Certificate No:
TAM0000012

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Diesel Engine

with type designation(s)
Series 2000

Issued to
MTU Friedrichshafen GmbH
FRIEDRICHSHAFEN, Germany

is found to comply with
Det Norske Veritas' Rules for Classification of Ships/High Speed and Light Craft

Application :

The approval is valid for propulsion, auxiliary and emergency duty.

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Rating see page 2 and 3.

This Certificate is valid until **2018-12-31**.

Issued at **Høvik** on **2015-07-08**

for **DNV GL**

DNV GL local station: **Augsburg**

Approval Engineer: **Amir Dzaferi**

Oddvar Deinboll
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Job Id: **262.1-003793-5**
Certificate No: **TAM0000012**

Product description

Four Stroke Diesel Engine

Cylinder bore:	130 mm
Piston stroke:	150 mm
No. of cylinders:	8, 12 and 16 in V

Application/Limitation

The approval is valid for propulsion, auxiliary and emergency duty and is based on the following main data:

Propulsion:

Mean indicated pressure (bar)	22.7
Max. cylinder pressure (bar)	160 170 +/- 10 for 12 and 16V M91
Rated continuous output (kW/cyl)	76.3
Corresponding to (RPM):	2300 (maximum)
Max. intermittent output [1)] (kW/cyl)	83.9
Max. intermittent speed [1)] (RPM)	2300

1) 83,9 kW/cyl @ 2300/2350 rpm with operational load profiles corresponding to MTU's designation 1DS and subject to conditions given in Det Norske Veritas' Rules for Classification of Ships/High Speed, Light Craft and Naval Surface Craft Pt.4 Ch.3 Sec.1 B109.

Auxiliary/Emergency:

Engine	Power (kW)	Speed (RPM)	Max. cylinder pressure (bar)	Mean indicated pressure (bar)
12V 2000 M50A/M51A	498	1500	120 + 10	18.7
12V 2000 M40A/M41A	575	1500	135 + 10	21.6
12V 2000 M50B/M51B	600	1800	135 + 10	18.7
12V 2000 M40B/M41B	695	1800	145 + 10	21.7

Auxiliary:

Engine	Power (kW)	Speed (RPM)	Max. cylinder pressure (bar)	Mean indicated pressure (bar)
8V 2000 M50A/M51A and B	332	1500	120 + 10	18.7
8V 2000 M40A/M41A and B	385	1500	135 + 10	21.6
8V 2000 M50B/M51A and B	400	1800	135 + 10	18.7
8V 2000 M40B/M41A and B	465	1800	145 + 10	21.8
16V 2000 M50A/M51A and B	664	1500	120 + 10	18.7
16V 2000 M40A/M41A and B	770	1500	135 + 10	21.6
16V 2000 M50B/M51A and B	800	1800	135 + 10	18.7
16V 2000 M40B/M41A and B	930	1800	145 + 10	21.8

Tests carried out

Type test carried out 1997-03-03 to 07, Test report for 16V2000 engine No. 536 000 208
Surface temperature measurements for SOLAS requirements. Report TWE 37711

Marking of product

The product to be marked with manufacturer's name or trademark and type number identification.

Periodical assessment

For retention of the Type Approval, a DNV surveyor shall perform a survey every second year and before the expiry date of this certificate to verify that the conditions of the type approval are complied with.

The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval Certificate was issued. The main scope of the Periodical Assessment will normally include:

- Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the Type Approval documentation and that this is still used as basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking.

In cases where the Type Approved product is manufactured at other companies, the Periodical Assessment shall verify that the Type Approval applicant has a quality control system for consistent production at their licensees/subcontractors. Furthermore Periodical Assessment shall be carried out randomly at these companies.

Other conditions

- Foundation arrangement to be submitted for each installation according to the Rules, Pt. 4 Ch.3 Sec.1 A500 – Documentation of arrangement.

- Torsional vibration calculations to be submitted for each installation according to the Rules Pt.4, Ch.3, Sec.1, G - Vibration.

- Signboards according to the Rules Pt.4, Ch.3, Sec.1, C 406

- Flexible hoses with couplings to be type approved by DNV.

- Engine safety, control and monitoring systems, including sensors and actuators are not covered by this type approval certificate. Documentation for engine safety, control including speed governing and monitoring systems shall be submitted for approval according to Pt.4 Ch.9 Sec.1 Table C2 and/or as listed in relevant type approval certificates.

- Electric cables and cabling are not covered by this approval and must be verified to comply with the requirement of DNV Rules for Ships/ High, Speed Light Craft and Naval Surface Craft Pt.4 Ch.8 - Electrical Installation.

- The approval does not include driven member.

END OF CERTIFICATE