Certificate No:
TAA00003BG

TYPE APPROVAL CERTIFICATE

This is to certify:

That the NOx Selective Catalytic Reduction Control System

with type designation(s)
NOR E control and monitoring system

Issued to
Wärtsilä Finland Oy
Vaasa, Pohjanmaa, **Finland**

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application :

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

Issued at **Høvik** on **2025-01-16**
This Certificate is valid until **2027-01-15**.
DNV local unit: **Finland CMC**

Approval Engineer: **Andrzej Rosinski**

for **DNV**

Siri Tag
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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees (“DNV”) arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

This Type Approval (TA) certificate covers the NOR E control and monitoring system for NOx Selective Catalytic Reduction (SCR) System.
The NOx SCR system is based on reagent injection, governed by the NOR E control and monitoring system. Reagent may be injected based on pre-calculated and tunable parameters (open-loop) or based on pre-calculated and tunable parameters in combination with measurements from an optional NOx sensor (closed-loop). The start and stop of the SCR system are controlled based on engine process data monitored via a Modbus TCP connection to the engine, and reactor process data directly connected to the NOR system.

The NOR E control and monitoring system incorporates the following functionality:

- Reagent dosing control (-different selectable control strategies)
- Soot blowing logic (optional)
- Interfaces to the ship systems (Ethernet-Modbus TCP or RTU and/or hardwired group alarms (major / minor))
- SCR Bypass Automation (optional, supporting “Isolation bypass” and “Inlet bypass” with/without sealing air)

The NOR E control and monitoring system covers the cabinets/units as listed in Table 1, with the following HMI-variants:

- Variant 1- One local dedicated HMI in each individual dosing unit. Interface to the vessel main alarm system shall either be hardwired (group alarms, major / minor) or by Modbus TCP/RTU.

- Variant 2- One dedicated HMI common for multiple dosing units, normally located in the ECR or in other centralized location within the machinery space. Interface to the vessel main alarm system shall either be hardwired (group alarms, major / minor) or by Modbus TCP/RTU.

- Variant 3- HMI not included in NOR E scope. Presentation of process values and alarms shall be through the vessel main/integrated alarm system. Interface to the vessel main/integrated alarm system shall be Modbus TCP/RTU. See information under Approval conditions.

Table 1: Cabinets/units and SW covered by this TA certificate

Cabinet/unit		Software (NOR E release version)
No.	Name	
11N05_	SCR Pump Unit (one or more per vessel, variations: single version (one pump) and redundant version (two pumps)	
11N06_	SCR Dosing Unit (one per engine including own COM-10 CPU)	1.5.X.X
11I05_	SCR Bypass Automation Unit (optional, oner per engine)	
Note: The main C&M components in the cabinets/units are listed in document “NOR E – Control and Monitoring System Components”, Drw. No. DMTA00073031, rev. A. SW version tested during TA test: 1.5.0.0		

Place of manufacture

Wärtsilä Finland Oy,
Teollisuuskatu 1,
65170, Vaasa,
Republic of Finland

Application/Limitation

This Type Approval covers the “*NOR E control and monitoring system”*, i.e. the control and monitoring system for the NOx SCR system.

The NOR E control and monitoring system covers hardware as listed in document “NOR E Control and Monitoring System Components”**,** Drw. No. DMTA00073031**,** rev. A, and software as listed in Table 1.

The NOR E control and monitoring system used on DNV class HSLC vessels with additional notation for unattended machinery operation, shall comply with DNV HSLC Rules Pt.6 Ch.2 Sec.2 [1.1.3], meaning that all alarms shall be individually transferred to the vessel’s alarm system.

Reagent tank-level and temperature monitoring (high/low alarm and remote indication) is not covered by this TA certificate.

Optional instrumentation used for closed-loop injection is not covered by the subject TA certificate.
Compliance with the environmental specifications in Pt.4 Ch.9 Sec. 5 shall be provided to the attending DNV surveyor onboard upon request.

Approval conditions

This TA certificate is based on the validity of the TA certificates referred to in document "NOR E – Control and Monitoring System Components", Drw. No. DMTA00073031, rev. A.

The detailed interface shall be agreed between Wartsila and the supplier of the vessel main alarm system in due time prior to shipment and installation onboard.

DNV shall be informed in writing whenever the system will be installed on board a DNV classed vessels. The letter to DNV shall include a signed copy of Annex 1 in this Type Approval Certificate together with the following project specific drawings:

- Block diagram (ref. DAAF611477 rev E) **Note A**
- I/O and parameter list (ref. DMTA00074868 rev -) **Note A**
- P&ID / Process layout (ref. DAAF601350 rev E) **Note A**
- Modbus TCP (ref. DMTA00076935 rev A) **Note A, B**
- Modbus RTU (ref. DMTA00076936 rev A) **Note A, B**

Note A:
Any change compared to the reference drawing shall be clearly identified (by cloud/bold/colour) on the project specific drawing. Changes affecting class-required functionality shall be described and may be subject to case-by-case approval and certification.

Note B:
The project specific drawing shall be submitted for Variant 3 only.

When changing non-programmable components to alternatives listed in document "NOR E – Control and Monitoring System Components", Drw. No. DMTA00073031, rev. A no further assessment will be required.

The following applies for variant 1 and 2:
As long as the system is covered by this Type Approval certificate a product certificate according to Pt.4 Ch.9 Sec.1 [1.4] will **not** be required. Correct configuration and set up for each delivery to be tested during commissioning after installation, inclusive the interface to the main alarm system, and reagent tank-level and temperature monitoring as appropriate.

The following applies for variant 3:

<u>Clause for application software control</u>
All changes in software are to be recorded as long as the system is in use on board. Records of major changes are to be forwarded to DNV for evaluation and approval and shall be approved before implemented on board.

Type Approval documentation

Tests carried out
NOR E - Control and Monitoring System Test Summary, Drw. No. DMTA00074277, rev.-

Marking of product
Wärtsilä NOR control and monitoring system for NOx Selective Catalytic Reduction system.
Cabinets marked according to table 1.
Dosing unit
Supply Voltage: 100- 240 VAC, 110 – 250 VDC or 24 VDC
Frequency: 50/60 Hz

Pump unit:
380-480 VAC 3-phase
Frequency: 50/60 Hz

Periodical assessment
The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications

- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE