

Preliminary

Model: TBD
Frequency: 50 Hz
Fuel Type: Low BTU
Emissions Performance NOx: 500 mg/Nm³
LT Water Inlet Temperature: 42°C (107.6°F)
HT Water Outlet Temp: 85°C (185°F)

Generator set data sheet
497kW continuous

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Generator Set Outline Drawing	N/A
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Fuel Consumption (ISO3046/1)	See Note	100% of Rated Load	80% of Rated Load	60% of Rated Load	
Fuel Consumption (LHV) ISO3046/1, kW (MMBTU/hr)	2,3,9	1255 (4.28)	1026 (3.5)	792 (2.7)	
Mechanical Efficiency ISO3046/1, percent	2,4,9	42.5%	41.7%	40.7%	
Electrical Efficiency ISO3046/1, percent	2,9,11	41.6%	40.7%	39.8%	

Engine	
Engine Manufacturer	Liebherr
Engine Model	G9512
Configuration	V12
Displacement, L (cu.in)	25 (1526)
Aspiration	Turbocharged and Aftercooled
Gross Engine Power Output, kWm (hp)	515 (690.6)
BMEP, bar (psi)	16 (233)
Bore, mm (in)	130 (5.12)
Stroke, mm (in)	157 (6.18)
Rated Speed, rpm	1500
Piston Speed, m/s (ft/min)	9.42 (1854)
Compression Ratio	13.3:1
Lube Oil Capacity, L (qt)	90 (95)
Overspeed Limit, rpm	1650
Full Load Lubricating oil consumption, g/kWe-hr (g/hp-hr)	0.30 (0.22)

Fuel	
Max Gas Pressure at the fuel shut off valve (DMV), bar (psi)	0.5 (7.2)
Min Gas Pressure at the fuel shut off valve (DMV), bar (psi)	0.1 (1.45)
Minimum Methane Index	80

Starting System(s)	
Electric starter voltage, volts	24
Minimum battery capacity @ 40 deg.C (104 deg.F), AH	N/A

Genset Dimensions (see note 1)	
Genset Length, m (ft)	4.7 (15.3)
Genset Width, m (ft)	2 (6.5)
Genset Height, m (ft)	2.2 (7.1)
Genset Weight (dry), kg (lbs)	5500 (12100)

	See Notes	100% of Rated Load	80% of Rated Load	60% of Rated Load	
Energy Data					
Continuous Generator Electrical Output kWe @ 1.0 pf	2,11	497	398	300	
Total Heat Rejected in LT Circuit, kW (MMBTU/h)	15	42 (0.14)	29 (0.10)	20 (0.07)	
Total Heat Rejected in HT Circuit, kW (MMBTU/h)	15	185 (0.63)	194 (0.66)	121 (0.41)	
Heat Radiated to Ambient, kW (MMBTU/h)	15	56 (0.19)	46 (0.16)	36 (0.12)	
Available Exhaust heat to 105°C, kW (MMBTU/h)	15	324 (1.11)	275 (0.94)	223 (0.76)	
Intake Air Flow					
Intake Air Flow Mass, kg/s (lb/hr)	15	0.76 (6050)	0.62 (4890)	0.47 (3760)	
Intake Air Flow Volume, m ³ /s @ 0°C (scfm)	15	0.6 (1320)	0.5 (1070)	0.4 (830)	
Maximum Air Cleaner Restriction, mmHG (in H ₂ O)	13	20.5 (11.0)			
Exhaust Air Flow					
Exhaust Gas Flow Mass, kg/s (lb/hr)	15	0.79 (6260)	0.64 (5060)	0.49 (3900)	
Exhaust Gas Flow Volume, m ³ /s (cfm)	15	1.58 (3350)	1.30 (2750)	1.03 (2180)	
Exhaust Temperature After Turbine, °C (°F)	5	432 (810)	448 (838)	466 (871)	
Max Exhaust System Back Pressure, mmHG (in H ₂ O)	13	74.7 (40.0)			
HT Cooling Circuit					
HT Circuit Engine Coolant Volume, L (gal)		65 (17)	65 (17)	65 (17)	
HT Coolant Flow @ Max Ext Restriction, m ³ /h (gal/min)	15	35 (154)	35 (154)	35 (154)	
Maximum HT Engine Coolant Inlet Temp, °C (°F) Reference	7	80 (176)	80 (176)	80 (176)	
HT Coolant Outlet Temp, °C (°F)	7	85 (185)	85 (185)	85 (185)	
Max Pressure Drop in External HT Circuit, bar (psig)		1.0 (15)	1.0 (15)	1.0 (15)	
HT Circuit Maximum Pressure, bar (psig)		3.5 (51)	3.5 (51)	3.5 (51)	
Minimum Static Head - Pump Inlet, bar (psig)		0.5-1.8 (7-22)	0.5-1.8 (7-22)	0.5-1.8 (7-22)	
LT Cooling Circuit					
LT Circuit Engine Coolant Volume, L (gal)		11.5 (3)	11.5 (3)	11.5 (3)	
LT Coolant Flow @ Max Ext Restriction, m ³ /h (gal/min)	15	6.5 (29)	6.5 (29)	6.5 (29)	
Maximum LT Engine Coolant Inlet Temp, °C (°F)	8	50 (122)	50 (122)	50 (122)	
Nominal LT Coolant Inlet Temp, °C (°F)	8	35 (95)	35 (95)	35 (95)	
Max Pressure Drop in External LT Circuit, bar (psig)		1.0 (15)	1.0 (15)	1.0 (15)	
LT Circuit Maximum Pressure, bar (psig)		3.5 (51)	3.5 (51)	3.5 (51)	
Minimum Static Head - Pump Inlet, bar (psig)		0.5-1.8 (7-22)	0.5-1.8 (7-22)	0.5-1.8 (7-22)	
Emissions					
NO _x Emissions <i>dry</i> , ppm	14	165	169	169	
NO _x Emissions, mg/Nm ³ @5% O ₂ (g/hp-h)	14	406 (0.85)	409 (0.88)	405 (0.90)	
THC Emissions <i>wet</i> , ppm	12	1833	1874	1830	
THC Emissions, mg/Nm ³ @5% O ₂ (g/hp-h)	12	2091 (4.37)	2100 (4.52)	2033 (4.53)	
CH ₄ Emissions <i>wet</i> , ppm	12	1684	1745	1665	
CH ₄ Emission, mg/Nm ³ (g/hp-h)	12	1449 (3.03)	1476 (3.18)	1396 (3.11)	
NMHC Emissions <i>wet</i> , ppm	12	149	129	165	
NMHC Exhaust Emissions, mg/Nm ³ (g/hp-h)	12	170 (0.36)	145 (0.31)	183 (0.41)	
Formaldehyde <i>wet</i> , ppm	12	57	60	60	
Formaldehyde, mg/Nm ³ (g/hp-h)	12	92 (0.19)	95 (0.20)	94 (0.21)	
CO Emissions (<i>dry</i>), ppm	15	454	467	475	
CO Emissions, mg/Nm ³ @5% O ₂ (g/hp-h)	15	680 (1.42)	688 (1.48)	693 (1.55)	
CO ₂ Emissions (<i>dry</i>), percent	15	6.3	6.4	6.5	
O ₂ Emissions (<i>dry</i>), percent	15	9.8	9.6	9.5	
Particulates PM10, µg/Nm ³			<1		

Genset De-rating

Altitude Derate Multiplication Factor

Barometer		Altitude		Table A *
In Hg	mbar	Feet	Meters	Altitude Multiplier
23.5	795	6562	2000	0.90
24.3	820	5741	1750	0.93
25.0	846	4921	1500	0.95
25.8	872	4101	1250	0.98
26.6	899	3281	1000	1.00
27.4	926	2461	750	1.00
28.3	954	1640	500	1.00
29.1	983	820	250	1.00
29.5	995	492	150	1.00
30.0	1012	0	0	1.00

Temperature & Altitude Derate

Temperature & Altitude Derate

1. Determine derate multiplier for altitude and temperature from Table A and B respectively depending upon your operating condition.
2. Assumes the LT return temperature is 10 deg C above the air filter inlet with a maximum LT temperature of 45 deg C.
3. If the LT temperature exceeds 45 deg C, consult factory for recommendations.
4. Altitude is based upon SAE standard ambient pressure vs. altitude. For low barometric conditions add 150m (500 ft) to site altitude.

Ambient Temperature Derate Multiplication Factor

Barometer		Table B *
°F	°C	Ambient Multiplier
104	40	0.94
95	35	0.99
86	30	1.00
77	25	1.00
68	20	1.00
59	15	1.00
50	10	1.00
41	5	1.00
32	0	1.00

* Based on SAE standard ambient pressure vs. altitude. Assumes LT return temperature is 10°C above air filter inlet.

Heat Rejection Factor (altitude and ambient) for HT and LT Circuits

Barometer		Altitude		Table C				
In Hg	mbar	Feet	Meters	Multiplier for HT & LT Heat Rejection vs Alt & Temp.				
23.5	795	6562	2000	1.02	1.06	1.07	1.08	
24.3	820	5741	1750	1.01	1.04	1.06	1.07	
25.0	846	4921	1500	0.99	1.03	1.05	1.06	
25.8	872	4101	1250	0.98	1.02	1.04	1.05	
26.6	899	3281	1000	0.97	1.01	1.02	1.04	
27.4	926	2461	750	0.96	1.00	1.01	1.03	
28.3	954	1640	500	0.95	0.99	1.00	1.02	
29.1	983	820	250	0.94	0.98	0.99	1.00	
29.5	995	492	150	0.94	0.97	0.99	1.00	
30.0	1012	0	0	0.93	0.97	0.98	0.99	
				°C	20	25	30	35
				°F	68	77	86	95
				Air Filter Inlet Temperature				

LT & HT Circuit Heat Rejection Calculation

1. Determine derate multiplier vs. temperature derate per above.
2. Using the multiplier from #1 above as the percent load factor determine the Heat rejection from the previous page.
3. From Table C find the HT and LT circuit multiplier.
4. Multiply the result of step 2 by the result of step 3 to obtain the heat rejection at your altitude and temperature.

Methane Number Capability

Load (Percent of Rated)		
100%	95%	80%
80	78	76

Alternator Data

Voltage Range	Connection Configuration	Temp Rise Degrees C	Duty ¹⁰ Cycle	Winding No.	Alternator Data Sheet
380-440	Wye, 3 Phase	80	C	311	ADS-309
380-440	Wye, 3 Phase	105	C	311	ADS-309

Continuous Rating Definition

Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO8528, ISO3046, AS2789, DIN6271, and BS5514).

Notes

- 1) Weights and set dimensions represent a generator set with its standard features only. See outline drawing for other configurations.
- 2) At ISO3046 reference conditions, altitude 1013 mbar (30in Hg), air inlet temperature 25°C (77°F)
- 3) According to ISO 3046/I with fuel consumption tolerance of +5% at rated power.
- 4) Tolerance on engineering supplied brake efficiency data is ± 1% BTE.
- 5) With air intake at 25°C (77°F). Tolerance ± 10°C.
- 6) Performance data for biogas with LHV of 18MJ/Nm³ (450BTU/SCF) for 50% Methane (CH₄)
- 7) Outlet temperature controlled by thermostat. Inlet temperature for reference only.
- 8) Inlet temperature controlled by thermostat, outlet temperature for reference only.
- 9) Without engine driven coolant pumps
- 10) Standby (S), Prime (P), Continuous (C)
- 11) At electrical output of 1.0 Power Factor
- 12) Tolerance ± 15%
- 13) Exhaust system back pressure is at rated load and will decrease at lower loads
- 14) Tolerance ±10%
- 15) Tolerance ± 5% at rated power.

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