Technical Data Sheet

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MTU 12V4000 GS

GG12V4000A1

Voltage / Frequency	V / Hz	**400**	**/**	**50**
Cooling water temperature (in / out)	°C		**78 / 90**	
NOx emissions (dry, 5 % O_2)	mg/m³ i.N.		**< 500**	
Mixture cooler 1st stage water temperature (in)	°C			
Mixture cooler 2nd stage water temperature (in)	°C		**53**	
Exhaust gas temperature	°C		**445**	
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				

Energy balance	**%**	**100**	**75**	**50**
Electrical Power [2) 3)]	kW	1169	877	585
Energy input [4) 5)]	kW	2755	2117	1515
Thermal output total [6)]	kW	636	494	367
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6)]	kW	636	494	367
Thermal output mixture cooler 1st stage [6)]	kW			
Thermal output mixture cooler 2nd stage [6)]	kW	90	52	28
Exhaust heat (180 °C) [6)]	kW	(519)	(421)	(325)
Engine power ISO 3046-1 [2)]	kW	1200	902	605
Generator efficiency at power factor = 1	%	97.4	97.3	96.7
Electrical efficiency [4)]	%	42.4	41.4	38.6
Total efficiency	%	84.4	84.6	84.3
Power consumption [7)]	kW			
Combustion air / Exhaust gas				
Combustion air volume flow [1)]	m³ i.N./h	4415	3342	2313
Combustion air mass flow	kg/h	5701	4316	2987
Exhaust gas volume flow, wet [1)]	m³ i.N./h	4758	3607	2503
Exhaust gas volume flow, dry [1)]	m³ i.N./h	4335	3283	2271
Exhaust gas mass flow, wet	kg/h	6259	4747	3296
Exhaust temperature after turbocharger	°C	445	463	493
Reference fuel [8)]				
Natural gas			not applicable	
Sewage gas			CH_4 60 Vol.%; CO_2 40 Vol.%	
Biogas			CH_4 60 Vol.%; CO_2 40 Vol.%	
Landfill gas			CH_4 60 Vol.%; CO_2 40 Vol.%	
Fuel requirements [9)]				
Minimum methane number	MN		120	
Range of heating value: design / operation range without power derating	kWh/m³ i.N.		5.0 - 6.5 / 4.5 - 7.0	
Exhaust gas emissions [5) 8)] Compliance with emissions standards only for ≥ 585 kWel				
NOx, stated as NO_2 (dry, 5 % O_2)	mg/m³ i.N.	< 500		
CO (dry, 5 % O_2)	mg/m³ i.N.	< 1000		
HCHO (dry, 5 % O_2)	mg/m³ i.N.	< 80		
VOC (dry, 5 % O_2)	mg/m³ i.N.			
Otto-gas engine, lean burn operation with turbocharging				
Number of cylinders / configuration		12	/	V
Engine type			12V4000L32FB	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm³		57.2	
Mean piston speed	m/s		10.5	
Compression ratio			13.9	
BMEP at nominal engine speed min-1	bar	16.8		
Lube oil consumption [10)]	dm³/h	0.27		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	
Generator				
Rating power (temperature rise class F) [11)]	kVA		1770	
Insulation class / temperature rise class			H / F	
Winding pitch			2/3	
Protection			IP 23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) [12)]			0.8 / 1.0	
Voltage tolerance / frequency tolerance	%		± 5 / ± 5	
Engine cooling water system				
Coolant temperature (in / out), design	°C	78 / 90		
Coolant flow rate, constant [13) 14)]	m³/h	49.4		
Pressure drop, design [14)] Cv value [13) 15)]	bar / m³/h	1.87	/	36.7
Max. operation pressure (coolant before engine)	bar		6.0	
Exhaust gas heat exchanger (EGHE)				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, constant [13) 14)]	m³/h			
Pressure drop, design [14)] Cv value [13) 15)]	kPa / m³/h		/	
Min. coolant flow rate / min. operation gauge pressure	m³/h / bar		/	
Max. operation pressure (coolant water)	bar			

Mixture cooler 1st stage, external						
Coolant temperature (in / out), design		°C				
Coolant volumetric flow, design, constant [13) 14)]		m³/h				
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h		/		
Min. coolant flow rate / min. operation gauge pressure		m³/h / bar		/		
Max. operation pressure before mixture cooler		bar				
Mixture cooling 2nd stage, external						
Coolant temperature (in / out), design		°C	53 / 55.5			
Coolant volumetric flow, design, constant [13) 14)]		m³/h	33.2			
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h	0.24	/	69.3	
Max. operation pressure before mixture cooler		bar		6		
Heating circuit interface						
Engine coolant temperature (in / out), design		°C				
Heating water temperature (in / out), design		°C				
Heating water flow rate, design [14) 16)]		m³/h				
Pressure drop, design [14)]	Cv value [15) 16)]	bar / m³/h		/		
Max. operation gauge pressure (heating water)		bar				
Room ventilation						
Genset ventilation heat [17)]		kW		68		
Inlet air temperature: (min./design/max.)		°C		30 / 35 / 40		
Min. engine room temperature [18)]		°C		15		
Max. temperature difference ventilation air (in / out)		K		20		
Min. supply air volume flow rate (combustion + ventilation) [19)]		m³ i.N./h		14000		
Gearbox		**%**	**100**	**75**	**50**	
Efficiency		%	-	-	-	
Starter battery						
Nominal voltage / power / capacity required		V / kW / Ah		24 / 9.0 / --		
Filling quantities						
Lube oil for engine		dm³		280		
Coolant in engine		dm³		200		
Coolant in mixture cooler		dm³		20		
Heating water for plate heat exchanger [20)]		dm³				
Lube oil for gearbox		dm³				
Gas regulation line						
Nominal size / gas pressure min. - max. (at gas regulation line inlet)		DN / mbar - mbar	125	/	100 - 200	
Engine sound level [21)] (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level						
Frequency		Hz	**63**	**125**	**250**	**500**
Sound pressure level		dB	82.8	86.4	87.5	92.1
Frequency		Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level		dB	90.2	89.6	89.4	96.8
Linear total sound pressure level		Lin dB	100.2			
A-weighted total sound pressure level		dB(A)	99.4			
A-weighted total sound power level		dB(A)	118.4			
Undampened exhaust noise [21)] (1 meter distance to outlet within 90°, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level						
Frequency		Hz	**63**	**125**	**250**	**500**
Sound pressure level		dB	113.8	114.9	112.3	102.2
Frequency		Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level		dB	92.6	91.4	88.3	83.0
Linear total sound pressure level		Lin dB	118.7			
A-weighted total sound pressure level		dB(A)	106.0			
A-weighted total sound power level		dB(A)	118.6			
Dimensions (aggregate)						
Length		mm		~ 4700		
Width		mm		~ 2000		
Height		mm		~ 2300		
Gross weight (dry weight)		kg		~ 12500 (~ 12000)		
Power derating						
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)
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.
Resonance effects of the connected exhaust line can influence the exhaust noise sound pressure level
22) Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'