TYPE APPROVAL CERTIFICATE

Certificate No:
TAM00000FV

This is to certify:

That the Diesel Engine

with type designation(s)
28/33D + STC

Issued to
MAN Diesel & Turbo SE
86153 Augsburg, Germany

is found to comply with
DNVGL Rules for Classification: Ships/ High Speed and Light Craft/ Naval Vessels - Surface ships

Application :

propulsion, multi engine plant

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **6th March, 2022**.

Issud at **Hamburg** on **10th March, 2017**
DNV GL local station: **Augsburg** for **DNV GL**

Approval Engineer: **Ralph Michael**

Frank Lutz
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.

Job Id: **262.1-004813-7**
Certificate No: **TAM00000FV**

Product description

four stroke, v-engine, non-reversible, trunk-piston, with supercharging, with charge air cooling, constant-pressure charging system, direct injection, injection+valve operation by cams, liquid fuel

Cylinder bore :	280
Piston stroke :	330
No. of cylinders :	12, 16, 20

Additional place of production

Application/Limitation

Rated power [kW/cyl.]	500	455	405
Rated speed [rpm]	1032	1000	900
Mean effective pressure [bar]	28.6	26.9	28.6
Max. firing pressure [bar]	200	200	200
Definition	ICFN	ICN	-

Type Approval documentation

Tests carried out

Documentation:

Test report titel	Type Approval Test V28/33D STC+ V28/33 D
Place of test	MAN Diesel & Turbo SE, Augsburg, Bed 33
Date of test	2014-02-05 until 2014-02-07

Test engine:

Model	16V28/33D STC
Serial no.	1 062 108
No. of cylinders	20,16,12
Power [kW/cyl.]	455
Speed [rpm]	1000

Marking of product

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

Periodical assessment

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.
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.
In case 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

Engine safety, control and monitoring systems, including sensors, cables 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 DNV GL Rule Pt.4 Ch.9 Sec.1
According to MAN Definition of load profiles,Project Guide 09.2012 Version 3.9, 500 kW per cylinder at 1032 rpm is an ICFN power definition for application with Navy load profile according to ISO3046-1:2002
According to MAN Definition of load profiles,Project Guide 09.2012 Version 3.9, 455 kW per cylinder at 1000 rpm is an ICN power definition for application with Ferry load profile according to ISO3046-1:2002

END OF CERTIFICATE