

Performance Number: DM9390

Change Level: 00

SALES MODEL:	3516B	COMBUSTION:	DI
ENGINE POWER (BKW):	1,785.0	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	1,640.0	HERTZ:	60
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 EMISSION
INJECTOR TYPE:	EUI	CRANKCASE BLOWBY RATE (M3/HR):	67.8
FUEL INJECTOR:	2309457	FUEL RATE (RATED RPM) NO LOAD (L/HR):	45.0
REF EXH STACK DIAMETER (MM):	305	PISTON SPD @ RATED ENG SPD (M/SEC):	11.4
MAX OPERATING ALTITUDE (M):	1,100		

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
1,640.0	100	1,785	1,725	207.0	440.6	228.4	79.3	596.1	219.9	439.0
1,476.0	90	1,614	1,560	208.1	400.5	213.1	76.8	565.5	201.8	416.6
1,312.0	80	1,446	1,397	209.9	361.7	196.0	74.3	538.2	183.4	399.4
1,230.0	75	1,362	1,316	211.1	342.7	186.8	73.1	525.7	174.2	392.6
1,148.0	70	1,277	1,234	212.6	323.8	175.8	71.9	514.2	164.0	388.0
984.0	60	1,110	1,072	216.5	286.4	152.1	69.7	492.7	142.2	382.2
820.0	50	943	911	221.7	249.2	127.7	67.7	470.7	120.2	377.5
656.0	40	776	750	228.5	211.4	102.2	66.2	446.2	99.1	370.6
492.0	30	608	588	238.6	173.0	76.7	65.0	416.7	79.0	359.6
410.0	25	523	505	246.3	153.6	64.2	64.5	399.9	69.2	352.6
328.0	20	437	422	257.4	133.9	52.2	64.0	381.1	59.7	344.2
164.0	10	259	250	305.4	94.3	30.3	62.9	324.3	43.8	312.1

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
1,640.0	100	1,785	178	215.3	158.3	387.2	10,931.0	11,301.1	148.5	137.7
1,476.0	90	1,614	166	201.2	152.6	360.7	10,537.7	10,873.5	142.9	133.0
1,312.0	80	1,446	153	187.5	145.8	335.4	10,059.2	10,362.3	136.2	127.2
1,230.0	75	1,362	146	180.6	141.9	322.8	9,788.0	10,075.3	132.4	123.9
1,148.0	70	1,277	138	173.3	137.0	309.5	9,450.1	9,721.8	127.9	119.8
984.0	60	1,110	120	157.7	126.1	281.9	8,691.9	8,932.5	117.5	110.3
820.0	50	943	101	141.1	114.3	253.3	7,882.1	8,091.2	106.3	100.0
656.0	40	776	82	123.3	101.8	222.9	7,013.5	7,190.9	94.6	89.2
492.0	30	608	62	104.4	88.9	191.3	6,122.4	6,267.6	82.6	78.1
410.0	25	523	52	94.7	82.5	175.4	5,682.9	5,811.7	76.5	72.6
328.0	20	437	43	84.9	76.4	159.4	5,254.4	5,366.7	70.5	67.0
164.0	10	259	26	65.2	64.9	128.1	4,461.5	4,540.6	59.8	57.2

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
1,640.0	100	1,785	685	135	1,654	870	234	420	1,785	4,392	4,679
1,476.0	90	1,614	639	126	1,501	762	213	369	1,614	3,993	4,254
1,312.0	80	1,446	594	119	1,360	671	192	321	1,446	3,606	3,841
1,230.0	75	1,362	572	116	1,293	632	182	297	1,362	3,417	3,639
1,148.0	70	1,277	549	113	1,229	596	172	271	1,277	3,228	3,439
984.0	60	1,110	503	109	1,104	532	152	217	1,110	2,855	3,042
820.0	50	943	455	104	981	470	132	164	943	2,484	2,646
656.0	40	776	405	99.9	849	402	112	115	776	2,108	2,245
492.0	30	608	350	95.2	713	330	91.9	70.4	608	1,725	1,837
410.0	25	523	322	92.7	644	293	81.5	50.0	523	1,531	1,631
328.0	20	437	292	90.1	574	257	71.1	30.9	437	1,335	1,423
164.0	10	259	226	83.9	430	175	50.1	2.6	259	940	1,001



Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	1,640.0	1,230.0	820.0	410.0	164.0
ENGINE POWER	BKW	1,785	1,362	943	523	259
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	19,927	12,300	7,191	3,857	2,593
TOTAL CO	G/HR	1,373	1,252	1,273	1,345	1,527
TOTAL HC	G/HR	532	511	456	386	437
PART MATTER	G/HR	160.1	164.8	219.0	305.1	331.1
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	4,290.7	3,401.5	2,738.3	2,391.7	2,683.3
TOTAL CO	(CORR 5% O2) MG/NM3	274.3	320.6	449.7	780.0	1,506.0
TOTAL HC	(CORR 5% O2) MG/NM3	92.0	113.8	139.7	194.3	379.3
PART MATTER	(CORR 5% O2) MG/NM3	27.5	37.1	68.5	157.8	293.7
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	2,090	1,657	1,334	1,165	1,307
TOTAL CO	(CORR 5% O2) PPM	219	256	360	624	1,205
TOTAL HC	(CORR 5% O2) PPM	172	212	261	363	708
TOTAL NOX (AS NO2)	G/HP-HR	8.37	6.77	5.72	5.53	7.50
TOTAL CO	G/HP-HR	0.58	0.69	1.01	1.93	4.42
TOTAL HC	G/HP-HR	0.22	0.28	0.36	0.55	1.26
PART MATTER	G/HP-HR	0.07	0.09	0.17	0.44	0.96
TOTAL NOX (AS NO2)	LB/HR	43.93	27.12	15.85	8.50	5.72
TOTAL CO	LB/HR	3.03	2.76	2.81	2.97	3.37
TOTAL HC	LB/HR	1.17	1.13	1.01	0.85	0.96
PART MATTER	LB/HR	0.35	0.36	0.48	0.67	0.73

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	1,640.0	1,230.0	820.0	410.0	164.0
ENGINE POWER	BKW	1,785	1,362	943	523	259
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	16,606	10,250	5,993	3,214	2,161
TOTAL CO	G/HR	763	696	707	747	848
TOTAL HC	G/HR	400	385	343	290	328
TOTAL CO2	KG/HR	1,149	891	639	394	239
PART MATTER	G/HR	114.3	117.7	156.4	217.9	236.5
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	3,575.6	2,834.6	2,281.9	1,993.1	2,236.1
TOTAL CO	(CORR 5% O2) MG/NM3	152.4	178.1	249.8	433.3	836.7
TOTAL HC	(CORR 5% O2) MG/NM3	69.2	85.5	105.1	146.1	285.2
PART MATTER	(CORR 5% O2) MG/NM3	19.6	26.5	48.9	112.7	209.8
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,742	1,381	1,111	971	1,089
TOTAL CO	(CORR 5% O2) PPM	122	142	200	347	669
TOTAL HC	(CORR 5% O2) PPM	129	160	196	273	532
TOTAL NOX (AS NO2)	G/HP-HR	6.97	5.64	4.77	4.61	6.25
TOTAL CO	G/HP-HR	0.32	0.38	0.56	1.07	2.45
TOTAL HC	G/HP-HR	0.17	0.21	0.27	0.42	0.95
PART MATTER	G/HP-HR	0.05	0.06	0.12	0.31	0.68
TOTAL NOX (AS NO2)	LB/HR	36.61	22.60	13.21	7.09	4.76
TOTAL CO	LB/HR	1.68	1.53	1.56	1.65	1.87
TOTAL HC	LB/HR	0.88	0.85	0.76	0.64	0.72
TOTAL CO2	LB/HR	2,532	1,964	1,409	869	528
PART MATTER	LB/HR	0.25	0.26	0.34	0.48	0.52
OXYGEN IN EXH	%	11.1	12.5	13.3	14.5	15.9
DRY SMOKE OPACITY	%	1.4	1.7	2.8	5.2	4.3
BOSCH SMOKE NUMBER		0.49	0.57	1.03	1.50	1.34

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**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	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785
250	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,767	1,785
500	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,766	1,739	1,713	1,785
750	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,766	1,738	1,712	1,685	1,660	1,785
1,000	1,785	1,785	1,785	1,785	1,785	1,785	1,768	1,739	1,711	1,684	1,658	1,633	1,609	1,785
1,250	1,785	1,785	1,785	1,785	1,771	1,741	1,713	1,685	1,658	1,632	1,607	1,582	1,558	1,785
1,500	1,785	1,785	1,776	1,745	1,715	1,686	1,659	1,632	1,606	1,580	1,556	1,532	1,509	1,738
1,750	1,782	1,750	1,719	1,690	1,661	1,633	1,606	1,580	1,555	1,530	1,507	1,484	1,461	1,693
2,000	1,726	1,694	1,665	1,636	1,608	1,581	1,555	1,530	1,505	1,481	1,459	1,436	1,415	1,648
2,250	1,670	1,640	1,611	1,583	1,556	1,530	1,505	1,480	1,457	1,434	1,412	1,390	1,369	1,604
2,500	1,616	1,587	1,559	1,532	1,506	1,480	1,456	1,432	1,409	1,387	1,366	1,345	1,325	1,561
2,750	1,563	1,535	1,508	1,482	1,456	1,432	1,408	1,386	1,363	1,342	1,321	1,301	1,282	1,519
3,000	1,512	1,484	1,458	1,433	1,409	1,385	1,362	1,340	1,319	1,298	1,278	1,258	1,239	1,477
3,250	1,462	1,435	1,410	1,385	1,362	1,339	1,317	1,296	1,275	1,255	1,235	1,217	1,198	1,437
3,500	1,413	1,387	1,363	1,339	1,316	1,294	1,273	1,252	1,232	1,213	1,194	1,176	1,158	1,397
3,750	1,365	1,341	1,317	1,294	1,272	1,251	1,230	1,210	1,191	1,172	1,154	1,136	1,119	1,358
4,000	1,319	1,295	1,272	1,250	1,229	1,208	1,188	1,169	1,150	1,132	1,115	1,098	1,081	1,319
4,250	1,274	1,251	1,229	1,207	1,187	1,167	1,148	1,129	1,111	1,093	1,077	1,060	1,044	1,282
4,500	1,230	1,208	1,186	1,166	1,146	1,127	1,108	1,090	1,073	1,056	1,039	1,024	1,008	1,245

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	1HZ00101	PS005	LS

		Test Specification Data				
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
3704860	GG0534	1HZ02901	3678100	ADEM3		

**Supplementary Data**

Type	Classification	Performance Number
CONVERTIBLE SECONDARY FREQUENCY	50HZ	DM9388
AFTERCOOLER TEMP	90C	DM9415

**General Notes**

General Notes DM9390 - 00
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[DM9390]

### 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 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.

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. Log on to the Technology and Solutions Divisions (T&SD) web page ([http://tsd.cat.com/etsd/index.cfm?tech\\_id=2635ICAL](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 changes for world, federal, state and local. 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

## PERFORMANCE DATA[DM9390]

August 6, 2012

SOUND DEFINITIONS:  
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