

# Cogeneration unit

## HE-EC-497/556-LG497-GZ

### 1. Basic technical data of genset

Engine: Liebherr G9512 natural gas		
Adjusting the temp. of the mixture	45	°C
No. of cylinders, cyl. arrangement	12	V-form
Bore	130	mm
Stroke	157	mm
Displacement	25	litre
Compression ratio	13.3:1	-
Engine speed	1500	rpm

#### Engine

- Reliable engine with high durability, easy to operate and service
- Single heads and removable wet cylinder liners
- Cooling forced by external electric pump with temperature regulation
- Low fuel consumption and low emission levels
- Closed crankcase breathing system
- Microprocessor-based engine management system

Alternator		
Electric power	680	kVA
Voltage	400	V
Frequency	50	Hz
Engine speed	1500	rpm
Efficiency at $\cos \phi = 1.0$	96.3	%

#### Alternator

- High efficiency
- Reliable
- Brushless, self-excited, double bearing
- High breaking capacity

### 2. Performance and efficiency

	%	Load ratio					
		100		80		60	
Energy in fuel	kW	1178	100.0	979	100.0	724	100.0
Mechanical power	kW <sub>m</sub>	516	43.8	412	42.1	309	42.7
Electrical power	kW <sub>e</sub>	497	42.2	397	40.5	298	41.1
Heating power	kW <sub>t</sub>	556	47.2	476	48.6	378	52.2
Total heat rejected in HT circuit	kW <sub>t</sub>	188	16.0	172	17.6	147	20.3
Available exhaust heat (~120 °C)	kW <sub>t</sub>	305	25.9	258	26.4	208	28.7
Heat from intercooler HT	kW <sub>t</sub>	63	5.3	46	4.7	23	3.2
Fuel consumption	Nm <sup>3</sup> /h	123	-	102	-	76	-
Recommended load	%	50-100	-	-	-	-	-

### 3. Fuel, feed system

Fuel type	Natural gas
Calorific value	34,430 kJ/Nm <sup>3</sup>
Gas supply pressure to engine inlet	5 – 8 kPa
Permissible changing rate of gas pressure	0.3 kPa/min

#### Air-fuel ratio system

- System equipped with gas shut-off solenoid valves
- Zero pressure valve – self-adjustment of gas dose
- Automatic control of excess air ratio –  $\lambda$  coefficient

#### 4. Ventilation and combustion air

Heat radiated to ambient	100 kW
Amount of air needed for ventilation	21,311 m <sup>3</sup> /h
Amount of air needed for combustion	2,053 Nm <sup>3</sup> /h
Temperature of intake air for combustion	10-35 °C

#### 5. Exhaust gas system

Exhaust temperature after turbine	475 °C
Maximum exhaust system back pressure	5 kPa
Exhaust gas volume flow	2,151 Nm <sup>3</sup> /h
Exhaust gas volume flow (120 °C)	3,096 m <sup>3</sup> /h
Hot exhaust gas volume flow	5,893 m <sup>3</sup> /h
Exhaust gas mass flow	2,747 kg/h

#### 6. Technical parameters of heating system

Nominal heating power	556 kW
Water flow in external circulation (85/65 °C)**	25 m <sup>3</sup> /h
Connections/type	DN 65
Disposable pressure	50 kPa

#### 7. Mixture cooling, intercooler (LT system)

Thermal output	42 kW
Flow of LT system (45/40 °C**; ethylene glycol 50%)	14 m <sup>3</sup> /h

#### 8. Enclosure versions

	Dimensions (mm)***	Mass* (kg)	Volume (dB)A
Open version	4200x1800x2500	5,500	104
Version in soundproof enclosure	4200x1800x3200	8,700	75 at 1m

Soundproof enclosure:

- Reduces sound emission in the engine room
- Improves the ventilation of engine and generator
- In case of several units in the room, makes servicing easier
- Is equipped with a standard lighting system and detection of dangerous gas concentration

Container version	8000x3000x3300	16,200	80 at 7m
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Container enclosure:

- Can reduce time of design process
- Reduces costs and project execution time
- Provides sound reduction suitable for ambient conditions
- Separate, ventilated operator room
- Equipped with ventilation and cooling systems to provide proper operation of the cogeneration unit
- Includes following systems: Basic and emergency lighting, service sockets and gas detection system

\* Mass of ready-to-work unit (including liquids)

\*\* Input/output

\*\*\* Length x width x height

#### 9. Lube system

Lube oil – quantity	72 litre
Oil change interval	1000 hr
Oil consumption	0.11 l/h

- Automatic oil make-up system

#### 10. Exhaust emissions data (nominal load, 5% O<sub>2</sub>)

	ppm	mg/Nm <sup>3</sup>
NOx	<400	<500
CO	<645	<750

Ambient conditions	
Atmospheric pressure	100 kPa
Ambient temperature	25 °C
Relative humidity	30%

Parameters tolerance
According to ISO 3046-1

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