

Performance Number: EM2652

Change Level: 00

SALES MODEL:	3516B	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,500
ENGINE POWER (BKW):	2,145.0	HERTZ:	50
GEN POWER WITH FAN (EKW):	2,000.0	FAN POWER (KW):	46.0
COMPRESSION RATIO:	15.5	ASPIRATION:	TA
RATING LEVEL:	STANDBY	AFTERCOOLER TYPE:	SCAC
PUMP QUANTITY:	2	AFTERCOOLER CIRCUIT TYPE:	JW+OC, AC
FUEL TYPE:	DIESEL	AFTERCOOLER TEMP (C):	90
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:	GTA5518BN-56T-1.24
IGNITION TYPE:	CI	COMBUSTION STRATEGY:	LOW EMISSION
INJECTOR TYPE:	EUI	CRANKCASE BLOWBY RATE (M3/HR):	81.4
UNIT INJECTOR TIMING (MM):	64.34	FUEL RATE (RATED RPM) NO LOAD (L/HR):	44.4
REF EXH STACK DIAMETER (MM):	305	PISTON SPD @ RATED ENG SPD (M/SEC):	10.8
MAX OPERATING ALTITUDE (M):	750		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A 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)
EKW	%	BKW	KPA	G/BKW-HR	L/HR
2,000.0	100	2,125	2,177	207.4	518.5
1,800.0	90	1,914	1,961	207.5	467.2
1,600.0	80	1,705	1,746	207.9	416.9
1,500.0	75	1,600	1,640	207.5	390.6
1,400.0	70	1,496	1,533	207.0	364.4
1,200.0	60	1,289	1,321	205.8	312.2
1,000.0	50	1,083	1,110	207.9	265.0
800.0	40	879	901	212.0	219.3
600.0	30	675	691	219.4	174.1
500.0	25	572	586	225.3	151.6
400.0	20	468	480	234.0	128.9
200.0	10	259	265	274.1	83.5

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BKW	KPA	DEG C	DEG C	DEG C	KPA	DEG C
2,000.0	100	2,125	283.5	101.9	710.8	540.0	288	231.4
1,800.0	90	1,914	259.7	99.8	680.2	517.1	264	215.6
1,600.0	80	1,705	230.7	96.9	651.4	499.8	234	198.1
1,500.0	75	1,600	211.0	96.3	638.9	494.3	214	186.6
1,400.0	70	1,496	191.4	95.7	626.6	490.7	195	175.1
1,200.0	60	1,289	152.3	94.7	602.4	489.0	156	152.2
1,000.0	50	1,083	117.8	93.6	578.5	496.2	121	130.6
800.0	40	879	87.3	92.8	549.3	496.3	90	109.5
600.0	30	675	60.8	92.1	509.6	482.5	63	89.0
500.0	25	572	49.2	91.8	480.5	462.5	51	79.6
400.0	20	468	38.6	91.6	445.9	434.9	40	70.5
200.0	10	259	21.3	91.2	358.3	354.5	23	54.7

General Performance Data (Continued)

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	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)
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PERFORMANCE DATA[EM2652]

December 1, 2021

EKW	%	BKW	M3/MIN	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MIN
2,000.0	100	2,125	158.2	453.6	11,199.3	11,640.0	152.4	137.5
1,800.0	90	1,914	149.8	416.6	9,992.6	10,389.7	144.0	129.9
1,600.0	80	1,705	139.3	378.6	8,880.8	9,235.2	133.8	120.7
1,500.0	75	1,600	131.6	356.0	8,300.7	8,632.9	126.7	114.3
1,400.0	70	1,496	123.7	333.4	7,726.8	8,036.6	119.2	107.6
1,200.0	60	1,289	107.7	288.5	6,673.5	6,938.8	103.4	93.3
1,000.0	50	1,083	91.4	246.0	5,747.6	5,972.9	87.3	78.8
800.0	40	879	76.6	206.1	4,819.6	5,005.9	73.2	66.0
600.0	30	675	63.7	168.6	3,872.3	4,020.3	60.9	55.0
500.0	25	572	58.4	150.9	3,374.8	3,503.6	56.0	50.6
400.0	20	468	53.7	133.9	2,882.1	2,991.7	51.6	46.6
200.0	10	259	46.2	101.9	1,947.9	2,018.9	44.4	40.0

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
2,000.0	100	2,125	759	175	2,117	1,228	262	406	2,125	5,240	5,582
1,800.0	90	1,914	706	163	1,903	1,082	236	341	1,914	4,718	5,026
1,600.0	80	1,705	651	153	1,693	950	211	274	1,705	4,203	4,477
1,500.0	75	1,600	624	148	1,590	882	198	241	1,600	3,947	4,205
1,400.0	70	1,496	596	144	1,489	818	184	208	1,496	3,693	3,934
1,200.0	60	1,289	538	136	1,291	707	158	143	1,289	3,189	3,397
1,000.0	50	1,083	479	128	1,099	614	134	82.0	1,083	2,696	2,872
800.0	40	879	418	119	914	516	111	31.1	879	2,218	2,363
600.0	30	675	354	110	733	407	87.9	-8.1	675	1,750	1,864
500.0	25	572	319	105	644	345	76.5	-22.2	572	1,519	1,619
400.0	20	468	283	100	554	286	65.1	-33.0	468	1,290	1,374
200.0	10	259	208	89.0	376	166	42.1	-44.0	259	834	889

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1500 RPM

GENSET POWER WITH FAN	EKW	2,000.0	1,500.0	1,000.0	500.0	200.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BKW	2,125	1,600	1,083	572	259
TOTAL NOX (AS NO2)	G/HR	18,533	12,957	10,033	5,582	3,017
TOTAL CO	G/HR	1,959	1,883	766	460	443
TOTAL HC	G/HR	334	295	215	170	175
TOTAL CO2	KG/HR	1,402	1,053	713	408	225
PART MATTER	G/HR	76.4	83.9	71.4	75.9	79.7
TOTAL NOX (AS NO2) (CORR 5% O2)	MGNM3	3,059.2	2,862.2	3,248.6	3,176.5	3,167.8
TOTAL CO (CORR 5% O2)	MGNM3	323.3	415.9	248.0	261.6	465.7
TOTAL HC (CORR 5% O2)	MGNM3	55.2	65.1	69.6	96.6	184.2
PART MATTER (CORR 5% O2)	MGNM3	12.6	18.5	23.1	43.2	83.8
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,490	1,409	1,596	1,541	1,513
TOTAL CO (CORR 5% O2)	PPM	259	327	199	211	380
TOTAL HC (CORR 5% O2)	PPM	89	104	113	156	299
TOTAL NOX (AS NO2)	G/HP-HR	6.50	6.04	6.91	7.28	8.69
TOTAL CO	G/HP-HR	0.69	0.88	0.53	0.60	1.28
TOTAL HC	G/HP-HR	0.12	0.14	0.15	0.22	0.50
PART MATTER	G/HP-HR	0.03	0.04	0.05	0.10	0.23
TOTAL NOX (AS NO2)	LB/HR	40.86	28.57	22.12	12.31	6.65
TOTAL CO	LB/HR	4.32	4.15	1.69	1.01	0.98
TOTAL HC	LB/HR	0.74	0.65	0.47	0.37	0.39
TOTAL CO2	LB/HR	3,090	2,322	1,572	899	495
PART MATTER	LB/HR	0.17	0.18	0.16	0.17	0.18

PERFORMANCE DATA[EM2652]

December 1, 2021

OXYGEN IN EXH	%	9.3	10.5	10.7	11.8	14.8
DRY SMOKE OPACITY	%	1.0	2.0	2.3	3.6	3.8
BOSCH SMOKE NUMBER		0.37	0.66	0.81	1.22	1.26

RATED SPEED POTENTIAL SITE VARIATION: 1500 RPM

GENSET POWER WITH FAN	EKW	2,000.0	1,500.0	1,000.0	500.0	200.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BKW	2,125	1,600	1,083	572	259
TOTAL NOX (AS NO2)	G/HR	22,240	15,548	12,040	6,698	3,620
TOTAL CO	G/HR	3,526	3,389	1,379	828	797
TOTAL HC	G/HR	444	392	286	226	233
PART MATTER	G/HR	107.0	117.5	100.0	106.3	111.6
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	3,671.0	3,434.6	3,898.3	3,811.8	3,801.3
TOTAL CO (CORR 5% O2)	MG/NM3	581.9	748.6	446.4	470.9	838.3
TOTAL HC (CORR 5% O2)	MG/NM3	73.4	86.6	92.6	128.5	245.0
PART MATTER (CORR 5% O2)	MG/NM3	17.6	25.9	32.3	60.5	117.3
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,788	1,691	1,915	1,849	1,816
TOTAL CO (CORR 5% O2)	PPM	466	589	358	380	685
TOTAL HC (CORR 5% O2)	PPM	118	138	150	207	398
TOTAL NOX (AS NO2)	G/HP-HR	7.80	7.24	8.29	8.74	10.43
TOTAL CO	G/HP-HR	1.24	1.58	0.95	1.08	2.30
TOTAL HC	G/HP-HR	0.16	0.18	0.20	0.29	0.67
PART MATTER	G/HP-HR	0.04	0.05	0.07	0.14	0.32
TOTAL NOX (AS NO2)	LB/HR	49.03	34.28	26.54	14.77	7.98
TOTAL CO	LB/HR	7.77	7.47	3.04	1.83	1.76
TOTAL HC	LB/HR	0.98	0.86	0.63	0.50	0.51
PART MATTER	LB/HR	0.24	0.26	0.22	0.23	0.25

Regulatory Information

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

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BKW)

AMBIENT OPERATING TEMP (C)	0	5	10	15	20	25	30	35	40	45	50	NORMAL
ALTTITUDE (M)												
0	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,102	2,145
250	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,139	2,102	2,145
500	2,145	2,145	2,145	2,145	2,145	2,145	2,145	2,143	2,109	2,076	2,043	2,145
750	2,145	2,145	2,145	2,145	2,145	2,145	2,114	2,079	2,046	2,014	1,983	2,145
1,000	2,083	2,083	2,083	2,083	2,083	2,083	2,051	2,017	1,985	1,954	1,924	2,083
1,250	2,024	2,024	2,024	2,024	2,024	2,023	1,989	1,957	1,926	1,895	1,866	2,024
1,500	1,966	1,966	1,966	1,966	1,966	1,962	1,929	1,898	1,868	1,838	1,810	1,966
1,750	1,910	1,910	1,910	1,910	1,910	1,902	1,871	1,840	1,811	1,783	1,755	1,910
2,000	1,856	1,856	1,856	1,856	1,856	1,844	1,814	1,784	1,756	1,728	1,701	1,856
2,250	1,803	1,803	1,803	1,803	1,803	1,788	1,758	1,730	1,702	1,675	1,649	1,803
2,500	1,752	1,752	1,752	1,752	1,752	1,732	1,704	1,676	1,649	1,623	1,598	1,752
2,750	1,703	1,703	1,703	1,703	1,703	1,679	1,651	1,624	1,598	1,573	1,549	1,703
3,000	1,655	1,655	1,655	1,655	1,654	1,626	1,599	1,573	1,548	1,524	1,500	1,655
3,250												
3,500												
3,750												

4,000
4,250
4,500

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
4581863	GG1372	5084273	GS639	XJ	DB400001	
5643632	LL1487	5331493	PG281	DK	STJ00001	
5643756	GG2068	5331493	PG281	DK	SZJ00001	
5643632	LL1677	5331495	PG281	DK	STJ00001	
5643756	GG2092	5331495	PG281	DK	SZJ00001	
4581552	LL6748	5390551	PG236	-	LY400001	

Supplementary Data

Type	Classification	Performance Number
SOUND	SOUND PRESSURE	DM8779

This performance data is supplementary data for:
EM2650

General Notes

General Notes EM2652 - 00
SOUND PRESSURE DATA FOR THIS RATING CAN BE FOUND IN PERFORMANCE NUMBER - DM8779

Performance Parameter Reference

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.

PERFORMANCE DATA[EM2652]

December 1, 2021

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 JAN2014 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.

PERFORMANCE DATA[EM2652]

December 1, 2021

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