DNV·GL

Certificate No:
TAM0000086

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Engine Subsystem

with type designation(s)
MAN Diesel's concept of Selective Catalytic Reduction System

Issued to
MAN Diesel & Turbo, branch of MAN Diesel & Turbo SE, Germany
København SV, Denmark

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV GL class programme CP-0353 – Type Approval of selective catalytic reduction systems

Application :

The approval is only covering the concept of SCR system in combination with two stroke MAN Diesel engines.

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

This Certificate is valid until **2021-07-03**.

Issued at **Høvik** on **2016-07-04**

for **DNV GL**

DNV GL local station: **Høvik Machinery**

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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Job Id: **262.1-022210-1**
Certificate No: **TAM0000086**

Product description

The Low Sulphur selective catalic reduction (SCR) system consists of combined vaporiser/mixer unit and the SCR reactor. In the vaporiser, the catalytic process is prepared by injecting the reducing agent which will vaporise and mix with the exhaust gas. The prepared gas is led to the SCR reactor where the NOx reduction takes place.

Application/Limitation

SCR system	Exhaust gas pressure engine load	Pressure drop (total)	Design temperature
High pressure (HP) *	1.1 bara 25% load 5.0 bara 100% load	70 mbar Max. incl. all components	500 °C (reactor side) 330 °C (dosing side)
low pressure (LP) *	1 bara 25% load 1 bara 100% load	100% load: 300 mm H_2O	290 °C (reactor side) 275 °C (dosing side)

* The SCR solutions are designed for low sulphur fuels of 0.1% S or less, due to the SOx requirements in the emission control areas.

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 GL 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.

Other conditions

- 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 the Rules Pt.4 Ch.9 Sec.1 Table 5 and/or as listed in relevant type approval certificates.

- Electric cables and installation of this is not covered by this approval and must be verified to comply with the requirement of the Rules Pt.4 Ch.8 - Electrical Installation.

- SCR bypass arrangements are not covered by this certificate. If bypass is required due to vessel machinery configuration, the arrangement shall be reviewed, in accordance with Rules for ships Pt.4 Ch.6 Sec.8 [2].

- Urea storage arrangements, including tank instrumentation, filling, ventilation and sounding arrangements is not covered by this approval.

- Documentation of vessel arrangement to be submitted according to Pt.4 Ch.6 Sec.1 Table 2.

- Pipe dimensions and standard to be according to DNV GL Rules Pt.4 Ch.6 Sec.9

- The materials used in the SCR system exposed to exhaust shall be made of materials with a melting point above 925°C. Plastic piping may be used subject to the requirements of Pt.4 Ch.6 Sec.2.

- Flexible hoses to be type approved by DNV GL.

- This approval does not cover the NOx reduction capacity

END OF CERTIFICATE