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GG16V4000D1

- Voltage / Frequency
- Cooling water temperature (in / out)
- NOx emissions (dry, 5 % O<sub>2</sub>)
- Mixture cooler 1st stage water temperature (in)
- Mixture cooler 2nd stage water temperature (in)
- Exhaust gas temperature
- Catalytic converter
- Special equipment
- Elevation above sea level
- Combustion air temperature
- Relative combustion air humidity
- Standard specifications and regulations

- V / Hz
- °C
- mg/m<sup>3</sup> i.N.
- °C
- °C
- °C
- m / mbar
- °C
- %

400	/	50
	78 / 90	
	< 250	
	56	
	445	
	not included	
100	/	1000
	35	
	60	
	VDE-AR-N 4110	

Energy balance	%	100	75	50
Electrical Power <sup>2) 3)</sup>	kW	1720	1290	860
Energy input <sup>4) 5)</sup>	kW	4080	3120	2188
Thermal output total <sup>6)</sup>	kW	1950	1528	1115
Thermal output engine (block, lube oil, 1st stage mixture cooler) <sup>6)</sup>	kW	1023	762	537
Thermal output mixture cooler 1st stage <sup>6)</sup>	kW			
Thermal output mixture cooler 2nd stage <sup>6)</sup>	kW	86	50	22
Exhaust heat optional ( 120 °C ) <sup>6)</sup>	kW	( 927 )	( 766 )	( 578 )
Engine power ISO 3046-1 <sup>2)</sup>	kW	1764	1324	888
Generator efficiency at power factor = 1	%	97.5	97.4	96.9
Electrical efficiency <sup>4)</sup>	%	42.2	41.3	39.3
Total efficiency	%	90.0	90.3	90.3
Power consumption <sup>7)</sup>	kW			

Combustion air / Exhaust gas				
Combustion air volume flow <sup>1)</sup>	m <sup>3</sup> i.N./h	6733	5043	3454
Combustion air mass flow	kg/h	8699	6516	4464
Exhaust gas volume flow, wet <sup>1)</sup>	m <sup>3</sup> i.N./h	7081	5309	3642
Exhaust gas volume flow, dry <sup>1)</sup>	m <sup>3</sup> i.N./h	6325	4731	3236
Exhaust gas mass flow, wet	kg/h	9000	6746	4626
Exhaust temperature after turbocharger	°C	445	478	512

Reference fuel <sup>8)</sup>			
Natural gas			CH <sub>4</sub> >95 Vol.%
Sewage gas			not applicable
Biogas			not applicable
Landfill gas			not applicable
Propane HD 5			not applicable

Fuel requirements <sup>9)</sup>			
Nominal rated methane number	MN		70
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

Exhaust gas emissions <sup>5) 8)</sup> Compliance with emissions standards only for ≥ 860 kWel			
NOx, stated as NO <sub>2</sub> (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 250	
CO (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 1200	
HCHO (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 130	
VOC (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.		

Otto-gas engine, lean burn operation with turbocharging			
Number of cylinders / configuration		16	/ v
Engine type			16V4000L64FNER TR
Engine speed	1/min		1500
Bore	mm		170.0
Stroke	mm		210.0
Displacement	dm <sup>3</sup>		76.27
Mean piston speed	m/s		10.5
Compression ratio			12.5
BMEP at nominal engine speed min-1	bar	18.5	
Lube oil consumption <sup>10)</sup>	dm <sup>3</sup> /h	0.36	
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60

Generator			
Rating power (temperature rise class F) <sup>11)</sup>	kVA		2800
Insulation class / temperature rise class			F / H
Winding pitch			2/3
Protection			IP 23
Max. admissible cos phi inductive (overexcited) / capacitive (underexcited) <sup>12) 22)</sup>			0.8 / 0.95
Voltage tolerance / frequency tolerance	%		+/- 10 / +/- 5

Engine cooling water system			
Coolant temperature (in / out), design	°C	78 / 90	
Coolant flow rate, constant <sup>13) 14)</sup>	m <sup>3</sup> /h	80.0	
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	3.4	/ 43.8
Max. operation pressure (coolant before engine)	bar		6

Exhaust gas heat exchanger (EGHE)			
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>		/
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 cooler 2nd stage, external</b>				
Coolant temperature (in / out), design		°C	56 / 58.6	
Coolant volumetric flow, design, constant <sup>13) 14)</sup>		m³/h	32.0	
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m³/h	0.42	49.9
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	95	
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>			20000	
<b>Gearbox</b>		%	100	75
Efficiency		%		
<b>Starter battery</b>				
Nominal voltage / power / capacity required		V / kW / Ah	24 / 2 x 9 / --	
<b>Filling quantities</b>				
First filling quantity lube oil / refilling amount lube oil		dm³	365 / 330	
Coolant in engine circuit		dm³	270	
Coolant in mixture cooler		dm³	25	
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	100 /	131 - 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	63	125	250 500
Sound pressure level	dB	84.8	90.5	90.0 93.0
Frequency	Hz	1000	2000	4000 8000
Sound pressure level	dB	92.5	91.8	99.2 101.4
Linear total sound pressure level	Lin dB	104.8		
A-weighted total sound pressure level	dB(A)	104.4		
A-weighted total sound power level	dB(A)	124.1		
<b>Undamped 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	63	125	250 500
Sound pressure level	dB	113.9	119.8	111.9 104.5
Frequency	Hz	1000	2000	4000 8000
Sound pressure level	dB	97.1	96.8	94.0 83.9
Linear total sound pressure level	Lin dB	121.6		
A-weighted total sound pressure level	dB(A)	108.0		
A-weighted total sound power level	dB(A)	120.6		
<b>Dimensions (aggregate)</b>				
Length	mm		~ 5400	
Width	mm		~ 1900	
Height	mm		~ 2300	
Gross weight (dry weight)	kg		~ 17500 (~ 16500)	
<b>Power derating</b>				
Maximum ambient air dew point on site		°C	26.0	
Configuration change			No	
Mixture cooler coolant temperature (in)			specific to the project	
Methane number			specific to the project	
<b>Boundary conditions and consumables</b>				A001072
Systems and consumables have to conform to the following actual company standards:				

- 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 (ISO 8528-6)
- 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'