



	400 V / 50 Hz	Biogas
Electrical power	kW	200
Total thermal output	kW	224
Energy input	kW	519
Fuel consumption	Nm ³ /h	86,6
Electrical efficiency	%	38,5
Thermal efficiency with LT	%	45,9
Thermal efficiency without LT	%	43,1
Overall efficiency with LT	%	84,4

Engine: MAN Type: E2876 LE202

Alternator: Leroy-Somer

Type: LSA 46.3 L10

No. of cylinders / configuration	-	6 in line	Voltage / frequency	V/Hz	400/50
Engine speed	min ⁻¹	1500	PF	-	0,8L / 0,8C
Bore / stroke / displacement	mm / mm / dm ³	128/166/12,82	Alternator efficiency at rated power	%	95,9
Compression ratio	-	14	Max. ambient temperature	°C	40
Engine power max.	kW	220			
Spark plugs type	-	M14			
Lube oil consumption max.	kg/h	0,15			
Lube oil filling quantity max.	dm ³	65			

Energy balance

					CHP unit performance parameters at rated load
Load	%	100	75	50	95
ISO standard engine power	kW	220	165	110	209
Electrical power	kW	211	158	104	200
Engine cooling thermal output	kW	103	89	80	100
Exhaust gas thermal output (180 °C)	kW	118	93	70	113
Thermal output mixture cooling - HT	kW	13	4	0	11
Thermal output mixture cooling - LT	kW	15	13	6	15
Total thermal output	kW	234	186	150	224
Radiation heat max.	kW	17	17	14	17
Energy input 1)	kW	545	422	309	519
Fuel consumption	Nm ³ /h	90,8	70,3	51,5	86,6
Combustion air mass flow	kg/h	977	727	522	925
Exhaust gas mass flow, wet	kg/h	1121	838	604	1062
Exhaust temperature after turbocharger	°C	478	493	510	481
Alternator efficiency at PF=1	%	95,9	95,8	94,5	95,9
Electrical efficiency 1)	%	38,7	37,5	33,6	38,5
Thermal efficiency	%	43,0	44,0	48,4	43,1
Overall efficiency without LT	%	81,7	81,5	82,0	81,6

1) According to ISO 3046.

Fuel: Biogas

Min. methane number	-	100
Lower calorific value	MJ/Nm ³	21,6
Biogas composition CH ₄ /CO ₂	% vol./% vol.	60/40
Gas pressure at gas regulation line inlet 1)	kPa	4÷10
Max. gas temperature	°C	30

1) The gas regulation line for MAN engines is standardly dimensioned at 4 ÷ 5 kPa.

Heating water circuit

Thermal output	kW	224
Temperature gradient	°C / °C	90 / 70
Min. cooling medium volume flow	m ³ /h	9,90
Pressure loss of heating circuit 1)	bar	0,12
Heat transfer medium	-	Treated water
Max. operating pressure	bar	6

1) Pressure loss of all heating water circuit components at GENTEC CHP scope of supply.

LT mixture cooling circuit

Thermal output	kW	15
Temperature gradient	°C / °C	43,9 / 40
Cooling medium volume flow	m ³ /h	3,51
Max. allowable pressure loss 1)	kPa	20
Heat transfer medium concentration - glycol / water	% vol./% vol.	40/60
Max. operating pressure	bar	3
Dry cooler acoustic sound pressure level at 10 m 2)	dB(A)	65
Max. ambient temperature	°C	35

1) Pipework between CHP unit and dry cooler.

2) The value of the sound pressure level is considered in free field.

Emergency cooler

Thermal output	kW	224
Heat transfer medium	-	Ethylene glycol/Water-40/60
Max. allowable pressure loss 1)	kPa	15
Dry cooler acoustic sound pressure level at 10 m 2)	dB(A)	65
Max. ambient temperature	°C	35

1) Pipework between CHP unit and dry cooler.

2) The value of the sound pressure level is considered in free field

Ventilation and combustion air

Fan air volume flow 1)	m ³ /h	6200
Max. allowable pressure loss of air duct 2)	Pa	50
Max. inlet air temperature	°C	35

1) At temperature 35 °C and pressure 101,3 kPa.

2) Air ducts between CHP unit and air inlet/air outlet.

Exhaust gas system

Exhaust gas mass flow, wet	kg/h	1062
Exhaust gas temperature at CHP unit outlet	°C	180
Max. allowable pressure loss 1)	mbar	6
Silencer flanges 2)	-	DN200-PN10

1) Exhaust gas pipe between CHP unit and outlet excluding components at GENTEC CHP scope of supply.

2) According to EN 1092-1.

Emissions

CO	mg/Nm ³	<1000
NO _x	mg/Nm ³	<500

Correlation 5% O₂.

Noise level

CHP unit design without canopy 1)	dB(A)	88,1
CHP unit design with canopy 1)	dB(A)	74
Exhaust gas noise at 1 meter distance to silencer outlet 3)	dB(A)	80
Input/Output air ventilation 1)	dB(A)	80/80

All values of the sound pressure level is considered in free field.

1) Sound pressure level measured at 1 m distance from the CHP unit.

2) Sound pressure level measured at 10 m distance from the container.

3) On request, noise can be reduced by additional optimization of the standard silencer.

Dimensions and weight

Canopy dimensions L/W/H	mm	3945/1708/2180
Dry weight of CHP unit design with canopy	kg	6000

Standard conditions and tolerances

Atmospheric pressure	kPa	100
Air temperature	°C	25
Relative air humidity	%	30
Tolerance for the electrical power	%	±3
Tolerance for the usable thermal output	%	±7
Tolerance for the specific fuel consumption	%	+5

The energy balance parameters listed in this data sheet are related to the standard conditions.

Detailed technical specifications of components on demand.

Change of technical parameters and printing errors reserved.

Minimum requirements for gas quality

Parameter	Unit	Limit value	Unit	Comment
Methane number ¹⁾	MN	> 100	-	Consult GENTEC CHP in case of lower methane numbers
Lower calorific value	H _u	> 5	kWh / Nm ³	
Chlorine concentration*	Cl	< 80	mg / Nm ³ _{CH4}	Chlorine exists as a volatile compound
Fluorine concentration*	F	< 40	mg / Nm ³ _{CH4}	Fluorine exists as a volatile compound
Total Chlorine - Fluorine content*	Σ(Cl, F)	< 80	mg / Nm ³ _{CH4}	
Dust content < 5 µm*		< 10	mg / Nm ³ _{CH4}	
Oil vapour*		< 400	mg / Nm ³ _{CH4}	Condensation must not occur in the mixture section
Volatile organic compounds*	VOC	< 25	mg / Nm ³ _{CH4}	Without saturated hydrocarbon compounds
Silicion content ^{2)*}	Si	< 2	mg / Nm ³ _{CH4}	In the case of high concentrations, please consult GENTEC CHP
Total sulphur content*	S	< 200	mg / Nm ³ _{CH4}	Hydrogen sulfide is included in the total sulfur content
Hydrogen sulphide content ^{3)*}	H ₂ S	< 150	ppm	Consult GENTEC CHP in case of higher concentrations
		< 228	mg / Nm ³ _{CH4}	
Ammonia content*	NH ₃	< 40	ppm	
		< 30	mg / Nm ³ _{CH4}	
Relative humidity	φ	< 60	%	Condensation must not occur in the mixture section
Temperature of the gas mixture after the gas mixer	T _G	10 ÷ 30	°C	
Hydrogen ^{4)*}	H ₂	< 2	% _{vol}	

** If these components are also part of the intake air, they need to be allocated to the fuel gas as components. The limit values mentioned above yield a limit value for the total of components contained from intake air and fuel gas.*

1) For all fuel gases, except natural gas, please contact GENTEC CHP

2) The engine oil may contain silicone due to additives (defoamers) being added. However, silicone may also have been diffused into the engine oil in form of dust due to insufficient air filtering or gas filtering. Therefore, the concentration of silicone in the gas shall always be evaluated together with the oil analyses. Depending on the occurrence in organic or inorganic form, high concentrations of silicone in the engine oil can result in increased component wear. The contents of wear elements such as iron, chromium and aluminum shall also be included in the evaluation in case of increased silicone content in the engine oil.

3) If catalyst is used, maximum allowed hydrogen sulphide is < 3 ppm (5 mg/ Nm³)

4) If hydrogen content exceeds 2 %vol please contact GENTEC CHP

Release date	Created	Revision	Project / Offer
28.08.2023	EB	1	