


# Inhaltsverzeichnis

## Contents

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Rated power [kW]	3088				
Rated speed [rpm]	1500				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
Data Set No.	XZ54954100066				
Data Set Basis	NEA Singapore for ORDE				
Fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				

Inhalt content	Notiz Note	Seite Page	Buchstabe/Revision change index
Emissions Daten Blatt (EDS) emission Data Sheet (EDS)	O2 gem. O2 meas.	2	d, g
Emissions Daten Blatt (EDS) emission Data Sheet (EDS)	5% O2 5% O2	5	d, e, f, g
Emissions Daten Blatt (EDS) emission Data Sheet (EDS)	15% O2 5% O2	7	g
Not to exceed Werte Not to exceed values	O2 gem. O2 meas.	3	a, b, d, g
Not to exceed Werte Not to exceed values	5% O2 5% O2	6	d, e, f, g
Not to exceed Werte Not to exceed values	15% O2 5% O2	8	g
Typzulassung für Singapur Type approval for Singapore		4	

Unterschriftenweg	EDS erstellt	<del>TETC Teamleiter</del>	<del>TET Leiter Org.-Einheit</del>	Baureihen - Teamleiter	Baureihen Leiter Org.-Einheit	Freigabe im Windchill
Datum	18.02.2019	-	-	18.02.2019	18.02.2019	20.02.2019
Org.-Einheit	TKEE	-	-	TKFV	TKF	TKM
Name	T. Lenhof	-	-	Dr. Kneifel	Breuer	Link

 <b>MTU</b> Friedrichshafen GmbH		<b>WORD</b> Datum/ Date	Name	Projekt-/Auftrags-Nr. Project/Order No. Verwendbar f.Type Applicable to Model	Format/Size <b>A3</b>
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		Bearb. Change	20.02.2019 13:47:31	link	
		Inhalt Content	17.01.2019	Lenhof	Benennung/ Title <b>Emissionsdatenblatt</b> <b>Emission Data Sheet</b>
		Gepr. Checked			
		Motortyp / Engine Type <b>20V4000G94F</b>			
		Zeichnungs-Nr./Drawing No. <b>ZNG00005098</b>			Blatt/ Sheet <b>1</b> von/of <b>8</b>
Buchst./Rev. Ltr. g.1	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle In Arbeit		Beschreibung/Description NEA Singapore for ORDE	

Revision Change index	d	g			
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### Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				
mg/mN³ values base on residual oxygen value of [%]	measured				

### Motor Rohemissionen\*

Engine raw emissions\*

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/Pcycle)	[-]	1	0,75	0,50	0,25	0,10			
Power	[kW]	3090	2317	1545	772	309			
Speed (n/nN)	[-]	1	1	1	1	1			
Speed	[rpm]	1501	1501	1501	1501	1500			
Exhaust temperature after turbine	[°C]	460	427	436	394	262			
Exhaust massflow	[kg/h]	18500	15819	11326	7150	5284			
Exhaust back pressure (total)	[mbar]	52	35	16	5	0			
NOx	[g/kWh]	6,5	5,3	4,8	4,6	9,2			
	[mg/mN³]	1541	1108	918	686	735			
CO	[g/kWh]	0,2	0,3	1,1	1,4	3,2			
	[mg/mN³]	54	58	206	201	251			
HC	[g/kWh]	0,07	0,08	0,10	0,18	0,84			
	[mg/mN³]	16	16	18	27	66			
O2	[%]	10,3	11,5	12,0	13,3	16,0			
Particulate measured	[g/kWh]	0,02	0,02	0,09	0,14	0,06			
	[mg/mN³]	4	5	17	21	5			
Particulate calculated	[g/kWh]	-	-	-	-	-			
	[mg/mN³]	-	-	-	-	-			
Dust (only TA-Luft)	[mg/mN³]	-	-	-	-	-			
FSN	[-]	0,2	0,2	0,7	0,9	0,0			
NO/NO2**	[-]	24,5	20,7	16,0	9,3	6,7			
CO2	[g/kWh]	642,1	655,7	668,8	721,9	867,8			
	[mg/mN³]	149443	132804	125858	106693	68168			
SO2	[g/kWh]	0,006	0,006	0,006	0,007	0,008			
	[mg/mN³]	1,4	1,3	1,2	1,0	0,7			


\* 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 these values mentioned above and as well on engine behavior, which have to be reflected and assessed within the complete propulsion system especially in regard to emission compliance and product safety.

These data are representing the contractual agreed scope or will represent, if there is so far no agreed contract, of the MTU engine at the time of delivery.

MTU doesn't take any responsibility or liability neither out or in connection with the contract or contract to be agreed 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.

\*\* No standard test. To be measured on demand.

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		Erstell. Drawn	17.01.2019 13:19:28	link	Verwendbar f.Type Applicable to Model	
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		Inhalt Content	17.01.2019	Lenhof	Benennung/ Title	
		Gepr. Checked			<b>Emissionsdatenblatt</b>	
		Motortyp / Engine Type			<b>20V4000G94F</b>	
Aenderungsbeschreibung/Description of Revision NO/NO2 Verhältnis mit aufgenommen sowie die Fußzeile ausgetauscht		Kommt vor/Frequency		Zeichnungs-Nr./Drawing No.		Blatt/ Sheet <b>2</b> von/of <b>8</b>
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle		Beschreibung/Description		
g.1		In Arbeit		NEA Singapore for ORDE		

Revision Change index	a	b	d	g	
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## Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				
mg/mN <sup>3</sup> values base on residual oxygen value of [%]	measured				

## Not to exceed Werte\*

not to exceed values\*

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/Pcycle)	[-]	1	0,75	0,50	0,25				
Power	[kW]	3090	2317	1545	772				
Speed (n/nN)	[-]	1	1	1	1				
Speed	[rpm]	1501	1501	1501	1501				
Exhaust back pressure (total)	[mbar]	52	35	16	5				
NOx	[g/kWh]	8,4	6,9	6,2	6,8				
	[mg/mN <sup>3</sup> ]	2003	1440	1193	1029				
CO	[g/kWh]	0,4	0,5	2,1	2,7				
	[mg/mN <sup>3</sup> ]	92	99	391	402				
HC	[g/kWh]	0,12	0,13	0,18	0,36				
	[mg/mN <sup>3</sup> ]	27	27	34	54				
O2	[%]	10,3	11,5	12,0	13,3				
Particulate measured	[g/kWh]	0,03	0,04	0,13	0,21				
	[mg/mN <sup>3</sup> ]	6	7	25	31				
SO2	[g/kWh]	0,009	0,009	0,010	0,010				
	[mg/mN <sup>3</sup> ]	2,2	1,9	1,8	1,5				

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Calculated values are not proven by tests and therefore the accuracy cannot be guaranteed.

Emissions data measurement procedures are consistent with those described in the applicable rules and standards.

The NOx, CO, HC and PM emission data tabulated here were taken from a single new engine under the test conditions shown above and are valid for the following conditions:


- Ambient air pressure 1 bar
- Air intake temperature approx. 25°C
- Rel. Humidity 30%-60%
- New Engine
- New standard- air filter
- Exhaust gas back pressure according the given value in this EDS
- Fuel according to EN 590 or US EPA 40CFR89
- Coolant and Lubricants according MTU Fuels and Lubricants Specification

Emissions data is based on single operating points and thus cannot be used to compare to EPA 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.

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		Inhalt Content	17.01.2019	Lenhof	Benennung/ Title	
		Gepr. Checked			<b>Emissionsdatenblatt</b>	
		Motortyp / Engine Type			<b>20V4000G94F</b>	<b>Emission Data Sheet</b>
Aenderungsbeschreibung/Description of Revision NO/NO2 Verhältnis mit aufgenommen sowie die Fußzeile ausgetauscht		Kommt vor/Frequency				
Zeichnungs-Nr./Drawing No.		<b>ZNG00005098</b>			Blatt/ Sheet <b>3</b> von/of <b>8</b>	
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle		Beschreibung/Description <b>NEA Singapore for ORDE</b>		
g.1		In Arbeit				

Revision					
Change index					

## Typzulassung für NEA Singapur

Type approval for NEA Singapore


	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
Data Set	XZ54954100066				
Serial-Number	V122				
Test-Report-Number	EDS40001186				
Test Location	P126				
Date of test	29.03.2017				
Tester	MTU Friedrichshafen GmbH				
Date of EDS	04.04.2017				

## Emissions Zykluswerte\*

Engine cycle emissions\*

Emission	Cycle Value [g/kWh]	U.S. T2-Limit [g/kWh]
NOX	5,23	-
HC	0,12	-
NOX+NMHC	5,35	6,4
CO	0,77	3,5
PM	0,063	0,20

\* Cycle values based on not rounded values, differences between single values and added values, e.g. NOX/HC/NOX+HC. NMHC = 0,98\*HC (40 CFR Part 1065.650 (c)(5))

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		Inhalt Content	17.01.2019	Lenhof	Benennung/ Title	
		Gepr. Checked			<b>Emissionsdatenblatt</b>	
		Motortyp / Engine Type			<b>Emission Data Sheet</b>	
Aenderungsbeschreibung/Description of Revision NO/NO2 Verhältnis mit aufgenommen sowie die Fußzeile ausgetauscht		Kommt vor/Frequency				
Zeichnungs-Nr./Drawing No.		<b>ZNG00005098</b>			Blatt/ Sheet	<b>4</b> von/of <b>8</b>
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle	Beschreibung/Description			
g.1		In Arbeit	NEA Singapore for ORDE			

Revision Change index	d	e	f	g	
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### Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				
mg/mN³ values base on residual oxygen value of [%]	5				

### Motor Rohemissionen\*

Engine raw emissions\*


Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/Pcycle)	[-]	1	0,75	0,50	0,25	0,10			
Power	[kW]	3090	2317	1545	772	309			
Speed (n/nN)	[-]	1	1	1	1	1			
Speed	[rpm]	1501	1501	1501	1501	1500			
Exhaust temperature after turbine	[°C]	460	427	436	394	262			
Exhaust massflow	[kg/h]	18500	15819	11326	7150	5284			
Exhaust Volumetric Flowrate	[m³/s]	10,6	8,7	6,3	3,8	2,3			
Exhaust back pressure (total)	[mbar]	52	35	16	5	0			
NOx	[g/kWh]	6,5	5,3	4,8	4,6	9,2			
	[g/s]	5,5	3,4	2,1	1,0	0,8			
	[mg/mN³]	2306	1865	1624	1429	2350			
CO	[g/kWh]	0,2	0,3	1,1	1,4	3,2			
	[g/s]	0,2	0,2	0,5	0,3	0,3			
	[mg/mN³]	81	98	365	418	803			
HC	[g/kWh]	0,07	0,08	0,10	0,18	0,84			
	[g/s]	0,06	0,05	0,04	0,04	0,07			
	[mg/mN³]	24	27	32	56	210			
O2	[%]	10,3	11,5	12,0	13,3	16,0			
Particulate measured	[g/kWh]	0,02	0,02	0,09	0,14	0,06			
	[g/s]	0,02	0,01	0,04	0,03	0,01			
	[mg/mN³]	6	8	30	43	15			
Particulate calculated	[g/kWh]	-	-	-	-	-			
	[mg/mN³]	-	-	-	-	-			
Dust (only TA-Luft)	[mg/mN³]	-	-	-	-	-			
FSN	[-]	0,2	0,2	0,7	0,9	0,0			
NO/NO2**	[-]	24,5	20,7	16,0	9,3	6,7			
CO2	[g/kWh]	642,1	655,7	668,8	721,9	867,8			
	[g/s]	551,1	422,0	287,0	154,9	74,4			
	[mg/mN³]	223679	223481	222717	222190	217875			
SO2	[g/kWh]	0,006	0,006	0,006	0,007	0,008			
	[g/s]	0,002	0,002	0,001	0,001	0,000			
	[mg/mN³]	2,2	2,1	2,1	2,1	2,1			

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		Motortyp / Engine Type			<b>Emission Data Sheet</b>	
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		Zeichnungs-Nr./Drawing No.			<b>ZNG00005098</b>	
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Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle		Blatt/ Sheet		
g.1		In Arbeit		<b>5</b> von/of <b>8</b>		

Revision	d	e	f	g
Change index				

## Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				
mg/mN <sup>3</sup> values base on residual oxygen value of [%]	5				

## Not to exceed Werte\*

not to exceed values\*

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/Pcycle)	[-]	1	0,75	0,50	0,25				
Power	[kW]	3090	2317	1545	772				
Speed (n/nN)	[-]	1	1	1	1				
Speed	[rpm]	1501	1501	1501	1501				
Exhaust back pressure (total)	[mbar]	52	35	16	5				
NOx	[g/kWh]	8,4	6,9	6,2	6,8				
	[g/s]	7,2	4,5	2,7	1,5				
	[mg/mN <sup>3</sup> ]	2998	2425	2111	2144				
CO	[g/kWh]	0,4	0,5	2,1	2,7				
	[g/s]	0,3	0,3	0,9	0,6				
	[mg/mN <sup>3</sup> ]	138	167	694	836				
HC	[g/kWh]	0,12	0,13	0,18	0,36				
	[g/s]	0,10	0,09	0,08	0,08				
	[mg/mN <sup>3</sup> ]	41	46	61	112				
O2	[%]	10,3	11,5	12,0	13,3				
Particulate measured	[g/kWh]	0,03	0,04	0,13	0,21				
	[g/s]	0,02	0,02	0,06	0,05				
	[mg/mN <sup>3</sup> ]	10	13	44	64				
SO2	[g/kWh]	0,009	0,009	0,010	0,010				
	[g/s]	0,004	0,003	0,002	0,001				
	[mg/mN <sup>3</sup> ]	3,2	3,2	3,2	3,2				

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Calculated values are not proven by tests and therefore the accuracy cannot be guaranteed.

Emissions data measurement procedures are consistent with those described in the applicable rules and standards.

The NOx, CO, HC and PM emission data tabulated here were taken from a single new engine under the test conditions shown above and are valid for the following conditions:


- Ambient air pressure 1 bar
- Air intake temperature approx. 25°C
- Rel. Humidity 30%-60%
- New Engine
- New standard- air filter
- Exhaust gas back pressure according the given value in this EDS
- Fuel according to EN 590 or US EPA 40CFR89
- Coolant and Lubricants according MTU Fuels and Lubricants Specification

Emissions data is based on single operating points and thus cannot be used to compare to EPA 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.

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		Inhalt Content	17.01.2019	Lenhof	Benennung/ Title	
		Gepr. Checked			<b>Emissionsdatenblatt</b>	
		Motortyp / Engine Type				
Aenderungsbeschreibung/Description of Revision		Kommt vor/Frequency				
NO/NO2 Verhältnis mit aufgenommen sowie die Fußzeile ausgetauscht						
		Zeichnungs-Nr./Drawing No.		<b>ZNG00005098</b>		Blatt/ Sheet
		Beschreibung/Description		NEA Singapore for ORDE		<b>6</b>
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle				von/of
g.1		In Arbeit				<b>8</b>

Revision	g				
Change index					

### Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				
mg/mN³ values base on residual oxygen value of [%]	15				

### Motor Rohemissionen\*

Engine raw emissions\*


Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/Pcycle)	[-]	1	0,75	0,50	0,25	0,10			
Power	[kW]	3090	2317	1545	772	309			
Speed (n/nN)	[-]	1	1	1	1	1			
Speed	[rpm]	1501	1501	1501	1501	1500			
Exhaust temperature after turbine	[°C]	460	427	436	394	262			
Exhaust massflow	[kg/h]	18500	15819	11326	7150	5284			
Exhaust Volumetric Flowrate	[m³/s]	10,6	8,7	6,3	3,8	2,3			
Exhaust back pressure (total)	[mbar]	52	35	16	5	0			
NOx	[g/kWh]	6,5	5,3	4,8	4,6	9,2			
	[g/s]	5,5	3,4	2,1	1,0	0,8			
	[mg/mN³]	865	699	609	536	881			
CO	[g/kWh]	0,2	0,3	1,1	1,4	3,2			
	[g/s]	0,2	0,2	0,5	0,3	0,3			
	[mg/mN³]	30	37	137	157	301			
HC	[g/kWh]	0,07	0,08	0,10	0,18	0,84			
	[g/s]	0,06	0,05	0,04	0,04	0,07			
	[mg/mN³]	9	10	12	21	79			
O2	[%]	10,3	11,5	12,0	13,3	16,0			
Particulate measured	[g/kWh]	0,02	0,02	0,09	0,14	0,06			
	[g/s]	0,02	0,01	0,04	0,03	0,01			
	[mg/mN³]	2	3	11	16	6			
Particulate calculated	[g/kWh]	-	-	-	-	-			
	[mg/mN³]	-	-	-	-	-			
Dust (only TA-Luft)	[mg/mN³]	-	-	-	-	-			
FSN	[-]	0,2	0,2	0,7	0,9	0,0			
NO/NO2**	[-]	24,5	20,7	16,0	9,3	6,7			
CO2	[g/kWh]	642,1	655,7	668,8	721,9	867,8			
	[g/s]	551,1	422,0	287,0	154,9	74,4			
	[mg/mN³]	83879	83805	83519	83321	81703			
SO2	[g/kWh]	0,006	0,006	0,006	0,007	0,008			
	[g/s]	0,002	0,002	0,001	0,001	0,000			
	[mg/mN³]	2,2	2,1	2,1	2,1	2,1			

\* 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 these values mentioned above and as well on engine behavior, which have to be reflected and assessed within the complete propulsion system especially in regard to emission compliance and product safety. These data are representing the contractual agreed scope or will represent, if there is so far no agreed contract, of the MTU engine at the time of delivery.

MTU doesn't take any responsibility or liability neither out or in connection with the contract or contract to be agreed 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.

\*\* No standard test. To be measured on demand.

 <b>MTU</b> Friedrichshafen GmbH		<b>WORD</b>	Datum/ Date	Name	Projekt-/Auftrags-Nr. Project/Order No.	Format/Size <b>A3</b>	
		Erstell. Drawn	17.01.2019 13:19:28	link	Verwendbar f.Type Applicable to Model		
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		Inhalt Content	17.01.2019	Lenhof	Benennung/ Title		
		Gepr. Checked			<b>Emissionsdatenblatt</b>		
		Motortyp / Engine Type			<b>20V4000G94F</b>		<b>Emission Data Sheet</b>
Aenderungsbeschreibung/Description of Revision		Kommt vor/Frequency		Zeichnungs-Nr./Drawing No.			Blatt/ Sheet
NO/NO2 Verhältnis mit aufgenommen sowie die Fußzeile ausgetauscht				<b>ZNG00005098</b>			<b>7</b>
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle		Beschreibung/Description			von/of
g.1		In Arbeit		NEA Singapore for ORDE			<b>8</b>

Revision	g				
Change index					

## Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	x				
Engine model	20V4000G94F				
Application group	3D				
Emission Stage/Optimisation	NEA Singapore for ORDE				
Test cycle	D2				
fuel sulphur content [ppm]	15 (max. value of DIN EN 590)				
mg/mN <sup>3</sup> values base on residual oxygen value of [%]	15				

## Not to exceed Werte\*

not to exceed values\*

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/Pcycle)	[-]	1	0,75	0,50	0,25				
Power	[kW]	3090	2317	1545	772				
Speed (n/nN)	[-]	1	1	1	1				
Speed	[rpm]	1501	1501	1501	1501				
Exhaust back pressure (total)	[mbar]	52	35	16	5				
NOx	[g/kWh]	8,4	6,9	6,2	6,8				
	[g/s]	7,2	4,5	2,7	1,5				
	[mg/mN <sup>3</sup> ]	1125	909	792	804				
CO	[g/kWh]	0,4	0,5	2,1	2,7				
	[g/s]	0,3	0,3	0,9	0,6				
	[mg/mN <sup>3</sup> ]	51	63	260	314				
HC	[g/kWh]	0,12	0,13	0,18	0,36				
	[g/s]	0,10	0,09	0,08	0,08				
	[mg/mN <sup>3</sup> ]	15	17	23	42				
O2	[%]	10,3	11,5	12,0	13,3				
Particulate measured	[g/kWh]	0,03	0,04	0,13	0,21				
	[g/s]	0,02	0,02	0,06	0,05				
	[mg/mN <sup>3</sup> ]	4	5	17	24				
SO2	[g/kWh]	0,009	0,009	0,010	0,010				
	[g/s]	0,004	0,003	0,002	0,001				
	[mg/mN <sup>3</sup> ]	3,2	3,2	3,2	3,2				

\* 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 have to be reflected and assessed within the complete propulsion system especially in regard to emission compliance and product safety.

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- 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.

Calculated values are not proven by tests and therefore the accuracy cannot be guaranteed.

Emissions data measurement procedures are consistent with those described in the applicable rules and standards.

The NOx, CO, HC and PM emission data tabulated here were taken from a single new engine under the test conditions shown above and are valid for the following conditions:


- Ambient air pressure 1 bar
- Air intake temperature approx. 25°C
- Rel. Humidity 30%-60%
- New Engine
- New standard- air filter
- Exhaust gas back pressure according the given value in this EDS
- Fuel according to EN 590 or US EPA 40CFR89
- Coolant and Lubricants according MTU Fuels and Lubricants Specification

Emissions data is based on single operating points and thus cannot be used to compare to EPA 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.

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		Gepr. Checked			<b>Emissionsdatenblatt</b>	
		Motortyp / Engine Type		<b>20V4000G94F</b>	<b>Emission Data Sheet</b>	
Aenderungsbeschreibung/Description of Revision NO/NO2 Verhältnis mit aufgenommen sowie die Fußzeile ausgetauscht		Kommt vor/Frequency				
Zeichnungs-Nr./Drawing No.		<b>ZNG00005098</b>			Blatt/ Sheet <b>8</b> von/of <b>8</b>	
Buchst./Rev. Ltr.	Aenderungs-Nr./Revision Notice No.	Bearbeitungsstatus/Lifecycle		Beschreibung/Description <b>NEA Singapore for ORDE</b>		
g.1		In Arbeit				