DNV·GL

Certificate No:
TAP000014V

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Exhaust gas cleaning systems for the reduction of NOx

with type designation(s)
Selective Catalytic Reduction (SCR) System

Issued to
Cummins Emission Solutions
Mineral Point WI, United States

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:	**8.5 bar (dosing side)**
Pressure drop:	**105 mbar (max. including all components)**
Design temperature:	**reactor side < 500 ºC / dosing side < 55 ºC**

Issued at **Hamburg** on **2017-11-06**

This Certificate is valid until **2022-11-05**.

for **DNV GL**

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

Approval Engineer: **Yongju Park**

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.

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Job Id: **262.1-027361-1**
Certificate No: **TAP000014V**

Product description

The Cummins Emission Solutions´ exhaust after-treatment system to reduce NOx present in the engine exhaust. It is composed of a catalyst package (SCR unit) with airless type diesel exhaust fluid delievery system (DEF supply module and DEF dosing module).

The CES SCR system configurations *)

Applicable diesel exhaust flow (kg/h)	SCR system model	
5150	6000 EIEO	A055F603 (LH/LH) and A055F597 (RH/RH)
3800	4000 EIEO	A055F572 (LH/LH) and A055F562 (RH/RH)
5150	6000 SIEO	A055F625 (LH/LH) and A055F620 (RH/RH)
3800	4000 SIEO	A055F607 (LH/LH) and A055F613 (RH/RH)

*) The configuration and its suitability of units are not scope of TA. The information is based on the CES product Introduction for DNV GL

Treatment fluid system :

1. Aqueous urea solution (UREA 32.5% - 40%) as a reactant.
2. UREA Supply pumps (DEF pump – supply module)
   - A047H782 (2CV) : 0.0210 m3/h
   - A050G798 (3CV) : 0.0228 m3/h
3. UREA Dosing pumps (DEF pump – Dosing module)

Application/Limitation

1. 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 spilleage of UREA, shall be quick acting shutoff valves arranged as for fuel oil systems or fail-to-closed type

4. The system is not approved to run with heavy fuel oil

5. 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

According to submitted type testing procedure (CES SCR DNV GL completed Witness Test Report)

Marking of product

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.