PERFORMANCE DATA[DM0635]

December 17, 2018

Performance Number: DM0635 **Change Level: 05**

SALES MODEL:	3412C	**COMBUSTION:**	DI
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
ENGINE POWER (BHP):	1,109	**HERTZ:**	60
GEN POWER WITH FAN (EKW):	750.0	**FAN POWER (HP):**	51.0
COMPRESSION RATIO:	13	**ASPIRATION:**	TA
RATING LEVEL:	STANDBY	**AFTERCOOLER TYPE:**	JWAC
PUMP QUANTITY:	1	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC+AC
FUEL TYPE:	DIESEL	**AFTERCOOLER TEMP (F):**	196
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	210.2
GOVERNOR TYPE:	PEEC	**TURBO CONFIGURATION:**	SERIES
IGNITION TYPE:	CI	**TURBO QUANTITY:**	4
REF EXH STACK DIAMETER (IN):	8	**TURBOCHARGER MODEL:**	TV9215-48T-2.00
MAX OPERATING ALTITUDE (FT):	7,546	**COMBUSTION STRATEGY:**	LOW BSFC
		PISTON SPD @ RATED ENG SPD (FT/MIN):	1,800.0

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

General Performance Data

GENSET POWER WITH 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	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	DEG F
750.0	100	1,109	296	0.344	54.5	71.0	207.0	1,258.9	957.0
675.0	90	1,001	267	0.342	49.0	60.1	200.5	1,225.6	946.2
600.0	80	895	239	0.342	43.8	50.3	194.7	1,193.2	935.4
562.5	75	842	225	0.342	41.2	45.7	192.4	1,176.5	929.0
525.0	70	790	211	0.343	38.6	41.4	190.2	1,159.2	921.6
450.0	60	685	183	0.344	33.7	33.3	186.1	1,121.7	902.8
375.0	50	581	155	0.350	29.0	26.1	182.5	1,078.9	878.2
300.0	40	478	128	0.359	24.5	19.7	179.1	1,024.9	842.7
225.0	30	375	100	0.372	19.9	14.0	176.0	952.6	790.3
187.5	25	323	86	0.379	17.5	11.3	174.5	904.4	753.7
150.0	20	270	72	0.390	15.1	8.8	173.0	847.8	709.4
75.0	10	162	43	0.446	10.3	4.6	171.9	701.7	591.0

GENSET POWER WITH 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	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	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
750.0	100	1,109	73	397.6	2,302.4	6,423.4	10,223.2	10,604.8	2,229.3	1,998.4
675.0	90	1,001	61	368.6	2,076.4	5,741.9	9,064.5	9,407.4	2,008.1	1,800.1
600.0	80	895	51	337.1	1,853.9	5,095.6	7,978.0	8,284.4	1,795.8	1,609.8
562.5	75	842	46	321.6	1,752.6	4,794.9	7,471.2	7,759.7	1,697.7	1,521.9
525.0	70	790	42	306.2	1,656.1	4,505.8	6,982.2	7,252.8	1,603.9	1,437.8
450.0	60	685	34	275.6	1,476.1	3,962.1	6,055.5	6,291.1	1,429.7	1,281.6
375.0	50	581	27	246.0	1,313.5	3,453.1	5,180.4	5,383.6	1,269.1	1,137.6
300.0	40	478	21	217.1	1,158.0	2,965.9	4,327.0	4,498.5	1,119.7	1,003.7
225.0	30	375	15	187.9	1,009.1	2,479.6	3,472.8	3,612.2	975.3	874.3
187.5	25	323	12	173.0	937.6	2,234.4	3,039.9	3,162.5	905.4	811.7
150.0	20	270	9	157.8	869.3	1,986.7	2,601.4	2,706.8	835.5	749.0
75.0	10	162	4	132.4	759.8	1,549.1	1,824.6	1,896.9	724.9	649.8

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY

PERFORMANCE DATA[DM0635]

December 17, 2018

EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
750.0	100	1,109	26,957	6,483	45,157	26,106	3,361	7,394	47,010	117,881	125,573
675.0	90	1,001	24,285	5,858	40,209	23,034	3,162	5,915	42,461	105,924	112,836
600.0	80	895	21,782	5,516	35,545	20,246	2,952	4,437	37,962	94,658	100,835
562.5	75	842	20,529	5,299	33,354	18,899	2,850	3,814	35,727	89,089	94,902
525.0	70	790	19,280	5,062	31,223	17,630	2,747	3,242	33,492	83,553	89,004
450.0	60	685	16,834	4,550	27,128	15,128	2,531	2,218	29,050	72,822	77,574
375.0	50	581	14,557	4,379	23,314	12,794	2,309	1,421	24,633	62,775	66,871
300.0	40	478	12,359	4,272	19,557	10,484	2,086	768	20,276	53,007	56,465
225.0	30	375	10,109	4,092	15,787	8,119	1,852	225	15,899	43,078	45,889
187.5	25	323	8,903	3,896	13,801	6,865	1,701	-16	13,688	37,856	40,326
150.0	20	270	7,688	3,698	11,846	5,585	1,543	-226	11,451	32,613	34,741
75.0	10	162	5,303	3,414	8,210	3,199	1,213	-511	6,875	22,324	23,781

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		EKW	750.0	562.5	375.0	187.5	75.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	1,109	842	581	323	162
TOTAL NOX (AS NO2)		G/HR	7,989	6,093	3,973	1,969	1,137
TOTAL CO		G/HR	1,462	993	724	759	828
TOTAL HC		G/HR	272	153	134	176	396
PART MATTER		G/HR	235.0	184.1	168.5	130.8	81.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,421.1	3,451.8	3,136.2	2,621.7	2,451.9
TOTAL CO	(CORR 5% O2)	MG/NM3	625.0	559.7	570.6	1,022.9	2,545.3
TOTAL HC	(CORR 5% O2)	MG/NM3	106.8	78.6	98.9	223.2	1,434.0
PART MATTER	(CORR 5% O2)	MG/NM3	82.7	86.4	112.9	148.8	130.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,571	1,578	1,429	1,175	1,159
TOTAL CO	(CORR 5% O2)	PPM	496	441	469	810	1,487
TOTAL HC	(CORR 5% O2)	PPM	187	138	174	382	1,455
TOTAL NOX (AS NO2)		G/HP-HR	7.21	7.23	6.84	6.10	7.01
TOTAL CO		G/HP-HR	1.32	1.18	1.25	2.35	5.11
TOTAL HC		G/HP-HR	0.25	0.18	0.23	0.54	2.44
PART MATTER		G/HP-HR	0.21	0.22	0.29	0.41	0.50
TOTAL NOX (AS NO2)		LB/HR	17.61	13.43	8.76	4.34	2.51
TOTAL CO		LB/HR	3.22	2.19	1.60	1.67	1.83
TOTAL HC		LB/HR	0.60	0.34	0.30	0.39	0.87
PART MATTER		LB/HR	0.52	0.41	0.37	0.29	0.18

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		EKW	750.0	562.5	375.0	187.5	75.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	1,109	842	581	323	162
TOTAL NOX (AS NO2)		G/HR	6,602	5,035	3,284	1,627	939
TOTAL CO		G/HR	782	531	387	406	443
TOTAL HC		G/HR	144	81	71	93	209
TOTAL CO2		KG/HR	550	411	290	173	102
PART MATTER		G/HR	120.5	94.4	86.4	67.1	41.5
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,827.4	2,852.7	2,591.9	2,166.7	2,026.4
TOTAL CO	(CORR 5% O2)	MG/NM3	334.2	299.3	305.1	547.0	1,361.1
TOTAL HC	(CORR 5% O2)	MG/NM3	56.5	41.6	52.3	118.1	758.7
PART MATTER	(CORR 5% O2)	MG/NM3	42.4	44.3	57.9	76.3	67.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,298	1,304	1,181	971	958
TOTAL CO	(CORR 5% O2)	PPM	265	236	251	433	795
TOTAL HC	(CORR 5% O2)	PPM	99	73	92	202	770
TOTAL NOX (AS NO2)		G/HP-HR	5.96	5.98	5.65	5.04	5.79
TOTAL CO		G/HP-HR	0.71	0.63	0.67	1.26	2.73
TOTAL HC		G/HP-HR	0.13	0.10	0.12	0.29	1.29
PART MATTER		G/HP-HR	0.11	0.11	0.15	0.21	0.26
TOTAL NOX (AS NO2)		LB/HR	14.56	11.10	7.24	3.59	2.07
TOTAL CO		LB/HR	1.72	1.17	0.85	0.90	0.98
TOTAL HC		LB/HR	0.32	0.18	0.16	0.21	0.46
TOTAL CO2		LB/HR	1,212	906	639	382	224
PART MATTER		LB/HR	0.27	0.21	0.19	0.15	0.09
OXYGEN IN EXH		%	9.8	9.9	10.6	12.3	14.7

Regulatory Information

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

Altitude Derate Data

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	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109
1,000	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109
2,000	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109
3,000	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,087	1,031	1,109
4,000	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,065	1,009	954	1,109
5,000	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,087	1,042	976	920	865	1,109
6,000	1,109	1,109	1,109	1,109	1,109	1,109	1,076	1,009	954	898	832	787	1,109
7,000	1,109	1,109	1,109	1,109	1,087	1,042	987	932	865	810	754	710	1,109
8,000	1,109	1,109	1,109	1,076	1,020	954	898	843	787	732	688	643	1,087
9,000	1,109	1,091	1,054	987	932	876	821	765	710	665	621	577	1,020
10,000	1,071	1,020	965	909	843	787	743	688	643	599	566	521	954
11,000	998	932	876	821	765	721	665	621	577	543	510	477	887
12,000	909	854	798	743	699	643	599	566	532	499	466	433	832
13,000	821	776	721	676	621	588	543	510	477	444	421	399	765
14,000	754	699	654	610	566	532	499	466	433	410	388	366	710
15,000	676	632	588	555	510	477	455	421	399	377	355	333	665

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
2T9786	PP4109	1483596	GS014	-	1EZ00001	
2T9786	PP4109	1668587	GS014	-	1EZ00001	

Performance Parameter Reference

Parameters Reference:DM9600-11

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 29 deg C (84.2 deg F), where the density is 838.9 G/Liter (7.001 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

PERFORMANCE DATA[DM0635]

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.
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 : 11/29/18