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# MERCURY DIESEL

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TDI 3.0L Emission Documents



## INTERNATIONAL MARITIME ORGANIZATION (IMO)

Technical File

and

Copy of United States

Environmental Protection Agency

(EPA) Statement of Compliance

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MARINE DIESEL ENGINES

Base Engine TDI 3.0L 260

Mercury Diesel Models:

TDI 3.0L 260

TDI 3.0L 230 (4000 RPM)

TDI 3.0L 230 (3500 RPM)

IMPORTANT: To comply with regulations this document must remain with the engine at all times.

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## TDI 3.0L Technical File

### Engine Family: EM9XW03.0TDI

#### 1. Components, settings and operating values of the engine which influence its NOx emissions

**Components:**

Injector  
Turbocharger  
Charge air cooler  
Electronic control module

**Settings:**

Injection Timing  
Injection duration  
Injection pressure  
Status of turbocharging

**Engine operating values:**

Please refer to individual engine specifications

#### 2. Full range of allowable adjustments or alternatives for the components of the engine

**Adjustments:**

No adjustments are allowed to the emission relevant settings.

**Alternatives for the components:**

Use only those component part numbers specified on the part number summary or equivalent as specified by Mercury Marine at the time of rebuild or repair.

#### 3. Full record of the relevant engine's performance, including the engine's rated speed and rated power

Please see Appendix A.

#### 4. On-board NOx verification procedures

To complete an engine parameter check, the following items must be verified by the surveyor:

- a. parameter "injection timing" and "fueling rate calibration"  
confirm calibration by connecting the appropriate diagnostic device to the ECM
- b. parameter "injection nozzle"  
verify injector part number
- c. parameter "turbocharger type and build"  
verify turbocharger part number
- d. parameter "charge air cooler"  
verify charge air cooler part number
- e. parameter "valve lash"  
automatic valve lash compensation, self-regulating

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**5. Copy of the Base Engine Test Report**

Please see Appendix B.

**6. Designation and restrictions for an engine which is a member of an engine group or engine family**

Designation: These engines are for use in recreational marine propulsion applications only.  
 Restriction: Must be installed in accordance with Mercury Marine installation guide/manual.

**7. Specifications of spare parts/components which, when used in the engine, according to those specifications, will result in continued compliance of the engine with the NO<sub>x</sub> emission limits**

Identification numbers which should be checked within the scope of the On-Board NO<sub>x</sub> verification procedures (section 4) are shown below.

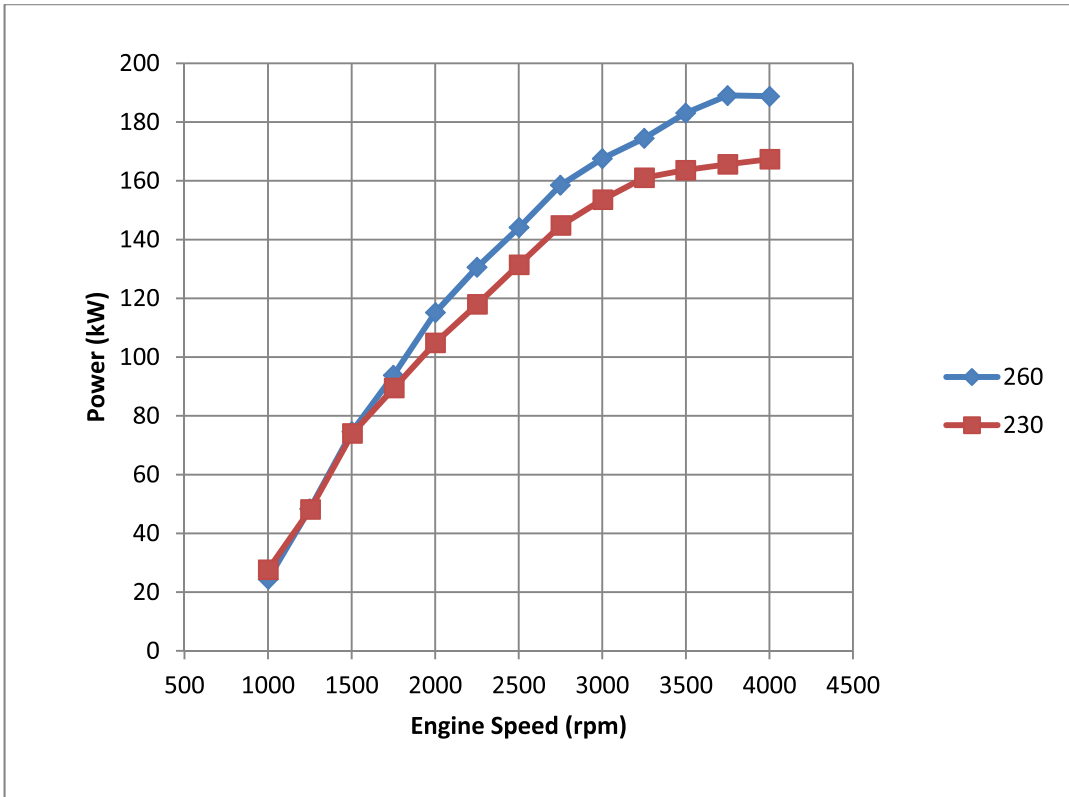
No. of Cyl.	Engine Code	Engine Rating (kW @ rpm)	Component Type	Identification number
6	TDI 3.0 260	191 @ 4000	Injector Pump Injector Turbocharger Charge Air Cooler/Aftercooler Electronic Control Module Phase Sensor Coolant Temperature Sensor Fuel Temperature Sensor Air Pressure Sensor Temperature/Pressure Sensor	059.130.755.S 059.130.277.BD 06V.145.701; 06V.145.701.A 06V.145.730; 06V.145.805 8M0086298 06E.905.163 065.919.501 03L.919.824.C 03G.906.051.E 03N.906.081.A
6	TDI 3.0 230	169 @ 4000	Same as engine code TDI 3.0 HO 260 Except: Electronic Control Module	8M0086297
6	TDI 3.0 230	169 @ 3500	Same as engine code TDI 3.0 HO 260 Except: Electronic Control Module	8M0086296

**8. EIAPP Certificate or statement of Voluntary Compliance (as applicable)**

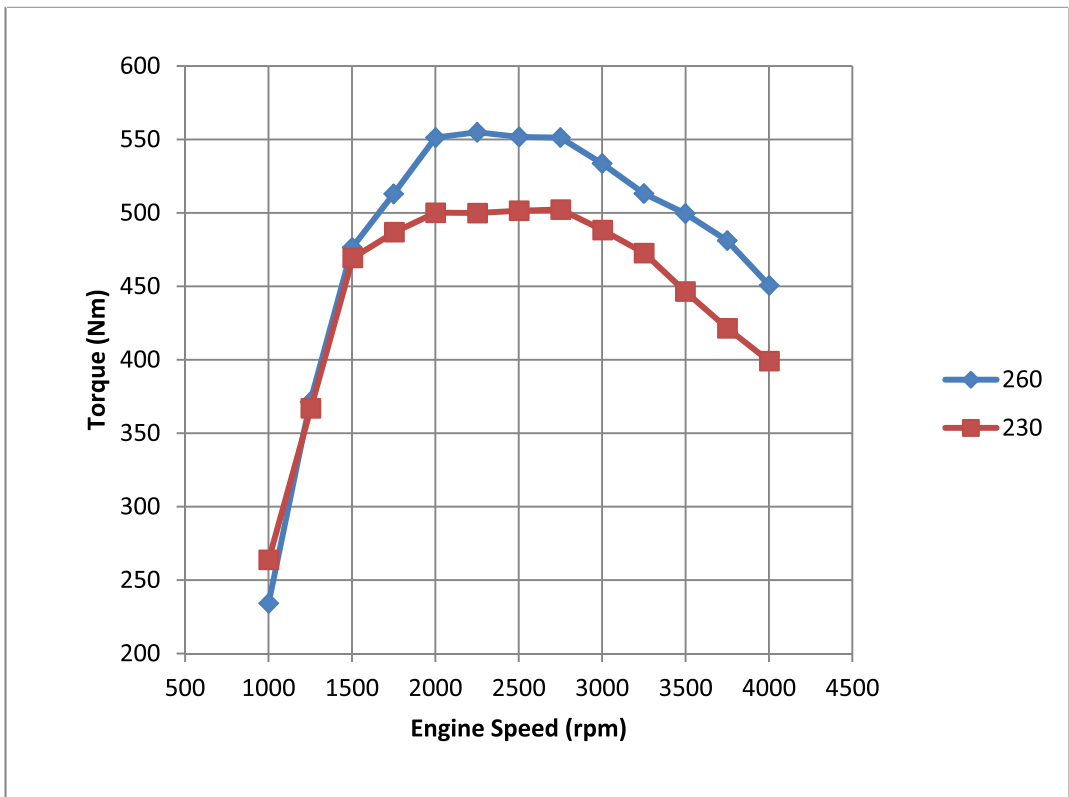
Please see Appendix C.

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Appendix A - Power/Torque Curves



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## Appendix B - Parent Engine Test Report

## Engine:

Manufacturer	Mercury Marine		
Engine type	TDI 3.0L 260		
Family or group identification	EM9XW03.0TDI		
Serial number	CEZ000209		
Rated speed	4000 rpm		
Rated power	191 kW		
Intermediate speed	N/A		
Maximum torque at intermediate speed	N/A		
Static injection timing	N/A		
Electronic injection control	no:	yes: x	
Variable injection timing	no:	yes: x	
Variable turbocharger geometry	no:	yes: x	
Bore	83 mm		
Stroke	91.4 mm		
Nominal compression ratio	17.0 : 1		
Cylinder number and configuration	Number: 6	V: X	In-Line:
Auxiliaries	N/A		

## Specified ambient conditions:

Maximum seawater temperature	38 °C (100°F)
Maximum charge air temperature	65 °C (149°F)
Cooling system spec. intermediate cooler	Operating temperature 90°- 98° C (194-208° F)
Cooling system spec. charge air stages	Same temperature of incoming sea water
Low/high temperature Cooling system set points	Thermostat fully closed 68°C (154 °F), fully open @ 85°C (185 °F)
Maximum inlet depression	3 kPa
Maximum exhaust backpressure	35 kPa
Fuel specification	Grade 2-D diesel fuel
Fuel temperature	Minimum -5°C (23 °F), Maximum 50°C (122 °F) at fuel filter
Lubricating oil specification	SAE 5W-30

## Application/Intended for:

Customer	Pleasure craft (planning hull)
Final application/installation, ship	N/A
Final application/installation, engine	Main: X      Aux:

## Emission test results

Cycle	ISO 8178-4 E5
NOx (g/kWh)	4.54
Date(s)	6 August, 2013
Test numbers	VA63309

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<b>Engine family information / Group information (common specifications)</b>	
Combustion cycle	Four stroke
Cooling medium	60 % Water, 40 % G12++
Cylinder configuration	V
Method of aspiration	Turbocharged with intercooler
Fuel type to be used on board	Grade 2D diesel fuel
Combustion chamber	Ref. VW 057.000.151.A
Valve port configuration	4 valves per cylinder (2 exh – 2 inlet)
Valve size and number	Ø 28.7 mm (inlet) – Ø 24.7 mm (exh.)
Fuel system type	Common Rail

<b>Miscellaneous features</b>	
Exhaust gas recirculation	N/A
Water injection/emulsion	N/A
Air injection	N/A
Charge cooling system	Yes
Exhaust after-treatment	N/A
Exhaust after-treatment type	N/A
Dual fuel	N/A

<b>Engine family / group information (selection of parent engine for test-bed test)</b>			
Family / group identification	EM9XW03.0TDI		
Method of pressure charging	Turbocharger + Intercooler		
Charge air cooling system	Air / Water		
Criteria of the selection (specify)	Highest NO <sub>x</sub> emission		
Engine Model	TDI 3.0L 260	TDI 3.0L 230	TDI 3.0L 230
Number of cylinders	6	6	6
Max. rated power per cylinder (kW)	31.8	28	28
Rated speed (rpm)	4000	4000	3500
Selected parent engine	TDI 3.0L HO 260		
Application	Main Engine Pleasure Craft		

54707

**Test results for  
ISO 8178-4 E5 ( CI ) duty cycle**

<u>VW Antriebssysteme</u>	Engine type: <u>3.0L 4V TDICR</u>
Date: <u>06.08.2013</u>	Engine-No.: <u>CEZ000209</u>
Location of testing: <u>VW Salzgitter</u>	Bore / Stroke: <u>83mm / 91,4mm</u>
Test bench: <u>VSZE01</u>	Engine Displacement: <u>2967cm³</u>
Test bench operator: <u>Kazuschke</u>	Numbers of cylinders: <u>6</u>
Engineer: <u>Papst</u>	Operating method: <u>4 stroke</u>
	Test-No.: <u>va63309</u>

Measuring point	Unit	1	2	3	4	5
Engine speed	[rpm]	4000	3638	3196	2518	650
Torque	[Nm]	440	375	284	180	2
Power	[kW]	184,30	142,94	95,04	47,46	0,15
G <sub>exh</sub>	[kg/h]	972,15	742,60	506,16	301,36	62,20
CO <sub>korr</sub>	[ppm]	171,9	122,8	180,5	358,8	292,1
HC	[ppm]	51,5	86,9	50,4	116,5	199,6
NOx <sub>korr</sub>	[ppm]	700,2	633,0	378,4	246,1	81,3
CO <sub>mass</sub> * WF	[g/h]	161,45	88,06	88,26	104,46	17,55
HC <sub>mass</sub> * WF	[g/h]	23,98	30,91	12,22	16,82	5,95
NOx <sub>mass</sub> * WF	[g/h]	1080,20	745,99	303,94	117,69	8,02
P * WF	[kW]	14,74	18,58	16,16	15,19	0,04

54708

**Test results for  
ISO 8178-4 E5 ( CI ) duty cycle**

<u>VW Antriebssysteme</u>	Engine type: <u>3.0L 4V TDICR</u>
Date: <u>06.08.2013</u>	Engine-No.: <u>CEZ000209</u>
Location of testing: <u>VW Salzgitter</u>	Bore / Stroke: <u>83mm / 91.4mm</u>
Test bench: <u>VSZE01</u>	Engine Displacement: <u>2967cm<sup>3</sup></u>
Test bench operator: <u>Kazuschke</u>	Numbers of cylinders: <u>6</u>
Engineer: <u>Papst</u>	Operating method: <u>4 stroke</u>
	Test-No.: <u>va63309</u>

Test result	spec. Emisions [g/kWh]	Emission Limits EPA [g/kWh]	DF
CO	1,206	5,00	1,07
HC	0,235	-	0,04
NOx	4,252	-	0,29
HC+NOx	4,486	5,80	
CO <sub>2</sub>	800,788	-	
PM	0,078	0,15	0,067

Test Result by carbon balance	spec. Emisions [g/kWh]
CO	1,202
HC	0,234
NOx	4,220
CO <sub>2</sub>	794,975

Weighted test power [kW]	64,71
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## Measured values

Manufacturer: <u>VW Antriebssysteme</u>	Engine type: <u>3.0L 4V TDICR</u>
Date: <u>06.08.2013</u>	Engine-No.: <u>CEZ000209</u>
Location of testing: <u>VW Salzgitter</u>	Bore / Stroke: <u>83mm / 91,4mm</u>
Test bench: <u>VSZE01</u>	Engine Displacement: <u>2967cm³</u>
Test bench operator: <u>Kazuschke</u>	Numbers of cylinders: <u>6</u>
Engineer: <u>Papst</u>	Operating method: <u>4 stroke</u>
	Test-No.: <u>va63309</u>

Measuring point	Unit	1	2	3	4	5
Engine speed	[rpm]	3999,8	3638,0	3195,5	2517,8	650,5
Engine power	[kW]	184,30	142,94	95,04	47,46	0,15
Barometric pressure	[mbar]	999,8	999,9	1000,1	999,8	1000,1
Ambient temperature	[°C]	26,0	24,3	24,8	27,1	25,0
rel. Humidity	[%]	19,9	18,1	19,9	19,3	20,7
Intake air temperature	[°C]	26,0	24,3	24,8	27,1	25,0
Charge-air temperature after comp.	[°C]	184,3	126,9	86,4	51,8	29,5
Charge-air temperature after CAC	[°C]	58,2	41,6	31,2	25,6	24,0
Exhaust gas temp. bef. turbine inlet	[°C]	704,9	637,0	656,9	565,2	139,9
Fuel temp. bef. HPP	[°C]	31,6	33,29	34,21	34,65	33,0
Coolant inlet temp.	[°C]	81,5	77,9	75,9	76,1	75,2
Coolant outlet temp.	[°C]	-	-	-	-	-
Oiltemperature	[°C]	98,3	103,2	95,5	87,6	78,0
Intake air pressure	[mbar]	-22,3	-9,5	-8,3	-4,0	-0,6
Charge-air pressure after comp.	[mbar]	1729,6	1159,2	623,5	214,8	7,4
Charge-air pressure after CAC	[mbar]	1672,4	1121,9	602,5	205,4	5,5
Exhaust gas back pressure	[mbar]	334,0	186,4	94,1	29,8	0,0
Intake air mass flow	[kg/h]	927,6	710,2	482,9	288,8	61,7
Fuel mass flow	[kg/h]	44,5	32,4	23,3	12,6	0,5
CO-concentration	[ppm]	189,9	134,8	199,3	393,0	299,1
HC-concentration	[ppm]	51,5	86,9	50,4	116,5	199,6
NOx-concentration	[ppm]	865,0	787,0	469,5	300,8	93,2
CO <sub>2</sub> -concentration	[%]	10,8	10,3	10,9	9,8	1,8
O <sub>2</sub> -concentration	[%]	6,2	7,0	6,2	7,7	18,2

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## Calculated values

Manufacturer: <u>VW Antriebssysteme</u>	Engine type: <u>3.0L 4V TDCR</u>
Date: <u>06.08.2013</u>	Engine-No.: <u>CEZ000209</u>
Location of testing: <u>VW Salzgitter</u>	Bore / Stroke: <u>83mm / 91,4mm</u>
Test bench: <u>VSZE01</u>	Engine Displacement: <u>2967cm<sup>3</sup></u>
Test bench operator: <u>Kazuschke</u>	Numbers of cylinders: <u>6</u>
Engineer: <u>Papst</u>	Operating method: <u>4 stroke</u>
	Test-No.: <u>va63309</u>

Measuring point	Unit	1	2	3	4	5
Power measured	[kW]	184,30	142,94	95,04	47,46	0,15
Engine power	[kW]	184,30	142,94	95,04	47,46	0,15
Barometric pressure	[mbar]	999,8	999,9	1000,1	999,8	1000,1
Test conditions fa	[1]	1,003	0,993	0,996	1,008	0,998
G <sub>Fuel</sub>	[kg/h]	44,51	32,44	23,27	12,57	0,55
P <sub>s</sub>	[hPa]	33,66	30,34	31,32	35,82	31,71
rel. Humidity	[%]	19,89	18,10	19,94	19,28	20,68
P <sub>ST</sub>	[hPa]	6,695	5,491	6,245	6,908	6,559
H <sub>a</sub>	g W/kg A	4,1933	3,4348	3,9084	4,3275	4,1067
G <sub>AIRD</sub>	[kg/h]	923,77	707,73	481,01	287,55	61,41
G <sub>AIRW</sub>	[kg/h]	927,64	710,16	482,89	288,79	61,66
G <sub>EXH</sub>	[kg/h]	972,15	742,6	506,16	301,36	62,2
K <sub>HDIES</sub>	[1]	0,894	0,883	0,890	0,896	0,893
F <sub>FFH</sub>	[1]	1,823	1,827	1,822	1,831	1,894
k <sub>w2</sub>	[1]	0,007	0,005	0,006	0,007	0,007
k <sub>w,r,1</sub>	[1]	0,905	0,911	0,906	0,913	0,977
CO <sub>korr</sub>	[ppm]	171,9	122,8	180,5	358,8	292,1
CO <sub>2korr</sub>	[%]	9,82	9,37	9,87	8,93	1,78
NOx <sub>korr</sub>	[ppm]	700,2	633,0	378,4	246,1	81,3
HC	[ppm]	51,5	86,9	50,4	116,5	199,6
CO	[g/h]	161,5	88,1	88,3	104,5	17,5
CO <sub>2</sub>	[g/h]	144988,5	105712,7	75858,5	40876,4	1681,3
NOx	[g/h]	1080,20	745,99	303,94	117,69	8,02
HC	[g/h]	23,98	30,91	12,22	16,82	5,95
WF	[1]	0,08	0,13	0,17	0,32	0,30
P * WF	[kW]	14,74	18,58	16,16	15,19	0,04
G <sub>Fuel</sub> * WF	[g/h]	3560,81	4217,55	3955,31	4022,11	163,56
CO * WF	[g/h]	12,92	11,45	15,00	33,43	5,26
CO <sub>2</sub> * WF	[g/h]	11599,08	13742,65	12895,95	13080,46	504,38
NOx * WF	[g/h]	86,42	96,98	51,67	37,66	2,41
HC * WF	[g/h]	1,92	4,02	2,08	5,38	1,78

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Calculated values

Manufacturer: <u>VW Antriebssysteme</u>	Engine type: <u>3.0L 4V TDICR</u>
Date: <u>06.08.2013</u>	Engine-No.: <u>CEZ000209</u>
Location of testing: <u>VW Salzgitter</u>	Bore / Stroke: <u>83mm / 91,4mm</u>
Test bench: <u>VSZE01</u>	Engine Displacement: <u>2967cm<sup>3</sup></u>
Test bench operator: <u>Kazuschke</u>	Numbers of cylinders: <u>6</u>
Engineer: <u>Papst</u>	Operating method: <u>4 stroke</u>
	Test-No.: <u>va63309</u>

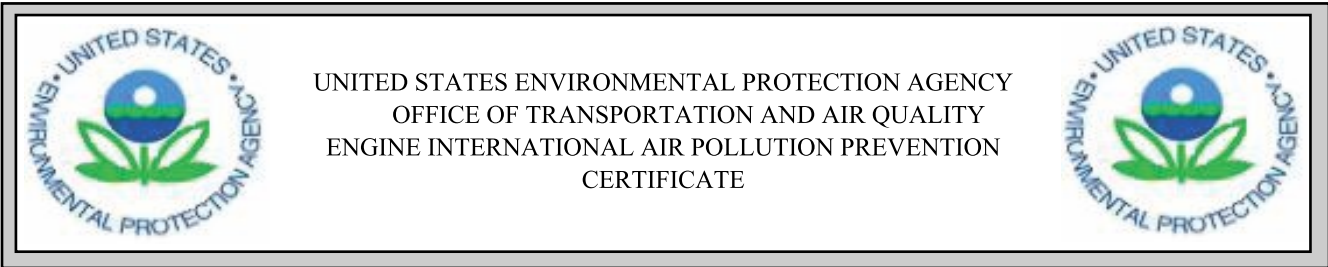
Measuring point	Unit	1	2	3	4	5
Brake spec. fuel cons.	[g/kWh]				G <sub>Fuel</sub> [g/kWh]	245,99
Brake spec. emissions CO	[g/kWh]				CO [g/kWh]	1,21
Brake spec. emissions CO <sub>2</sub>	[g/kWh]				CO <sub>2</sub> [g/kWh]	800,79
Brake spec. emissions NOx	[g/kWh]				NOx [g/kWh]	4,25
Brake spec. emissions HC	[g/kWh]				HC [g/kWh]	0,23

Values calculated by carbon balance						
Measuring point	Unit	1	2	3	4	5
CO <sub>masse</sub>	[g/h]	160,15	87,34	87,47	103,83	18,41
CO <sub>2masse</sub>	[g/h]	143819,85	104847,92	75176,64	40629,07	1764,06
NOx <sub>masse</sub>	[g/h]	1071,49	739,89	301,21	116,98	8,42
HC <sub>masse</sub>	[g/h]	23,78	30,66	12,11	16,71	6,24
CO <sub>masse</sub> * WF	[g/h]	12,81	11,35	14,87	33,22	5,52
CO <sub>2masse</sub> * WF	[g/h]	11505,59	13630,23	12780,03	13001,30	529,22
NOx <sub>masse</sub> * WF	[g/h]	85,72	96,19	51,21	37,43	2,53
HC <sub>masse</sub> * WF	[g/h]	1,90	3,99	2,06	5,35	1,87
Brake spec. fuel cons.	[g/kWh]				G <sub>Fuel</sub> [g/kWh]	
Brake spec. emissions CO	[g/kWh]				CO [g/kWh]	1,20
Brake spec. emissions CO <sub>2</sub>	[g/kWh]				CO <sub>2</sub> [g/kWh]	794,98
Brake spec. emissions NOx	[g/kWh]				NOx [g/kWh]	4,22
Brake spec. emissions HC	[g/kWh]				HC [g/kWh]	0,23


Comparison of calculation results						
Measuring point	Unit	1	2	3	4	5
Brake spec. fuel cons.	%			measured / calculated		-
CO emissions	%			measured / calculated		100,4
CO <sub>2</sub> emissions	%			measured / calculated		100,7
NOx emissions	%			measured / calculated		100,8
HC emissions	%			measured / calculated		100,1

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Appendix C - EIAPP Certificate or Statement of Voluntary Compliance (as applicable)



Manufacturer: **MERCURY MARINE**  
Engine Family: **EM9XW03.0TDI**  
Certificate Number: **M9X-IMO-14-02.1**  
Date Issued: **11/7/2013**

  
Byron J. Bunker, Director  
Compliance Division  
Office of Transportation and Air Quality

This is to certify that the manufacturer of the above mentioned marine diesel engine has provided information to the U.S. Environmental Protection Agency that demonstrates:

1. this engine has been tested in accordance with the requirements of the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines, and,
2. the engine, its components, adjustable features, and Technical File, prior to the engine's installation and/or service on board a ship, fully comply with the applicable regulation 13 of Annex VI to MARPOL 73/78

This certificate is valid for the life of the engine subject to surveys in accordance with regulation 5 of Annex VI to MARPOL 73/78, installed in ships under the authority of this Government.

Issued at U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Washington, DC



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 OFFICE OF TRANSPORTATION AND AIR QUALITY  
 ENGINE INTERNATIONAL AIR POLLUTION PREVENTION  
 CERTIFICATE



Page 2

This is to certify that this record is correct in all respects. Issued at U.S. Environmental Protection Agency, Office of Transportation and Air Quality Washington, DC

Byron J. Bunker, Director  
 Compliance Division  
 Office of Transportation and Air Quality

**1. Particulars of the engine**

1.1 Name & address of manufacturer:

**Mercury Marine  
 W6250 Pioneer Road  
 PO Box 1939  
 Fond du Lac, WI 54936-1939**

1.8 Test cycle:

**E5 Recreational**

1.2 Place of engine build:

**Volkswagen Marine  
 Industriestraße Nord, 38231  
 Salzgitter, HS-2/2, Brieffach 7366  
 Germany**

1.9 Rated Power(kW) & Speed(RPM):

**191                      4000**

1.3 Date of engine build:

**06/06/2013**

1.10 Engine certificate number:

**M9X-IMO-14-02.1**

1.4 Place of pre-certification survey:

**Volkswagen Marine  
 Industriestraße Nord, 38231  
 Salzgitter, HS-2/2, Brieffach 7366  
 Germany**

1.11 Test fuel:

**Distillate Diesel [94.108(a)(1)]**

1.5 Date of pre-certification survey:

**08/06/2013**

1.12 NOx reducing device?:

**No**

1.6 Engine family:

**EM9XW03.0TDI**

1.13 Applicable NOx Emission Limit(g/kW-hr):

**7.7**

1.7 Models:

**Mercury Diesel TDI 3.0L 260  
 Mercury Diesel TDI 3.0L 230 (4000 rpm)  
 Mercury Diesel TDI 3.0L 230 (3500 rpm)**

1.14 Engine NOx Emission Value(g/kW-hr):

**4.54**

**2 Particulars of the Technical File:**

2.1 Technical File number:

**TDI 3.0L IMO Technical File**

2.2 NOx verification number:

**TDI 3.0L IMO Technical File**

**Products of Mercury Marine**  
W6250 Pioneer Road  
Fond du Lac, WI 54936-1939

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