Certificate No: TO.DEB. 20-1417

TÜRK LOYDU

TYPE APPROVAL CERTIFICATE

This Certificate consists of 3 pages.

This is to certify that the

INTERNAL COMBUSTION ENGINES

With type designations

4000 Mx3

Manufactured by

MTU Friedrichshafen GmbH

Is found to comply with

"TL Rules, Part B, Chapter 5, Electric July 2019", "TL Rules, Part B, "TL Rules, Part A, Chapter 2, Material July 2019", "Chapter 4, Machinery January 2020".

Application	: The engine intended for main propulsion and auxiliary
Design	: MTU Friedrichshafen GmbH
Sizes	: See second page.
Address of Manufacturer	: 88045 Friedrichshafen, Germany
Place and date	: İSTANBUL / 15.10.2021

Subject to the conditions referred to in the following pages, this certificate is valid until 14.10.2026

Emrah SÖĞÜTÇÜ
New Building Division Manager

119332

Product description:
Four stroke, v-engine, non-reversible, trunk-piston, with supercharging, with charge air cooling, constant-pressure charging system, direct injection, injection operation electronically controlled, valve operation by cams, liquid fuel.
Cylinder bore [mm] 170
Piston stroke [mm] 190
No. of cylinders 12, 16, 20

Rated power [kW/cyl.]	215*	195
Rated speed [rpm]	2100	2100
Mean effective pressure [bar]	28.49*	25.84
Max. firing pressure [bar]	225*	220

*Max. output per cylinder (110%) (non overloadable) Speed

Type Designation : 4000 Mx3

Materials used : To be referred to the approved drawing dated 10.11.2020, 07.01.20211,18.01.2021.

Application/ Limitation (Approval conditions):
1- When required by the rules the accessories fitted on the engine must be type approved. Their certificates are to be presented to the Port Authorities when requested.
2-These engine may be fitted on ships granted with an automation notation provided that all requirements stated in our rules are complied with.
4-The lubricating oil supply must also be ensured during start up and run-down of the exhaust gas turbochargers.
5-The engine shall be equipped with the parts listed in the manufacturer's parts catalog exclusively.
6- The engine will be delivered with the relevant documentation for their maintenance and their operation.
7-Ambient condition has been stated at rules for classification of steel ships, Part B Chapter 4-Machinery Section 1 C.
8- Materials for main component are to be supplied by the approved manufacturers and are to be of certified by this Society or to be satisfactory to the TL Surveyor according to the relevant Rule requirement.
9- -Control,Alarm and Monitoring Systems,including sensors for the engine are not covered by this approval
10- Individual Product Certification is required. The engines to be used in TL class ships, a product certificate must also be obtained.
11- Where the engine is installed on the unattended machinery automation Ship(AUT-Ship) the drawings related to safety devices are to be submitted separately for approval. Documentation for engine safety, control including speed governing and monitoring systems shall be submitted for approval according to TL Rule- Part B,--Chapter 5.
12- Comparison list of engine components is to be submitted to this Society by engine manufacturers for the subjected vessel.Documents required for engine components are given in IACS UR M72 , Table M72.2 and / or TL Machinery Rules Table 2.6.B
13- Torsional vibration calculations are to be subjected for each installation.
14- Certification of turbochargers and project approval are not approved as they are not within the scope of machine certification.

15- The ambient conditions are ;
İnclination limits (degrees) Athwartships Fore --and--aft.

	Static	Dynamic	Static	Dynamic
Main@Auxiliary machinery	± 15,0°	± 22,5°	± 5,0°	± 7,5°
Emergency machinery	± 22,5°	± 22,5°	± 10,0°	± 10,0°
Emergency machinery on ships for the carriage of liquefied gas and liquid chemicals	± 30,0°	± 30,0°		

Seawater temperature: +32 °C
Temperature range: 0°C ÷ +45 °C
Atmospheric pressure: 1 bar
Suction air temperature: +45 °C
Relative humidity: 60 %
For electric components: 0°C ÷ +55 °C

Documentation : To be referred to the approved drawing dated 10.11.2020, 07.01.2021, 18.01.2021 with Ref: PAE-EPAS/007816/20-1417/GTÇ, PAE-EPAS/008322/20-1417/SÜ, PAE-EPAS/008407/20-1417/ZK.

Test carried out (and results) :
Following tests were carried out, found satisfactory.

- Performance test according to Türk Loydu rules.
- Visual inspection.

Documentation:
Test report titel: Type Test MTU Diesel Engine 20V 4000 M93
Place of test: MTU Friedrichshafen GmbH
Date of test: 2007-11-05 until 2007-11-09 and from 22 to 23 of November 2007
Test engine:
Model 20V 4000 M93
Serial no. 528 100719
No. of cylinders 20
Power [kW/cyl.] 195
Speed [rpm] 2100

Place of test carried out : MTU Friedrichshafen GmbH, 88045 Friedrichshafen, Germany.

Marking of product: The product to be marked same as below mentioned.

- Maker's name or trade mark.
- Serial number of the units.
- Equipment type or model identification.
- Rated power and speed.

S. Mahir TUĞCU
Surveyor

This certificate is subject to terms and conditions described below:

- Any significant change in design or construction may render this Certificate invalid. Type Approval Certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. This certificate is not valid for products without marking above mentioned. The manufacturer should notify TÜRK LOYDU of any modifications or changes to the equipment in order to obtain valid certificate. This certificate shows that tested specimens as representative of the product complies of the TÜRK LOYDU rules, and relevant international instruments that apply to it.