Contents

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	20V4000G94F				
Fuel type	EN590				
Rated power [kW]	3088				
Rated speed [rpm]	1500				
Application Group	3D				
Legislative body	NEA Singapore for ORDE				
Test cycle	D2				
Data Set No.	XZ54954100066				
Data Set Basis	NEA Singapore for ORDE				
Fuel sulphur content [ppm]	5				

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PDF	Name	Project no. **AWS**	Size **A4**
Configurator	Lenhof, Torsten (TARC)	Order no. **AWS FRA 044**	
Approver1	Kneifel, Alexander (TSLE)	EDS-ID **2524-22.03.2023**	
Approver2	Koliwer, Michael (TV)		
Approver3			
Approver4			
User	FN2\witzigmann		

Engine model **20V4000G94F**

Title **Emission data sheet**

Description of Revision	Frequency
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 420122_364_NEA_G94F_D2.nc for 294 in EDS platfrom.	

Emissionstage **NEA Singapore for ORDE**

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Emissionstage basis **NEA Singapore for ORDE**

General Disclaimers (valid for Measured and NTE values)

Please note that these data are physical and/or technical values only referring to and representing a normative defined operating condition. Any change in operating time and conditions will have impact on physical values and engine behavior, which must be considered and assessed within the complete propulsion system especially in regard to emission compliance and product safety.

Measurements listed in this EDS are representative of the listed engine rating at the time of testing. These measurements and results can change according to instrumentation, boundary condition, and engine to engine variability. In addition - changes to the engine family hard or software may occur which could result in changes to some of the listed values.

Emissions data measurement procedures are conducted according to applicable rules and standards as per “Emission Stage/Optimization”. Potential deviations from these procedures are documented internally.

The listed emission values relate to the corresponding certification data. Seller doesn´t take any responsibility or liability neither out or in connection with the contract nor on any other basis
- beyond these specified operating conditions of the engine
- and for any installation/modification of the entire propulsion system by the customer itself or any third party
and the customer will indemnify MTU on first demand for any third party claim out or in connection with this.

Seller reserves the right to amend specifications and information without notice and without obligation or liability. No liability for any errors, facts or opinions is accepted. Customers must satisfy themselves as to the suitability of this product for their application. No responsibility for any loss as a result of any person placing reliance on any material contained in this data sheet will be accepted.

Seller reserves all rights in the information contained in this data sheet. It shall not be reproduced, made available to a third party or otherwise used in any way whatsoever.

When applicable, emission values are measured after combined exhaust streams.

Measured Emissions data is based on single operating points and thus cannot be used to compare to regulations which use values based on a weighted cycle.

Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures, and instrumentation. Over time deterioration may occur which may have an impact on emission levels.

The SO2 emission rates comprehend exclusively the SO2 content as found in the fuel source, oil consumption effects are not included. Variation of sulfur content in the fuel changes only the stated SO2 emissions, cross sensitivity to other emissions (e.g. particulates) is not possible.

All values based on metric units, inaccuracies for non metric values can occur, values are not binding.

Specific to gas engines: The listed emission values are based on gas composition at the time of certification measurement. Gas composition is as displayed in the EDS-document. Carbon dioxide and methane concentrations have direct influence on the corresponding displayed carbon dioxide and methane emissions.

EAT Specific Disclaimers (valid for EDS values)

NH3 emissions levels measured with AVL SESAM i60/ 4 FT Multi Component Exhaust Measurement System (FTIR) including EPA 40 CFR 1065 legislation compliant automated checks for linearity.
Generators or engines with exhaust after-treatment systems require a stabilization period of approximately 1 hour to ensure stable temperatures across SCR prior to performing an emissions test. Performing emissions measurements before a stable temperature has been achieved can result in inconsistent emission values. NOx Values only applicable if temperatures across SCR reached for DEF Dosing.

NTE Disclaimers (valid for NTE calculated values)

Calculated not to exceed values (NTE) are not proven by tests and therefore the accuracy is not guaranteed.

All emission data shown in chapters Emission Data Sheet, Not to Exceed Values, and Type Approval were gathered from a corresponding certification engine under test conditions shown above and complying to corresponding TEN data.

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Engine model **20V4000G94F**

Title **Emission data sheet**

Description of Revision	Frequency

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Ref.-dataset: 420122_364_NEA_G94F_D2.nc for 294 in EDS platfrom.

Emissionstage **NEA Singapore for ORDE**

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Emissionstage basis **NEA Singapore for ORDE**

Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	20V4000G94F				
Fuel type	EN590				
Application Group	3D				
Legislative body	NEA Singapore for ORDE				
Test cycle	D2				
Fuel sulphur content [ppm]	5				
mg/mN^3 values base on residual oxygen value of [%]	5				

Engine raw emissions*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	3090	2317	1545	772	309
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	1/min	1501	1501	1501	1501	1500
Engine speed relative	[-]	1	1	1	1	1
Filter smoke number	Bosch	0.18	0.2	0.7	0.89	0.04
Exhaust temperature after ETC	grdC	453	420.8	421	378.5	259
Exhaust back pressure after ETC (static)	mbar	34	23	11	5	2
Exhaust back pressure after ETC (total)	mbar	52	35	16	5	0
Exhaust mass flow wet	kg/h	18500	15819	11326	7150	5284
NOX-Emissions specific	g/kWh	6.46	5.32	4.78	4.56	9.18
CO-Emissions specific	g/kWh	0.23	0.29	1.1	1.36	3.2
HC1-Emissions specific	g/kWh	0.07	0.08	0.1	0.18	0.84
NMHC-Emissions specific	g/kWh	0.07	0.08	0.1	0.18	0.82
NOX+HC1-Emissions specific	g/kWh	6.53	5.4	4.88	4.74	10.02

PDF	Name	Project no. AWS	Size A4
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Engine model
20V4000G94F

Title
Emission data sheet

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Emissionstage basis
NEA Singapore for ORDE

NOX+NMHC-Emissions specific	g/kWh	6.53	5.4	4.88	4.74	10
CO2-Emissions specific	g/kWh	642.1	655.7	668.8	721.9	867.8
PM-Emissions specific (Meas.)	g/kWh	0.019	0.023	0.089	0.139	0.061
NOX-Emissions (based on 5% O2)	mg/m3N	2306	1865	1624	1429	2350
NOX+HC1-Emissions (based on 5% O2)	mg/m3N	2331	1891	1656	1484	2560
NOX+NMHC-Emissions (based on 5% O2)	mg/m3N	2330	1891	1655	1483	2556
CO2-Emissions (based on 5% O2)	mg/m3N	223679	223479	222718	222190	217876
CO-Emissions (based on 5% O2)	mg/m3N	81	98.2	364.9	418	803.3
HC1-Emissions (based on 5% O2)	mg/m3N	24.4	26.7	32.3	55.5	210.4
PM-Emissions (based on 5% O2)	mg/m3N	6.4	7.8	29.7	42.9	15.4
Oxygen (O2)	%	10.3	11.5	12	13.3	16

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Engine model **20V4000G94F**

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Emissionstage **NEA Singapore for ORDE**

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Emissionstage basis **NEA Singapore for ORDE**

Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	20V4000G94F				
Fuel type	EN590				
Application Group	3D				
Legislative body	NEA Singapore for ORDE				
Test cycle	D2				
Fuel sulphur content [ppm]	5				
mg/mN^3 values base on residual oxygen value of [%]	5				

Not to exceed emission values*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	3090	2317	1545	772	309
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	1/min	1501	1501	1501	1501	1500
Engine speed relative	[-]	1	1	1	1	1
NOX-Emissions specific	g/kWh	7.11	6.92	6.22	6.84	17.44
CO-Emissions specific	g/kWh	0.4	0.49	2.08	2.72	6.4
HC1-Emissions specific	g/kWh	0.12	0.13	0.18	0.36	2.43
NMHC-Emissions specific	g/kWh	0.12	0.13	0.18	0.35	
NOX+HC1-Emissions specific	g/kWh	7.23	7.05	6.4	7.21	19.87
NOX+NMHC-Emissions specific	g/kWh	7.22	7.05	6.4	7.2	
PM-Emissions specific (Meas.)	g/kWh	0.028	0.037	0.134	0.209	0.227
NOX-Emissions (based on 5% O2)	mg/m3N	2537	2424	2111	2143	4464
NOX+HC1-Emissions (based on 5% O2)	mg/m3N	2578	2469	2172	2254	5075

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Approver3			
Approver4			
User	FN2\witzigmann		

Engine model **20V4000G94F**

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NOX+NMHC-Emissions (based on 5% O2)	mg/m3N	2577	2468	2171	2252	
CO-Emissions (based on 5% O2)	mg/m3N	137.7	166.9	693.4	836.1	1607
HC1-Emissions (based on 5% O2)	mg/m3N	41.5	45.4	61.4	111	610.2
PM-Emissions (based on 5% O2)	mg/m3N	9.7	12.6	44.5	64.3	57

PDF	Name	Project no. **AWS**	Size **A4**
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Engine model **20V4000G94F**

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