



TD\_0600\_L64\_1521\_50\_500\_EN\_SI\_V2

GG12V4000D1

Voltage / Frequency	V / Hz	400	/	50
Cooling water temperature (in / out)	°C		77 / 91	
NOx emissions (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.		< 500	
Mixture cooler 1st stage water temperature (in)	°C			
Mixture cooler 2nd stage water temperature (in)	°C		58	
Exhaust gas temperature	°C		417	
Catalytic converter			not included	
Special equipment				
Elevation above sea level	m / mbar	100	/	1000
Combustion air temperature	°C		35	
Relative combustion air humidity	%		60	
Standard specifications and regulations			VDE-AR-N 4110	

<b>Energy balance</b>	%	100	75	50
Electrical Power <sup>2)3)</sup>	kW	1521	1140	760
Energy input <sup>4)5)</sup>	kW	3428	2618	1822
Thermal output total <sup>6)</sup>	kW	1566	1224	876
Thermal output engine (block, lube oil, 1st stage mixture cooler) <sup>6)</sup>	kW	849	619	421
Thermal output mixture cooler 1st stage <sup>6)</sup>	kW			
Thermal output mixture cooler 2nd stage <sup>6)</sup>	kW	79	49	29
Exhaust heat optional ( 120 °C ) <sup>6)</sup>	kW	( 717 )	( 605 )	( 455 )
Engine power ISO 3046-1 <sup>2)</sup>	kW	1560	1170	784
Generator efficiency at power factor = 1	%	97.5	97.4	97.0
Electrical efficiency <sup>4)</sup>	%	44.4	43.6	41.7
Total efficiency	%	90.1	90.3	89.8
Power consumption <sup>7)</sup>	kW			

<b>Combustion air / Exhaust gas</b>				
Combustion air volume flow <sup>1)</sup>	m <sup>3</sup> i.N./h	5700	4252	2901
Combustion air mass flow	kg/h	7363	5493	3749
Exhaust gas volume flow, wet <sup>1)</sup>	m <sup>3</sup> i.N./h	5990	4474	3056
Exhaust gas volume flow, dry <sup>1)</sup>	m <sup>3</sup> i.N./h	5354	3989	2719
Exhaust gas mass flow, wet	kg/h	7615	5686	3884
Exhaust temperature after turbocharger	°C	417	455	487

<b>Reference fuel<sup>8)</sup></b>				
Natural gas			CH <sub>4</sub> >95 Vol.%	
Sewage gas			not applicable	
Biogas			not applicable	
Landfill gas			not applicable	

<b>Fuel requirements<sup>9)</sup></b>				
Nominal rated methane number	MN		80	
Range of heating value: design / operation range without power derating	kWh/m <sup>3</sup> i.N.		10.0 - 10.5 / 8.0 - 11.0	

<b>Exhaust gas emissions<sup>5)8)</sup> Compliance with emissions standards only for ≥ 760 kWel</b>				
NOx, stated as NO <sub>2</sub> (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 500		
CO (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 1000		
HCHO (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 120		
VOC (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.			

<b>Otto-gas engine, lean burn operation with turbocharging</b>				
Number of cylinders / configuration		12	/	v
Engine type			12V4000L64FNER	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm <sup>3</sup>		57.2	
Mean piston speed	m/s		10.5	
Compression ratio			12.5	
BMEP at nominal engine speed min-1	bar	21.8		
Lube oil consumption <sup>10)</sup>	dm <sup>3</sup> /h	0.27		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	

<b>Generator</b>				
Rating power (temperature rise class F) <sup>11)</sup>	kVA		1935	
Insulation class / temperature rise class			H / F	
Winding pitch			2/3	
Protection			IP 23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) <sup>12)</sup>			0.8 / 0.95	
Voltage tolerance / frequency tolerance	%		± 10 / ± 5	

<b>Engine cooling water system</b>				
Coolant temperature (in / out), design	°C		77 / 91	
Coolant flow rate, constant <sup>13)14)</sup>	m <sup>3</sup> /h		56.18	
Pressure drop, design <sup>14)</sup>	Cv value <sup>13)15)</sup>	bar / m <sup>3</sup> /h	2.2	/
Max. operation pressure (coolant before engine)	bar		6	

<b>Exhaust gas heat exchanger (EGHE)</b>				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, constant <sup>13)14)</sup>	m <sup>3</sup> /h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>13)15)</sup>	kPa / m <sup>3</sup> /h		/
Min. coolant flow rate / min. operation gauge pressure	m <sup>3</sup> /h / bar			/
Max. operation pressure (coolant water)	bar			



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<b>Mixture cooler 1st stage, external</b>					
Coolant temperature (in / out), design		°C			
Coolant volumetric flow, design, constant <sup>13) 14)</sup>		m³/h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m³/h	/		
Min. coolant flow rate / min. operation gauge pressure		m³/h / bar	/		
Max. operation pressure before mixture cooler		bar			
<b>Mixture cooling 2nd stage, external</b>					
Coolant temperature (in / out), design		°C	58 / 60.2		
Coolant volumetric flow, design, constant <sup>13) 14)</sup>		m³/h	33.0		
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m³/h	0.52	/	46.7
Max. operation pressure before mixture cooler		bar			6
<b>Heating circuit interface</b>					
Engine coolant temperature (in / out), design		°C			
Heating water temperature (in / out), design		°C			
Heating water flow rate, design <sup>14) 16)</sup>		m³/h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>15) 16)</sup>	bar / m³/h	/		
Max. operation gauge pressure (heating water)		bar			
<b>Room ventilation</b>					
Genset ventilation heat <sup>17)</sup>		kW			85
Inlet air temperature: (min./design/max.)		°C			30 / 35 / 40
Min. engine room temperature <sup>18)</sup>		°C			15
Max. temperature difference ventilation air (in / out)		°C			20
Min. supply air volume flow rate (combustion + ventilation) <sup>19)</sup>		m³ i.N./h			17500
<b>Gearbox</b>		%	<b>100</b>	<b>75</b>	<b>50</b>
Efficiency		%			
<b>Starter battery</b>					
Nominal voltage / power / capacity required		V / kW / Ah			24 / 9 / --
<b>Filling quantities</b>					
First filling quantity lube oil / refilling amount lube oil		dm³			320 / 280
Coolant in engine circuit		dm³			200
Coolant in mixture cooler		dm³			20
Heating water for plate heat exchanger <sup>20)</sup>		dm³			
Lube oil for gearbox		dm³			
<b>Gas regulation line</b>					
Nominal size / gas pressure min. - max. (at gas regulation line inlet)		DN / mbar - mbar	80	/	142 - 250
<b>Engine sound level<sup>21)</sup> (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level</b>					
Frequency		Hz	<b>63</b>	<b>125</b>	<b>250</b>
Sound pressure level		dB	83.3	87.4	88.6
Frequency		Hz	<b>1000</b>	<b>2000</b>	<b>4000</b>
Sound pressure level		dB	90.1	87.3	92.9
Linear total sound pressure level		Lin dB	104.9		
A-weighted total sound pressure level		dB(A)	104.5		
A-weighted total sound power level		dB(A)	123.9		
<b>Undampened exhaust noise<sup>21)</sup> (1 meter distance to outlet within 90°, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level</b>					
Frequency		Hz	<b>63</b>	<b>125</b>	<b>250</b>
Sound pressure level		dB	118.5	120.3	110.8
Frequency		Hz	<b>1000</b>	<b>2000</b>	<b>4000</b>
Sound pressure level		dB	92.9	92.3	92.1
Linear total sound pressure level		Lin dB	122.8		
A-weighted total sound pressure level		dB(A)	108.4		
A-weighted total sound power level		dB(A)	121.3		
<b>Dimensions (aggregate)</b>					
Length		mm			~ 4600
Width		mm			~ 1900
Height		mm			~ 2300
Gross weight (dry weight)		kg			~ 13000 (~ 12000)
<b>Power derating</b>					
Elevation					specific to the project
Combustion air temperature					specific to the project
Mixture cooler coolant temperature (in)					specific to the project
Methane number					specific to the project

**Boundary conditions and consumables**

Systems and consumables have to conform to the following actual company standards: A001072

- 1) Normal cubic meter at 1013 mbar and T = 273 K
- 2) Prime power operation will be designed specific to the project
- 3) Generator gross power at nominal voltage, power factor = 1 and nominal frequency
- 4) According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency
- 5) Emission values during grid parallel operation
- 6) Thermal output at layout temperature; tolerance +/- 8 %
- 7) Power consumption of all electrical consumers which are mounted at the module / genset
- 8) Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions
- 9) Functional capability
- 10) Reference value at nominal load (without amount of oil exchange) oil density set to 860g/l
- 11) Generator (at nominal power) max. 1000 m height of location and max. 40 °C intake air temperature; else power derating
- 12) Max. allowable cos phi at nominal power (view of producer)
- 13) Stated values for cooling fluid composition 65% water and 35% glycol, adaption for use of other cooling fluid composition necessary  
The system design must consider the tolerance.
- 14) Pressure loss at reference flow rate
- 15) The Cv value declares the volumetric flow in m³/h at a pressure drop of 1 bar. Min. and max. flow rate limits are defined.
- 16) Stated values for pure water, adaption for other cooling fluid composition necessary
- 17) Only generator- and surface losses
- 18) Frost-free conditions must be guaranteed
- 19) Amount of ventilation air must be adapted to the gas safety concept
- 20) Assemblies including pipe work
- 21) All sound pressure levels at nominal load, according to ISO 8528-10 and ISO 6798.
- 22) Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'