Technical Data Sheet

mtu 16V4000 GS

		GG16V4000A1		
Application				
Operation mode				
Engine type				
Voltage / Frequency	**V / Hz**	**400**		**50**
Cooling water temperature (in / out)	**°C**		**76 / 90**	
NOx emissions (dry, 5 % O_2)	**mg/m³ i.N.**		**< 250**	
Mixture cooler 1st stage water temperature (in)	**°C**			
Mixture cooler 2nd stage water temperature (in)	**°C**		**43**	
Exhaust gas temperature	**°C**		**432**	
Catalytic converter			**not included**	
Special equipment			**SRD**	
Elevation above sea level	**m / mbar**	**100**		**1000**
Combustion air temperature	**°C**		**25**	
Maximum ambient air dew point on site	**°C**		**30**	
Standard specifications and regulations			**VDE-AR-N 4110**	

Energy balance		**%**	**100**	**75**	**50**
Electrical Power [2) 3)]		kW	2028	1521	1014
Energy input [4) 5)]		kW	4751	3626	2551
Thermal output total [6)]		kW	1092	808	553
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6)]		kW	1092	808	553
Thermal output mixture cooler 1st stage [6)]		kW			
Thermal output mixture cooler 2nd stage		kW	151	104	65
Exhaust heat optional (120 °C) [6)]		kW	(1054)	(874)	(698)
Engine power ISO 3046-1 [2)]		kW	2080	1560	1045
Generator efficiency at power factor = 1		%	97.5	97.5	97.0
Electrical efficiency [4)]		%	42.7	41.9	39.7
Total efficiency		%	87.9	88.3	88.8
Power consumption [7)]		kW			
Combustion air / Exhaust gas					
Combustion air volume flow [1)]		m³ i.N./h	7998	6003	4053
Combustion air mass flow		kg/h	10328	7752	5234
Exhaust gas volume flow, wet [1)]		m³ i.N./h	8398	6308	4268
Exhaust gas volume flow, dry [1)]		m³ i.N./h	7516	5635	3795
Exhaust gas mass flow, wet		kg/h	10677	8017	5421
Exhaust temperature after turbocharger		°C	432	463	522
Reference fuel [8)]					
Natural gas				CH_4 >95 Vol.%	
Sewage gas				not applicable	
Biogas				not applicable	
Landfill gas				not applicable	
Propane HD 5				not applicable	
Fuel requirements [9)]					
Nominal rated methane number		MN		72	
Range of heating value: design / operation range without power derating		kWh/m³ i.N.		10.0 - 10.5 / 8.0 - 11.0	
Exhaust gas emissions 5) 8) Compliance with emissions standards only for ≥ 1014 kWel					
				Raw emissions	
NOx, stated as NO2 (dry, 5 % O2)		mg/m³ i.N.		< 250	
CO (dry, 5 % O2)		mg/m³ i.N.		< 800	
HCHO (dry, 5 % O2)		mg/m³ i.N.		< 90	
VOC (dry, 5 % O2)		mg/m³ i.N.			
Otto-gas engine, lean burn operation with turbocharging					
Number of cylinders / configuration			16	/	V
Engine type				16V4000L64FNER	
Engine speed		1/min		1500	
Bore		mm		170.0	
Stroke		mm		210.0	
Displacement		dm³		76.3	
Mean piston speed		m/s		10.5	
Compression ratio				12.5	
BMEP at nominal engine speed min-1		bar	21.8		
Lube oil consumption [10)]		dm³/h	0.35		
Exhaust back pressure min. - max. after module		mbar - mbar		30 - 60	
Turbocharger setting					
Generator					
Generator type					
Rating power (temperature rise class F) [11)]		kVA		2800	
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 / 0.95	
Voltage tolerance / frequency tolerance				+/- 10 / +/- 5	
Engine cooling water system					
Coolant temperature (in / out), design		°C	76 / 90		
Coolant flow rate, constant [13) 14)]		m³/h	72.7		
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h	2.64	/	45.4
Max. operation pressure (coolant before engine)		bar		6	
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 cooler 2nd stage, external						
Coolant temperature (in / out), design		°C		43 / 47.1		
Coolant volumetric flow, design, constant [13) 14)]		m³/h		34.3		
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h		0.72	/	41.3
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 in heat exchanger, design [14)]	Cv value [15) 16)]	bar / m³/h			/	
Max. operation gauge pressure (heating water)		bar				
Room ventilation						
Genset ventilation heat [17)]		kW			118	
Inlet air temperature: (min./design/max.)		°C			20 / 25 / 30	
Min. engine room temperature [18)]		°C			15	
Max. temperature difference ventilation air (in / out)		°C			20	
Min. supply air volume flow rate (combustion + ventilation) [19)]		m³ i.N./h			24500	
Gearbox		**%**		**100**	**75**	**50**
Efficiency		%				
Starter battery						
Nominal voltage / power / capacity required		V / kW / Ah			24 / 2x9 / --	
Filling quantities						
First filling quantity lube oil / refilling amount lube oil		dm³			330	
Coolant in engine circuit		dm³			270	
Coolant in mixture cooler		dm³			25	
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		100	/	155 - 250
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	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			
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	113.9	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)	121.0			
Dimensions (aggregate)						
Length		mm			~ 5300	
Width		mm			~ 2000	
Height		mm			~ 2300	
Weight		kg			~ 17700 (~ 17000)	
Power derating						
Design drawing						
Load step						
Maintenance plan						
Configuration change						
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 (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) Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'
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) If the voltage tolerance is greater than +/-5%, the theoretical service life of the insulation system may be reduced due to the permanent max. nominal conditions of the generator.
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'