

Perf No: TM3217

Change Level: 10

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

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SALES MODEL:	3412C	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,500
MACHINE SALES MODEL:		HERTZ:	50
ENGINE POWER (BKW):	577.0	FAN POWER (KW):	16.0
GEN POWER WITH FAN (EKW):	520.0	ASPIRATION:	TA
COMPRESSION RATIO:	14.3	AFTERCOOLER TYPE:	JWAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC+AC
PUMP QUANTITY:	1	AFTERCOOLER TEMP (C):	91
FUEL TYPE:	DIESEL	JACKET WATER TEMP (C):	99
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	PARALLEL
GOVERNOR TYPE:	HYDRA	TURBO QUANTITY:	2
IGNITION TYPE:	CI	TURBOCHARGER MODEL:	F555-3.86
TIMING-STATIC (DEG):	30.0	COMBUSTION STRATEGY:	LOW BSFC
TIMING-STATIC ADVANCE (DEG):	3.5	FUEL RATE (RATED RPM) NO LOAD (L/HR):	10.4
REF EXH STACK DIAMETER (MM):	203	PISTON SPD @ RATED ENG SPD (M/SEC):	7.6
MAX OPERATING ALTITUDE (M):	525		

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

General Performance Data [Top](#)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)
EKW	%	BKW	KPA	G/BKW-HR	G/BKW-HR	L/HR	L/HR
520.0	100	577	1,707	214.9	209.8	145.9	142.4
468.0	90	520	1,537	218.2	213.0	133.4	130.2
416.0	80	463	1,370	222.1	216.8	121.0	118.1
390.0	75	435	1,287	223.4	218.1	114.3	111.6
364.0	70	407	1,204	224.3	219.0	107.4	104.8
312.0	60	351	1,039	224.5	219.2	92.7	90.5
260.0	50	296	875	224.7	219.4	78.2	76.4
208.0	40	242	715	233.3	227.8	66.3	64.8
156.0	30	187	554	247.1	241.2	54.4	53.1
130.0	25	160	473	257.7	251.5	48.4	47.3
104.0	20	132	391	272.9	266.4	42.4	41.4
52.0	10	74.9	222	326.8	319.0	28.8	28.1

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
520.0	100	577	150.5	86.7	723.3	585.8	149	166.8
468.0	90	520	126.7	85.4	687.0	567.0	127	148.0
416.0	80	463	103.3	84.4	651.2	548.4	106	129.4
390.0	75	435	92.5	83.9	635.8	539.5	97	121.1
364.0	70	407	82.3	83.5	621.8	530.9	87	113.6
312.0	60	351	65.0	82.7	597.7	514.4	69	100.9
260.0	50	296	50.0	82.1	573.9	498.0	51	89.1

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
208.0	40	242	37.7	81.6	535.2	468.6	38	77.7
156.0	30	187	27.2	81.2	481.1	425.5	27	66.8
130.0	25	160	22.5	81.1	448.3	398.6	22	61.7
104.0	20	132	17.9	81.0	410.7	367.2	17	56.8
52.0	10	74.9	9.5	80.9	317.7	287.0	9	48.9

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)
EKW	%	BKW	M3/MIN	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MIN
520.0	100	577	39.7	122.1	2,827.4	2,951.3	38.8	34.1
468.0	90	520	35.8	108.6	2,453.9	2,567.2	35.3	31.0
416.0	80	463	32.4	95.8	2,111.6	2,214.5	31.9	28.0
390.0	75	435	30.9	90.2	1,965.6	2,062.7	30.3	26.7
364.0	70	407	29.4	85.0	1,831.9	1,923.2	28.9	25.4
312.0	60	351	26.6	75.6	1,596.6	1,675.5	26.2	23.1
260.0	50	296	24.2	66.6	1,378.5	1,445.0	23.6	20.7
208.0	40	242	21.9	57.8	1,150.1	1,206.2	21.3	18.7
156.0	30	187	19.8	49.1	919.9	966.2	19.2	16.9
130.0	25	160	18.9	44.9	808.2	849.4	18.3	16.1
104.0	20	132	18.0	40.7	698.1	734.1	17.4	15.3
52.0	10	74.9	16.8	33.0	495.0	519.5	16.1	14.1

Heat Rejection Data Top

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
520.0	100	577	337	113	569	346	47.8	59.9	577	1,497	1,595
468.0	90	520	309	131	500	298	45.4	42.3	520	1,371	1,460
416.0	80	463	282	142	439	256	42.7	27.5	463	1,245	1,326
390.0	75	435	267	140	411	237	41.2	21.7	435	1,176	1,253
364.0	70	407	252	133	384	220	39.6	16.7	407	1,104	1,176
312.0	60	351	218	110	334	189	36.2	9.1	351	951	1,013
260.0	50	296	184	83.0	288	162	32.8	3.2	296	800	852
208.0	40	242	157	81.3	242	132	29.7	-1.6	242	678	722
156.0	30	187	130	79.0	197	101	26.5	-5.4	187	556	592
130.0	25	160	116	77.6	174	85.1	24.7	-6.9	160	495	527
104.0	20	132	102	76.0	150	69.2	22.8	-8.2	132	432	461
52.0	10	74.9	71.3	64.1	104	36.3	17.9	-10.2	74.9	294	313

Emissions Data Top

Units Filter All Units

DIESEL

RATED SPEED NOMINAL DATA: 1500 RPM

GENSET POWER WITH FAN	EKW	520.0	390.0	260.0	130.0	52.0
ENGINE POWER	BKW	577	435	296	160	74.9
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	3,975	3,519	2,772	2,075	1,347
TOTAL CO	G/HR	2,026	1,428	506	257	260
TOTAL HC	G/HR	21	18	24	42	63
TOTAL CO2	KG/HR	410	326	222	139	82
PART MATTER	G/HR	438.6	144.4	66.7	35.8	26.3
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,265.5	2,772.4	3,022.1	4,204.0	5,558.8
TOTAL CO	(CORR 5% O2) MG/NM3	1,154.6	1,124.6	551.2	520.5	1,075.3
TOTAL HC	(CORR 5% O2) MG/NM3	12.1	14.4	26.3	85.6	258.7

GENSET POWER WITH FAN ENGINE POWER		EKW	520.0	390.0	260.0	130.0	52.0
PERCENT LOAD		BKW	577	435	296	160	74.9
		%	100	75	50	25	10
PART MATTER	(CORR 5% O2)	MG/NM3	250.0	113.7	72.7	72.6	108.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,096	1,359	1,506	2,077	2,718
TOTAL CO	(CORR 5% O2)	PPM	917	901	442	425	892
TOTAL HC	(CORR 5% O2)	PPM	19	23	44	141	416
TOTAL NOX (AS NO2)		G/HP-HR	5.14	6.03	6.99	9.68	13.41
TOTAL CO		G/HP-HR	2.62	2.45	1.28	1.20	2.58
TOTAL HC		G/HP-HR	0.03	0.03	0.06	0.20	0.63
PART MATTER		G/HP-HR	0.57	0.25	0.17	0.17	0.26
TOTAL NOX (AS NO2)		LB/HR	8.76	7.76	6.11	4.57	2.97
TOTAL CO		LB/HR	4.47	3.15	1.12	0.57	0.57
TOTAL HC		LB/HR	0.05	0.04	0.05	0.09	0.14
TOTAL CO2		LB/HR	904	719	490	306	181
PART MATTER		LB/HR	0.97	0.32	0.15	0.08	0.06
OXYGEN IN EXH		%	7.3	8.2	9.3	13.0	16.7
DRY SMOKE OPACITY		%	12.7	6.6	2.9	2.4	1.9
BOSCH SMOKE NUMBER			3.14	2.22	1.26	1.07	0.86

RATED SPEED POTENTIAL SITE VARIATION: 1500 RPM

GENSET POWER WITH FAN ENGINE POWER		EKW	520.0	390.0	260.0	130.0	52.0
PERCENT LOAD		BKW	577	435	296	160	74.9
		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	4,810	4,258	3,354	2,511	1,630
TOTAL CO		G/HR	3,789	2,670	946	481	486
TOTAL HC		G/HR	40	34	45	79	119
PART MATTER		G/HR	855.3	281.6	130.0	69.8	51.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,741.2	3,354.6	3,656.8	5,086.9	6,726.2
TOTAL CO	(CORR 5% O2)	MG/NM3	2,159.1	2,103.0	1,030.8	973.3	2,010.9
TOTAL HC	(CORR 5% O2)	MG/NM3	22.9	27.2	49.7	161.8	489.0
PART MATTER	(CORR 5% O2)	MG/NM3	487.4	221.7	141.8	141.6	212.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,326	1,644	1,822	2,513	3,289
TOTAL CO	(CORR 5% O2)	PPM	1,715	1,685	826	795	1,667
TOTAL HC	(CORR 5% O2)	PPM	36	43	83	266	786
TOTAL NOX (AS NO2)		G/HP-HR	6.22	7.30	8.45	11.72	16.22
TOTAL CO		G/HP-HR	4.90	4.58	2.38	2.24	4.83
TOTAL HC		G/HP-HR	0.05	0.06	0.11	0.37	1.18
PART MATTER		G/HP-HR	1.11	0.48	0.33	0.33	0.51
TOTAL NOX (AS NO2)		LB/HR	10.60	9.39	7.39	5.54	3.59
TOTAL CO		LB/HR	8.35	5.89	2.09	1.06	1.07
TOTAL HC		LB/HR	0.09	0.08	0.10	0.17	0.26
PART MATTER		LB/HR	1.89	0.62	0.29	0.15	0.11

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NON-CERTIFIED

1970 - 2100

THIS ENGINE RATING IS NOT EMISSIONS CERTIFIED BY ANY DOMESTIC OR FOREIGN AGENCY.

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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	577	577	577	577	577	577	577	577	577	565	554	537	519	577
250	577	577	577	577	577	577	577	577	572	560	542	525	514	577
500	577	577	577	577	577	577	573	564	554	537	519	508	496	577
750	577	577	577	577	575	565	556	547	531	519	502	490	479	564
1,000	577	577	577	568	558	549	540	525	514	496	485	473	462	551
1,250	577	570	560	551	541	532	519	508	496	479	467	456	444	537
1,500	563	553	543	534	525	516	502	490	479	462	450	439	415	524
1,750	546	536	527	518	509	500	485	473	462	450	433	410	387	511
2,000	530	520	511	502	493	479	467	456	444	427	404	381	358	498
2,250	513	504	495	487	478	467	450	439	421	392	369	346	329	485
2,500	497	489	480	472	462	450	433	410	387	364	340	323	306	473
2,750	482	473	465	456	444	427	404	381	358	335	317	300	283	461
3,000	467	459	450	439	421	392	369	346	329	312	294	277	265	449

AMBIENT OPERATING TEMP (C)	0	5	10	15	20	25	30	35	40	45	50	55	60	NORMAL
3,250	452	444	433	410	387	364	340	323	306	289	271	260	248	437
3,500	438	427	404	381	358	335	317	300	283	271	260	248	237	415
3,750	421	398	369	346	329	312	294	277	265	254	242	231	225	392
4,000	387	364	340	323	306	289	271	260	248	242	231	219	213	369
4,250	358	335	317	300	283	271	260	248	237	225	219	208	202	346
4,500	329	312	294	277	265	254	242	231	225	213	208	196	190	323

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Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
OK0520	PP4242	1483590	GS014	-	3FZ00001	
OK0522	PP4244	1483591	GS014	-	3FZ00001	
OT6515	PL8873	7E0153	GS014	-	81Z00088	
OT6515	PL8873	7W8653	GS014	-	81Z00088	
OT6515	PL8873	7W8663	GS014	-	81Z00088	
OT6515	PL8873	9A5537	NAP	NAP	81Z00088	
OT6515	PL8873	9A5540	NAP	NAP	81Z00088	

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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

Caterpillar Confidential: **Green**

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