Technical Data Sheet

mtu 20V4000 GS

		GG20V4000D1M		
Application			**Power Generation**	
Operation mode			**Grid Parallel**	
Engine type			**20V4000L64FNER EU**	
Voltage / Frequency	**V / Hz**	**10500**		**50**
Cooling water temperature (in / out)	**°C**		**78 / 92**	
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**		**43**	
Exhaust gas temperature	**°C**		**413**	
Catalytic converter			**not included**	
Special equipment				
Elevation above sea level	**m / mbar**	**100**		**1000**
Combustion air temperature	**°C**		**25**	
Maximum ambient air dew point on site	**°C**		**19.0**	
Standard specifications and regulations			**VDE-AR-N 4110**	

Energy balance		**%**	**100**	**75**	**50**
Electrical Power [2) 3)]		kW	2547	1910	1273
Energy input [4) 5)]		kW	5781	4418	3107
Thermal output total [6)]		kW	2583	2026	1502
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6)]		kW	1386	1017	708
Thermal output mixture cooler 1st stage [6)]		kW			
Thermal output mixture cooler 2nd stage		kW	227	148	95
Exhaust heat optional (120 °C) [6)]		kW	(1197)	(1009)	(794)
Engine power ISO 3046-1 [2)]		kW	2600	1953	1309
Generator efficiency at power factor = 1		%	98.0	97.8	97.3
Electrical efficiency [4)]		%	44.1	43.2	41.0
Total efficiency		%	88.7	89.1	89.3
Power consumption [7)]		kW			
Combustion air / Exhaust gas					
Combustion air volume flow [1)]		m³ i.N./h	9633	7219	4833
Combustion air mass flow		kg/h	12446	9325	6244
Exhaust gas volume flow, wet [1)]		m³ i.N./h	10124	7593	5097
Exhaust gas volume flow, dry [1)]		m³ i.N./h	9051	6774	4520
Exhaust gas mass flow, wet		kg/h	12869	9650	6471
Exhaust temperature after turbocharger		°C	413	448	502
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 ≥ 1273 kWel					
				Raw emissions	
NOx, stated as NO2 (dry, 5 % O2)		mg/m³ i.N.		< 500	
CO (dry, 5 % O2)		mg/m³ i.N.		< 1000	
HCHO (dry, 5 % O2)		mg/m³ i.N.		< 120	
VOC (dry, 5 % O2)		mg/m³ i.N.			
Otto-gas engine, lean burn operation with turbocharging					
Number of cylinders / configuration			20	/	V
Engine type				20V4000L64FNER EU	
Engine speed		1/min		1500	
Bore		mm		170.0	
Stroke		mm		210.0	
Displacement		dm³		95.33	
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	0.45		
Exhaust back pressure min. - max. after module		mbar - mbar		30 - 60	
Turbocharger setting				H65-TA60	
Generator					
Generator type				S9H1DG42Wdg83	
Rating power (temperature rise class F) [11)]		kVA		3735	
Insulation class / temperature rise class				H / F	
Winding pitch				5/6	
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	78 / 92		
Coolant flow rate, constant [13) 14)]		m³/h	97.0		
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h	3.1		54.8
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 / 48.0		
Coolant volumetric flow, design, constant [13) 14)]		m³/h		44.0		
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h		0.84		48.7
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			132	
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			28000	
Gearbox		**%**		**100**	**75**	
Efficiency		%				
Starter battery						
Nominal voltage / power / capacity required		V / kW / Ah			24 / 2 x 9 / --	
Filling quantities						
First filling quantity lube oil / refilling amount lube oil		dm³			478 / 450	
Coolant in engine circuit		dm³			310	
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		164 - 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	93.1	95.1	91.5	95.0
Frequency		Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level		dB	93.5	92.8	91.8	99.7
Linear total sound pressure level		Lin dB	104.0			
A-weighted total sound pressure level		dB(A)	102.0			
A-weighted total sound power level		dB(A)	122.3			
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	118.4	118.9	108.8	100.5
Frequency		Hz	**1000**	**2000**	**4000**	**8000**
Sound pressure level		dB	91.9	91.5	91.8	84.1
Linear total sound pressure level		Lin dB	122.0			
A-weighted total sound pressure level		dB(A)	106.5			
A-weighted total sound power level		dB(A)	119.4			
Dimensions (aggregate)						
Length		mm			~ 6200	
Width		mm			~ 2100	
Height		mm			~ 2400	
Weight		kg			~ 21000 (~ 20000)	
Power derating						
Design drawing						
Load step						
Maintenance plan						
Configuration change					No	
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'