



TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA0000318
Revision No:
5

This is to certify:
that the Emission Monitoring System

with type designation(s)
MARSIC280

issued to
Endress+Hauser SICK GmbH+Co. KG
Ottendorf-Okrilla, Germany

is found to comply with
DNV GL rules for classification – Ships

Application:

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

Location classes:

Temperature	A / B* / D*
Humidity	B
Vibration	A / B*
EMC	A
Enclosure	A / B* / C*

Issued at **Hamburg** on **2025-04-11**

This Certificate is valid until **2026-09-12**.

DNV local unit: **Augsburg**

Approval Engineer: **Dariusz Lesniewski**



for **DNV**

This document has been digitally signed and will
therefore not have handwritten signature

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 USD 300 000.

Product description

MARSIC280 is a modular extractive multi-component analyser system for measuring of SO₂ and CO₂ concentration in exhaust gas cleaning systems (EGCS) on sea-going ships.

Main system components:

- Gas sampling unit SFU-BF-NI GL (optional 2)
- Gas sampling unit SFU100 (indoor, optional 2)
- Gas sampling unit SFU150 (outdoor, optional 2)
- Heated sample gas line HSL (optional 2)
- Bundle of pipes (optional 2)
- Sample gas conditioning device (SCD)
- Analyzer unit containing the following analyzers
 - SO₂: DEFOR (UVRAS)
 - CO₂: FINOR (NDIR)

Main system features / technical data:

- Measuring range: CO₂ 0 ... 25 Vol. %
SO₂ 0 ... 100 ppm; 0 ... 500 ppm
- Power supply: 115V or 230V, 50Hz /60 Hz
- Degree of protection: IP 23 (SFU-BF-NI GL)
IP 54 (SFU100)
IP 66 (SFU150)

Software version: 4.0.XX

Approval conditions

The following documentation of the actual application is to be submitted for approval in each case:

- Reference to this Type Approval Certificate
- System block diagram
- Power supply arrangement (may be part of the System block diagram)

The Type Approval covers hardware and software listed under Product description.

As long as the units are 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

Application/Limitation

Vibration location class: B* refer to the certificate no. TAA00002N3.

Temperature location class: B* for SFU100, D* for SFU150

Enclosure location class: B* for SFU100, C* for SFU150

The "MARSIC280" is found to be suitable as a continuous monitoring system with a sample point switching for up to two measuring points of:

- SO₂ and CO₂ according MEPC.259(68)/MEPC.340(77)

The functional testing has been demonstrated under surveillance and to the satisfaction of DNV in accordance with MEPC.259(68).

Requirements of MEPC.259(68)/MEPC.340(77), Chapter 6.7, regarding SO₂ loss have been observed.

According to MEPC.259(68)/MEPC.340(77), 6.8, both gas concentrations (CO₂ and SO₂) will be measured at the same residual water content in the sample and therefore no dry-to-wet conversion factors are required in the calculation of the CO₂/SO₂ ratio.

The "MARSIC280" is found to be in compliance with the requirements of MEPC.259(68)/MEPC.340(77), Chapter 6 "Emission Testing" as well as with relevant requirements of Revised MARPOL Annex VI and NOX Technical Code 2008 and meets the following requirements:

- Principle of detection MEPC.259(68)/MEPC.340(77), 6.2
- Accuracy NTC 2008; Appendix III, 1.6
- Precision NTC 2008; Appendix III, 1.7
- Noise NTC 2008; Appendix III, 1.8
- Zero and span drift NTC 2008; Appendix III, 1.9 and 1.10
- Calibration curve NTC 2008; Appendix IV, 5.5.1

- Interference effect NTC 2008; Appendix IV, 9

This is to Note

1. In order to completely fulfil the requirements of MEPC.259(68)/MEPC.340(77) for "continuous emission monitoring" additional equipment (e. g. data recording and processing device) will have to be installed.
2. The ambient temperature should be between +5°C and +45°C for correct operation.
3. The emission monitoring system shall be installed, calibrated and operated in compliance with the operation manual.
4. For SO₂ and CO₂ monitoring according MEPC.259(68)/MEPC.340(77) the calibration interval with calibration of the "MARSIC280" with span gas needs to be done via the gas cooler.
Calibration should be performed acc. to operation manual via sampling probe and gas cooler.

The calibration Interval is defined as follows:

- Zero point calibration will be done on weekly base with instrument air or nitrogen 5.0
- End point calibration is recommended to be done within 3 months with calibration gas

The calibration needs to be checked with calibration gas latest after measurement relevant parts of the "MARSIC280" have been replaced.

5. A system leakage test should be performed every 6 months.

Type Approval documentation

MARSIC280 User Manual, Doc.-No: 8021339/1CHC/V1-1/2021-07
MARSIC280 System Specification, Doc.-ID: E310548 V. 01.1
Operating Instructions MARSIC280 Doc. No. 8030498/AE00/V3-0/2024-06
Operating Instructions SFU Doc. No. 8029819/YJ80/V3-0/2015-08
System Design Requirement Specification SFU1X0 Doc.-ID: E398135 Ver. 00
TREO Test Report No. 014-20, issue 5
SIIQITR Test Report No. W02014330553E issued on 2020-08-20
TüV Nord Test Reports: No. 20087-1-R00 issued on 2020-07-07, No. 20087-2-R00 issued on 2020-08-03
TüV Nord Test Reports: No. 20087-3-R00 issued on 2020-07-07, No. 20087-7-R00 issued on 2020-08-03
SICK Corporate Test Center Test Report No. E406543 dated 2024-07-30
TREO Test Report no. 207-24 Issue 2, dated 2024-07-12
E-Drawings: 9345487 (V 2.9.4), 9345523 (V 2.9.4), 9345486 (V 2.9.4), 9345213 (V 2.9.4),
E-Drawings: 9360775 (V 02), 9401155 (V 02)
DNV Statement of Compliance No. 28294884/DNV
Other documents as referenced in the document E310548 V. 01.1
Type approval assessment report issued at Augsburg on 2020-03-18
Type approval assessment report issued at Changzhou on 2021-09-13

Tests carried out

Applicable tests according to class guideline DNV CG-0339, August 2021.

Marking of product

The products to be marked with:

- manufacturer name
- model name
- serial number
- power supply ratings

Manufactured by:

Endress+Hauser SICK GmbH+Co. KG
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