PERFORMANCE DATA [AT400240]

(AT400240)-ENGINE (BAA126422A)-CEM

MARCH 03, 2021

For Help Desk Phone Numbers Click here

Perf No: DM8430 **Change Level:** 03

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

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SALES MODEL:	3512C	**COMBUSTION:**	DIRECT INJECTION
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
ENGINE POWER (BKW):	1,785.0	**HERTZ:**	60
GEN POWER W/O FAN (EKW):	1,700.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	14.7	**AFTERCOOLER TYPE:**	SCAC
RATING LEVEL:	PRIME	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, AC
PUMP QUANTITY:	2	**AFTERCOOLER TEMP (C):**	40
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:**	GTB6772BLN-48T-1.56
CAMSHAFT TYPE:	STANDARD	**CERTIFICATION YEAR:**	2007
IGNITION TYPE:	CI	**CRANKCASE BLOWBY RATE (M3/HR):**	67.9
INJECTOR TYPE:	EUI	**FUEL RATE (RATED RPM) NO LOAD (L/HR):**	35.5
FUEL INJECTOR:	2501368	**PISTON SPD @ RATED ENG SPD (M/SEC):**	12.9
UNIT INJECTOR TIMING (MM):	64.34		
REF EXH STACK DIAMETER (MM):	254		
MAX OPERATING ALTITUDE (M):	700		

INDUSTRY	SUB INDUSTRY	APPLICATION
MARINE	DREDGE	MARINE AUXILIARY
MARINE	FISHING	MARINE AUXILIARY
MARINE	GENERAL CARGO	MARINE AUXILIARY
MARINE	OFFSHORE	MARINE AUXILIARY
MARINE	GOVERNMENT	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)	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
1,870.0	110	1,968	2,241	203.3	470.8	283.1	57.4	639.9	202.6	466.7
1,700.0	100	1,784	2,031	200.2	420.1	252.0	54.7	609.1	175.8	445.9
1,530.0	90	1,599	1,820	199.5	375.4	221.2	52.4	587.5	151.5	435.1
1,360.0	80	1,416	1,612	202.9	338.0	195.7	50.7	575.5	133.3	433.8
1,275.0	75	1,325	1,509	205.0	319.7	183.1	50.0	569.6	124.7	433.4
1,190.0	70	1,236	1,407	207.5	301.7	170.8	49.4	563.7	116.6	433.2
1,020.0	60	1,059	1,206	214.9	267.8	146.7	48.2	552.1	101.2	433.1
850.0	50	884	1,007	223.9	233.0	123.0	47.2	540.6	85.6	433.5
680.0	40	711	810	230.6	193.0	93.0	46.2	515.6	68.7	426.5
510.0	30	538	612	236.8	149.9	59.8	45.3	468.4	49.4	402.6
425.0	25	451	513	242.2	128.4	44.9	44.9	437.8	38.8	384.9
340.0	20	363	413	253.1	108.0	33.1	44.5	400.9	27.0	358.6

GENSET POWER WITHOUT 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
170.0	10	183	209	320.6	69.2	17.3	44.1	306.6	-0.3	276.8

GENSET POWER WITHOUT 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
1,870.0	110	1,968	292	216.8	162.6	418.8	11,362.2	11,762.7	154.6	142.2
1,700.0	100	1,784	259	197.6	151.0	375.2	10,486.6	10,843.3	142.5	131.3
1,530.0	90	1,599	228	180.7	138.8	337.8	9,593.0	9,911.8	130.3	120.1
1,360.0	80	1,416	202	166.7	128.3	310.4	8,838.1	9,125.3	119.9	110.7
1,275.0	75	1,325	189	160.4	123.1	297.0	8,464.9	8,736.5	114.8	106.1
1,190.0	70	1,236	177	154.2	118.0	283.8	8,096.4	8,352.8	109.8	101.5
1,020.0	60	1,059	153	140.5	107.7	258.0	7,368.0	7,594.6	99.8	92.4
850.0	50	884	129	126.5	97.5	232.7	6,647.5	6,844.8	89.9	83.5
680.0	40	711	98	106.2	84.0	198.3	5,715.1	5,879.1	77.4	72.0
510.0	30	538	64	82.0	69.1	157.3	4,682.7	4,810.0	63.6	59.3
425.0	25	451	49	70.8	62.4	137.7	4,224.5	4,333.7	57.1	53.4
340.0	20	363	37	61.5	57.1	120.3	3,862.7	3,954.4	52.0	48.8
170.0	10	183	21	48.0	50.2	91.4	3,396.3	3,455.1	45.4	43.1

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 VALU ENER
EKW	%	BKW	KW	KW	KW	KW	KW	KW	KW	KW
1,870.0	110	1,968	637	121	1,830	1,006	253	509	1,968	4,756
1,700.0	100	1,784	590	119	1,607	858	226	421	1,784	4,244
1,530.0	90	1,599	549	115	1,430	751	202	345	1,599	3,792
1,360.0	80	1,416	512	111	1,307	687	182	287	1,416	3,414
1,275.0	75	1,325	494	109	1,247	657	172	261	1,325	3,229
1,190.0	70	1,236	477	107	1,188	627	162	237	1,236	3,048
1,020.0	60	1,059	440	104	1,073	569	144	193	1,059	2,705
850.0	50	884	402	101	962	513	125	150	884	2,354
680.0	40	711	356	97.0	812	428	104	106	711	1,950
510.0	30	538	302	93.3	626	315	80.6	59.5	538	1,514
425.0	25	451	273	91.5	534	261	69.1	35.5	451	1,297
340.0	20	363	244	89.9	447	207	58.1	17.5	363	1,091
170.0	10	183	182	87.1	288	97.8	37.2	3.3	183	699

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

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITHOUT FAN ENGINE POWER PERCENT LOAD		EKW BKW %	1,870.0 1,968 110	1,700.0 1,784 100	1,275.0 1,325 75	850.0 884 50	425.0 451 25	170. 183 10
TOTAL NOX (AS NO2)		G/HR	17,635	16,562	10,256	4,617	3,348	2,509
TOTAL CO		G/HR	4,796	1,950	825	632	942	1,235
TOTAL HC		G/HR	383	391	353	361	256	281
PART MATTER		G/HR	438.6	178.6	97.4	101.8	115.4	111.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,252.8	3,420.0	2,748.5	1,727.6	2,265.1	3,100
TOTAL CO	(CORR 5% O2)	MG/NM3	853.9	396.3	220.7	236.7	644.7	1,558
TOTAL HC	(CORR 5% O2)	MG/NM3	60.1	69.0	81.9	116.5	155.2	308.2
PART MATTER	(CORR 5% O2)	MG/NM3	65.6	30.8	22.6	31.8	69.0	126.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,584	1,666	1,339	841	1,103	1,510
TOTAL CO	(CORR 5% O2)	PPM	683	317	177	189	516	1,246
TOTAL HC	(CORR 5% O2)	PPM	112	129	153	218	290	575
TOTAL NOX (AS NO2)		G/HP-HR	6.73	6.97	5.80	3.91	5.56	10.23
TOTAL CO		G/HP-HR	1.83	0.82	0.47	0.53	1.56	5.04
TOTAL HC		G/HP-HR	0.15	0.16	0.20	0.31	0.42	1.15
PART MATTER		G/HP-HR	0.17	0.08	0.06	0.09	0.19	0.46
TOTAL NOX (AS NO2)		LB/HR	38.88	36.51	22.61	10.18	7.38	5.53
TOTAL CO		LB/HR	10.57	4.30	1.82	1.39	2.08	2.72
TOTAL HC		LB/HR	0.84	0.86	0.78	0.80	0.56	0.62
PART MATTER		LB/HR	0.97	0.39	0.21	0.22	0.25	0.25

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITHOUT FAN ENGINE POWER PERCENT LOAD		EKW BKW %	1,870.0 1,968 110	1,700.0 1,784 100	1,275.0 1,325 75	850.0 884 50	425.0 451 25	170. 183 10
TOTAL NOX (AS NO2)		G/HR	14,696	13,802	8,547	3,848	2,790	2,091
TOTAL CO		G/HR	2,665	1,083	458	351	523	686
TOTAL HC		G/HR	288	294	265	272	192	211
TOTAL CO2		KG/HR	1,258	1,118	841	609	332	176
PART MATTER		G/HR	313.3	127.6	69.6	72.7	82.4	79.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,710.6	2,850.0	2,290.5	1,439.7	1,887.6	2,583
TOTAL CO	(CORR 5% O2)	MG/NM3	474.4	220.1	122.6	131.5	358.1	865.6
TOTAL HC	(CORR 5% O2)	MG/NM3	45.2	51.9	61.6	87.6	116.7	231.7
PART MATTER	(CORR 5% O2)	MG/NM3	46.9	22.0	16.2	22.7	49.3	90.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,320	1,388	1,116	701	919	1,259
TOTAL CO	(CORR 5% O2)	PPM	379	176	98	105	287	692
TOTAL HC	(CORR 5% O2)	PPM	84	97	115	164	218	433
TOTAL NOX (AS NO2)		G/HP-HR	5.61	5.81	4.83	3.26	4.63	8.53
TOTAL CO		G/HP-HR	1.02	0.46	0.26	0.30	0.87	2.80
TOTAL HC		G/HP-HR	0.11	0.12	0.15	0.23	0.32	0.86
PART MATTER		G/HP-HR	0.12	0.05	0.04	0.06	0.14	0.33
TOTAL NOX (AS NO2)		LB/HR	32.40	30.43	18.84	8.48	6.15	4.61
TOTAL CO		LB/HR	5.87	2.39	1.01	0.77	1.15	1.51
TOTAL HC		LB/HR	0.64	0.65	0.58	0.60	0.42	0.47
TOTAL CO2		LB/HR	2,773	2,464	1,853	1,343	733	388
PART MATTER		LB/HR	0.69	0.28	0.15	0.16	0.18	0.18
OXYGEN IN EXH		%	10.5	10.8	11.5	12.3	13.5	15.9
DRY SMOKE OPACITY		%	3.1	2.0	1.2	1.9	3.0	2.8
BOSCH SMOKE NUMBER			1.16	0.67	0.42	0.61	1.11	1.04

Regulatory Information Top

EPA TIER 2 **2007 - 2011**

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 COMMERCIAL COMPRESSION-IGNITION EMISSION REGULATIONS. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE MARINE REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	MARINE COMMERCIAL	TIER 2	CO: 5.0 NOx + HC: 7.2 PM: 0.20

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.

IMO II **2011 - ----** **CYCLE : E2,D2**

IMO II	2011 - ----	CYCLE : E2,D2
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED 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

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	1,763	1,737	1,785
250	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,766	1,738	1,712	1,686	1,785
500	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,769	1,741	1,714	1,687	1,661	1,636	1,785
750	1,775	1,775	1,775	1,775	1,775	1,774	1,745	1,717	1,689	1,663	1,637	1,612	1,588	1,771
1,000	1,723	1,723	1,723	1,723	1,723	1,721	1,693	1,666	1,639	1,613	1,588	1,564	1,428	1,723

Cross Reference Top

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K8055	LL5784	2772931	E890	-	SLM00001	
4369341	LL6531	3856970	EE134	-	MXP00001	
4485992	GG1029	3856970	EE134	XJ	DE200001	
4182916	GG0645	4161749	GS739	-	E3900001	
4182916	GG0645	4161754	GS739	-	E3900001	
4576955	GG8102	4756275	GS785	-	RSS00001	

Supplementary Data Top

Type	Classification	Performance Number
SOUND	SOUND PRESSURE	DM8779

Performance Parameter Reference Top

Parameters Reference: DM9600 - 12

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 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.

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 : 07/10/19