

Performance Number: DM1909

Change Level: 04

SALES MODEL:	3412C	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,500
MACHINE SALES MODEL:		HERTZ:	50
ENGINE POWER (BHP):	1,051	FAN POWER (HP):	29.5
GEN POWER WITH FAN (EKW):	720.0	ASPIRATION:	TA
COMPRESSION RATIO:	13	AFTERCOOLER TYPE:	JWAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC+AC
PUMP QUANTITY:	1	AFTERCOOLER TEMP (F):	196
FUEL TYPE:	DIESEL	JACKET WATER TEMP (F):	210.2
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	SERIES
GOVERNOR TYPE:	ELEC	TURBO QUANTITY:	2
IGNITION TYPE:	CI	TURBOCHARGER MODEL:	TV9215-48T-2.00
INJECTOR TYPE:	MUI	COMBUSTION STRATEGY:	LOW BSFC
TIMING-STATIC (DEG):	22.0	PISTON SPD @ RATED ENG SPD (FT/MIN):	1,500.0
TIMING-STATIC ADVANCE (DEG):	18.5		
REF EXH STACK DIAMETER (IN):	8		
MAX OPERATING ALTITUDE (FT):	5,988		

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

General Performance Data

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	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR
720.0	100	1,051	336	0.337	0.329	50.0	48.8
648.0	90	946	303	0.335	0.327	44.6	43.6
576.0	80	842	270	0.335	0.327	39.8	38.8
540.0	75	791	253	0.336	0.328	37.5	36.6
504.0	70	740	237	0.337	0.329	35.2	34.3
432.0	60	638	204	0.339	0.331	30.5	29.8
360.0	50	538	172	0.342	0.334	26.0	25.3
288.0	40	439	140	0.349	0.340	21.6	21.0
216.0	30	339	109	0.358	0.349	17.1	16.7
180.0	25	289	93	0.364	0.356	14.8	14.5
144.0	20	238	76	0.375	0.366	12.6	12.3

72.0	10	135	43	0.425	0.415	8.1	7.9
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GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
720.0	100	1,051	69.0	199.9	1,293.4	45.4	1,011.5	70	393.4
648.0	90	946	57.8	193.9	1,260.9	38.5	1,001.9	59	358.8
576.0	80	842	48.6	190.9	1,238.7	32.6	990.4	49	330.9
540.0	75	791	44.5	187.6	1,221.1	30.1	979.7	45	313.7
504.0	70	740	40.4	186.0	1,203.3	27.4	968.9	41	297.5
432.0	60	638	32.3	186.4	1,165.8	22.1	946.9	32	266.5
360.0	50	538	24.8	184.8	1,120.4	17.5	918.2	25	235.7
288.0	40	439	18.3	180.7	1,057.0	13.7	871.5	19	205.5
216.0	30	339	12.4	177.9	962.2	10.3	793.3	13	175.6
180.0	25	289	9.7	177.1	899.9	8.7	741.3	10	161.0
144.0	20	238	7.3	176.4	827.6	7.2	681.4	8	146.6
72.0	10	135	3.3	175.8	649.9	4.7	537.4	3	121.5

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	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
720.0	100	1,051	1,928.7	5,521.9	8,410.8	8,765.5	1,845.4	1,685.8
648.0	90	946	1,717.0	4,883.7	7,487.7	7,804.4	1,642.8	1,500.6
576.0	80	842	1,548.7	4,370.3	6,753.9	7,036.1	1,481.8	1,354.9
540.0	75	791	1,440.5	4,036.2	6,281.9	6,547.7	1,378.7	1,259.3
504.0	70	740	1,352.3	3,766.1	5,897.3	6,146.4	1,296.1	1,184.1
432.0	60	638	1,202.9	3,296.4	5,245.8	5,461.9	1,152.3	1,055.0
360.0	50	538	1,066.1	2,852.3	4,649.5	4,833.6	1,017.8	935.0
288.0	40	439	938.5	2,421.0	4,092.9	4,245.8	894.2	825.0
216.0	30	339	816.4	1,992.6	3,560.4	3,682.0	781.9	726.0
180.0	25	289	759.2	1,778.0	3,310.8	3,416.6	727.9	678.9
144.0	20	238	704.9	1,562.1	3,074.1	3,163.7	673.1	631.1
72.0	10	135	617.2	1,169.7	2,691.5	2,749.1	576.8	548.7

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
720.0	100	1,051	24,527	6,801	39,846	24,914	3,473	6,518	44,580	108,663	115,754
648.0	90	946	22,010	6,118	35,103	21,847	3,100	4,944	40,114	97,015	103,345
576.0	80	842	19,753	5,444	31,249	19,324	2,765	3,786	35,719	86,520	92,166
540.0	75	791	18,638	5,703	28,949	17,680	2,605	3,172	33,542	81,514	86,833
504.0	70	740	17,574	5,762	26,738	16,300	2,443	2,632	31,370	76,456	81,444
432.0	60	638	15,422	5,133	23,019	13,933	2,119	1,681	27,067	66,314	70,641
360.0	50	538	13,324	4,519	19,476	11,694	1,804	948	22,802	56,438	60,120
288.0	40	439	11,234	4,146	15,969	9,376	1,498	407	18,596	46,885	49,944
216.0	30	339	9,132	3,862	12,239	6,847	1,188	-34	14,382	37,188	39,615
180.0	25	289	8,079	3,753	10,308	5,573	1,032	-213	12,258	32,291	34,398
144.0	20	238	6,995	3,581	8,478	4,341	875	-368	10,112	27,380	29,166
72.0	10	135	4,769	3,018	5,251	2,089	563	-585	5,739	17,626	18,776

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1500 RPM

GENSET POWER WITH FAN		EKW	720.0	540.0	360.0	180.0	72.0
ENGINE POWER		BHP	1,051	791	538	289	135
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	6,315	4,643	3,254	1,618	869
TOTAL CO		G/HR	1,017	295	92	122	176
TOTAL HC		G/HR	591	131	88	145	231
TOTAL CO2		KG/HR	501	374	261	147	80
PART MATTER		G/HR	137.8	73.0	63.9	57.7	110.3
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,167.8	3,103.0	3,125.3	2,739.4	2,651.7
TOTAL CO	(CORR 5% O2)	MG/NM3	443.3	180.9	76.4	182.7	672.7
TOTAL HC	(CORR 5% O2)	MG/NM3	248.1	69.6	68.1	181.5	717.5
PART MATTER	(CORR 5% O2)	MG/NM3	51.5	37.2	45.1	97.4	473.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,543	1,511	1,522	1,334	1,292
TOTAL CO	(CORR 5% O2)	PPM	355	145	61	146	538
TOTAL HC	(CORR 5% O2)	PPM	463	130	127	339	1,339
TOTAL NOX (AS NO2)		G/HP-HR	6.05	5.92	6.09	5.63	6.46
TOTAL CO		G/HP-HR	0.97	0.38	0.17	0.42	1.31
TOTAL HC		G/HP-HR	0.57	0.17	0.17	0.50	1.72
PART MATTER		G/HP-HR	0.13	0.09	0.12	0.20	0.82

TOTAL NOX (AS NO2)		LB/HR	13.92	10.24	7.17	3.57	1.92
TOTAL CO		LB/HR	2.24	0.65	0.20	0.27	0.39
TOTAL HC		LB/HR	1.30	0.29	0.19	0.32	0.51
TOTAL CO2		LB/HR	1,105	826	576	324	177
PART MATTER		LB/HR	0.30	0.16	0.14	0.13	0.24
OXYGEN IN EXH		%	8.6	8.6	9.4	11.8	14.8
DRY SMOKE OPACITY		%	3.1	1.5	1.7	1.8	1.4
BOSCH SMOKE NUMBER			1.34	0.66	0.74	0.79	0.59

RATED SPEED POTENTIAL SITE VARIATION: 1500 RPM

GENSET POWER WITH FAN		EKW	720.0	540.0	360.0	180.0	72.0
ENGINE POWER		BHP	1,051	791	538	289	135
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	7,641	5,618	3,937	1,958	1,052
TOTAL CO		G/HR	1,901	551	172	228	329
TOTAL HC		G/HR	1,117	248	167	274	437
PART MATTER		G/HR	268.6	142.3	124.5	112.5	215.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,833.0	3,754.6	3,781.6	3,314.6	3,208.6
TOTAL CO	(CORR 5% O2)	MG/NM3	828.9	338.4	142.8	341.7	1,257.9
TOTAL HC	(CORR 5% O2)	MG/NM3	468.9	131.5	128.7	343.1	1,356.1
PART MATTER	(CORR 5% O2)	MG/NM3	100.5	72.6	87.9	190.0	923.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,867	1,829	1,842	1,615	1,563
TOTAL CO	(CORR 5% O2)	PPM	663	271	114	273	1,006
TOTAL HC	(CORR 5% O2)	PPM	875	245	240	641	2,532
TOTAL NOX (AS NO2)		G/HP-HR	7.33	7.16	7.37	6.82	7.82
TOTAL CO		G/HP-HR	1.82	0.70	0.32	0.79	2.45
TOTAL HC		G/HP-HR	1.07	0.32	0.31	0.95	3.25
PART MATTER		G/HP-HR	0.26	0.18	0.23	0.39	1.60
TOTAL NOX (AS NO2)		LB/HR	16.85	12.39	8.68	4.32	2.32
TOTAL CO		LB/HR	4.19	1.21	0.38	0.50	0.73
TOTAL HC		LB/HR	2.46	0.55	0.37	0.60	0.96
PART MATTER		LB/HR	0.59	0.31	0.27	0.25	0.47

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 (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051
1,000	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051
2,000	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051
3,000	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051
4,000	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,034	1,017	1,051
5,000	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,048	1,029	1,012	994	978	1,051
6,000	1,051	1,051	1,051	1,051	1,051	1,045	1,026	1,007	990	973	956	940	1,051
7,000	1,051	1,051	1,051	1,043	1,023	1,004	986	968	951	935	919	904	1,051
8,000	1,051	1,042	1,021	1,002	983	965	947	930	914	898	883	868	1,021
9,000	1,021	1,000	981	962	944	926	909	893	878	862	848	834	988
10,000	980	960	942	924	906	889	873	858	842	828	814	800	955
11,000	941	922	904	886	869	853	838	823	808	794	781	768	923
12,000	902	884	867	850	834	819	804	789	775	762	749	737	892
13,000	865	848	831	815	800	785	771	757	744	731	718	706	861
14,000	829	812	797	781	766	752	739	725	713	700	688	677	831
15,000	794	778	763	748	734	721	708	695	683	671	660	649	802

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
2T7520	PP3041	1483588	GS272	-	1EZ00001	
2T9794	PP4117	1483588	GS272	-	1EZ00001	
2T7520	PP3041	2400540	GS244	XJ	1EZ00001	
2T9794	PP4117	2400540	GS244	XJ	1EZ00001	
2T7520	PP3041	7E0158	E368	-	2WJ00001	

Performance Parameter Reference

Parameters Reference: DM9600 - 15

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% Specific fuel consumption (C7-C18) +/- 4% 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 : 03/12/24