



TEST CERTIFICATE

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QSEDOK1|QSEDOK 2 TEST BED 1

ENGINE TEST CERTIFICATE ACCORDING TO	ISO 3046	GENSET TEST CERTIFICATE ACCORDING TO	ISO 8528
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PASSWORD:	NELSON GARDENS LFG 1-4 US		
Order-No.:	8662	Customer:	
Outfit-No.:	J N795	PENN DETROIT DIESEL ALLISON, LLC	

GENERATOR SET			
Manufacturer:	GEJenbacher	Type:	JGS 320 GS-L.L
			Number: 1058642

ENGINE			
Manufacturer:	GEJenbacher	Type:	J 320 GS-C82
Coolant:	40% Glycol - Water	Starter:	E-Starter
			Number: 1058643
			Oil: Mobil Pegasus 705

ALTERNATOR			
Manufacturer:	NEWAGE STAMFORD	Type:	PE 734 B2
Style:	IM 1001	Safety Class:	IP23
Nominal Power: (Type "F")	1575 kVA	cosφ	0,8
Nominal Current:	1894 A		Number: A12D162508
			Isolation class: H
			Nominal Voltage: 480 V
			Nominal Frequency: 60 Hz

SWITCHGEAR					
Type:	Number:	Manufacturer:	Type:	Number:	Manufacturer:
Module Control	1058636	GEJenbacher			
Interface	1058640	GEJenbacher			

NOMINAL VALUES OF GEN-SET	US	
ELECTRIC POWER		1059 kW
ENGINE OUTPUT		1468 bhp
NOMINAL VOLTAGE		480 V
NOMINAL CURRENT		1274 A
NOMINAL POWER FACTOR		1,00 cosφ
SPEC. HEAT CONSUMPTION	(+/- 5%)	6,671 Btu Bhp.hr
ELECTRICAL EFFICIENCY	(+/- 5%)	36,9 %
HIGH TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
LOW TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
MIXTURE TEMPERATURE		158 °F
ENGINE COOLANT DISCHARGE TEMP.		201,2 °F
SPEED		1800 RPM
NOx		0,6 g bhp.hr
-		- g bhp.hr
-		-

FUEL GAS (at test bench)	NATURAL GAS	
LOWER CALORIC VALUE	975,19	Btu scft
DENSITY	0,099	oz g
METHANE NUMBER	90,1	

test run,date	tested by
04.05.2012	Sanner Cornee

released Assembly Quality

Wopatchler Johannes



TEST CERTIFICATE

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PASSWORD: NELSON GARDENS LFG 1-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058643

MEASURING-NO.		1	2	3	4	5	6	7	8	
ENGINE LOAD	[%]	100	100	50	50	75	75			
TIME	[hh:mm]	08:19	08:22	08:37	08:43	09:01	09:04			
TEST RUN CONDITIONS										
1)										
1	BAROMETRIC PRESSURE	psi(a)	13,74	13,74	13,74	13,74	13,74	13,74		
2	INTAKE AIR TEMPERATURE	°F	83	84	80	80	83	83		
3	RELATIV AIR HUMIDITY	%	50,2	47,6	44,3	43,9	43,1	43,1		
CAPACITY										
4	ENGINE SPEED	min ⁻¹ RPM	1801	1801	1802	1802	1802	1802		
5	FREQUENCY	Hz	60	60	60	60	60	60		
6	VOLTAGE	V	479	479	480	480	480	480		
7	CURRENT	A	1280	1279	635	632	954	955		
8	POWER FACTOR	cosφ	1,00	1,00	1,00	1,00	1,00	1,00		
9	ELECTRICAL OUTPUT	kW	1062	1061	528	526	793	794		
10	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
11	ENGINE OUTPUT	bhp	1472	1471	740	738	1104	1104		
12	Reserve		#	#	#	#	#	#		
13	Reserve		#	#	#	#	#	#		
FUEL CONSUMPTION at cos φ = 1,0										
14	GASFLOW RATE	scft hr	10559	10552	5710	5689	8126	8126		
15	GAS PRESSURE	PSI(g)	1,909	1,909	2,026	2,025	1,944	1,944		
16	GAS TEMPERATURE	°F	79,9	79,5	79,3	79,3	79,3	79,2		
17	NORMAL GASFLOW RATE (0°C, 1013,25 mbar)	cu ft hr	106,2	106,2	57,92	57,7	81,99	82,01		
18	FUEL CALORIFIC INPUT	kW	2932	2932	1599	1593	2264	2265		
19	SPECIFIC HEAT CONSUMPTION	Btu bhp.hr	6796	6801	7370	7370	6999	7002		
20	ELECTRICAL EFFICIENCY	%	36,2	36,2	33,0	33,0	35,0	35,1		



PASSWORD: NELSON GARDENS LFG 1-4 US
 ENGINE-TYPE: J 320 GS-C82
 ENGINE-NR.: 1058643

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	50	75	75		
TIME	[hh:mm]	08:19	08:22	08:37	08:43	09:01	09:04		

CALCULATION at $\cos\phi = 1$

1	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
2	ELECTRICAL OUTPUT	kW	1062	1061	528	526	793	794		
3	ELECTRICAL EFFICIENCY	%	36,2	36,2	33,0	33,0	35,0	35,0		

HIGH TEMPERATURE COOLING CIRCUIT

4	HOT WATER TEMPERATURE INLET	°F	157,4	158,1	158,0	157,6	157,3	157,3		
5	HOT WATER TEMPERATURE OUTLET	°F	189,0	189,8	175,6	175,0	181,4	181,5		
6	HOT WATER FLOW RATE	GPM	165,8	165,8	167,6	167,8	167,0	167,1		
7	THERMAL OUTPUT	MBTU hr	2421	2432	1366	1346	1858	1865		

LOW TEMPERATURE COOLING CIRCUIT

8	LOW TEMPERATURE COOLANT TEMP. INLET	°F	138,0	137,8	139,1	137,0	138,2	138,1		
9	LOW TEMPERATURE COOLANT TEMP. OUTLET	°F	142,4	142,4	140,2	138,3	140,6	140,6		
10	LOW TEMP. CIRCUIT FLOW RATE	GPM	88,1	88,1	88,1	88,1	88,0	88,1		
11	THERMAL OUTPUT LT-COOLING CIRCUIT	MBTU hr	178	184	44	51	96	99		

ENGINE COOLANT

12	COOLINGWATER TEMP. INLET	°F	#	#	#	#	#	#		
13	COOLINGWATER TEMP.OUTLET	°F	192,3	193,2	177,9	177,3	184,1	184,2		
14	RESERVE		#	#	#	#	#	#		

ENGINE OIL

15	OILTEMP. BEFORE COOLER	°F	#	#	#	#	#	#		
16	OILTEMP. AFTER COOLER	°F	189,0	189,8	182,1	180,7	184,5	184,5		
17	OILPRESSURE BEFORE FILTER	psi(g)	0,68	0,68	0,7	0,7	0,72	0,72		
18	OILPRESSURE AFTER FILTER	psi(g)	0,59	0,59	0,62	0,63	0,6	0,61		



TEST CERTIFICATE

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PASSWORD: NELSON GARDENS LFG 1-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058643

MEASURING-NO.		1	2	3	4	5	6	7	8	
ENGINE LOAD	[%]	100	100	50	50	75	75			
TIME	[hh:mm]	08:19	08:22	08:37	08:43	09:01	09:04			
AIR-MIXTURE										
39	MIXTURE TEMP. AFTER INTERCOOLER	°F	146	146	140	138	141	142		
40	PRECHAMBER GAS PRESSURE	psi(g)	#	#	#	#	#	#		
41	BOOST PRESSURE BEFORE THROTTLE-FLAP	psi(g)	31,43	31,42	9,99	9,83	20,42	20,43		
42	BOOST PRESSURE AFTER THROTTLE-FLAP	psi(g)	30,81	30,79	9,70	9,54	19,98	19,99		
43	PRESSURE DROP INTERCOOLER	psi(g)	0,68	0,68	0,5	0,5	0,61	0,61		
POWER RESERVE										
44	TURBOBYPASS POSITION	%	32	32	42	42	37	37		
45	GAS MIXER POSITION	%	18,8	18,7	19,2	19,2	18,8	18,8		
46	THROTTLE VALVE POSITION	%	100	100	100	100	100	100		
47	IGNITION TIMING	°cs b. TDC	20	20	20	20	20	20		
EXHAUST GAS										
48	EXHAUSTGAS TEMP. AFTER ENGINE	°F	870	871	967	967	917	918		
49	Reserve		#	#	#	#	#	#		
50	Reserve		#	#	#	#	#	#		
51	O2-CONTENT EXHAUST GAS	%	9,82	9,82	9,40	9,38	9,68	9,68		
52	CO-CONTENT EXHAUST GAS (without Oxicat)	g bhp.hr	2	2,01	1,87	1,87	1,93	1,94		
53	NOx-CONTENT EXHAUST GAS	g bhp.hr	0,59	0,59	0,62	0,62	0,54	0,54		



PASSWORD:	NELSON GARDENS LFG 1-4 US
ENGINE-TYPE:	J 320 GS-C82
ENGINE-NR.:	1058643

REMARKS

... in the field of measured quantity ... not available or not measured

Exhaustgas emissions with reference to 5 % O₂ in dry exhaust gas

- 1) Further test run conditions: Sea level: 520m; Ambient temperature = air intake temperature
- 2) Thermal Output measured with: 40% Glycol - Water

Test run has been carried out in island operation with original generator (due to 1800 RPM engine speed and 60 Hz generator frequency it is not possible to drive grid parallel with european 50 Hz grid). In island mode the electrical power output was dissipated with load resistor.



PASSWORD: NELSON GARDENS LFG 1-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058643

Prozess - Gaschromatograph PGC 9000 VC

Natural Gas Analysis Report

Sample Name: Erdgas
Injection Date: 03.05.2012 07:30
Operator: Tasser

Component	Vol %
Oxygene (O ₂)	0,0000%
Nitrogene (N ₂)	0,8000%
Methane (CH ₄)	96,9400%
n-Hexane (C ₆ H ₁₄)	0,0100%
Carbon Dioxide (CO ₂)	0,1900%
Ethane (C ₂ H ₆)	1,4800%
Propane (C ₃ H ₈)	0,4300%
i-Butane (i-C ₄ H ₁₀)	0,0700%
n-Butane (n-C ₄ H ₁₀)	0,0700%
i-Pentane (i-C ₅ H ₁₂)	0,0100%
n-Pentane (n-C ₅ H ₁₂)	0,0100%
neo-Pentane (neo-C ₅ H ₁₂)	0,0000%
total:	100,0000%

Lower Caloric Value at 32°F **975,188** Btu|scft
Methan number: **90,13**
Density at 32°F **0,741** kg|mn³

Reference: ISO 6976: 1995(E)

END OF THE REPORT



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ENGINE TEST CERTIFICATE ACCORDING TO	ISO 3046	GENSET TEST CERTIFICATE ACCORDING TO	ISO 8528
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PASSWORD:	NELSON GARDENS LFG 2-4 US		
Order-No.:	8662	Customer:	
Outfit-No.:	J N795	PENN DETROIT DIESEL ALLISON, LLC	

GENERATOR SET			
Manufacturer:	GEJenbacher	Type:	JGS 320 GS-L.L
			Number: 1058625

ENGINE			
Manufacturer:	GEJenbacher	Type:	J 320 GS-C82
Coolant:	40% Glycol - Water	Starter:	E-Starter
			Number: 1058626
			Oil: Mobil Pegasus 705

ALTERNATOR			
Manufacturer:	NEWAGE STAMFORD	Type:	PE 734 B2
Style:	IM 1001	Safety Class:	IP23
Nominal Power: (Type "F")	1575 kVA	cosφ	0,8
Nominal Current:	1894 A		Number: A12D162310
			Isolation class: H
			Nominal Voltage: 480 V
			Nominal Frequency: 60 Hz

SWITCHGEAR					
Type:	Number:	Manufacturer:	Type:	Number:	Manufacturer:
Module Control	1058624	GEJenbacher			
Interface	1058632	GEJenbacher			

NOMINAL VALUES OF GEN-SET	US	
ELECTRIC POWER		1059 kW
ENGINE OUTPUT		1468 bhp
NOMINAL VOLTAGE		480 V
NOMINAL CURRENT		1274 A
NOMINAL POWER FACTOR		1,00 cosφ
SPEC. HEAT CONSUMPTION	(+/- 5%)	6,671 Btu Bhp.hr
ELECTRICAL EFFICIENCY	(+/- 5%)	36,9 %
HIGH TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
LOW TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
MIXTURE TEMPERATURE		158 °F
ENGINE COOLANT DISCHARGE TEMP.		201,2 °F
SPEED		1800 RPM
NOx		0,6 g bhp.hr
-		- g bhp.hr
-		-

FUEL GAS (at test bench)	NATURAL GAS	
LOWER CALORIC VALUE	975,19	Btu scft
DENSITY	0,099	oz g
METHANE NUMBER	90,2	

test run,date 09.05.2012	tested by Ramoser Robert
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released Assembly Quality

Wopatchler Johannes



TEST CERTIFICATE

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PASSWORD: NELSON GARDENS LFG 2-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058626

MEASURING-NO.		1	2	3	4	5	6	7	8	
ENGINE LOAD	[%]	100	100	50	51	75	75			
TIME	[hh:mm]	19:44	19:47	20:02	20:05	20:17	20:20			
TEST RUN CONDITIONS										
1)										
1	BAROMETRIC PRESSURE	psi(a)	13,9	13,9	13,9	13,9	13,9	13,9		
2	INTAKE AIR TEMPERATURE	°F	107	107	101	101	101	101		
3	RELATIV AIR HUMIDITY	%	34,2	36,0	34,1	34,1	35,1	34,1		
CAPACITY										
4	ENGINE SPEED	min ⁻¹ RPM	1801	1801	1801	1801	1801	1801		
5	FREQUENCY	Hz	60	60	60	60	60	60		
6	VOLTAGE	V	479	479	479	480	479	479		
7	CURRENT	A	1279	1282	633	636	955	958		
8	POWER FACTOR	cosφ	1,00	1,00	1,00	1,00	1,00	1,00		
9	ELECTRICAL OUTPUT	kW	1061	1064	525	528	793	795		
10	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
11	ENGINE OUTPUT	bhp	1471	1475	736	742	1102	1105		
12	Reserve		#	#	#	#	#	#		
13	Reserve		#	#	#	#	#	#		
FUEL CONSUMPTION at cos φ = 1,0										
14	GASFLOW RATE	scft hr	10633	10647	5590	5629	8105	8122		
15	GAS PRESSURE	PSI(g)	1,112	1,108	1,639	1,636	1,41	1,408		
16	GAS TEMPERATURE	°F	63,0	63,1	66,2	66,7	67,6	67,8		
17	NORMAL GASFLOW RATE (0°C, 1013,25 mbar)	cu ft hr	105,9	106	57,28	57,61	81,61	81,75		
18	FUEL CALORIFIC INPUT	kW	2924	2926	1582	1591	2254	2257		
19	SPECIFIC HEAT CONSUMPTION	Btu bhp.hr	6780	6768	7330	7320	6976	6971		
20	ELECTRICAL EFFICIENCY	%	36,3	36,4	33,2	33,2	35,2	35,2		



PASSWORD: NELSON GARDENS LFG 2-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058626

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	51	75	75		
TIME	[hh:mm]	19:44	19:47	20:02	20:05	20:17	20:20		

CALCULATION at $\cos\phi = 1$

1	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
2	ELECTRICAL OUTPUT	kW	1061	1064	525	529	793	795		
3	ELECTRICAL EFFICIENCY	%	36,3	36,4	33,2	33,2	35,2	35,2		

HIGH TEMPERATURE COOLING CIRCUIT

4	HOT WATER TEMPERATURE INLET	°F	155,7	155,5	155,7	155,9	155,8	155,7		
5	HOT WATER TEMPERATURE OUTLET	°F	194,4	194,2	177,1	177,0	184,6	184,6		
6	HOT WATER FLOW RATE	GPM	143,9	143,7	147,6	147,6	146,1	146,1		
7	THERMAL OUTPUT	MBTU hr	2578	2568	1458	1441	1943	1950		

LOW TEMPERATURE COOLING CIRCUIT

8	LOW TEMPERATURE COOLANT TEMP. INLET	°F	139,8	139,0	139,3	139,5	139,6	139,5		
9	LOW TEMPERATURE COOLANT TEMP. OUTLET	°F	143,4	142,6	140,2	140,4	141,5	141,4		
10	LOW TEMP. CIRCUIT FLOW RATE	GPM	109,7	109,8	109,7	109,7	109,7	109,7		
11	THERMAL OUTPUT LT-COOLING CIRCUIT	MBTU hr	178	181	44	41	92	96		

ENGINE COOLANT

12	COOLINGWATER TEMP. INLET	°F	155,4	155,1	155,1	155,2	155,1	155,0		
13	COOLINGWATER TEMP.OUTLET	°F	193,9	193,6	176,6	176,6	184,0	184,0		
14	RESERVE	#	#	#	#	#	#	#		

ENGINE OIL

15	OILTEMP. BEFORE COOLER	°F	#	#	#	#	#	#		
16	OILTEMP. AFTER COOLER	°F	197,3	197,2	186,8	186,2	189,8	190,2		
17	OILPRESSURE BEFORE FILTER	psi(g)	0,64	0,64	0,67	0,67	0,66	0,66		
18	OILPRESSURE AFTER FILTER	psi(g)	0,55	0,55	0,59	0,59	0,58	0,58		



PASSWORD: NELSON GARDENS LFG 2-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058626

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	51	75	75		
TIME	[hh:mm]	19:44	19:47	20:02	20:05	20:17	20:20		
AIR-MIXTURE									
39	MIXTURE TEMP. AFTER INTERCOOLER	°F	146	146	140	140	142	142	
40	PRECHAMBER GAS PRESSURE	psi(g)	#	#	#	#	#	#	
41	BOOST PRESSURE BEFORE THROTTLE-FLAP	psi(g)	31,64	31,65	9,70	9,83	20,41	20,49	
42	BOOST PRESSURE AFTER THROTTLE-FLAP	psi(g)	30,74	30,76	9,29	9,42	19,78	19,85	
43	PRESSURE DROP INTERCOOLER	psi(g)	0,86	0,84	0,63	0,65	0,62	0,62	
POWER RESERVE									
44	TURBOBYPASS POSITION	%	27	27	40	40	34	33	
45	GAS MIXER POSITION	%	20,1	20,1	21	20,9	20,4	20,4	
46	THROTTLE VALVE POSITION	%	100	100	100	100	100	100	
47	IGNITION TIMING	°cs b. TDC	20	20	20	20	20	20	
EXHAUST GAS									
48	EXHAUSTGAS TEMP. AFTER ENGINE	°F	884	884	977	976	927	926	
49	Reserve		#	#	#	#	#	#	
50	Reserve		#	#	#	#	#	#	
51	O2-CONTENT EXHAUST GAS	%	9,70	9,70	9,24	9,22	9,57	9,57	
52	CO-CONTENT EXHAUST GAS (without Oxicat)	g bhp.hr	2,09	2,08	2	1,99	2,03	2,02	
53	NOx-CONTENT EXHAUST GAS	g bhp.hr	0,53	0,53	0,6	0,59	0,5	0,5	



PASSWORD:	NELSON GARDENS LFG 2-4 US
ENGINE-TYPE:	J 320 GS-C82
ENGINE-NR.:	1058626

REMARKS

... in the field of measured quantity ... not available or not measured
Exhaustgas emissions with reference to 5 % O₂ in dry exhaust gas

- 1) Further test run conditions: Sea level: 520m; Ambient temperature = air intake temperature
- 2) Thermal Output measured with: 40% Glycol - Water

Test run has been carried out in island operation with original generator (due to 1800 RPM engine speed and 60 Hz generator frequency it is not possible to drive grid parallel with european 50 Hz grid).
In island mode the electrical power output was dissipated with load resistor.

Oil temperture at 91°C due to 100% open bypass valve. If bypass valve is closed -> higher waterflow -> oil temperature = 89°C



PASSWORD: NELSON GARDENS LFG 2-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058626

Prozess - Gaschromatograph PGC 9000 VC

Natural Gas Analysis Report

Sample Name: Erdgas
Injection Date: 09.05.2012 11:08
Operator: Tasser

Component	Vol %
Oxygene (O ₂)	0,0000%
Nitrogene (N ₂)	0,7800%
Methane (CH ₄)	97,0400%
n-Hexane (C ₆ H ₁₄)	0,0100%
Carbon Dioxide (CO ₂)	0,1600%
Ethane (C ₂ H ₆)	1,4300%
Propane (C ₃ H ₈)	0,4300%
i-Butane (i-C ₄ H ₁₀)	0,0700%
n-Butane (n-C ₄ H ₁₀)	0,0700%
i-Pentane (i-C ₅ H ₁₂)	0,0100%
n-Pentane (n-C ₅ H ₁₂)	0,0100%
neo-Pentane (neo-C ₅ H ₁₂)	0,0000%
total:	100,0000%

Lower Caloric Value at 32°F **975,188** Btu|scft
Methan number: **90,22**
Density at 32°F **0,740** kg|mn³

Reference: ISO 6976: 1995(E)

END OF THE REPORT



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ENGINE TEST CERTIFICATE ACCORDING TO	ISO 3046	GENSET TEST CERTIFICATE ACCORDING TO	ISO 8528
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PASSWORD:	NELSON GARDENS LFG 3-4 US		
Order-No.:	8662	Customer:	
Outfit-No.:	J N795	PENN DETROIT DIESEL ALLISON, LLC	

GENERATOR SET			
Manufacturer:	GEJenbacher	Type:	JGS 320 GS-L.L
			Number: 1058638

ENGINE			
Manufacturer:	GEJenbacher	Type:	J 320 GS-C82
Coolant:	40% Glycol - Water	Starter:	E-Starter
			Number: 1058639
			Oil: Mobil Pegasus 705

ALTERNATOR			
Manufacturer:	NEWAGE STAMFORD	Type:	PE 734 B2
Style:	IM 1001	Safety Class:	IP23
Nominal Power: (Type "F")	1575 kVA	cosφ	0,8
Nominal Current:	1894 A		Number: A12D162622
			Isolation class: H
			Nominal Voltage: 480 V
			Nominal Frequency: 60 Hz

SWITCHGEAR					
Type:	Number:	Manufacturer:	Type:	Number:	Manufacturer:
Module Control	1058634	GEJenbacher			
Interface	1058629	GEJenbacher			

NOMINAL VALUES OF GEN-SET	US	
ELECTRIC POWER		1059 kW
ENGINE OUTPUT		1468 bhp
NOMINAL VOLTAGE		480 V
NOMINAL CURRENT		1274 A
NOMINAL POWER FACTOR		1,00 cosφ
SPEC. HEAT CONSUMPTION	(+/- 5%)	6,671 Btu Bhp.hr
ELECTRICAL EFFICIENCY	(+/- 5%)	36,9 %
HIGH TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
LOW TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
MIXTURE TEMPERATURE		158 °F
ENGINE COOLANT DISCHARGE TEMP.		201,2 °F
SPEED		1800 RPM
NOx		0,6 g bhp.hr
-		- g bhp.hr
-		-

FUEL GAS (at test bench)	NATURAL GAS	
LOWER CALORIC VALUE	975,19	Btu scft
DENSITY	0,099	oz g
METHANE NUMBER	90,5	

test run,date	tested by
11.05.2012	Ramoser Robert

released Assembly Quality

[Signature]
Wopatchler Johannes



TEST CERTIFICATE

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QSEDOK1|QSEDOK 2 TEST BED 3

PASSWORD: NELSON GARDENS LFG 3-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058639

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	50	75	75		
TIME	[hh:mm]	20:35	20:38	20:59	21:02	21:14	21:17		
TEST RUN CONDITIONS 1)									
1	BAROMETRIC PRESSURE	psi(a)	13,9	13,9	13,9	13,9	13,9		
2	INTAKE AIR TEMPERATURE	°F	96	108	95	95	103	103	
3	RELATIV AIR HUMIDITY	%	32,3	32,3	32,3	32,3	33,4	32,6	
CAPACITY									
4	ENGINE SPEED	min ⁻¹ RPM	1801	1801	1801	1801	1801	1801	
5	FREQUENCY	Hz	60	60	60	60	60	60	
6	VOLTAGE	V	478	478	479	479	478	478	
7	CURRENT	A	1283	1282	633	632	957	958	
8	POWER FACTOR	cosφ	1,00	1,00	1,00	1,00	1,00	1,00	
9	ELECTRICAL OUTPUT	kW	1063	1062	525	524	792	793	
10	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4	
11	ENGINE OUTPUT	bhp	1474	1472	736	735	1102	1104	
12	Reserve		#	#	#	#	#	#	
13	Reserve		#	#	#	#	#	#	
FUEL CONSUMPTION at cos φ = 1,0									
14	GASFLOW RATE	scft hr	10651	10633	5615	5601	8038	8023	
15	GAS PRESSURE	PSI(g)	1,105	1,111	1,603	1,595	1,385	1,436	
16	GAS TEMPERATURE	°F	70,2	70,2	73,0	72,9	68,5	68,2	
17	NORMAL GASFLOW RATE (0°C, 1013,25 mbar)	cu ft hr	104,6	104,5	56,66	56,51	80,66	80,84	
18	FUEL CALORIFIC INPUT	kW	2888	2885	1565	1561	2227	2232	
19	SPECIFIC HEAT CONSUMPTION	Btu bhp.hr	6686	6684	7251	7246	6895	6902	
20	ELECTRICAL EFFICIENCY	%	36,8	36,8	33,6	33,6	35,6	35,5	



PASSWORD: NELSON GARDENS LFG 3-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058639

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	50	75	75		
TIME	[hh:mm]	20:35	20:38	20:59	21:02	21:14	21:17		

CALCULATION at $\cos\phi = 1$

1	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
2	ELECTRICAL OUTPUT	kW	1063	1062	525	524	792	793		
3	ELECTRICAL EFFICIENCY	%	36,8	36,8	33,6	33,6	35,6	35,5		

HIGH TEMPERATURE COOLING CIRCUIT

4	HOT WATER TEMPERATURE INLET	°F	156,4	156,3	156,2	156,5	156,4	156,3		
5	HOT WATER TEMPERATURE OUTLET	°F	196,9	197,2	178,6	178,7	186,8	186,8		
6	HOT WATER FLOW RATE	GPM	132,2	131,9	136,2	136,2	134,9	134,6		
7	THERMAL OUTPUT	MBTU hr	2476	2493	1407	1393	1895	1899		

LOW TEMPERATURE COOLING CIRCUIT

8	LOW TEMPERATURE COOLANT TEMP. INLET	°F	139,9	139,5	138,8	139,2	139,6	139,2		
9	LOW TEMPERATURE COOLANT TEMP. OUTLET	°F	143,7	143,1	139,6	140,1	141,6	141,4		
10	LOW TEMP. CIRCUIT FLOW RATE	GPM	109,6	109,7	109,7	109,7	109,6	109,7		
11	THERMAL OUTPUT LT-COOLING CIRCUIT	MBTU hr	195	178	41	41	99	109		

ENGINE COOLANT

12	COOLINGWATER TEMP. INLET	°F	#	#	#	#	#	#		
13	COOLINGWATER TEMP.OUTLET	°F	195,6	195,9	177,4	177,5	185,4	185,4		
14	RESERVE		#	#	#	#	#	#		

ENGINE OIL

15	OILTEMP. BEFORE COOLER	°F	#	#	#	#	#	#		
16	OILTEMP. AFTER COOLER	°F	196,0	196,1	183,7	183,6	187,9	188,3		
17	OILPRESSURE BEFORE FILTER	psi(g)	0,66	0,66	0,69	0,69	0,68	0,68		
18	OILPRESSURE AFTER FILTER	psi(g)	0,57	0,56	0,61	0,61	0,59	0,59		



PASSWORD: NELSON GARDENS LFG 3-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058639

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	50	75	75		
TIME	[hh:mm]	20:35	20:38	20:59	21:02	21:14	21:17		
AIR-MIXTURE									
39	MIXTURE TEMP. AFTER INTERCOOLER	°F	147	147	140	140	143	142	
40	PRECHAMBER GAS PRESSURE	psi(g)	#	#	#	#	#	#	
41	BOOST PRESSURE BEFORE THROTTLE-FLAP	psi(g)	31,00	30,90	9,33	9,29	19,84	19,87	
42	BOOST PRESSURE AFTER THROTTLE-FLAP	psi(g)	30,08	29,97	8,92	8,88	19,22	19,24	
43	PRESSURE DROP INTERCOOLER	psi(g)	0,7	0,69	0,51	0,51	0,63	0,63	
POWER RESERVE									
44	TURBOBYPASS POSITION	%	22	22	34	34	28	28	
45	GAS MIXER POSITION	%	20,1	20,1	20,9	20,8	20,4	20,4	
46	THROTTLE VALVE POSITION	%	100	100	100	100	100	100	
47	IGNITION TIMING	°cs b. TDC	20	20	20	20	20	20	
EXHAUST GAS									
48	EXHAUSTGAS TEMP. AFTER ENGINE	°F	891	891	977	977	932	932	
49	Reserve		#	#	#	#	#	#	
50	Reserve		#	#	#	#	#	#	
51	O2-CONTENT EXHAUST GAS	%	9,72	9,72	9,25	9,24	9,58	9,59	
52	CO-CONTENT EXHAUST GAS (without Oxicat)	g bhp.hr	1,94	1,95	1,92	1,93	1,92	1,92	
53	NOx-CONTENT EXHAUST GAS	g bhp.hr	0,54	0,54	0,61	0,61	0,52	0,51	



PASSWORD:	NELSON GARDENS LFG 3-4 US
ENGINE-TYPE:	J 320 GS-C82
ENGINE-NR.:	1058639

REMARKS

... in the field of measured quantity ... not available or not measured
Exhaustgas emissions with reference to 5 % O₂ in dry exhaust gas

- 1) Further test run conditions: Sea level: 520m; Ambient temperature = air intake temperature
- 2) Thermal Output measured with: 40% Glycol - Water

Test run has been carried out in island operation with original generator (due to 1800 RPM engine speed and 60 Hz generator frequency it is not possible to drive grid parallel with european 50 Hz grid).
In island mode the electrical power output was dissipated with load resistor.

Oil temperture at 91°C due to 100% open bypass valve. If bypass valve is closed -> higher waterflow -> oil temperature = 89°C



PASSWORD: NELSON GARDENS LFG 3-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058639

Prozess - Gaschromatograph PGC 9000 VC

Natural Gas Analysis Report

Sample Name: Erdgas
Injection Date: 11.05.2012 08:07
Operator: Tasser

Component	Vol %
Oxygene (O ₂)	0,0000%
Nitrogene (N ₂)	0,7800%
Methane (CH ₄)	97,1600%
n-Hexane (C ₆ H ₁₄)	0,0100%
Carbon Dioxide (CO ₂)	0,1200%
Ethane (C ₂ H ₆)	1,3600%
Propane (C ₃ H ₈)	0,4200%
i-Butane (i-C ₄ H ₁₀)	0,0700%
n-Butane (n-C ₄ H ₁₀)	0,0600%
i-Pentane (i-C ₅ H ₁₂)	0,0100%
n-Pentane (n-C ₅ H ₁₂)	0,0100%
neo-Pentane (neo-C ₅ H ₁₂)	0,0000%
total:	100,0000%

Lower Caloric Value at 32°F **975,188** Btu|scft
Methan number: **90,48**
Density at 32°F **0,739** kg|mn³

Reference: ISO 6976: 1995(E)

END OF THE REPORT



TEST CERTIFICATE

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QSEDOK1|QSEDOK 2 TEST BED 7

ENGINE TEST CERTIFICATE ACCORDING TO	ISO 3046	GENSET TEST CERTIFICATE ACCORDING TO	ISO 8528
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PASSWORD:	NELSON GARDENS LFG 4-4 US		
Order-No.:	8662	Customer:	
Outfit-No.:	J N795	PENN DETROIT DIESEL ALLISON, LLC	

GENERATOR SET			
Manufacturer:	GEJenbacher	Type:	JGS 320 GS-L.L
			Number: 1058618

ENGINE			
Manufacturer:	GEJenbacher	Type:	J 320 GS-C82
Coolant:	40% Glycol - Water	Starter:	E-Starter
			Number: 1058623
			Oil: Mobil Pegasus 705

ALTERNATOR			
Manufacturer:	NEWAGE STAMFORD	Type:	PE 734 B2
Style:	IM 1001	Safety Class:	IP23
Nominal Power: (Type "F")	1575 kVA	cosφ	0,8
Nominal Current:	1894 A		Number: A12D162831
			Isolation class: H
			Nominal Voltage: 480 V
			Nominal Frequency: 60 Hz

SWITCHGEAR					
Type:	Number:	Manufacturer:	Type:	Number:	Manufacturer:
Module Control	1058621	GEJenbacher			
Interface	1058619	GEJenbacher			

NOMINAL VALUES OF GEN-SET	US	
ELECTRIC POWER		1059 kW
ENGINE OUTPUT		1468 bhp
NOMINAL VOLTAGE		480 V
NOMINAL CURRENT		1274 A
NOMINAL POWER FACTOR		1,00 cosφ
SPEC. HEAT CONSUMPTION	(+/- 5%)	6,671 Btu Bhp.hr
ELECTRICAL EFFICIENCY	(+/- 5%)	36,9 %
HIGH TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
LOW TEMP. CIRCUIT THERMAL OUTPUT	(+/- 8%)	- MBTU hr 2)
MIXTURE TEMPERATURE		158 °F
ENGINE COOLANT DISCHARGE TEMP.		201,2 °F
SPEED		1800 RPM
NOx		0,6 g bhp.hr
-		- g bhp.hr
-		-

FUEL GAS (at test bench)	NATURAL GAS	
LOWER CALORIC VALUE	971,33	Btu scft
DENSITY	0,098	oz g
METHANE NUMBER	91,8	

test run,date	tested by
15.05.2012	Unterberger Michael

released Assembly Quality

[Signature]
Wopatchler Johannes



TEST CERTIFICATE

PAGE 2-6
QSEDOK1|QSEDOK 2 TEST BED 3

PASSWORD: NELSON GARDENS LFG 4-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058623

MEASURING-NO.		1	2	3	4	5	6	7	8	
ENGINE LOAD	[%]	100	100	50	50	76	75			
TIME	[hh:mm]	21:28	21:34	21:49	21:52	21:58	22:01			
TEST RUN CONDITIONS 1)										
1	BAROMETRIC PRESSURE	psi(a)	13,79	13,79	13,8	13,8	13,8	13,8		
2	INTAKE AIR TEMPERATURE	°F	97	97	89	88	89	89		
3	RELATIV AIR HUMIDITY	%	32,4	32,7	32,3	32,3	33,1	33,1		
CAPACITY										
4	ENGINE SPEED	min ⁻¹ RPM	1801	1801	1801	1801	1801	1801		
5	FREQUENCY	Hz	60	60	60	60	60	60		
6	VOLTAGE	V	482	482	483	482	481	481		
7	CURRENT	A	1268	1272	628	625	957	953		
8	POWER FACTOR	cosφ	1,00	1,00	1,00	1,00	1,00	1,00		
9	ELECTRICAL OUTPUT	kW	1059	1062	525	522	797	794		
10	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
11	ENGINE OUTPUT	bhp	1468	1472	738	732	1109	1104		
12	Reserve		#	#	#	#	#	#		
13	Reserve		#	#	#	#	#	#		
FUEL CONSUMPTION at cos φ = 1,0										
14	GASFLOW RATE	scft hr	10679	10704	5633	5594	8175	8140		
15	GAS PRESSURE	PSI(g)	1,108	1,102	1,635	1,637	1,398	1,405		
16	GAS TEMPERATURE	°F	65,5	65,1	66,0	66,2	66,0	65,8		
17	NORMAL GASFLOW RATE (0°C, 1013,25 mbar)	cu ft hr	105	105,3	57,33	56,93	81,94	81,65		
18	FUEL CALORIFIC INPUT	kW	2889	2897	1577	1566	2254	2246		
19	SPECIFIC HEAT CONSUMPTION	Btu bhp.hr	6712	6714	7294	7297	6933	6943		
20	ELECTRICAL EFFICIENCY	%	36,6	36,7	33,3	33,3	35,4	35,3		



PASSWORD: NELSON GARDENS LFG 4-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058623

MEASURING-NO.		1	2	3	4	5	6	7	8
ENGINE LOAD	[%]	100	100	50	50	76	75		
TIME	[hh:mm]	21:28	21:34	21:49	21:52	21:58	22:01		

CALCULATION at $\cos\phi = 1$

1	GENERATOR EFFICIENCY	%	96,7	96,7	95,6	95,6	96,4	96,4		
2	ELECTRICAL OUTPUT	kW	1059	1062	525	522	797	794		
3	ELECTRICAL EFFICIENCY	%	36,6	36,7	33,3	33,3	35,4	35,3		

HIGH TEMPERATURE COOLING CIRCUIT

4	HOT WATER TEMPERATURE INLET	°F	154,5	154,6	154,8	154,8	155,7	155,1		
5	HOT WATER TEMPERATURE OUTLET	°F	189,7	190,0	174,8	174,4	180,2	181,1		
6	HOT WATER FLOW RATE	GPM	151,1	151,0	154,2	154,0	152,9	152,8		
7	THERMAL OUTPUT	MBTU hr	2459	2469	1421	1393	1735	1837		

LOW TEMPERATURE COOLING CIRCUIT

8	LOW TEMPERATURE COOLANT TEMP. INLET	°F	139,5	144,3	136,9	137,7	140,2	140,8		
9	LOW TEMPERATURE COOLANT TEMP. OUTLET	°F	143,9	147,0	137,7	138,5	141,3	142,5		
10	LOW TEMP. CIRCUIT FLOW RATE	GPM	109,7	109,5	109,7	109,7	109,7	109,6		
11	THERMAL OUTPUT LT-COOLING CIRCUIT	MBTU hr	219	137	38	34	55	82		

ENGINE COOLANT

12	COOLINGWATER TEMP. INLET	°F	#	#	#	#	#	#		
13	COOLINGWATER TEMP.OUTLET	°F	188,3	188,5	173,5	173,1	178,8	179,8		
14	RESERVE		#	#	#	#	#	#		

ENGINE OIL

15	OILTEMP. BEFORE COOLER	°F	#	#	#	#	#	#		
16	OILTEMP. AFTER COOLER	°F	192,4	193,1	183,9	183,2	183,7	185,3		
17	OILPRESSURE BEFORE FILTER	psi(g)	0,65	0,65	0,68	0,68	0,67	0,67		
18	OILPRESSURE AFTER FILTER	psi(g)	0,56	0,56	0,59	0,6	0,59	0,59		



TEST CERTIFICATE

PASSWORD: NELSON GARDENS LFG 4-4 US
 ENGINE-TYPE: J 320 GS-C82
 ENGINE-NR.: 1058623

MEASURING-NO.		1	2	3	4	5	6	7	8	
ENGINE LOAD	[%]	100	100	50	50	76	75			
TIME	[hh:mm]	21:28	21:34	21:49	21:52	21:58	22:01			
AIR-MIXTURE										
39	MIXTURE TEMP. AFTER INTERCOOLER	°F	147	150	138	139	142	144		
40	PRECHAMBER GAS PRESSURE	psi(g)	#	#	#	#	#	#		
41	BOOST PRESSURE BEFORE THROTTLE-FLAP	psi(g)	31,52	31,96	9,87	9,74	20,80	20,72		
42	BOOST PRESSURE AFTER THROTTLE-FLAP	psi(g)	30,35	30,76	9,38	9,24	19,99	19,91		
43	PRESSURE DROP INTERCOOLER	psi(g)	0,92	0,85	0,87	0,83	0,89	0,86		
POWER RESERVE										
44	TURBOBYPASS POSITION	%	27	26	38	37	32	32		
45	GAS MIXER POSITION	%	20,6	20,6	21,3	21,4	20,8	20,8		
46	THROTTLE VALVE POSITION	%	100	100	100	100	100	100		
47	IGNITION TIMING	°cs b. TDC	20	20	20	20	20	20		
EXHAUST GAS										
48	EXHAUSTGAS TEMP. AFTER ENGINE	°F	886	886	971	971	918	922		
49	Reserve		#	#	#	#	#	#		
50	Reserve		#	#	#	#	#	#		
51	O2-CONTENT EXHAUST GAS	%	9,88	9,97	9,40	9,40	9,69	9,75		
52	CO-CONTENT EXHAUST GAS (without Oxicat)	g bhp.hr	1,88	1,88	1,82	1,83	1,84	1,85		
53	NOx-CONTENT EXHAUST GAS	g bhp.hr	0,57	0,58	0,61	0,61	0,61	0,56		



PASSWORD:	NELSON GARDENS LFG 4-4 US
ENGINE-TYPE:	J 320 GS-C82
ENGINE-NR.:	1058623

REMARKS

... in the field of measured quantity ... not available or not measured

Exhaustgas emissions with reference to 5 % O₂ in dry exhaust gas

- 1) Further test run conditions: Sea level: 520m; Ambient temperature = air intake temperature
- 2) Thermal Output measured with: 40% Glycol - Water

Test run has been carried out in island operation with original generator (due to 1800 RPM engine speed and 60 Hz generator frequency it is not possible to drive grid parallel with european 50 Hz grid). In island mode the electrical power output was dissipated with load resistor.



PASSWORD: NELSON GARDENS LFG 4-4 US
ENGINE-TYPE: J 320 GS-C82
ENGINE-NR.: 1058623

Prozess - Gaschromatograph PGC 9000 VC

Natural Gas Analysis Report

Sample Name: Erdgas
Injection Date: 14.05.2012 10:49
Operator: Tasser

Component	Vol %
Oxygene (O ₂)	0,0000%
Nitrogene (N ₂)	0,7900%
Methane (CH ₄)	97,5700%
n-Hexane (C ₆ H ₁₄)	0,0000%
Carbon Dioxide (CO ₂)	0,0800%
Ethane (C ₂ H ₆)	1,1000%
Propane (C ₃ H ₈)	0,3400%
i-Butane (i-C ₄ H ₁₀)	0,0600%
n-Butane (n-C ₄ H ₁₀)	0,0500%
i-Pentane (i-C ₅ H ₁₂)	0,0100%
n-Pentane (n-C ₅ H ₁₂)	0,0100%
neo-Pentane (neo-C ₅ H ₁₂)	0,0000%
total:	100,0000%

Lower Caloric Value at 32°F **971,330** Btu|scft
Methan number: **91,77**
Density at 32°F **0,736** kg|mn³

Reference: ISO 6976: 1995(E)

END OF THE REPORT