

Estimated Average Engine Performance NOT FOR GUARANTEE, REFER TO PROJECT F&ID FOR DESIGN



GE Energy

Performance By: **Neil Karr**

Project Info: **EDC Caracas LM2500PE (Gas Fuel, Water Injected)**

Engine: **LM2500 PE**

Deck Info: **GE166B - 48f.scp**

Generator: **BDAX 167ER 60Hz, 13.8kV, 0.9PF (10807)**

Fuel: **Gas Fuel #10-1, 19000 Btu/lb,LHV**

Date: **01/14/2009**

Time: **9:08:38 AM**

Version: **3.7.6**

Case #	100	101	102	103	104
Ambient Conditions					
Dry Bulb, °F	32.0	50.0	68.0	86.0	104.0
Wet Bulb, °F	30.6	47.7	64.9	82.1	99.4
RH, %	85.0	85.0	85.0	85.0	85.0
Altitude, ft	17.1	17.1	17.1	17.1	17.1
Ambient Pressure, psia	14.687	14.687	14.687	14.687	14.687
Engine Inlet					
Comp Inlet Temp, °F	32.0	50.0	68.0	86.0	104.0
RH, %	85.0	85.0	85.0	85.0	85.0
Conditioning	NONE	NONE	NONE	NONE	NONE
Tons or kBtu/hr	0	0	0	0	0
Pressure Losses					
Inlet Loss, inH2O	4.00	4.00	4.00	4.00	4.00
Exhaust Loss, inH2O	4.00	4.00	4.00	4.00	4.00
kW, Gen Terms					
	24607	24026	22990	21735	19928
Est. Btu/kW-hr, LHV					
	9781	9797	9819	9869	10017
Fuel Flow					
MMBtu/hr, LHV	240.7	235.4	225.7	214.5	199.6
lb/hr	12667	12389	11881	11290	10506
NOx Control					
	Water	Water	Water	Water	Water
Water Injection					
lb/hr	13198	12759	11626	9940	7416
Temperature, °F	100.0	100.4	100.4	100.4	100.4
Control Parameters					
HP Speed, RPM	9701	9688	9585	9508	9460
PT Speed, RPM	3600	3600	3600	3600	3600
PS3 - CDP, psia	281.8	276.0	267.0	256.2	240.8
T3CRF - CDT, °F	849	867	874	879	878
T48IN, °R	1932	1945	1945	1945	1945
T48IN, °F	1472	1485	1485	1485	1485
Exhaust Parameters					
Temperature, °F	941.6	957.2	965.4	976.2	993.7
lb/sec	161.4	157.7	152.9	146.9	138.2
lb/hr	581158	567827	550360	528710	497368
Energy, Btu/s- Ref 0 °R	58671	58155	56900	55430	53359
Cp, Btu/lb-R	0.2796	0.2809	0.2822	0.2843	0.2880
Emissions (NOT FOR USE IN ENVIRONMENTAL PERMITS)					
NOx ppmvd Ref 15% O2	25	25	25	25	25
NOx as NO2, lb/hr	24	24	23	22	20
CO ppmvd Ref 15% O2	67	53	39	25	14
CO, lb/hr	39.45	30.66	21.57	13.02	6.77
CO2, lb/hr	31951.47	31266.13	30002.73	28525.25	26552.80
HC ppmvd Ref 15% O2	16	12	7	4	2
HC, lb/hr	5.42	3.83	2.31	1.19	0.64
SOX as SO2, lb/hr	0.00	0.00	0.00	0.00	0.00

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Exh Wght % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS)					
AR	1.2268	1.2231	1.2179	1.2086	1.1927
N2	72.1215	71.9048	71.5983	71.0521	70.1202
O2	14.4049	14.3287	14.3142	14.2280	14.0232
CO2	5.4979	5.5063	5.4515	5.3952	5.3387
H2O	6.7384	7.0282	7.4109	8.1105	9.3210
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0068	0.0054	0.0039	0.0025	0.0014
HC	0.0009	0.0007	0.0004	0.0002	0.0001
NOX	0.0029	0.0029	0.0028	0.0028	0.0028
Exh Mole % Dry (NOT FOR USE IN ENVIRONMENTAL PERMITS)					
AR	0.9655	0.9656	0.9654	0.9653	0.9654
N2	80.9410	80.9544	80.9371	80.9288	80.9364
O2	14.1535	14.1235	14.1666	14.1880	14.1709
CO2	3.9277	3.9462	3.9228	3.9117	3.9225
H2O	0.0000	0.0000	0.0000	0.0000	0.0000
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0076	0.0061	0.0044	0.0028	0.0016
HC	0.0019	0.0013	0.0008	0.0005	0.0003
NOX	0.0029	0.0029	0.0029	0.0028	0.0029
Exh Mole % Wet (NOT FOR USE IN ENVIRONMENTAL PERMITS)					
AR	0.8639	0.8598	0.8542	0.8441	0.8271
N2	72.4240	72.0847	71.6084	70.7634	69.3363
O2	12.6642	12.5761	12.5338	12.4059	12.1399
CO2	3.5144	3.5138	3.4706	3.4204	3.3603
H2O	10.5225	10.9564	11.5259	12.5609	14.3324
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0068	0.0054	0.0039	0.0025	0.0013
HC	0.0017	0.0012	0.0007	0.0004	0.0002
NOX	0.0026	0.0026	0.0025	0.0025	0.0024
Aero Energy Fuel Number					
	10-1 (GEDEF)				
	Volume %	Weight %			
Hydrogen	0.0000	0.0000			
Methane	84.5000	71.8447			
Ethane	5.5800	8.8924			
Ethylene	0.0000	0.0000			
Propane	2.0500	4.7909			
Propylene	0.0000	0.0000			
Butane	0.7800	2.4027			
Butylene	0.0000	0.0000			
Butadiene	0.0000	0.0000			
Pentane	0.1800	0.6883			
Cyclopentane	0.0000	0.0000			
Hexane	0.1700	0.7764			
Heptane	0.0000	0.0000			
Carbon Monoxide	0.0000	0.0000			
Carbon Dioxide	0.6700	1.5628			
Nitrogen	5.9300	8.8044			
Water Vapor	0.0000	0.0000			
Oxygen	0.1400	0.2374			
Hydrogen Sulfide	0.0000	0.0000			
Ammonia	0.0000	0.0000			
Btu/lb, LHV	19000				
Btu/scf, LHV	946				
Btu/scf, HHV	1047				
Btu/lb, HHV	20996				
Fuel Temp, °F	77.0				
NOx Scalar	0.998				
Specific Gravity	0.65				

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Ambient Conditions					
Dry Bulb, °C	0.0	10.0	20.0	30.0	40.0
Wet Bulb, °C	-0.8	8.7	18.3	27.8	37.5
RH, %	85.0	85.0	85.0	85.0	85.0
Altitude, m	5.2	5.2	5.2	5.2	5.2
Ambient Pressure, kPa	101.263	101.263	101.263	101.263	101.263
Engine Inlet					
Comp Inlet Temp, °C	0.0	10.0	20.0	30.0	40.0
RH, %	85.0	85.0	85.0	85.0	85.0
Conditioning	NONE	NONE	NONE	NONE	NONE
Tons or kBtu/hr	0	0	0	0	0
Pressure Losses					
Inlet Loss, mmH2O	101.60	101.60	101.60	101.60	101.60
Exhaust Loss, mmH2O	101.60	101.60	101.60	101.60	101.60
kW, Gen Terms					
	24607	24026	22990	21735	19928
Est. kJ/kWh, LHV					
	10319	10337	10360	10413	10568
Fuel Flow					
GJ/hr, LHV	253.9	248.3	238.2	226.3	210.6
kg/hr	5746	5620	5389	5121	4765
NOx Control					
	Water	Water	Water	Water	Water
Water Injection					
kg/hr	5986	5788	5273	4509	3364
Temperature, °C	37.8	38.0	38.0	38.0	38.0
Control Parameters					
HP Speed, RPM	9701	9688	9585	9508	9460
PT Speed, RPM	3600	3600	3600	3600	3600
PS3 - CDP, kPa	1943.2	1903.2	1840.8	1766.1	1660.1
T3CRF - CDT, °C	454	464	468	470	470
T48IN, °K	1073	1081	1081	1081	1081
T48IN, °C	800	807	807	807	807
Exhaust Parameters					
Temperature, °C	505.3	514.0	518.6	524.6	534.3
kg/sec	73.2	71.5	69.3	66.6	62.7
kg/hr	263611	257564	249642	239821	225605
Energy, KJ/s- Ref 0 °K	61901	61357	60033	58482	56297
KJ/kg-R	1.1704	1.1758	1.1813	1.1901	1.2056
Emissions (NOT FOR USE IN ENVIRONMENTAL PERMITS)					
NOx mg/Nm3 Ref 15% O2	51	51	51	51	51
NOx as NO2, kg/hr	11	11	10	10	9
CO mg/Nm3 Ref 15% O2	83	66	49	31	17
CO, kg/hr	17.90	13.91	9.78	5.91	3.07
CO2, kg/hr	14493.09	14182.22	13609.15	12938.97	12044.27
HC mg/Nm3 Ref 15% O2	12	8	5	3	2
HC, kg/hr	2.46	1.74	1.05	0.54	0.29
SOX as SO2, kg/hr	0.00	0.00	0.00	0.00	0.00

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CO2	3.5144	3.5138	3.4706	3.4204	3.3603
H2O	10.5225	10.9564	11.5259	12.5609	14.3324
SO2	0.0000	0.0000	0.0000	0.0000	0.0000
CO	0.0068	0.0054	0.0039	0.0025	0.0013
HC	0.0017	0.0012	0.0007	0.0004	0.0002
NOX	0.0026	0.0026	0.0025	0.0025	0.0024
Aero Energy Fuel Number					
	10-1 (GEDEF)				
	Volume %	Weight %			
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Ethane	5.5800	8.8924			
Ethylene	0.0000	0.0000			
Propane	2.0500	4.7909			
Propylene	0.0000	0.0000			
Butane	0.7800	2.4027			
Butylene	0.0000	0.0000			
Butadiene	0.0000	0.0000			
Pentane	0.1800	0.6883			
Cyclopentane	0.0000	0.0000			
Hexane	0.1700	0.7764			
Heptane	0.0000	0.0000			
Carbon Monoxide	0.0000	0.0000			
Carbon Dioxide	0.6700	1.5628			
Nitrogen	5.9300	8.8044			
Water Vapor	0.0000	0.0000			
Oxygen	0.1400	0.2374			
Hydrogen Sulfide	0.0000	0.0000			
Ammonia	0.0000	0.0000			
kJ/kg, LHV	44194				
kJ/Nm3, LHV	37155				
kJ/Nm3, HHV	41122				
kJ/kg, HHV	48836				
Fuel Temp, °C	25.0				
NOx Scalar	0.998				
Specific Gravity	0.65				