Progress Energy

Robby A. Odom
Plant Manager
Crystal River Fossil Plant & Fuel Operations

January 31, 2011

Mr. Jeff Koerner, P.E.
Bureau of Air Regulation
Division of Air Resource Management
Florida Department of Environmental Protection
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32301

Re: Request for Authorization to Operate Emergency Generators & Auxiliary Boilers
Florida Power Corp. d/b/a Progress Energy Florida, Inc
Crystal River Energy Complex
Facility ID No. 0170004
Citrus County

Dear Mr. Koerner:

As you are aware, on Sunday, January 16th, 2011 a fire broke out at the Progress Energy Florida, Inc. (PEF) Crystal River South (CRS) Plant affecting Units 1 and 2 and the South Coal Yard (SCY) among other plant functions. This fire appears to have originated in the transformer directly adjacent to CRS and has resulted in the elimination of electrical service to the SCY and Units 1 and 2. At this time Units 1 & 2 are not operational and a detailed root cause analysis and damage assessment is currently being performed on these units. Furthermore, until this damage assessment is complete, the length of time these units will be out of service is unknown.

As a result of this fire and need to enter the plant and perform damage assessment safely and to continue supplying coal to Units 4 and 5, PEF has leased four (4) large portable generators for the Crystal River Site for an undetermined period of time. Each of these four generators is 2500 HP and produces 2 MW of electrical power. Two generators will be utilized to provide electrical power to the SCY for unloading and conveying coal to Crystal River Units 4 and 5; the remaining two generators will provide ancillary electrical power to Units 1 and 2. I understand that you have been provided with the performance specifications for each of the 2500 HP/2MW generators along with the fuel specifications; however, these documents are also enclosed.

These portable generators will be required to remain on site until Units 1, 2 and the SCY are back-fed from the grid or until Units 1 and 2 are operational again. As result, PEF is requesting authorization to operate the portable generators until power can be re-established to these critical plant systems.

The transformer fire has also created a temporary but critical need for an alternative steam supply at the Crystal River Nuclear Unit (CR3). This unit has been in an outage for an extended period of time and is scheduled to be re-started in the first quarter of 2011. However before CR3 can be re-started and brought back on-line the steam turbine requires preliminary testing, vacuum testing and initial rolling of the turbine. This process requires steam that is typically supplied by Units 1 and 2, but with these two units down indefinitely, PEF is exploring and pursuing options to supply the necessary steam on parallel paths.

Progress Energy Florida, Inc.
Crystal River Steam Plant
15760 W. Powerline Street
CN77
Crystal River, FL 34428

Option 1 consists of transporting auxiliary portable boiler(s) to the site to meet the steam requirement. Although the exact requirements and arrangements have not been secured at this stage, DARM has been provided with the equipment performance specifications along with the fuel specification for the diesel these auxiliary boilers would combust. These documents are enclosed as well.

Option 2 consists of burning No. 2 fuel oil ("light oil") in Crystal River Unit 1 to generate only steam for the start-up of CR 3. Unit 1 is currently authorized to combust this fuel in the facility's Title V Operating Permit (Permit No. 0170004-024-AV). The fuel specification for this option is enclosed.

With the parallel path pursuit of these two options to provide steam to CR3 for start-up in mind, PEF is requesting authorization to operate the portable auxiliary boilers onsite and to combust distillate oil in Unit 1 as an independent supply of steam to CR3.

Thank you for your time and effort in this matter. It is greatly appreciated. If you have any questions, concerns or require further information to complete this request, please contact Chris Bradley by telephone at (727) 820-5962 or e-mail at Chris.Bradley@pgnmail.com. Thank you for your consideration of this request.

I, the undersigned, am the responsible official as defined in Chapter 62-210.200, F.A.C., of the Title V source for which this document is being submitted. I hereby certify, based on the information and belief formed after reasonable inquiry, that the statements made and data contained in this document are true, accurate, and complete.

Best regards,

Robby A. Odom
Manager & Responsible Official
Crystal River Fossil Plant & Fuel Operations

Enclosures

Mr. Jeff Koerner, P.E., NSR Administrator
Authorization to Operate Emer. Gens. & Aux Boilers
Crystal River Energy Complex
January 31, 2011

Emergency Generator Performance Specifications

PERFORMANCE DATA [MHB00346]

(MHB00346)-ENGINE (G5Y00450)-GENERATOR (NAM00213)-GENSET

JANUARY 21, 2011

For Help Desk Phone Numbers Click here

Perf No: DM8454 **Change Level: (**

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

View PDF

SALES MODEL:	3516C	**COMBUSTION:**	DI
ENGINE POWER (BHP):	2,722	**ENGINE SPEED (RPM):**	1,800
GEN POWER WITH FAN (EKW):	1,825.0	**HERTZ:**	60
COMPRESSION RATIO:	14.7	**FAN POWER (HP):**	144.8
APPLICATION:	PACKAGED GENSET	**ASPIRATION:**	TA
RATING LEVEL:	PRIME	**AFTERCOOLER TYPE:**	ATAAC
PUMP QUANTITY:	2	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
FUEL TYPE:	DIESEL	**INLET MANIFOLD AIR TEMP (F):**	120
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	210.2
GOVERNOR TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
ELECTRONICS TYPE:	ADEM3	**TURBO QUANTITY:**	4
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	GTA5518BN-56T-1
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2008
INJECTOR TYPE:	EUI	**CRANKCASE BLOWBY RATE (FT3/HR):**	2,690.7
FUEL INJECTOR:	2664387	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	13.7
REF EXH STACK DIAMETER (IN):	12	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,244.1
MAX OPERATING ALTITUDE (FT):	3,937		

General Performance Data Top

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	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,825.0	100	2,721	284	0.330	128.4	74.6	120.0	1,080.6	67.3	729.8
1,642.5	90	2,450	256	0.335	117.1	69.8	118.7	1,040.1	62.0	702.9
1,460.0	80	2,188	229	0.341	106.6	64.8	117.4	1,005.1	56.8	683.4
1,368.8	75	2,059	215	0.345	101.4	62.1	116.8	987.9	54.2	675.3
1,277.5	70	1,931	202	0.348	96.0	59.1	116.1	970.6	51.4	667.6
1,095.0	60	1,678	175	0.355	85.0	52.1	114.7	936.4	44.9	654.3
912.5	50	1,429	149	0.357	72.9	42.7	113.1	897.8	36.8	647.4
730.0	40	1,181	123	0.358	60.3	31.8	111.4	849.9	27.9	643.2
547.5	30	932	97	0.368	49.0	22.7	110.4	792.6	20.9	633.2
456.2	25	806	84	0.377	43.4	18.8	110.1	757.8	18.0	624.1
365.0	20	678	71	0.391	37.9	15.2	109.7	717.6	15.4	611.2
182.5	10	416	43	0.448	26.7	9.1	109.1	599.5	11.0	542.8

GENSET POWER WITH	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW	ENGINE OUTLET WET EXH GAS VOL	WET INLET AIR MASS	WET EXH GAS MASS FLOW	WET EXH VOL FLOW RATE (32 DEG F	DRY EXH VOL FLOW RATE (32 DEG F

FAN					RATE	FLOW RATE	FLOW RATE	RATE	AND 29.98 IN HG)	AND 29.9 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,825.0	100	2,721	79	435.7	6,268.9	14,338.0	27,207.2	28,105.6	5,926.5	5,492.9
1,642.5	90	2,450	74	412.9	6,078.0	13,483.9	26,275.7	27,094.6	5,702.7	5,307.2
1,460.0	80	2,188	69	390.8	5,848.9	12,707.3	25,203.9	25,948.7	5,465.7	5,103.8
1,368.8	75	2,059	66	380.0	5,717.7	12,303.7	24,603.8	25,313.9	5,329.9	4,984.5
1,277.5	70	1,931	63	368.2	5,567.0	11,865.4	23,915.9	24,589.3	5,175.4	4,847.0
1,095.0	60	1,678	56	340.7	5,183.9	10,864.4	22,185.9	22,781.5	4,795.0	4,502.4
912.5	50	1,429	46	303.3	4,622.0	9,569.6	19,690.3	20,200.9	4,249.9	3,997.8
730.0	40	1,181	34	258.8	3,948.4	8,096.6	16,730.6	17,153.0	3,609.6	3,400.7
547.5	30	932	25	218.2	3,368.4	6,825.8	14,210.5	14,552.7	3,071.0	2,900.3
456.2	25	806	21	199.4	3,113.1	6,238.2	13,110.4	13,414.0	2,830.1	2,677.7
365.0	20	678	17	181.4	2,876.7	5,668.5	12,097.3	12,362.8	2,602.6	2,467.9
182.5	10	416	11	149.1	2,472.2	4,547.9	10,369.3	10,556.0	2,230.7	2,131.7

Heat Rejection Data Top

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	HIG HEA VAL ENI
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU
1,825.0	100	2,721	41,176	7,412	94,610	44,575	14,683	34,659	115,390	275,674	293
1,642.5	90	2,450	38,527	7,062	86,743	39,775	13,387	31,101	103,910	251,335	267
1,460.0	80	2,188	36,026	6,778	79,970	35,886	12,183	27,695	92,774	228,740	243
1,368.8	75	2,059	34,762	6,647	76,682	34,111	11,589	26,040	87,309	217,577	231
1,277.5	70	1,931	33,450	6,524	73,236	32,303	10,979	24,222	81,880	206,135	219
1,095.0	60	1,678	30,660	6,282	65,884	28,619	9,717	20,121	71,174	182,439	194
912.5	50	1,429	27,479	6,000	57,347	24,769	8,336	15,125	60,594	156,515	166
730.0	40	1,181	24,011	5,699	48,105	20,709	6,897	9,899	50,098	129,496	137
547.5	30	932	20,680	5,394	39,921	16,936	5,597	6,112	39,536	105,077	111
456.2	25	806	18,997	5,238	36,022	15,084	4,965	4,652	34,192	93,210	99,2
365.0	20	678	17,246	5,079	32,081	13,220	4,333	3,430	28,772	81,353	86,(
182.5	10	416	13,382	4,712	23,624	8,251	3,047	1,543	17,652	57,208	60,9

Emissions Data Top

Units Filter All Units

RATED SPEED NOT TO EXCEED DATA: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER		EKW BHP	1,825.0 2,721	1,368.8 2,059	912.5 1,429	456.2 806	182.5 416
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	16,211	8,787	5,621	4,219	3,018
TOTAL CO		G/HR	1,310	758	1,119	1,803	1,832
TOTAL HC		G/HR	463	490	508	414	450
PART MATTER		G/HR	100.3	99.7	149.3	256.4	204.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,031.7	2,151.1	1,936.1	2,415.5	2,867.1
TOTAL CO	(CORR 5% O2)	MG/NM3	237.1	174.2	373.5	931.1	1,712.5
TOTAL HC	(CORR 5% O2)	MG/NM3	73.4	97.2	140.5	198.7	377.7
PART MATTER	(CORR 5% O2)	MG/NM3	15.6	20.0	46.6	122.2	158.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,477	1,048	943	1,177	1,397
TOTAL CO	(CORR 5% O2)	PPM	190	139	299	745	1,370
TOTAL HC	(CORR 5% O2)	PPM	137	181	262	371	705
TOTAL NOX (AS NO2)		G/HP-HR	5.99	4.29	3.95	5.24	7.26
TOTAL CO		G/HP-HR	0.48	0.37	0.79	2.24	4.40
TOTAL HC		G/HP-HR	0.17	0.24	0.36	0.51	1.08
PART MATTER		G/HP-HR	0.04	0.05	0.10	0.32	0.49

TOTAL NOX (AS NO2)		LB/HR	35.74	19.37	12.39	9.30	6.65
TOTAL CO		LB/HR	2.89	1.67	2.47	3.97	4.04
TOTAL HC		LB/HR	1.02	1.08	1.12	0.91	0.99
PART MATTER		LB/HR	0.22	0.22	0.33	0.57	0.45

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**1,825.0**	**1,368.8**	**912.5**	**456.2**	**182.5**
ENGINE POWER		**BHP**	**2,721**	**2,059**	**1,429**	**806**	**416**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	13,509	7,322	4,684	3,516	2,515
TOTAL CO		G/HR	728	421	622	1,002	1,018
TOTAL HC		G/HR	348	368	382	311	339
TOTAL CO2		KG/HR	1,261	998	717	426	259
PART MATTER		G/HR	71.6	71.2	106.6	183.1	146.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,526.5	1,792.6	1,613.4	2,012.9	2,389.2
TOTAL CO	(CORR 5% O2)	MG/NM3	131.7	96.8	207.5	517.3	951.4
TOTAL HC	(CORR 5% O2)	MG/NM3	55.2	73.1	105.6	149.4	284.0
PART MATTER	(CORR 5% O2)	MG/NM3	11.1	14.3	33.3	87.3	113.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,231	873	786	981	1,164
TOTAL CO	(CORR 5% O2)	PPM	105	77	166	414	761
TOTAL HC	(CORR 5% O2)	PPM	103	136	197	279	530
TOTAL NOX (AS NO2)		G/HP-HR	4.99	3.57	3.29	4.37	6.05
TOTAL CO		G/HP-HR	0.27	0.21	0.44	1.24	2.45
TOTAL HC		G/HP-HR	0.13	0.18	0.27	0.39	0.81
PART MATTER		G/HP-HR	0.03	0.03	0.07	0.23	0.35
TOTAL NOX (AS NO2)		LB/HR	29.78	16.14	10.33	7.75	5.55
TOTAL CO		LB/HR	1.60	0.93	1.37	2.21	2.24
TOTAL HC		LB/HR	0.77	0.81	0.84	0.69	0.75
TOTAL CO2		LB/HR	2,781	2,199	1,581	939	570
PART MATTER		LB/HR	0.16	0.16	0.24	0.40	0.32
OXYGEN IN EXH		%	11.4	12.6	13.5	14.3	15.8
DRY SMOKE OPACITY		%	0.4	0.5	1.8	3.8	3.1
BOSCH SMOKE NUMBER			0.18	0.23	0.60	1.25	1.14

Regulatory Information Top

EPA TIER 2 **2006 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY **2011 - ----**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
1,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
2,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,715	2,669	2,722
3,000	2,722	2,722	2,722	2,722	2,722	2,706	2,659	2,613	2,569	2,722
4,000	2,722	2,722	2,722	2,700	2,651	2,604	2,558	2,514	2,471	2,722
5,000	2,722	2,697	2,646	2,597	2,550	2,504	2,460	2,418	2,377	2,693
6,000	2,644	2,593	2,544	2,497	2,451	2,408	2,365	2,324	2,285	2,607
7,000	2,541	2,492	2,445	2,400	2,356	2,314	2,273	2,234	2,196	2,523
8,000	2,441	2,394	2,349	2,305	2,263	2,223	2,184	2,146	2,110	2,441
9,000	2,344	2,299	2,256	2,214	2,174	2,135	2,097	2,061	2,026	2,361
10,000	2,251	2,207	2,166	2,125	2,087	2,049	2,014	1,979	1,945	2,282
11,000	2,160	2,118	2,078	2,040	2,003	1,967	1,932	1,899	1,867	2,206
12,000	2,072	2,032	1,993	1,957	1,921	1,887	1,853	1,821	1,791	2,131
13,000	1,986	1,948	1,911	1,876	1,842	1,809	1,777	1,747	1,717	2,058
14,000	1,904	1,867	1,832	1,798	1,765	1,734	1,703	1,674	1,646	1,987
15,000	1,824	1,789	1,755	1,723	1,691	1,661	1,632	1,604	1,576	1,918

Cross Reference Top

Engine Arrangement

Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2903313	MHB00001	PS017	-
3395408	KEN00001	PS017	-

Test Specification Data

Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K8521	LL6011	MHB00001	2903313	ADEM3		
0K9250	LL6076	KEN00001	3395408	ADEM3		

General Notes Top

DM8454 - 01

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

Performance Parameter Reference Top

Parameters Reference: DM9600 - 02

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%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%

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%

*Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

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 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25°C (77°F) at 60% relative humidity.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25°C, 100 KPA 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 35° API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29°C (84.2°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.

ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standar d 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.

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 'not to exceed' 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. Log on to the Technology and Solutions Divisions (T&SD) web page (http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:
Regulation watch covers regulations in effect and future regulation ch anges for world, federal, state and loca. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

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

Date Released : 12/06/10

PERFORMANCE DATA [MHB00355]

JANUARY 21, 2011

(MHB00355)-ENGINE (G5Y00458)-GENERATOR (NAM00223)-GENSET

For Help Desk Phone Numbers Click here

Perf No: DM8454 **Change Level: (**

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

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SALES MODEL:	3516C	**COMBUSTION:**	DI
ENGINE POWER (BHP):	2,722	**ENGINE SPEED (RPM):**	1,800
GEN POWER WITH FAN (EKW):	1,825.0	**HERTZ:**	60
COMPRESSION RATIO:	14.7	**FAN POWER (HP):**	144.8
APPLICATION:	PACKAGED GENSET	**ASPIRATION:**	TA
RATING LEVEL:	PRIME	**AFTERCOOLER TYPE:**	ATAAC
PUMP QUANTITY:	2	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
FUEL TYPE:	DIESEL	**INLET MANIFOLD AIR TEMP (F):**	120
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	210.2
GOVERNOR TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
ELECTRONICS TYPE:	ADEM3	**TURBO QUANTITY:**	4
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	GTA5518BN-56T-1
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2008
INJECTOR TYPE:	EUI	**CRANKCASE BLOWBY RATE (FT3/HR):**	2,690.7
FUEL INJECTOR:	2664387	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	13.7
REF EXH STACK DIAMETER (IN):	12	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,244.1
MAX OPERATING ALTITUDE (FT):	3,937		

General Performance Data Top

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	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,825.0	100	2,721	284	0.330	128.4	74.6	120.0	1,080.6	67.3	729.8
1,642.5	90	2,450	256	0.335	117.1	69.8	118.7	1,040.1	62.0	702.9
1,460.0	80	2,188	229	0.341	106.6	64.8	117.4	1,005.1	56.8	683.4
1,368.8	75	2,059	215	0.345	101.4	62.1	116.8	987.9	54.2	675.3
1,277.5	70	1,931	202	0.348	96.0	59.1	116.1	970.6	51.4	667.6
1,095.0	60	1,678	175	0.355	85.0	52.1	114.7	936.4	44.9	654.3
912.5	50	1,429	149	0.357	72.9	42.7	113.1	897.8	36.8	647.4
730.0	40	1,181	123	0.358	60.3	31.8	111.4	849.9	27.9	643.2
547.5	30	932	97	0.368	49.0	22.7	110.4	792.6	20.9	633.2
456.2	25	806	84	0.377	43.4	18.8	110.1	757.8	18.0	624.1
365.0	20	678	71	0.391	37.9	15.2	109.7	717.6	15.4	611.2
182.5	10	416	43	0.448	26.7	9.1	109.1	599.5	11.0	542.8

GENSET POWER WITH	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW	ENGINE OUTLET WET EXH GAS VOL	WET INLET AIR MASS	WET EXH GAS MASS FLOW	WET EXH VOL FLOW RATE (32 DEG F	DRY EXH VOL FLOW RATE (32 DEG F

FAN					RATE	FLOW RATE	FLOW RATE	RATE	AND 29.98 IN HG)	AND 29.9 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,825.0	100	2,721	79	435.7	6,268.9	14,338.0	27,207.2	28,105.6	5,926.5	5,492.9
1,642.5	90	2,450	74	412.9	6,078.0	13,483.9	26,275.7	27,094.6	5,702.7	5,307.2
1,460.0	80	2,188	69	390.8	5,848.9	12,707.3	25,203.9	25,948.7	5,465.7	5,103.8
1,368.8	75	2,059	66	380.0	5,717.7	12,303.7	24,603.8	25,313.9	5,329.9	4,984.5
1,277.5	70	1,931	63	368.2	5,567.0	11,865.4	23,915.9	24,589.3	5,175.4	4,847.0
1,095.0	60	1,678	56	340.7	5,183.9	10,864.4	22,185.9	22,781.5	4,795.0	4,502.4
912.5	50	1,429	46	303.3	4,622.0	9,569.6	19,690.3	20,200.9	4,249.9	3,997.8
730.0	40	1,181	34	258.8	3,948.4	8,096.6	16,730.6	17,153.0	3,609.6	3,400.7
547.5	30	932	25	218.2	3,368.4	6,825.8	14,210.5	14,552.7	3,071.0	2,900.3
456.2	25	806	21	199.4	3,113.1	6,238.2	13,110.4	13,414.0	2,830.1	2,677.7
365.0	20	678	17	181.4	2,876.7	5,668.5	12,097.3	12,362.8	2,602.6	2,467.9
182.5	10	416	11	149.1	2,472.2	4,547.9	10,369.3	10,556.0	2,230.7	2,131.7

Heat Rejection Data Top

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	HIG HE/ VAI ENI
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU
1,825.0	100	2,721	41,176	7,412	94,610	44,575	14,683	34,659	115,390	275,674	293
1,642.5	90	2,450	38,527	7,062	86,743	39,775	13,387	31,101	103,910	251,335	267
1,460.0	80	2,188	36,026	6,778	79,970	35,886	12,183	27,695	92,774	228,740	243
1,368.8	75	2,059	34,762	6,647	76,682	34,111	11,589	26,040	87,309	217,577	231
1,277.5	70	1,931	33,450	6,524	73,236	32,303	10,979	24,222	81,880	206,135	219
1,095.0	60	1,678	30,660	6,282	65,884	28,619	9,717	20,121	71,174	182,439	194
912.5	50	1,429	27,479	6,000	57,347	24,769	8,336	15,125	60,594	156,515	166
730.0	40	1,181	24,011	5,699	48,105	20,709	6,897	9,899	50,098	129,496	137
547.5	30	932	20,680	5,394	39,921	16,936	5,597	6,112	39,536	105,077	111
456.2	25	806	18,997	5,238	36,022	15,084	4,965	4,652	34,192	93,210	99,:
365.0	20	678	17,246	5,079	32,081	13,220	4,333	3,430	28,772	81,353	86,'
182.5	10	416	13,382	4,712	23,624	8,251	3,047	1,543	17,652	57,208	60,'

Emissions Data Top

Units Filter All Units

RATED SPEED NOT TO EXCEED DATA: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER		EKW BHP	1,825.0 2,721	1,368.8 2,059	912.5 1,429	456.2 806	182.5 416
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	16,211	8,787	5,621	4,219	3,018
TOTAL CO		G/HR	1,310	758	1,119	1,803	1,832
TOTAL HC		G/HR	463	490	508	414	450
PART MATTER		G/HR	100.3	99.7	149.3	256.4	204.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,031.7	2,151.1	1,936.1	2,415.5	2,867.1
TOTAL CO	(CORR 5% O2)	MG/NM3	237.1	174.2	373.5	931.1	1,712.5
TOTAL HC	(CORR 5% O2)	MG/NM3	73.4	97.2	140.5	198.7	377.7
PART MATTER	(CORR 5% O2)	MG/NM3	15.6	20.0	46.6	122.2	158.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,477	1,048	943	1,177	1,397
TOTAL CO	(CORR 5% O2)	PPM	190	139	299	745	1,370
TOTAL HC	(CORR 5% O2)	PPM	137	181	262	371	705
TOTAL NOX (AS NO2)		G/HP-HR	5.99	4.29	3.95	5.24	7.26
TOTAL CO		G/HP-HR	0.48	0.37	0.79	2.24	4.40
TOTAL HC		G/HP-HR	0.17	0.24	0.36	0.51	1.08
PART MATTER		G/HP-HR	0.04	0.05	0.10	0.32	0.49

TOTAL NOX (AS NO2)		LB/HR	35.74	19.37	12.39	9.30	6.65
TOTAL CO		LB/HR	2.89	1.67	2.47	3.97	4.04
TOTAL HC		LB/HR	1.02	1.08	1.12	0.91	0.99
PART MATTER		LB/HR	0.22	0.22	0.33	0.57	0.45

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**1,825.0**	**1,368.8**	**912.5**	**456.2**	**182.5**
ENGINE POWER		**BHP**	**2,721**	**2,059**	**1,429**	**806**	**416**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	13,509	7,322	4,684	3,516	2,515
TOTAL CO		G/HR	728	421	622	1,002	1,018
TOTAL HC		G/HR	348	368	382	311	339
TOTAL CO2		KG/HR	1,261	998	717	426	259
PART MATTER		G/HR	71.6	71.2	106.6	183.1	146.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,526.5	1,792.6	1,613.4	2,012.9	2,389.2
TOTAL CO	(CORR 5% O2)	MG/NM3	131.7	96.8	207.5	517.3	951.4
TOTAL HC	(CORR 5% O2)	MG/NM3	55.2	73.1	105.6	149.4	284.0
PART MATTER	(CORR 5% O2)	MG/NM3	11.1	14.3	33.3	87.3	113.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,231	873	786	981	1,164
TOTAL CO	(CORR 5% O2)	PPM	105	77	166	414	761
TOTAL HC	(CORR 5% O2)	PPM	103	136	197	279	530
TOTAL NOX (AS NO2)		G/HP-HR	4.99	3.57	3.29	4.37	6.05
TOTAL CO		G/HP-HR	0.27	0.21	0.44	1.24	2.45
TOTAL HC		G/HP-HR	0.13	0.18	0.27	0.39	0.81
PART MATTER		G/HP-HR	0.03	0.03	0.07	0.23	0.35
TOTAL NOX (AS NO2)		LB/HR	29.78	16.14	10.33	7.75	5.55
TOTAL CO		LB/HR	1.60	0.93	1.37	2.21	2.24
TOTAL HC		LB/HR	0.77	0.81	0.84	0.69	0.75
TOTAL CO2		LB/HR	2,781	2,199	1,581	939	570
PART MATTER		LB/HR	0.16	0.16	0.24	0.40	0.32
OXYGEN IN EXH		%	11.4	12.6	13.5	14.3	15.8
DRY SMOKE OPACITY		%	0.4	0.5	1.8	3.8	3.1
BOSCH SMOKE NUMBER			0.18	0.23	0.60	1.25	1.14

Regulatory Information Top

EPA TIER 2 **2006 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY **2011 - ----**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND IS 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
1,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
2,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,715	2,669	2,722
3,000	2,722	2,722	2,722	2,722	2,722	2,706	2,659	2,613	2,569	2,722
4,000	2,722	2,722	2,722	2,700	2,651	2,604	2,558	2,514	2,471	2,722
5,000	2,722	2,697	2,646	2,597	2,550	2,504	2,460	2,418	2,377	2,693
6,000	2,644	2,593	2,544	2,497	2,451	2,408	2,365	2,324	2,285	2,607
7,000	2,541	2,492	2,445	2,400	2,356	2,314	2,273	2,234	2,196	2,523
8,000	2,441	2,394	2,349	2,305	2,263	2,223	2,184	2,146	2,110	2,441
9,000	2,344	2,299	2,256	2,214	2,174	2,135	2,097	2,061	2,026	2,361
10,000	2,251	2,207	2,166	2,125	2,087	2,049	2,014	1,979	1,945	2,282
11,000	2,160	2,118	2,078	2,040	2,003	1,967	1,932	1,899	1,867	2,206
12,000	2,072	2,032	1,993	1,957	1,921	1,887	1,853	1,821	1,791	2,131
13,000	1,986	1,948	1,911	1,876	1,842	1,809	1,777	1,747	1,717	2,058
14,000	1,904	1,867	1,832	1,798	1,765	1,734	1,703	1,674	1,646	1,987
15,000	1,824	1,789	1,755	1,723	1,691	1,661	1,632	1,604	1,576	1,918

Cross Reference Top

Engine Arrangement

Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2903313	MHB00001	PS017	-
3395408	KEN00001	PS017	-

Test Specification Data

Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K8521	LL6011	MHB00001	2903313	ADEM3		
0K9250	LL6076	KEN00001	3395408	ADEM3		

General Notes Top

DM8454 - 01

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

Performance Parameter Reference Top

Parameters Reference: DM9600 - 02

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%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%

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%

*Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

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 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25°C (77°F) at 60% relative humidity.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25°C, 100 KPA 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 35° API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29°C (84.2°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.

ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standar d 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.

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 'not to exceed' 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. Log on to the* Technology and Solutions Divisions (T&SD) web page (http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

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Regulation watch covers regulations in effect and future regulation ch anges for world, federal, state and loca. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

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

Date Released : 12/06/10

PERFORMANCE DATA [MHB00358]

JANUARY 21, 2011

(MHB00358)-ENGINE (G5Y00461)-GENERATOR (NAM00224)-GENSET

For Help Desk Phone Numbers Click here

Perf No: DM8454 **Change Level: (**

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

View PDF

SALES MODEL:	3516C	**COMBUSTION:**	DI
ENGINE POWER (BHP):	2,722	**ENGINE SPEED (RPM):**	1,800
GEN POWER WITH FAN (EKW):	1,825.0	**HERTZ:**	60
COMPRESSION RATIO:	14.7	**FAN POWER (HP):**	144.8
APPLICATION:	PACKAGED GENSET	**ASPIRATION:**	TA
RATING LEVEL:	PRIME	**AFTERCOOLER TYPE:**	ATAAC
PUMP QUANTITY:	2	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
FUEL TYPE:	DIESEL	**INLET MANIFOLD AIR TEMP (F):**	120
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	210.2
GOVERNOR TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
ELECTRONICS TYPE:	ADEM3	**TURBO QUANTITY:**	4
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	GTA5518BN-56T-1.
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2008
INJECTOR TYPE:	EUI	**CRANKCASE BLOWBY RATE (FT3/HR):**	2,690.7
FUEL INJECTOR:	2664387	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	13.7
REF EXH STACK DIAMETER (IN):	12	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,244.1
MAX OPERATING ALTITUDE (FT):	3,937		

General Performance Data Top

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	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,825.0	100	2,721	284	0.330	128.4	74.6	120.0	1,080.6	67.3	729.8
1,642.5	90	2,450	256	0.335	117.1	69.8	118.7	1,040.1	62.0	702.9
1,460.0	80	2,188	229	0.341	106.6	64.8	117.4	1,005.1	56.8	683.4
1,368.8	75	2,059	215	0.345	101.4	62.1	116.8	987.9	54.2	675.3
1,277.5	70	1,931	202	0.348	96.0	59.1	116.1	970.6	51.4	667.6
1,095.0	60	1,678	175	0.355	85.0	52.1	114.7	936.4	44.9	654.3
912.5	50	1,429	149	0.357	72.9	42.7	113.1	897.8	36.8	647.4
730.0	40	1,181	123	0.358	60.3	31.8	111.4	849.9	27.9	643.2
547.5	30	932	97	0.368	49.0	22.7	110.4	792.6	20.9	633.2
456.2	25	806	84	0.377	43.4	18.8	110.1	757.8	18.0	624.1
365.0	20	678	71	0.391	37.9	15.2	109.7	717.6	15.4	611.2
182.5	10	416	43	0.448	26.7	9.1	109.1	599.5	11.0	542.8

GENSET POWER WITH	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW	ENGINE OUTLET WET EXH GAS VOL	WET INLET AIR MASS	WET EXH GAS MASS FLOW	WET EXH VOL FLOW RATE (32 DEG F	DRY EXH VOL FLOW RATE (32 DEG F

FAN					RATE	FLOW RATE	FLOW RATE	RATE	AND 29.98 IN HG)	AND 29.9 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,825.0	100	2,721	79	435.7	6,268.9	14,338.0	27,207.2	28,105.6	5,926.5	5,492.9
1,642.5	90	2,450	74	412.9	6,078.0	13,483.9	26,275.7	27,094.6	5,702.7	5,307.2
1,460.0	80	2,188	69	390.8	5,848.9	12,707.3	25,203.9	25,948.7	5,465.7	5,103.8
1,368.8	75	2,059	66	380.0	5,717.7	12,303.7	24,603.8	25,313.9	5,329.9	4,984.5
1,277.5	70	1,931	63	368.2	5,567.0	11,865.4	23,915.9	24,589.3	5,175.4	4,847.0
1,095.0	60	1,678	56	340.7	5,183.9	10,864.4	22,185.9	22,781.5	4,795.0	4,502.4
912.5	50	1,429	46	303.3	4,622.0	9,569.6	19,690.3	20,200.9	4,249.9	3,997.8
730.0	40	1,181	34	258.8	3,948.4	8,096.6	16,730.6	17,153.0	3,609.6	3,400.7
547.5	30	932	25	218.2	3,368.4	6,825.8	14,210.5	14,552.7	3,071.0	2,900.3
456.2	25	806	21	199.4	3,113.1	6,238.2	13,110.4	13,414.0	2,830.1	2,677.7
365.0	20	678	17	181.4	2,876.7	5,668.5	12,097.3	12,362.8	2,602.6	2,467.9
182.5	10	416	11	149.1	2,472.2	4,547.9	10,369.3	10,556.0	2,230.7	2,131.7

Heat Rejection Data Top

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	HIG HEA VAI ENI
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU
1,825.0	100	2,721	41,176	7,412	94,610	44,575	14,683	34,659	115,390	275,674	293
1,642.5	90	2,450	38,527	7,062	86,743	39,775	13,387	31,101	103,910	251,335	267
1,460.0	80	2,188	36,026	6,778	79,970	35,886	12,183	27,695	92,774	228,740	243
1,368.8	75	2,059	34,762	6,647	76,682	34,111	11,589	26,040	87,309	217,577	231
1,277.5	70	1,931	33,450	6,524	73,236	32,303	10,979	24,222	81,880	206,135	219
1,095.0	60	1,678	30,660	6,282	65,884	28,619	9,717	20,121	71,174	182,439	194
912.5	50	1,429	27,479	6,000	57,347	24,769	8,336	15,125	60,594	156,515	166
730.0	40	1,181	24,011	5,699	48,105	20,709	6,897	9,899	50,098	129,496	137
547.5	30	932	20,680	5,394	39,921	16,936	5,597	6,112	39,536	105,077	111
456.2	25	806	18,997	5,238	36,022	15,084	4,965	4,652	34,192	93,210	99,:
365.0	20	678	17,246	5,079	32,081	13,220	4,333	3,430	28,772	81,353	86,(
182.5	10	416	13,382	4,712	23,624	8,251	3,047	1,543	17,652	57,208	60,:

Emissions Data Top

Units Filter All Units

RATED SPEED NOT TO EXCEED DATA: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER		EKW BHP	1,825.0 2,721	1,368.8 2,059	912.5 1,429	456.2 806	182.5 416
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	16,211	8,787	5,621	4,219	3,018
TOTAL CO		G/HR	1,310	758	1,119	1,803	1,832
TOTAL HC		G/HR	463	490	508	414	450
PART MATTER		G/HR	100.3	99.7	149.3	256.4	204.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,031.7	2,151.1	1,936.1	2,415.5	2,867.1
TOTAL CO	(CORR 5% O2)	MG/NM3	237.1	174.2	373.5	931.1	1,712.5
TOTAL HC	(CORR 5% O2)	MG/NM3	73.4	97.2	140.5	198.7	377.7
PART MATTER	(CORR 5% O2)	MG/NM3	15.6	20.0	46.6	122.2	158.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,477	1,048	943	1,177	1,397
TOTAL CO	(CORR 5% O2)	PPM	190	139	299	745	1,370
TOTAL HC	(CORR 5% O2)	PPM	137	181	262	371	705
TOTAL NOX (AS NO2)		G/HP-HR	5.99	4.29	3.95	5.24	7.26
TOTAL CO		G/HP-HR	0.48	0.37	0.79	2.24	4.40
TOTAL HC		G/HP-HR	0.17	0.24	0.36	0.51	1.08
PART MATTER		G/HP-HR	0.04	0.05	0.10	0.32	0.49

TOTAL NOX (AS NO2)		LB/HR	35.74	19.37	12.39	9.30	6.65
TOTAL CO		LB/HR	2.89	1.67	2.47	3.97	4.04
TOTAL HC		LB/HR	1.02	1.08	1.12	0.91	0.99
PART MATTER		LB/HR	0.22	0.22	0.33	0.57	0.45

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**1,825.0**	**1,368.8**	**912.5**	**456.2**	**182.5**
ENGINE POWER		**BHP**	**2,721**	**2,059**	**1,429**	**806**	**416**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	13,509	7,322	4,684	3,516	2,515
TOTAL CO		G/HR	728	421	622	1,002	1,018
TOTAL HC		G/HR	348	368	382	311	339
TOTAL CO2		KG/HR	1,261	998	717	426	259
PART MATTER		G/HR	71.6	71.2	106.6	183.1	146.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,526.5	1,792.6	1,613.4	2,012.9	2,389.2
TOTAL CO	(CORR 5% O2)	MG/NM3	131.7	96.8	207.5	517.3	951.4
TOTAL HC	(CORR 5% O2)	MG/NM3	55.2	73.1	105.6	149.4	284.0
PART MATTER	(CORR 5% O2)	MG/NM3	11.1	14.3	33.3	87.3	113.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,231	873	786	981	1,164
TOTAL CO	(CORR 5% O2)	PPM	105	77	166	414	761
TOTAL HC	(CORR 5% O2)	PPM	103	136	197	279	530
TOTAL NOX (AS NO2)		G/HP-HR	4.99	3.57	3.29	4.37	6.05
TOTAL CO		G/HP-HR	0.27	0.21	0.44	1.24	2.45
TOTAL HC		G/HP-HR	0.13	0.18	0.27	0.39	0.81
PART MATTER		G/HP-HR	0.03	0.03	0.07	0.23	0.35
TOTAL NOX (AS NO2)		LB/HR	29.78	16.14	10.33	7.75	5.55
TOTAL CO		LB/HR	1.60	0.93	1.37	2.21	2.24
TOTAL HC		LB/HR	0.77	0.81	0.84	0.69	0.75
TOTAL CO2		LB/HR	2,781	2,199	1,581	939	570
PART MATTER		LB/HR	0.16	0.16	0.24	0.40	0.32
OXYGEN IN EXH		%	11.4	12.6	13.5	14.3	15.8
DRY SMOKE OPACITY		%	0.4	0.5	1.8	3.8	3.1
BOSCH SMOKE NUMBER			0.18	0.23	0.60	1.25	1.14

Regulatory Information Top

EPA TIER 2 **2006 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY **2011 - ----**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND IS 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
1,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
2,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,715	2,669	2,722
3,000	2,722	2,722	2,722	2,722	2,722	2,706	2,659	2,613	2,569	2,722
4,000	2,722	2,722	2,722	2,700	2,651	2,604	2,558	2,514	2,471	2,722
5,000	2,722	2,697	2,646	2,597	2,550	2,504	2,460	2,418	2,377	2,693
6,000	2,644	2,593	2,544	2,497	2,451	2,408	2,365	2,324	2,285	2,607
7,000	2,541	2,492	2,445	2,400	2,356	2,314	2,273	2,234	2,196	2,523
8,000	2,441	2,394	2,349	2,305	2,263	2,223	2,184	2,146	2,110	2,441
9,000	2,344	2,299	2,256	2,214	2,174	2,135	2,097	2,061	2,026	2,361
10,000	2,251	2,207	2,166	2,125	2,087	2,049	2,014	1,979	1,945	2,282
11,000	2,160	2,118	2,078	2,040	2,003	1,967	1,932	1,899	1,867	2,206
12,000	2,072	2,032	1,993	1,957	1,921	1,887	1,853	1,821	1,791	2,131
13,000	1,986	1,948	1,911	1,876	1,842	1,809	1,777	1,747	1,717	2,058
14,000	1,904	1,867	1,832	1,798	1,765	1,734	1,703	1,674	1,646	1,987
15,000	1,824	1,789	1,755	1,723	1,691	1,661	1,632	1,604	1,576	1,918

Cross Reference Top

Engine Arrangement

Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2903313	MHB00001	PS017	-
3395408	KEN00001	PS017	-

Test Specification Data

Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K8521	LL6011	MHB00001	2903313	ADEM3		
0K9250	LL6076	KEN00001	3395408	ADEM3		

General Notes Top

DM8454 - 01

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

Performance Parameter Reference Top

Parameters Reference: DM9600 - 02

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%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%

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%

*Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

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 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25°C (77°F) at 60% relative humidity.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25°C, 100 KPA 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 35° API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29°C (84.2°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.

ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standar d 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.

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 'not to exceed' 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. Log on to the Technology and Solutions Divisions (T&SD) web page (http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:
Regulation watch covers regulations in effect and future regulation ch anges for world, federal, state and loca. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

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

Date Released : 12/06/10

PERFORMANCE DATA [MHB00410]

(MHB00410)-ENGINE (G5Y00511)-GENERATOR (NAM00278)-GENSET

JANUARY 21, 2011

For Help Desk Phone Numbers Click here

Perf No: DM8454 **Change Level: (**

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

View PDF

SALES MODEL:	3516C	**COMBUSTION:**	DI
ENGINE POWER (BHP):	2,722	**ENGINE SPEED (RPM):**	1,800
GEN POWER WITH FAN (EKW):	1,825.0	**HERTZ:**	60
COMPRESSION RATIO:	14.7	**FAN POWER (HP):**	144.8
APPLICATION:	PACKAGED GENSET	**ASPIRATION:**	TA
RATING LEVEL:	PRIME	**AFTERCOOLER TYPE:**	ATAAC
PUMP QUANTITY:	2	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
FUEL TYPE:	DIESEL	**INLET MANIFOLD AIR TEMP (F):**	120
MANIFOLD TYPE:	DRY	**JACKET WATER TEMP (F):**	210.2
GOVERNOR TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
ELECTRONICS TYPE:	ADEM3	**TURBO QUANTITY:**	4
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	GTA5518BN-56T-1
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2008
INJECTOR TYPE:	EUI	**CRANKCASE BLOWBY RATE (FT3/HR):**	2,690.7
FUEL INJECTOR:	2664387	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	13.7
REF EXH STACK DIAMETER (IN):	12	***PISTON SPD @ RATED ENG SPD (FT/MIN):***	2,244.1
MAX OPERATING ALTITUDE (FT):	3,937		

General Performance Data Top

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	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,825.0	100	2,721	284	0.330	128.4	74.6	120.0	1,080.6	67.3	729.8
1,642.5	90	2,450	256	0.335	117.1	69.8	118.7	1,040.1	62.0	702.9
1,460.0	80	2,188	229	0.341	106.6	64.8	117.4	1,005.1	56.8	683.4
1,368.8	75	2,059	215	0.345	101.4	62.1	116.8	987.9	54.2	675.3
1,277.5	70	1,931	202	0.348	96.0	59.1	116.1	970.6	51.4	667.6
1,095.0	60	1,678	175	0.355	85.0	52.1	114.7	936.4	44.9	654.3
912.5	50	1,429	149	0.357	72.9	42.7	113.1	897.8	36.8	647.4
730.0	40	1,181	123	0.358	60.3	31.8	111.4	849.9	27.9	643.2
547.5	30	932	97	0.368	49.0	22.7	110.4	792.6	20.9	633.2
456.2	25	806	84	0.377	43.4	18.8	110.1	757.8	18.0	624.1
365.0	20	678	71	0.391	37.9	15.2	109.7	717.6	15.4	611.2
182.5	10	416	43	0.448	26.7	9.1	109.1	599.5	11.0	542.8

GENSET POWER WITH	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW	ENGINE OUTLET WET EXH GAS VOL	WET INLET AIR MASS	WET EXH GAS MASS FLOW	WET EXH VOL FLOW RATE (32 DEG F	DRY EXH VOL FLOW RATE (32 DEG F

FAN					RATE	FLOW RATE	FLOW RATE	RATE	AND 29.98 IN HG)	AND 29.9 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,825.0	100	2,721	79	435.7	6,268.9	14,338.0	27,207.2	28,105.6	5,926.5	5,492.9
1,642.5	90	2,450	74	412.9	6,078.0	13,483.9	26,275.7	27,094.6	5,702.7	5,307.2
1,460.0	80	2,188	69	390.8	5,848.9	12,707.3	25,203.9	25,948.7	5,465.7	5,103.8
1,368.8	75	2,059	66	380.0	5,717.7	12,303.7	24,603.8	25,313.9	5,329.9	4,984.5
1,277.5	70	1,931	63	368.2	5,567.0	11,865.4	23,915.9	24,589.3	5,175.4	4,847.0
1,095.0	60	1,678	56	340.7	5,183.9	10,864.4	22,185.9	22,781.5	4,795.0	4,502.4
912.5	50	1,429	46	303.3	4,622.0	9,569.6	19,690.3	20,200.9	4,249.9	3,997.8
730.0	40	1,181	34	258.8	3,948.4	8,096.6	16,730.6	17,153.0	3,609.6	3,400.7
547.5	30	932	25	218.2	3,368.4	6,825.8	14,210.5	14,552.7	3,071.0	2,900.3
456.2	25	806	21	199.4	3,113.1	6,238.2	13,110.4	13,414.0	2,830.1	2,677.7
365.0	20	678	17	181.4	2,876.7	5,668.5	12,097.3	12,362.8	2,602.6	2,467.9
182.5	10	416	11	149.1	2,472.2	4,547.9	10,369.3	10,556.0	2,230.7	2,131.7

Heat Rejection Data Top

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	HIG HEA VAL ENI
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU
1,825.0	100	2,721	41,176	7,412	94,610	44,575	14,683	34,659	115,390	275,674	293
1,642.5	90	2,450	38,527	7,062	86,743	39,775	13,387	31,101	103,910	251,335	267
1,460.0	80	2,188	36,026	6,778	79,970	35,886	12,183	27,695	92,774	228,740	243
1,368.8	75	2,059	34,762	6,647	76,682	34,111	11,589	26,040	87,309	217,577	231
1,277.5	70	1,931	33,450	6,524	73,236	32,303	10,979	24,222	81,880	206,135	219
1,095.0	60	1,678	30,660	6,282	65,884	28,619	9,717	20,121	71,174	182,439	194
912.5	50	1,429	27,479	6,000	57,347	24,769	8,336	15,125	60,594	156,515	166
730.0	40	1,181	24,011	5,699	48,105	20,709	6,897	9,899	50,098	129,496	137
547.5	30	932	20,680	5,394	39,921	16,936	5,597	6,112	39,536	105,077	111
456.2	25	806	18,997	5,238	36,022	15,084	4,965	4,652	34,192	93,210	99,1
365.0	20	678	17,246	5,079	32,081	13,220	4,333	3,430	28,772	81,353	86,1
182.5	10	416	13,382	4,712	23,624	8,251	3,047	1,543	17,652	57,208	60,9

Emissions Data Top

Units Filter All Units

RATED SPEED NOT TO EXCEED DATA: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER		EKW BHP	1,825.0 2,721	1,368.8 2,059	912.5 1,429	456.2 806	182.5 416
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	16,211	8,787	5,621	4,219	3,018
TOTAL CO		G/HR	1,310	758	1,119	1,803	1,832
TOTAL HC		G/HR	463	490	508	414	450
PART MATTER		G/HR	100.3	99.7	149.3	256.4	204.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,031.7	2,151.1	1,936.1	2,415.5	2,867.1
TOTAL CO	(CORR 5% O2)	MG/NM3	237.1	174.2	373.5	931.1	1,712.5
TOTAL HC	(CORR 5% O2)	MG/NM3	73.4	97.2	140.5	198.7	377.7
PART MATTER	(CORR 5% O2)	MG/NM3	15.6	20.0	46.6	122.2	158.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,477	1,048	943	1,177	1,397
TOTAL CO	(CORR 5% O2)	PPM	190	139	299	745	1,370
TOTAL HC	(CORR 5% O2)	PPM	137	181	262	371	705
TOTAL NOX (AS NO2)		G/HP-HR	5.99	4.29	3.95	5.24	7.26
TOTAL CO		G/HP-HR	0.48	0.37	0.79	2.24	4.40
TOTAL HC		G/HP-HR	0.17	0.24	0.36	0.51	1.08
PART MATTER		G/HP-HR	0.04	0.05	0.10	0.32	0.49

TOTAL NOX (AS NO2)		LB/HR	35.74	19.37	12.39	9.30	6.65
TOTAL CO		LB/HR	2.89	1.67	2.47	3.97	4.04
TOTAL HC		LB/HR	1.02	1.08	1.12	0.91	0.99
PART MATTER		LB/HR	0.22	0.22	0.33	0.57	0.45

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		**EKW**	**1,825.0**	**1,368.8**	**912.5**	**456.2**	**182.5**
ENGINE POWER		**BHP**	**2,721**	**2,059**	**1,429**	**806**	**416**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	13,509	7,322	4,684	3,516	2,515
TOTAL CO		G/HR	728	421	622	1,002	1,018
TOTAL HC		G/HR	348	368	382	311	339
TOTAL CO2		KG/HR	1,261	998	717	426	259
PART MATTER		G/HR	71.6	71.2	106.6	183.1	146.0
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,526.5	1,792.6	1,613.4	2,012.9	2,389.2
TOTAL CO	(CORR 5% O2)	MG/NM3	131.7	96.8	207.5	517.3	951.4
TOTAL HC	(CORR 5% O2)	MG/NM3	55.2	73.1	105.6	149.4	284.0
PART MATTER	(CORR 5% O2)	MG/NM3	11.1	14.3	33.3	87.3	113.4
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,231	873	786	981	1,164
TOTAL CO	(CORR 5% O2)	PPM	105	77	166	414	761
TOTAL HC	(CORR 5% O2)	PPM	103	136	197	279	530
TOTAL NOX (AS NO2)		G/HP-HR	4.99	3.57	3.29	4.37	6.05
TOTAL CO		G/HP-HR	0.27	0.21	0.44	1.24	2.45
TOTAL HC		G/HP-HR	0.13	0.18	0.27	0.39	0.81
PART MATTER		G/HP-HR	0.03	0.03	0.07	0.23	0.35
TOTAL NOX (AS NO2)		LB/HR	29.78	16.14	10.33	7.75	5.55
TOTAL CO		LB/HR	1.60	0.93	1.37	2.21	2.24
TOTAL HC		LB/HR	0.77	0.81	0.84	0.69	0.75
TOTAL CO2		LB/HR	2,781	2,199	1,581	939	570
PART MATTER		LB/HR	0.16	0.16	0.24	0.40	0.32
OXYGEN IN EXH		%	11.4	12.6	13.5	14.3	15.8
DRY SMOKE OPACITY		%	0.4	0.5	1.8	3.8	3.1
BOSCH SMOKE NUMBER			0.18	0.23	0.60	1.25	1.14

Regulatory Information Top

EPA TIER 2 **2006 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY **2011 - ----**

GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIAN WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
1,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,722
2,000	2,722	2,722	2,722	2,722	2,722	2,722	2,722	2,715	2,669	2,722
3,000	2,722	2,722	2,722	2,722	2,722	2,706	2,659	2,613	2,569	2,722
4,000	2,722	2,722	2,722	2,700	2,651	2,604	2,558	2,514	2,471	2,722
5,000	2,722	2,697	2,646	2,597	2,550	2,504	2,460	2,418	2,377	2,693
6,000	2,644	2,593	2,544	2,497	2,451	2,408	2,365	2,324	2,285	2,607
7,000	2,541	2,492	2,445	2,400	2,356	2,314	2,273	2,234	2,196	2,523
8,000	2,441	2,394	2,349	2,305	2,263	2,223	2,184	2,146	2,110	2,441
9,000	2,344	2,299	2,256	2,214	2,174	2,135	2,097	2,061	2,026	2,361
10,000	2,251	2,207	2,166	2,125	2,087	2,049	2,014	1,979	1,945	2,282
11,000	2,160	2,118	2,078	2,040	2,003	1,967	1,932	1,899	1,867	2,206
12,000	2,072	2,032	1,993	1,957	1,921	1,887	1,853	1,821	1,791	2,131
13,000	1,986	1,948	1,911	1,876	1,842	1,809	1,777	1,747	1,717	2,058
14,000	1,904	1,867	1,832	1,798	1,765	1,734	1,703	1,674	1,646	1,987
15,000	1,824	1,789	1,755	1,723	1,691	1,661	1,632	1,604	1,576	1,918

Cross Reference Top

Engine Arrangement

Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2903313	MHB00001	PS017	-
3395408	KEN00001	PS017	-

Test Specification Data

Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K8521	LL6011	MHB00001	2903313	ADEM3		
0K9250	LL6076	KEN00001	3395408	ADEM3		

General Notes Top

DM8454 - 01

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

Performance Parameter Reference Top

Parameters Reference: DM9600 - 02

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%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%

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%

*Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

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 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25°C (77°F) at 60% relative humidity.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25°C, 100 KPA 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 35° API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29°C (84.2°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.

ALTITUDE CAPABILITY
Altitude capability is the maximum altitude above sea level at standar d 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.

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 'not to exceed' 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. Log on to the Technology and Solutions Divisions (T&SD) web page (http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:
Regulation watch covers regulations in effect and future regulation ch anges for world, federal, state and loca. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

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

Date Released : 12/06/10

Emergency Generator Fuel Specifications

Marathon Petroleum Company LLC

4663 West Airline Highway
Garyville, LA 70051
Phone No: (985) 535-2100
Fax No: (504) 535-7445

Certificate of Analysis
Louisiana Refining Division

Date: 1/21/2011 9:57:07 AM

Product: No. 2 Diesel Fuel / Fuel Oil

Sample Description:		**Sample Date:**	1/20/2011 4:00:00 AM
Tank:	TK300-18	**Date Analyses Completed:**	1/20/2011 10:05:02 AM
Batch Number:	ULD110015	**LIMS ID:**	1571069
Vessel:	COAST RANGE-04 TR-016-11		

Test Method	Property	Result	Units	Lower Limit	Upper Limit
D4176	Workmanship	Passed		Passed	Passed
D4176	Visual Particulates	1			2
D6304	Moisture[4]	67	ppm		
Physical Properties					
D4052	API Gravity	38.0	°API @ 60°F	30.0	
D445	Viscosity @ 104°F(40°C)	2.3	cSt	1.9	3.4
D93A	Flash Point	146	°F	140	
D130	Copper Strip Corrosion	1a			1b
TM0172-86	NACE Corrosion[5]	A		B +	
D6468	Thermal Stability (90 minute aging)[3]	99.5	%	80.0	
D6045	ASTM Color	0.5			2.5
D4176	Colonial Haze Rating	1			2
D2624	Conductivity @ 40°F[2]	41	ps/m	25	
D482	Ash[3]	<0.001	wt. %		0.010
Chemical Analyses					
D5453	Sulfur	8	ppm		11
D5453	Sulfur, Top	8	ppm		11
D5453	Sulfur, Mid	8	ppm		11
D5453	Sulfur, Btm	8	ppm		11
D4952	Doctor Test	NEG			
D524	Carbon Residue, 10% Bottoms	0.09	wt. %		0.35
D976	Cetane Index (2 var)	48.6		40.0	
Distillation					
D86 Predicted	90%	612	°F	540	640
D86 Predicted	FBP	672	°F		690
Cold Flow Properties					
D5773	Cloud Point	7	°F		15
D5949	Pour Point	-15	°F		0
Combustion Properties					
D4737A	Cetane Calc. (4 var) LSD	49.0		40.0	

[2] Conductivity requirement is met by treating with an additive that is approved for use in jet fuel.

[3] Property is determined on a statistical basis of 1 in every 10 samples.

[4] KF water and visual particulate scale can be substituted for BS&W (ASTM D2709)

[5] Property is determined on a statistical basis of 1 in every 5 samples.

Batch(es):ULD110015/B_8942_1

Reviewed By:
MICHAEL JOSEPH FAUCHEUX
FOREMAN LABORATORY
LOUISIANA REF-LABORATORY

Signed

COA Prepared By:
KRISSY ST. PIERRE LOUQUE
ASSISTANT ADMINISTRATIVE
LOUISIANA REF-PROD CONTROL
985-535-2241 6690

Signed

Mr. Jeff Koerner, P.E., NSR Administrator
Authorization to Operate Emer. Gens. & Aux Boilers
Crystal River Energy Complex
January 31, 2011

Portable Auxiliary Boiler Specifications

WARRANTY

Warranty on all equipment supplied is in accordance with the attached Faber Burner Company General Conditions of Sale. This covers a period of twelve (12) months from the date of initial operation (first fire) or eighteen (18) months from the date of shipment, whichever occurs first.

EQUIPMENT SUPPLIED BY OTHERS

Any equipment supplied by others for mounting onto the burner assembly to arrive at FBC factory at least four (4) weeks in advance of shipment date.

DESIGN CONDITIONS

The data below represents the best information available to FABER Burner at the time of this proposal. Changes to the design conditions that require alteration of the equipment selected may result in adjustment of equipment price.

SITE DATA	
Location	Unknown
Design Elevation-Ft. Above Sea Level	1,000
Type of Installation	Outdoor
BOILER DATA	
Manufacturer and type	B&W FMO-74
With Econ.Total Heat Input, BTU/HR	109 / 102.5 x 10^6
Without Econ.Total Heat Input, BTU/HR	121.4 / 114.17 x 10^6
Steam Capacity, PPH	75,000
Operating Pressure, PSIG	250 to 675
Furnace Dimensions	6' H x 6.83' W x 20' L
Furnace Volume	820
Stack / FGR Temperature With Econ.	345 - 360
Stack / FGR Temperature Without Econ.	724 - 764
Stack Height.	Less than 50 feet
Steam Temperature, °F.	750
Feedwater Temperature, °F.	227
+Furnace Press @ Proposed Conditions, Inches W.C	9.3
BURNER DATA	
Burner Model #	WB-1-30-IFGR
Windbox & Burner Press Loss, Inches W.C.	5.8
Turndown Gas/Oil	10:1 / 8:1
Combustion Air Temperature, °F.	80
Code Requirements	IRI, NFPA
GAS DATA	
Nat. Gas Higher Heating Value, BTU/SCF.	1000
Regulation of Gas Pressure to Gas Train by	Others
Gas Train Design Pressure, MAX PSIG	40"
Main Gas Train Connection	4"
Gas Pressure Required to Gas Train, PSIG	15
Gas Flow, SCFH	121,400

OIL & ATOMIZING DATA

Fuel Oil Type	No. 2
Oil Higher Heating Value, BTU/LB	19,300
Regulation of Oil Pressure to Oil Train by	NBI
Oil Train Connection Size	1 ¼"
Oil Pressure Required to Oil Train, PSIG	150
Oil Flow, GPH	1 ¼"
Type Atomization	Steam
Regulation of Steam Pressure to Train by	Faber
Steam Train Connection Size	1 ¼"
Steam Pressure Required to Train, PSIG	250

ELECTRICAL & CONTROL DATA

Electrical Equipment Rating	NEMA 4
Forced Draft Motor Data	125-HP-1800 RPM-TEFC Prem. Eff.
Forced Draft Motor - Volt, Hertz, Phase	460/60/3
Control Power - Volt, Hertz, Phase	120/60/1
Control Power Transformer	Faber
Combustion Controls Furnished by	NBI
Type Combustion Controls	Parallel Positioning With Feedback
Feedwater Controls by	NBI
Type Operation	Automatic

PAINT & FINISH

Preparation

External Steel	SSPC-SP3
Piping/Fittings	SSPC-SP1
Electrical Panels	Manufacturers Standard
Instruments	Manufacturers Standard
Conduit	Manufacturers Standard

Primer:

All unprimed components are primed with Sherwin-Williams B50 Kem Bond primer

Paint:

All unpainted components are painted with Western Automotive Finishes 3rd Dimension Urethane. Western Automotive Finishes is a division of Sherwin-Williams. The burners will be painted NBI Blue.

***Assumed data to be confirmed prior to order.**

+Total of pressure losses in furnace/ economizer/ ducts/ stack

EMISSION GUARANTEES:

Boiler With Economizer – Natural Gas Firing – 364F Flue Gas Temperature For All Conditions

Heat Input MMBtu/Hr.	Approx. Steaming Capacity Lb/hr.	% FGR	Projected Flame Length	NOX Emissions PPM @ 3% O2	CO Emissions PPM @ 3% O2
109	75,000	10	20'	40	50
101.8	70,000	15	19.5'	30	50
94	65,000	18	18.75'	25	50
94 to 30	65,000 to 20,000			25	50

Boiler With Economizer – #2 Oil Firing – 364F Flue Gas Temperature For All Conditions

Heat Input MMBtu/Hr.	Approx. Steaming Capacity Lb/hr.	% FGR	Projected Flame Length	NOX Emissions PPM @ 3% O2	CO Emissions PPM @ 3% O2
103	75,000	5	18.5'	100	100
96	70,000	10	18'	90	100
89.2	65,000	12	17.5'	80	100
89.2 to 29	65,000 to 20,000			80	100

Boiler Without Economizer – Natural Gas Firing – 754F Flue Gas Temperature For All Conditions

Heat Input MMBtu/Hr.	Approx. Steaming Capacity Lb/hr.	% FGR	Projected Flame Length	NOX Emissions PPM @ 3% O2	CO Emissions PPM @ 3% O2
122	75,000	2	19.6'	90	200
113.9	70,000	5	18.9'	60	100
105.7	65,000	8	19.4'	48	50
97.6*	60,000	12	19.5'	40	50

*Mix Temperature is 174F with 12% FGR

Boiler Without Economizer – #2 Oil Firing – 754F Flue Gas Temperature For All Conditions

Heat Input MMBtu/Hr.	Approx. Steaming Capacity Lb/hr.	% FGR	Projected Flame Length	NOX Emissions PPM @ 3% O2	CO Emissions PPM @ 3% O2
114	75,000	0	18.5'	125	200
106.4	70,000	5	19'	110	200
98.8	65,000	5	18.3'	100	200
91.2	60,000	10	18.4'	80	100

EMISSION TEST CONDITIONS:

For a valid guarantee test, the following conditions must be met:

1. Emission guarantees are based upon the data in the design conditions above and steady state operating conditions. Heat inputs listed as HHV.
2. Guarantees are from 25% to 100% boiler MCR (maximum continuous rating) only and based upon the burner receiving the required amount of flue gas. %FGR above is projected only
3. Boiler meets (min.) construction requirements for furnace sidewall integrity and seals at the drums and front wall. CO emission stated above is provided furnace leakage (bypassing of flue gas) does not contribute more than .015 lb/MMBTU to the total CO emissions.
4. Fuel Quality:
   For NOx: No. 2 oil with a maximum fuel bound nitrogen content of 0.02%
5. NOX emissions for #2 oil above are for steam atomization only.
6. FABER field service must be present during testing for optimization of the equipment supplied.
7. Emission testing must be conducted within the warranty period. Upon obtaining the guaranteed emissions, as described above, the equipment shall be considered accepted.

NOTE: The forced draft fan assembly is designed for a maximum mix temperature (air & flue gas) of 174 F. Operating the fan in excess of its maximum design temperature will cause premature failure to the fan assembly components especially the motor bearings.

Mr. Jeff Koerner, P.E., NSR Administrator
Authorization to Operate Emer. Gens. & Aux Boilers
Crystal River Energy Complex
January 31, 2011

Crystal River Unit 1 No. 2 oil specifications

Laboratory Services

5012 Causeway Blvd * Tampa Fl. 33619 * Ph (813)630-7378 * Fax (813)630-7360 * DOH #E54272

Report For: Erika Tuchbaum-Biro, Progress Energy FL
15760 West Powerline St.
Crystal River, FL 34429

Erika.Tuchbaum-Biro@pgnmail.com

Route To: *Progress Energy - Crystal River S* *Progress Energy - Admin*

Report Date: 1/5/2011
Laboratory ID: AB11650
Location Code: PEI-#2-CR-S

Sample Information

Description: #2 Oil, Crystal River South, Progress Energy Inc.
Project Account Code: 01
Sample Collection Method: Sampled by Customer

Sampled By: RICHARD IVERSON
Date and Time Collected: 12/13/2010 8:00:00 AM
Date of Sample Receipt: 12/16/2010
SAMPLE TYPE: GRAB

Laboratory Results

PARAMETER	Result	Units	MDL	Qual Code	Test Method	Analyst	Analysis Date & Time	Lower Limit	Upper Limit	Violation Check
API Gravity @ 60 Deg. F	36.1	Degrees API	0.1		ASTM D5002	KAPXJ	12/22/10 11:32			
Carbon, Hydrogen, and Nitrogen in Oil										
Carbon	87.6	%			ASTM 5291	KAPXJ	12/20/10 09:58			
Hydrogen	12.7	%			ASTM 5291	KAPXJ	12/20/10 09:58			
Nitrogen	< 0.2	%	0.2	U	ASTM 5291	KAPXJ	12/20/10 09:58			
Density @ 15 C (59 F)	0.8438	kg/L	0.0001		ASTM Table3	KAPXJ	12/22/10 14:44			
Gross Heat of Combustion, Oils, (HHV)	5769960	BTU/Barrel	1		Calculation	KACLH	01/05/11 09:18			
Gross Heat of Combustion, Oils, (HHV)	137380	BTU/Gal.	1		Calculation	KACLH	01/05/11 09:18	137000		
Gross Heat of Combustion, Oils, (HHV)	19542	BTU/Lb.	1		ASTM D-240	KAPXJ	12/23/10 10:43			
Low Level Sulfur in Petrol Products % #2	0.0024	%	0.0001		ASTM D-5453-00	KAEMD	01/04/11 11:29			
Net Heat of Combustion, Oils, (LHV)	5427744	BTU/Barrel	1		Calculation	KACLH	01/05/11 09:18			
Net Heat of Combustion, Oils, (LHV)	129232	BTU/Gal.	1		Calculation	KACLH	01/05/11 09:18			
Net Heat of Combustion, Oils, (LHV)	18383	BTU/Lb.	1		ASTM D-240	KAPXJ	12/29/10 10:17			
Pounds / Gallon @ 60 Deg. F	7.0300000	Lbs./Gal.	0.001		ASTM D 1250-80	KAPXJ	12/22/10 14:44		9.5	
Relative Density 60/60 Deg. F	0.8443		0.0001		ASTM D-1250	KAPXJ	12/22/10 14:44			

Comments

Data Qualifier Codes Explanation:
U - Indicates that the compound was analyzed for but not detected.

Should there be any questions regarding this report, please contact:

Cheryl L. Howard

Cheryl Howard,
Designee for Peggy Penner
Manager, Laboratory Services
(813) 630-7490