1500 RPM

GENSET POWER WITH FAN		EKW	1,400.0	1,050.0	700.0	350.0	140.0
ENGINE POWER		BKW	1,536	1,170	809	451	229
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	17,609	13,858	9,418	5,584	3,326
TOTAL CO		G/HR	824	704	601	518	628
TOTAL HC		G/HR	274	235	210	177	197
TOTAL CO2		KG/HR	910	698	498	303	181
PART MATTER		G/HR	84.8	69.0	72.2	96.0	119.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	4,235.8	4,320.1	4,095.3	4,014.3	3,951.8
TOTAL CO	(CORR 5% O2)	MG/NM3	205.1	226.8	270.3	387.0	837.1
TOTAL HC	(CORR 5% O2)	MG/NM3	59.0	66.0	81.8	114.1	225.5
PART MATTER	(CORR 5% O2)	MG/NM3	17.6	18.5	27.4	62.2	138.9
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	2,063	2,104	1,995	1,955	1,925
TOTAL CO	(CORR 5% O2)	PPM	164	181	216	310	670
TOTAL HC	(CORR 5% O2)	PPM	110	123	153	213	421
TOTAL NOX (AS NO2)		G/HP-HR	8.61	8.90	8.75	9.30	10.92
TOTAL CO		G/HP-HR	0.40	0.45	0.56	0.86	2.06
TOTAL HC		G/HP-HR	0.13	0.15	0.20	0.30	0.65
PART MATTER		G/HP-HR	0.04	0.04	0.07	0.16	0.39
TOTAL NOX (AS NO2)		LB/HR	38.82	30.55	20.76	12.31	7.33
TOTAL CO		LB/HR	1.82	1.55	1.32	1.14	1.38
TOTAL HC		LB/HR	0.60	0.52	0.46	0.39	0.43
TOTAL CO2		LB/HR	2,005	1,538	1,099	667	399
PART MATTER		LB/HR	0.19	0.15	0.16	0.21	0.26
OXYGEN IN EXH		%	10.2	10.5	11.2	13.1	15.4
DRY SMOKE OPACITY		%	1.7	1.7	2.1	2.4	2.2
BOSCH SMOKE NUMBER			0.58	0.58	0.72	0.82	0.75

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	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,522	1,500	1,536
250	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,523	1,499	1,476	1,454	1,536
500	1,536	1,536	1,536	1,536	1,536	1,536	1,536	1,524	1,500	1,476	1,453	1,431	1,409	1,536
750	1,536	1,536	1,536	1,536	1,536	1,526	1,501	1,477	1,453	1,430	1,408	1,387	1,366	1,536
1,000	1,536	1,536	1,536	1,530	1,504	1,479	1,455	1,431	1,408	1,386	1,365	1,344	1,324	1,507
1,250	1,536	1,536	1,509	1,482	1,457	1,433	1,409	1,386	1,364	1,343	1,322	1,302	1,282	1,468
1,500	1,515	1,487	1,461	1,436	1,411	1,388	1,365	1,343	1,321	1,300	1,280	1,261	1,242	1,430
1,750	1,467	1,440	1,415	1,390	1,367	1,344	1,321	1,300	1,279	1,259	1,240	1,221	1,202	1,393
2,000	1,420	1,394	1,370	1,346	1,323	1,301	1,279	1,259	1,238	1,219	1,200	1,182	1,164	1,356
2,250	1,374	1,349	1,326	1,303	1,280	1,259	1,238	1,218	1,199	1,180	1,161	1,144	1,127	1,320
2,500	1,330	1,306	1,283	1,260	1,239	1,218	1,198	1,179	1,160	1,142	1,124	1,107	1,090	1,284
2,750	1,286	1,263	1,241	1,219	1,198	1,178	1,159	1,140	1,122	1,104	1,087	1,071	1,055	1,250
3,000	1,244	1,221	1,200	1,179	1,159	1,140	1,121	1,103	1,085	1,068	1,051	1,035	1,020	1,215
3,250	1,203	1,181	1,160	1,140	1,121	1,102	1,084	1,066	1,049	1,032	1,017	1,001	986	1,182
3,500	1,162	1,141	1,121	1,102	1,083	1,065	1,047	1,030	1,014	998	983	968	953	1,149
3,750	1,123	1,103	1,084	1,065	1,047	1,029	1,012	996	980	964	949	935	921	1,117
4,000	1,085	1,066	1,047	1,029	1,011	994	978	962	946	932	917	903	890	1,086
4,250	1,048	1,029	1,011	993	976	960	944	929	914	900	886	872	859	1,055
4,500	1,012	994	976	959	943	927	912	897	883	869	855	842	830	1,024

ALTITUDE CAPABILITY MUST BE RESET MANUALLY WHEN SWITCHING BETWEEN DIFFERENT FREQUENCY AND/OR SCAC TEMPERATURE OPERATION. PLEASE REFER TO THE APPROPRIATE PERFORMANCE DATA "MAX OPERATING ALTITUDE" IN THE HEADER DATA SECTION.

Cross Reference

Engine Arrangement			
Arrangement Number	**Effective Serial Number**	**Engineering Model**	**Engineering Model Version**
3678100	1HZ02901	PS005	LS

Test Specification Data						
Test Spec	**Setting**	**Effective Serial Number**	**Engine Arrangement**	**Governor Type**	**Default Low Idle Speed**	**Default High Idle Speed**
3704854	GG0528	1HZ02901	3678100	ADEM3		

Supplementary Data

Type	Classification	Performance Number
AFTERCOOLER TEMP	90C	DM9409

This performance data is supplementary data for:
DM9390

General Notes

General Notes DM9388 - 01
THIS ENGINE IS PART OF A CONVERTIBLE PACKAGE THAT IS CAPABLE OF SWITCHING BETWEEN 50 AND 60 HZ OPERATION. THIS REQUIRES DIFFERENT ENGINE SOFTWARE. REFER TO THE SUPPLEMENTARY DATA SECTION FOR PERFORMANCE AT THE OTHER FREQUENCY.

Performance Parameter Reference

Parameters Reference:DM9600-05

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%
Heat rejection	+/- 5%
Heat rejection exhaust only	+/- 10%

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 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25 (77) at 60% relative humidity.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25, 100 KPA 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.

PERFORMANCE DATA[DM9388]

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.

ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standar d 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.

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 'not to exceed' 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. Log on to the Technology and Solutions Divisions (T&SD) web page (http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:
Regulation watch covers regulations in effect and future regulation ch anges for world, federal, state and loca. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

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

EMISSIONS DEFINITIONS:
Emissions : DM1176

SOUND DEFINITIONS:

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Sound Power : DM8702

Sound Pressure : TM7080

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

Date Released : 11/23/11