



LIEBHERR Technical Data Sheet



Engine Type G9620
Ident Number 12854117
Engine Power 1060 kW
Engine Speed 1500 1/min
Application CHP 50Hz
Fuel Type Natural Gas

Date 17.06.2020
Verified LMB
TDS Status Final
TDS Revision 0

Grid-Parallel Operation

1	General technical data	Unit	100% load	80% load	60% load
1.1	Rated power (ISO 3046-1)	kW _m	1060	848	636
1.2	Rated speed	min ⁻¹	1500		
1.3	Engine configuration	-	V		
1.5	Number of cylinders	-	20		
1.6	Firing order	-	1-15-4-20-8-17-2-13-6-19-10-16-7-11-3-14-9-18-5-12		
1.7	Displacement	l	48.7		
1.8	Bore	mm	135		
1.9	Stroke	mm	170		
1.10	Compression ratio	-	13.5 : 1		
1.11	Torque	Nm	6749	5401	4049
1.12	Speed at maximum torque	min ⁻¹	1500		
1.14	Sense of rotation of engine (viewed from flywheel)	-	anti-clockwise		
1.15	Mass moment of inertia (engine with flywheel)	kgm ²	8		
1.18	Piston velocity mean value	m/s	10.2		
1.19	Air ratio estimation (depending on gas quality and calibration)	-	> 1.6		
1.20	Brake mean effective pressure	bar	17.4	13.9	10.5
1.21	Mechanical efficiency referred to DIN ISO 3046-1	%	43.9	43.2	42.1
1.22	Thermal efficiency referred to DIN ISO 3046-1	%	43.6	44.6	46.2
1.23	Engine over-all efficiency (shipment according to DIN ISO 3046-1)	%	87.4	87.8	88.3
1.27	Minimum permitted continuous load	-	50% of rated power		
1.28	Maximum permitted operating time below 50% of rated power	min	30		
1.32	Maximum permitted operating time w/o load	min	15		
1.33	Crankcase relative pressure to environment - target value	mbar	-5	N/A	N/A

2	Engine dimensions and weight	Unit	
2.1	Length	mm	2823
2.2	Width	mm	1366
2.3	Height	mm	2053
2.4	Weight (with lube oil, without coolant)	kg	4852

4	Intake air system	Unit	100% load	80% load	60% load
4.1	Nominal air mass flow	kg/h	5263	4239	3222
4.7	Min / Max intake air temperature before air filter	°C	15 / 35		
4.8	Nominal Gas consumption	kg/h	182	148	114
4.9	Maximum permitted air filter pressure drop	mbar	70		
4.10	Nominal mixture temperature after Intercooler	°C	45		
4.11	Air fuel ratio at nominal speed - no load - for optimum speed stability	-	1.00 - 1.20		
4.12	Minimum permitted mixture temperature after intercooler (after warm-up)	°C	40		

6	Exhaust system (point of reference see 18.2)	Unit	100% load	80% load	60% load
6.1	Nominal exhaust gas massflow	kg/h	5444	4387	3335
6.2	Nominal Exhaust gas temperature after turbine (800m above mean sea level)	°C	411	432	453
6.6	Nominal thermal power required to cool exhaust gas to 120°C	kW _{th}	487	423	344
6.16	Maximum exhaust gas backpressure after turbine	mbar	80	N/A	N/A
6.19	Nominal exhaust gas backpressure after turbine	mbar	50	40	35
6.20	Minimum exhaust gas backpressure after turbine	mbar	30	N/A	N/A

7	Coolant system (HT- high temp.)	Unit	100% load	80% load	60% load
7.1	Nominal heat rejection to coolant (engine + intercooler HT stage)	kW _{th}	566	454	354
7.3	Coolant capacity (engine + intercooler HT stage)	l	190		
7.4	Nominal coolant flow rate through main engine interface	Nm ³ /h	68		
7.11	Maximum coolant temperature at engine outlet	°C	95		
7.15	Nominal temperature difference over engine nominal in full load	K	9	N/A	N/A
7.16	Minimum coolant temperature at engine inlet (after warm-up)	°C	75		
7.17	Maximum coolant temperature at engine inlet	°C	85		
7.19	Minimum coolant flow rate through main engine interface	Nm ³ /h	63		
7.21	Minimum coolant pressure at engine inlet	bar	2.4		
7.22	Nominal coolant pressure at engine inlet	bar	2.6		
7.23	Maximum coolant pressure at engine inlet	bar	2.8		
7.24	Maximum time for warm-up to minimum coolant temperature at engine inlet	min	15		
7.25	Minimum post-cooling duration after engine stop	min	20		

8	Coolant system (LT- low temp.)	Unit	TA Luft	
			HT	LT
8.1	Coolant heat intercooler LT stage	kW _{th}	N/A	90
8.4	Nominal coolant flow rate	m ³ /h	N/A	30
8.16	Nominal coolant inlet temperature	°C	Linked to 7.16	40
8.17	max coolant inlet pressure	bar	N/A	2.5
8.18	Coolant pressure drop at nominal flow rate	bar	N/A	see graph
8.19	Quantity of coolant	l	N/A	15
8.20	The cooling water data is based on a share of antifreeze of:	%	50	

9	Lubricating oil system	Unit	100% load	80% load	60% load
9.8	Oil capacity with filled oil filters (min / max)	l	145 / 175		
9.9	Maximum consumption of lubricating oil	g/(kW _{h,m})	0.3	N/A	N/A
9.10	Minimum required oil temperature for cold start	°C	30		
9.11	Oil capacity of filters and oil supply channels	l	25		

11	Fuel specification	Unit	100% load	80% load	60% load
11.10	Minimum required Methane number for performance according to DIN ISO 3046-1	-	80		
11.11	Nominal combustible energy	kW _{th}	2416	1964	1510
11.14	Nominal fuel heating value in standard conditions	kJ/kg	47750		
11.15	The tolerance for specific fuel consumption at rated power	%	5	N/A	N/A

The gas quality requirements are described in the Liebherr "Combustion Gas Requirements" (LH-00-FGAS). This document must be complied with.
The engine is approved for natural gas only.

13	Noise emissions	Unit	100% load	80% load	60% load
13.1	Engine surface noise level SPL (average 1m distance w/o cooling, air intake and exhaust noise)*	dB(A)	97.6	N/A	N/A
13.2	Engine surface sound power LWA (w/o cooling, air intake and exhaust noise)**	dB(A)	115.9	N/A	N/A

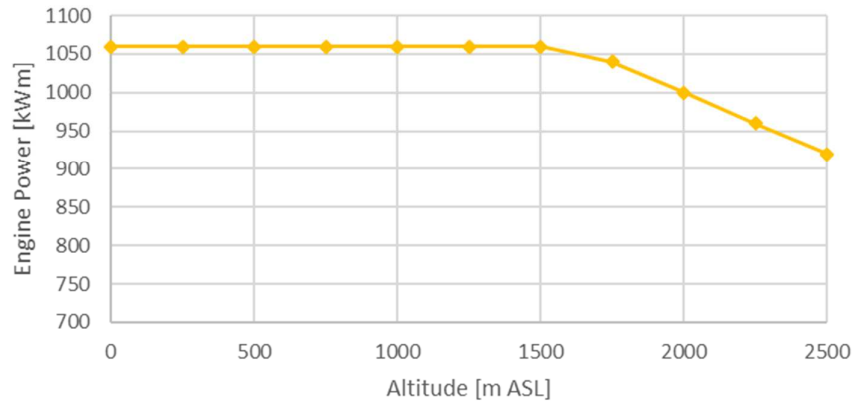
14	Equipment	Unit	100% load	80% load	60% load
14.6	Flywheel housing		SAE 0		
14.8	Nr. teeth of toothed flywheel ring (speed sensor trigger disc)	-	174 (58)		
14.11	Maximum permitted bending moment on the flywheel housing	Nm	5000		
14.13	Maximum permitted bending moment on the customer interface (gas mixer gas supply flange)	Nm	20		
14.14	Maximum permitted load on the customer interface (turbine ellbow)	N	98		

17	Component temperatures	Unit	100% load	80% load	60% load
17.2	Torsional vibration damper (surface)	°C	100		
17.4	Starter	°C	130		
17.7	Wiring harness	°C	125		
17.16	Speed sensor	°C	120		
17.18	NOx sensor on / off	°C	200		
17.19	NOx ECU 1 / 2	°C	105		
17.25	Air pressure switch	°C	120		
17.29	Oil, Coolant and Mixture pressure sensors	°C	120		
17.30	Oil temperature sensors	°C	120		
17.31	Coolant and Mixture temperature sensors	°C	125		
17.32	Ignition rail	°C	80		
17.33	Ignition box	°C	80		
17.34	Knock sensor	°C	130		
17.35	Throttle body actuator	°C	90		
17.36	Gas mixer	°C	90		
17.37	Spark plug connector	°C	150		
17.38	ATL Wastegate actuator (water cooled)	°C	140		
17.39	Ignition coils	°C	90		
17.40	Engine control unit (not water cooled)	°C	80		

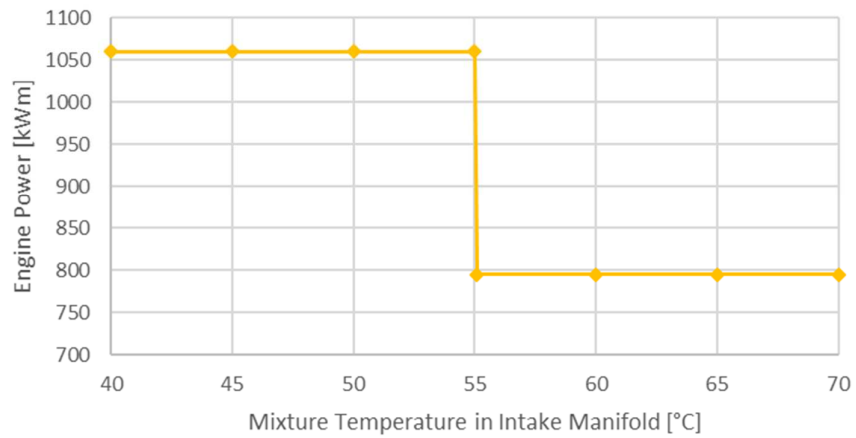
18	Emission values - exhaust gas emissions	Unit	TA Luft		
			100% load	80% load	60% load
18.1	NOx raw (dry)	ppm	170	169	162
18.2	CO (dry)	ppm	448	441	434
18.3	CO2 (dry)	% vol	6.3	6.3	6.4
18.4	O2 (dry)	% vol	9.7	9.6	9.5
18.5	NMHC (corrected to dry; HC1 basis)	ppm	194	198	226
18.6	THC (dry; HC1 basis)	ppm	1818	1938	2068
18.8	Particulate	µg/m ³	N/A	N/A	N/A
18.9	Formaldehyde (wet basis)	ppm	63	61	61
18.10	Ammonia	ppm	N/A	N/A	N/A
18.11	NOx referred to TA-Luft @ 5% O2	mg/m ³	500	500	500
18.12	CO referred to TA-Luft @ 5% O2	mg/m ³	786	767	742
18.13	HC referred to TA-Luft @ 5% O2	mg/m ³	1374	1449	1525

19	Remarks
19.1	All pressure, air and gas flow figures are related to the following reference conditions: altitude 100 m ASL, ambient temperature 25°C, relative humidity 60 %, methan number > 80 and air pressure 100 kPa. All pressures are relative, if not otherwise noted.
19.3	Tolerances on the power and torque outputs are according to standard DIN ISO 3046-1.
19.4	Tolerance on heat rejection power levels, exhaust gas flow, intake air flow, coolant flow are within ± 5 %.
19.6	Power adjustment is in accordance with the environmental conditions DIN ISO 3046-1.
19.7	Air-Fuel ratio calculated based on emissions (Brettschneider Formula)
19.9	The tolerance for usable heat is 8 % at rated power.
19.10	Cooling system related data are based on physical properties of Liebherr Antifreeze OS Mix.
19.14	* Reference sound pressure 20 μ Pa, reference sound power 10 ⁻¹² W
19.15	** Sound power level per ISO6798 (Grade3), tolerance 5dB, no contractual data
19.16	L _{WA} : A-weighted sound power level
19.17	All given data is subject to change
19.18	The installation guideline for gas engines must be complied with.
19.19	Operating parameters declared as "nominal" indicate consistency when all parameters are met.

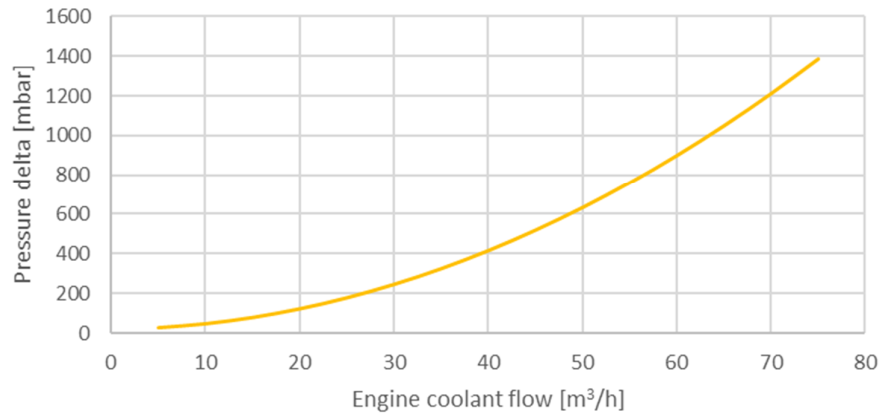
G9620 - Power derating
(for ambient temperature of 25°C)



G9620 - Power derating



Throttle curve - Engine main coolant circuit



Throttle curve - Intercooler LT coolant stage

