Certificate no.:
TAA00003HX

TYPE APPROVAL CERTIFICATE

This is to certify:

that the NOx Selective Catalytic Reduction Control System

with type designation(s)
Control and Monitoring System for SCR

issued to
Göteborgs Energy Systems AB
Hisings Backa, **Sweden**

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 **2025-03-21**
This Certificate is valid until **2027-03-20**.
DNV local unit: **Sweden CMC**

for **DNV**

Approval Engineer: **Andrzej Rosinski**

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 (TA) certificate covers the GESAB SCR C&M system intended for their SCR plant for NOx reduction. Each GESAB SCR C&M system comprises cabinets / units and SW as pr. Table 1 and can control the injection of UREA up to four engines.

Control and monitoring of the SCR plant is normally performed through a dedicated HMI panel in the Dosing Unit (DU), optionally through a Remote Panel (RP).

Depending on the actual installation, the GESAB SCR C&M system may incorporate the following:

- DU with HMI
- HMI in remote location (option)
- Soot blowing (option, depending on fuel type)
- Interface to the ship systems
- Data logging onto a SD-card
- SCR blocking damper (option, required when a single reactor serves multiple engines)
- SCR bypass damper (option)
- Pump unit(option)
- UREA tank monitoring (option) Note

Note: By default, supplied by Yard

The GESAB SCR system can be optionally equipped with a reactor bypass system:

- A single bypass valve controlling the opening of the bypass channel.
- Two independently dampers, one mounted in the bypass channel and the second upstream the reactor.

The bypass damper system contains a safety pressure switch that will automatically open the bypass valve via an independent relay in case of backpressure above safety limit.

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

Cabinet / unit		**Application SW version**
No.	Name	
DU0x	Dosing Unit, inclusive HMI and 750-8213 PLC-Ethernet Programmable Fieldbus Controller	1.3.x
RP0x	Remote Panel (optionally installed, inclusive HMI)	
PU0x	Pump Unit (optionally installed, inclusive UREA tank monitoring for up to 2 separate tanks)	
DS0x	Damper Switchboard (optionally installed, inclusive Simatic S7-1200 PLC)	1.1.x
Note: The main C&M components in the cabinets / units are listed in document “Electric components Type Approval list”, Drw. No GE-LI-203, rev. C. SCR C&M Application SW version tested during TA test: 1.3.1 Blocking damper system SW tested during TA test: 1.1.0		

Place of manufacture

Göteborgs Energy Systems AB
Exportgatan 81A
SE-422 46 Hisings Backa
Sweden

Application/Limitation

All process instruments for SCR plants are covered by this TA certificate except the sensors used for UREA tank monitoring and blocking damper system.

The SCR alarm (“common warning”) and the SCR shut down (“common failure”) shall be relayed to the vessels main alarm system.

Individual exhaust gas blocking dampers are required where exhaust outlet from two or more engines are served by the same reactor. Exhaust gas from up to 4 engines may use the same reactor in single or parallel operation.

SCR plants without exhaust gas bypass shall comply with the requirements in Pt.6 Ch.7 Sec.7 [4.1.2].

Approval Conditions

This TA certificate is based on validity of the TA certificates referred toin document “Electric components Type Approval list” Drw. No GE-LI-203, rev. C.

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 TA certificate together with the following project specific drawings depending on the scope of delivery:

1. SCR Line Diagram (ref. GE-IT-142, rev. 4) **Note A, Note B**
2. Instrument and equipment list (ref. GE-LI-108 rev. E) **Note A**
3. Damper System Line Diagram (ref. GE-IT-143 rev. B) **Note A, Note B, Note C**
4. Damper system instrument and equipment list (ref. GE-LI-096 rev. D) **Note A, Note C**
5. Wiring Diagram, Damper System (ref. GE-IT-070 rev. A) **Note A, Note C**
6. FAT Damper System (ref. GE-FT-040 rev. A) **Note A, Note C**
7. Alarm Test List – DU Appendix A (ref. GE-FR-077 rev. B) **Note A, Note C**

Only drawing 1. and 2. shall be uploaded for approval for SCR plants without bypass and/or blocking dampers.

Drawing 1. – 7. shall be uploaded for approval for SCR plants with bypass and/or blocking dampers.

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 drawing shall include all delivered C&M cabinets (as pr. Table 1). Exhaust gas blocking and by-pass dampers shall be clearly identified on the drawing.

Note C:
Only required for SCR plants with bypass and/or blocking dampers.

As long as the system is covered by this TA certificate is arranged without exhaust gas blocking dampers or by-pass system 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 vessel main/integrated alarm system, and reagent tank-level and temperature monitoring as appropriate.

Clause for application software control
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

According to documents:

- FAT SCR System-Dosing Unit GE-FT-039, rev. D
- Alarm Test List - Dosing Unit GE-FR-076, rev. B
- FAT SCR System - Pump Unit GE-FT-054, rev. C
- Alarm Test List - Pump Unit GE-FR-078, rev. B
- FAT Damper System GE-FT-040, rev. A

Marking of product

SCR control and monitoring system for NOx.
GESAB SCR
Cabinets marked according to information in table 1.

Dosing unit:
Power Supply Voltage: 100- 240 VAC, 50-60 Hz
Control Voltage: 24V DC

Pump unit:
Power Supply Voltage: 380-690 VAC 3-phase, 50 or 60Hz
Control Voltage: 24V DC

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