

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Exhaust gas cleaning systems for the reduction of NOx

with type designation(s)
SCR Aftertreatment System (air assisted)

Issued to

Caterpillar Inc.
Lafayette IN, USA

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

Application :

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

Design pressure: Max. 10 bar (DEF dosing pump discharge side)

Pressure drop: 1.9 mbar (including all components)

Design temperature: Exhaust operating temperature Min. <250 °C, Max. < 550 °C

Issued at **Hamburg** on **2018-04-06**

This Certificate is valid until **2023-04-05**.

for **DNV GL**

DNV GL local station: **Certification & Inspection Services**

Approval Engineer: **Yongju Park**

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Olaf Drews
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.



Product description

Caterpillar SCR Aftertreatment system for the reduction of NOx emissions which consists of Clean Emissions Module (CEM), including catalyst blocks, DEF injector and Pump Electronics Tank Unit (PETU), including DEF holding tank, DEF pump and DEF controls.

The Caterpillar SCR Aftertreatment system is manufactured in 1300 4H Park Road, Pontiac, IL 61764

Applicable diesel Engine Power	Engine Platform	Configuration
660 – 1900 bhp	C32	U-flow, Z-flow design
775 – 3386 bhp	3500	U-flow, Z-flow design
2588 – 3755 bhp	C175	U-flow, Z-flow design
2300 – 7577 bhp	C280	Cabinet design
1368 – 22,529 bhp	MaK	Cabinet design

Treatment fluid system :

1. Aqueous Urea Solution (AUS 32.5 or 40% UREA)
2. UREA supply pump (DEF pump) – model no. DME _60 / capacity 60 lph, model no. DME _375 / capacity 120 lph

Application/Limitation

1. The system is only accepted to single exhaust inlet only. Bypass shall be arranged for exhaust gas cleaning systems installed on vessels with a single main propulsion unit and where failure may lead to loss of any main function. This may be dispensed with if unrestricted flow is ensured and no risk of failure leading to shut down of engine is demonstrated
2. Pipe dimensions and standard to be according to DNV GL Rules Pt.4 Ch.6 Sec.9
3. UREA storage tank (DEF tank) outlet shall be arranged in accordance with DNV GL Rules Pt.4 Ch.6 Sec.8. 2.4 UREA solution based treatment fluid systems. The valves fitted to UREA storage tank, where single failure might cause spillage of UREA, shall be quick acting shutoff valves arranged as for fuel oil systems or fail-to-closed type
4. Drainage line connected to dosing cabinet shall be led to a closed drainage tank to the satisfaction of the attending surveyor
5. The system is not approved to run with heavy fuel oil
6. Below is not scope of this approval
 - Control and monitoring system. Items listed in Table 2 in Rules for ships Pt.4 Ch.6 Sec. 8 2.5. Excessive slip shall also be avoided by control unit
 - Certificates according to Rules for ships Pt.4 Ch.6 Sec.1 3.2.1 Table 5 "Certification requirements – piping components"
 - Urea storage arrangements, including tank instrumentation, filling, ventilation and sounding arrangements
 - NOx Emission reduction capacity assessment according to Appendix A in DNV-GL-CP-0353

Type Approval documentation

Tests carried out

Marking of product

Job Id: **262.1-025922-1**
Certificate No: **TAP000018U**

The products 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. 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.

END OF CERTIFICATE