PERFORMANCE DATA [S2G00210]

NOVEMBER 26, 2021

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Perf No: DM6970 **Change Level:** 02

General Heat Rejection Sound Emissions Regulatory Altitude Derate Cross Reference Supplementary Data Perf Param Ref

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SALES MODEL:	3512B	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,200
ENGINE POWER (BKW):	1,102.0	**HERTZ:**	60
GEN POWER W/O FAN (EKW):	1,030.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	14.0	**AFTERCOOLER TYPE:**	SCAC
RATING LEVEL:	PRIME	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, AC
PUMP QUANTITY:	2	**AFTERCOOLER TEMP (C):**	30
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (C):**	99
MANIFOLD TYPE:	DRY	**TURBO CONFIGURATION:**	PARALLEL
GOVERNOR TYPE:	ADEM3	**TURBO QUANTITY:**	2
ELECTRONICS TYPE:	ADEM3	**TURBOCHARGER MODEL:**	BTLA8501-56T-1.39
CAMSHAFT TYPE:	STANDARD	**CERTIFICATION YEAR:**	2004
IGNITION TYPE:	CI	**CRANKCASE BLOWBY RATE (M3/HR):**	41.8
INJECTOR TYPE:	EUI	**FUEL RATE (RATED RPM) NO LOAD (L/HR):**	19.3
FUEL INJECTOR:	3920200	**PISTON SPD @ RATED ENG SPD (M/SEC):**	7.6
UNIT INJECTOR TIMING (MM):	64.34		
REF EXH STACK DIAMETER (MM):	254		
MAX OPERATING ALTITUDE (M):	1,200		

INDUSTRY	SUB INDUSTRY	APPLICATION
MARINE	DREDGE	MARINE AUXILIARY
MARINE	FISHING	MARINE AUXILIARY
MARINE	OFFSHORE	MARINE AUXILIARY
MARINE	GENERAL CARGO	MARINE AUXILIARY

General Performance Data Top

GENSET POWER WITHOUT 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
1,030.0	100	1,080	2,086	205.2	260.6
927.0	90	971	1,876	205.9	235.2
824.0	80	863	1,668	207.2	210.4
772.5	75	810	1,565	208.3	198.4
721.0	70	756	1,461	209.5	186.4
618.0	60	650	1,256	212.5	162.4
515.0	50	544	1,051	216.6	138.6
412.0	40	439	849	221.7	114.6
309.0	30	334	646	230.1	90.4
257.5	25	281	543	236.8	78.2
206.0	20	227	438	249.7	66.6
103.0	10	115	223	320.2	43.5

GENSET POWER WITHOUT 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
1,030.0	100	1,080	226.1	38.0	611.8	454.7	231	198.3
927.0	90	971	206.7	37.0	585.6	432.8	212	186.1
824.0	80	863	187.2	36.0	562.2	416.2	192	173.9
772.5	75	810	175.8	35.4	551.7	410.7	181	167.3
721.0	70	756	163.1	34.8	541.3	406.1	168	159.9
618.0	60	650	137.0	33.5	520.8	396.9	141	143.9
515.0	50	544	109.8	32.6	499.2	387.5	114	126.1
412.0	40	439	82.2	33.1	465.6	374.7	86	106.0

GENSET POWER WITHOUT FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
309.0	30	334	54.3	33.6	421.2	357.5	57	85.7
257.5	25	281	40.4	33.8	394.5	346.9	43	75.4
206.0	20	227	30.2	33.6	359.5	325.8	33	66.8
103.0	10	115	13.4	32.9	273.0	268.8	16	50.8

GENSET POWER WITHOUT 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)
EKW	%	BKW	M3/MIN	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MIN
1,030.0	100	1,080	85.3	220.3	6,059.2	6,280.8	82.7	74.0
927.0	90	971	80.6	202.3	5,394.6	5,594.5	78.3	70.0
824.0	80	863	75.7	184.5	4,803.3	4,982.2	73.1	65.4
772.5	75	810	72.7	175.5	4,532.8	4,701.5	70.1	62.7
721.0	70	756	69.5	166.4	4,269.0	4,427.4	66.9	59.9
618.0	60	650	62.7	148.0	3,746.4	3,884.5	60.3	54.0
515.0	50	544	55.5	129.2	3,225.9	3,343.7	53.4	47.8
412.0	40	439	48.1	109.8	2,688.3	2,785.7	46.3	41.4
309.0	30	334	40.7	90.2	2,150.6	2,227.5	39.1	34.9
257.5	25	281	36.9	80.2	1,881.5	1,948.0	35.3	31.6
206.0	20	227	34.2	71.9	1,629.9	1,686.5	32.8	29.3
103.0	10	115	29.8	56.4	1,160.6	1,197.6	28.4	25.4

Heat Rejection Data Top

GENSET POWER WITHOUT 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
1,030.0	100	1,080	363	122	963	498	132	273	1,080	2,629	2,801
927.0	90	971	337	114	862	431	119	241	971	2,371	2,526
824.0	80	863	312	108	770	376	106	209	863	2,123	2,262
772.5	75	810	300	105	727	353	100	192	810	2,002	2,133
721.0	70	756	287	103	684	330	94.0	174	756	1,881	2,004
618.0	60	650	260	98.0	600	285	82.0	139	650	1,640	1,747
515.0	50	544	233	93.0	515	241	70.0	104	544	1,398	1,489
412.0	40	439	204	85.9	429	194	57.9	72.6	439	1,155	1,231
309.0	30	334	173	78.9	341	150	45.9	43.8	334	912	971
257.5	25	281	156	75.0	298	127	40.0	31.0	281	790	841
206.0	20	227	139	71.0	256	102	34.1	22.1	227	672	716
103.0	10	115	103	63.1	176	54.3	22.1	10.1	115	439	468

Sound Data Top

Note(s)

SOUND PRESSURE DATA FOR THIS RATING CAN BE FOUND IN PERFORMANCE NUMBER - DM8779.

Emissions Data Top

Units Filter All Units

DIESEL

RATED SPEED NOMINAL DATA: 1200 RPM

GENSET POWER WITHOUT FAN ENGINE POWER	EKW BKW	1,030.0 1,080	772.5 810	515.0 544	257.5 281	103.0 115
PERCENT LOAD	**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)	G/HR	10,198	6,125	3,655	2,395	1,711
TOTAL CO	G/HR	4,460	2,564	1,027	171	713
TOTAL HC	G/HR	47	52	66	75	135

GENSET POWER WITHOUT FAN ENGINE POWER		EKW BKW	1,030.0 1,080	772.5 810	515.0 544	257.5 281	103.0 115
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL CO2		KG/HR	725	557	388	218	113
PART MATTER		G/HR	82.5	66.1	50.4	11.8	15.5
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,370.1	2,651.6	2,266.3	2,628.3	3,384.4
TOTAL CO	(CORR 5% O2)	MG/NM3	1,473.6	1,110.1	637.0	187.7	1,414.8
TOTAL HC	(CORR 5% O2)	MG/NM3	15.4	22.4	41.0	82.5	266.1
PART MATTER	(CORR 5% O2)	MG/NM3	27.3	28.6	31.2	13.0	30.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,635	1,288	1,107	1,280	1,647
TOTAL CO	(CORR 5% O2)	PPM	1,182	886	513	151	1,151
TOTAL HC	(CORR 5% O2)	PPM	25	36	66	133	431
TOTAL NOX (AS NO2)		G/HP-HR	7.04	5.64	5.01	6.36	11.05
TOTAL CO		G/HP-HR	3.08	2.36	1.41	0.45	4.61
TOTAL HC		G/HP-HR	0.03	0.05	0.09	0.20	0.87
PART MATTER		G/HP-HR	0.06	0.06	0.07	0.03	0.10
TOTAL NOX (AS NO2)		LB/HR	22.48	13.50	8.06	5.28	3.77
TOTAL CO		LB/HR	9.83	5.65	2.26	0.38	1.57
TOTAL HC		LB/HR	0.10	0.11	0.15	0.17	0.30
TOTAL CO2		LB/HR	1,598	1,228	856	481	250
PART MATTER		LB/HR	0.18	0.15	0.11	0.03	0.03
OXYGEN IN EXH		%	10.1	11.3	12.1	13.5	15.9
DRY SMOKE OPACITY		%	2.4	2.3	2.2	1.0	1.0
BOSCH SMOKE NUMBER			0.86	0.81	0.76	0.37	0.37

RATED SPEED POTENTIAL SITE VARIATION: 1200 RPM

GENSET POWER WITHOUT FAN ENGINE POWER		EKW BKW	1,030.0 1,080	772.5 810	515.0 544	257.5 281	103.0 115
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	12,238	7,350	4,386	2,874	2,054
TOTAL CO		G/HR	8,028	4,616	1,849	308	1,284
TOTAL HC		G/HR	63	69	88	100	179
PART MATTER		G/HR	115.5	92.5	70.6	16.5	21.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	4,044.1	3,181.9	2,719.6	3,153.9	4,061.2
TOTAL CO	(CORR 5% O2)	MG/NM3	2,652.4	1,998.1	1,146.7	337.9	2,546.6
TOTAL HC	(CORR 5% O2)	MG/NM3	20.5	29.8	54.5	109.7	354.0
PART MATTER	(CORR 5% O2)	MG/NM3	38.2	40.0	43.7	18.2	43.2
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,962	1,546	1,328	1,536	1,976
TOTAL CO	(CORR 5% O2)	PPM	2,128	1,595	923	272	2,073
TOTAL HC	(CORR 5% O2)	PPM	33	48	88	177	573
TOTAL NOX (AS NO2)		G/HP-HR	8.45	6.77	6.01	7.63	13.26
TOTAL CO		G/HP-HR	5.54	4.25	2.54	0.82	8.29
TOTAL HC		G/HP-HR	0.04	0.06	0.12	0.26	1.16
PART MATTER		G/HP-HR	0.08	0.09	0.10	0.04	0.14
TOTAL NOX (AS NO2)		LB/HR	26.98	16.20	9.67	6.34	4.53
TOTAL CO		LB/HR	17.70	10.18	4.08	0.68	2.83
TOTAL HC		LB/HR	0.14	0.15	0.19	0.22	0.39
PART MATTER		LB/HR	0.25	0.20	0.16	0.04	0.05

Regulatory Information Top

EPA TIER 1 **2004 - 2007**

GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 94.103 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO US EPA MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.

EPA TIER 1 **2000 - 2005**

GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D 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 NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 1	CO: 11.4 NOx: 9.2 HC: 1.3 PM: 0.50

IMO **2000 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.

Altitude Derate Data Top

STANDARD

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	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,080	1,102
250	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,080	1,102
500	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,098	1,081	1,058	1,102
750	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,099	1,082	1,065	1,049	1,025	1,102
1,000	1,102	1,102	1,102	1,102	1,102	1,102	1,102	1,084	1,067	1,050	1,034	1,018	1,003	1,102

Cross Reference Top

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K5494	LL5578	2322502	E765	-	S2G00001	

Supplementary Data Top

Type	Classification	Performance Number
AFTERCOOLER TEMP	60C	DM6971
SOUND	SOUND PRESSURE	DM8779

Performance Parameter Reference Top

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.
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 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.

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