

TYPE APPROVAL CERTIFICATE

This is to certify:

That the NOx Selective Catalytic Reduction Control System

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

Issued to

Wärtsilä Finland Oy
Vaasa, Finland

is found to comply with
DNV GL 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 GL.
System certificate only.

Issued at **Høvik** on **2019-06-28**

This Certificate is valid until **2021-06-27**.

DNV GL local station: **Turku**

for **DNV GL**

Approval Engineer: **Ingrid Hagen Johansen**

.....
Jan Tore Grimsrud
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

This type approval certificate covers the NOR C control and monitoring system for NOx Selective Catalytic Reduction (SCR) System.

The NOx SCR is based on Reagent injection, governed by the NOR C control and monitoring system. Reagent may be injected based on engine load and the humidity of the ambient air. Reagent may also be injected based on measurements from an optional NOx sensor, emission analyzer or external emission analyzer.

The NOR C control and monitoring system incorporates:

- Screen based HMI
- Reagent dosing control (-different selectable control strategies)
- Soot blowing logic
- One NOR C control and monitoring system can cover up to totally 8 engines
- CAN switch(es) isolating the CAN buses connecting automation unit to dosing units to minimize effect of single point failure
- Two independent pump systems or alternatively one single pump in each pump unit
- Interface to the ship systems (Ethernet-Modbus or RS-485-Modbus RTU)

The complete NOx Selective Catalytic Reduction (SCR) System comprises cabinets as listed in Table 1.

Cabinet / module / unit	
No.	Name
11W04_	SCR Reactor Connection Panel
11N05_	SCR Pump Unit
11N06_	SCR Dosing Unit
11N07_	SCR Soot Blowing System
11N08_	SCR Reagent injector
11N09_	SCR Reactor
11N11_	SCR Humidity Transmitter
11N17_	SCR Power Distribution Unit (PDU)
11N12_	SCR Air Service Block
11T03_	SCR Reagent Tank*
*: REAGENT tank and tank monitoring is normally not supplied by Wärtsilä and hence is not covered by this Type Approval Certificate	

Table 1: Cabinet / unit names and numbers used in the Wärtsilä NOx SCR system

Hardware	Software (NOR C release version)
COM-10	1.0.X.X

Table 2: Wärtsilä NOR C, C&M system Software

Application/Limitation

This Type Approval covers the "NOR C control and monitoring system", i.e. the control and monitoring system for the NOx SCR system.

The NOR C control and monitoring system covers hardware as listed in document "NOR C – Control and Monitoring System Components", Drw. No. DMTA00002466, rev. E and software as listed in table 2.

This type approval certificate is based on the validity of the Type Approval certificates referred to in document "NOR C – Control and Monitoring System Components", Drw. No. DMTA00002466, rev. E.

Audible annunciating of alarms (both process alarms and system alarms) shall be through the vessels main alarm system. Alarm interface to the vessels main alarm system shall be hardwired and/or via Modbus and arranged fail safe.

A secondary operator station for remote control and alarm handling may optionally be installed within engine room / engine control room. This may either be a dedicated unit or integrated in the vessels

Job Id: **262.1-028752-1**
Certificate No: **TAA000027D**

Integrated Automation System. If dedicated unit is used, alarm announcing as required by Pt.4 Ch.9 Sec.3 [1.5.8] to be observed.

Control of by-pass/blocking damper arrangement is subject to case by case approval and is not covered by this Type Approval Certificate.

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

Reagent injected based on measurements from an optional NOx sensor, emission analyzer or external emission analyzer is subject to case by case approval and is not covered by this Type Approval Certificate.

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

- Project specific block diagram (ref. DAAF351106) **Note A**
- Project specific I/O and parameter list (ref. DBAE852772) **Note A**
- Project specific P&ID / Process layout (ref. DAAF392376) **Note A**

Note A:

Any change compared to the reference drawing shall be clearly identified (by cloud/bold/colour) on the project specific drawing. Substantial changes shall be described and may be subject to case by case approval and certification.

As long as the system is covered by the Type Approval, 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.

Type Approval documentation

Tests carried out

NOR C – Automation Systems Tests for Control and Monitoring System Type Approval, drw. No. DBAF005929, dated 2018-08-03
NOR C – Remote I/O and Bus Component Failure Tests, drw. No. DBAF062167, dated 2018-09-14
NOR C – Main Application SW Test, drw. No. DBAF004753, dated 2018-08-02
NOR C – Dosing Application SW Test, drw. No. DBAF004749, dated 2018-08-02
NOR C – Flow Control Application SW Test, drw. No. DBAF004754, dated 2018-08-02
NOR C – Sootblow Application SW Test, drw. No. DBAF004751, dated 2018-08-02

Marking of product

Wärtsilä NOR control and monitoring system for NOx Selective Catalytic Reduction system.
Cabinets marked according to table 1.
Supply Voltage: 380- 480 VAC or 690 VAC
Frequency: 50/60 Hz
UPS Back-up supply: 24 VDC

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

Periodical assessment is to be performed at renewal of this certificate.

Annex 1 / Declaration

A signed copy of this declaration shall be filled in and submitted to class together with project specific drawings as specified under "Application / Limitations" in each delivery project. Changes in project specific drawings compared to the originally Type Approved revisions shall be clearly identified (by cloud/bold/colour).

1	Production place	
1.1	This subject Control and Monitoring system is produced and configured by Wärtsilä Finland Oy (YES / NO).....	_____
2	Vessel class notations	
2.1	Do the vessel hold additional class notation DP and/or RP (YES/ NO) Note A	_____
3	Propulsion machinery	
3.1	This NOR C Control and monitoring system serves propulsion machinery (YES / NO)	_____
3.2	The no of propulsion engines served are (X / NA)	_____
3.3	Exhaust by-pass is provided (YES / NO) Note B	_____
3.4	Exhaust gas blocking damper provided (YES / NO) Note B	_____
4	Auxiliary machinery	
4.1	This NOR C Control and monitoring system serves auxiliary machinery (YES / NO).....	_____
4.2	The no of auxiliary engines served are (X / NA)	_____
4.3	Exhaust by-pass is provided (YES/NO) Note B	_____
4.4	Exhaust gas damper provided (YES / NO) Note B	_____
5	UREA tank monitoring	
5.1	UREA temperature- and level monitoring is included (YES / NO) Note C	_____
6	System SW	
6.1	The supplied COM-10 SW is 1.0.X.X (YES / NO)	_____
7	Internal tests	
7.1	Internal testing as per documents listed in "Tests carried out" is performed (YES / NO).....	_____
9	Miscellaneous	
9.1	This subject NOR C Control and monitoring system is fitted with a NOx sensor (YES / NO)	_____
9.2	System is covered by instrumentation and components listed in Document NOR C – Control and Monitoring System Components, Drw. No. DMTA00002466, rev. E and have valid TAC's, i.e. not exceeded the expiry date (YES / NO)	_____
9.3	The process instruments not covered by Document NOR C – Control and Monitoring System Components, Drw. No. DMTA00002466, rev. E supplied by Wärtsilä Finland Oy complies with IACS UR E10 (YES / NO).....	_____
9.4	Remote control from IAS or PDU (YES / NO) Note D	_____
The choice shown in BOLD text inside the brackets are covered by this type approval certificate and is the preferred choice. If the actual configuration deviates from the preferred choice, additional documentation and tests may be required. Note A: Additional class notation "DP" and / or "RP" may lead to compliance with rule requirements which is not covered by this type approval. Note B: Control of exhaust gas bypass damper(s) and/or blocking damper(s) are not covered by this type approval certificate. Control and safety of such arrangement is subject to separate approval. Note C: UREA tank monitoring as required by the rules to be verified by the attending surveyor after installation on-board. Note D: If YES, specify location of remote control arrangement in the comment field		
Comments by Wärtsilä		

for Wärtsilä Finland Oy

Sign. / date