

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Emission Monitoring System

with type designation(s)
ShipCEMS COMPACT

Issued to

Norsk Analyse AS
Barkåker, Norway

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.

Location classes:

Temperature	A
Humidity	B
Vibration	A
EMC	A
Enclosure	B

Issued at **Høvik** on **2023-06-30**

for **DNV**

This Certificate is valid until **2025-06-29**.

DNV local station: **East & South Norway CMC**

Approval Engineer: **Frode Nygård**

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Frederik Tore Elter
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

The ShipCEMS COMPACT continuous emission monitoring system is designed to monitor and report traces of gas substances contained in scrubber exhaust gas.

The analyzer have capabilities to measure multiple variants of gasses such as NO_x, CO, H₂O, CO₂, SO₂, CH₄ and O₂ on request.

The ShipCEMS COMPACT Cabinet (SCC) comprises the following units as required:

Analyser Module	Tunable T2500-30 or T2000-30 CEMS Analyser
PLC	WAGO 750-8102 ¹⁾
HMI	SIMATIC KTP-700 ²⁾
Sample Probe (SP)	-

¹⁾ Hardware is covered by separate type approval certificate TAA00001J4

²⁾ Hardware is covered by separate type approval certificate TAA0000341

Software versions at time of testing:

Software Version	Release date	Description
V1.3	2022-10-20	Operating Firmware (PLC)
V1.3	2022-10-20	User Interface (HMI)

Measuring range: SO₂: 0...1000ppm, CO₂: 0...15%, NO: 0-2000 ppm, NO₂: 0-500 ppm,
CO: 0-2000 ppm, CH₄: 0-10000 ppm, O₂: 0-25%, H₂O: 0-10000 ppm

Communication Interface: Modbus TCP/IP or RS-485
Power supply: 110-220V AC 60 Hz, 1700W (including Probe)

Place of manufacture

Norsk Analyse AB
Nyängsgatan 5, 66434 Grums,
Sweden

Application/Limitation

DNV shall be informed prior to installation of ShipCEMS COMPACT onboard DNV classed vessels. A reference to this type approval shall be included. The Type Approval covers hardware and software listed under Product description.

When the ShipCEMS is used in installations intended to comply with requirements for SO₂ and CO₂ analyzer specified in Chapter 6 of MEPC.340(77) - (adopted on 26 November 2021) "2021 Guidelines for Exhaust Gas Cleaning Systems" the following requirements are to be met:

- Accuracy (NTC 2008, App. III, 1.6)
- Precision (NTC 2008, App. III, 1.7)
- Noise (NTC 2008, App. III, 1.8)
- Zero and span drift (NTC 2008, App. III, 1.9/1.10)
- Calibration curve (NTC 2008, App. IV, 5.5.1)
- Interference effect (NTC 2008, Appendix IV, 9)

The ShipCEMS COMPACT marine continuous emission monitoring system shall be installed, calibrated and operated in compliance with the manufacturer's instructions and in accordance with the requirements of DNV Pt.4 Ch.6 and in accordance of the NO_x Technical Code 2008, Chapter 5 and associated appendices.

This Type Approval certificate does not cover the exhaust gas sample lines.

Correct configuration and set up for each delivery to be tested during commissioning after installation.

Application software control

All changes in software are to be recorded as long as the system is in use on board. Documentation of major changes is to be forwarded to DNV for evaluation and approval before implemented on board. Certification of modified functionality may be required for the particular vessel.

Software update notification

When the type approved software is revised (affecting all future deliveries) DNV is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

Type Approval documentation

Document no.	Title	Rev	Date
120-28012-1	Test for marine type approval of ShipCEMS COMPACT cabinet	-	2020-12-15
E20013.04	Test for marine type approval of Natural Gas Analyzer Model T2000 & T2500	04	2022-05-25
REP10012	Test report T2000 CEMS analyser	00	2021-06-21
REP10017	Test report T2500-30 gas analyser	02	2023-06-19
50118-D44-01	Internal Factory Test Procedure for ShipCEMS COMPACT (DNV Witnessed)	01	2022-08-24
NA-E-SPC-048	Software Spesification & Revision History ShipCEMS COMPACT	-	2022-10-21
NA-E-USM-107	User Manual ShipCEMS COMPACT	01	2021-05-28
NA-E-INS-106	Installation Manual ShipCEMS COMPACT	01	2021-06-29
50118-1001	ShipCEMS COMPACT, Hook-Up Locations	00	2022-09-29
50118-1003	ShipCEMS COMPACT, General Arrangement	00	2022-09-29
50118-1004	ShipCEMS COMPACT, Wire Dampers on Unistrut	00	2022-09-29
50118-1201	ShipCEMS COMPACT, General Arrangement, Sample Prob (SP)	00	2023-04-18
50118-1202	ShipCEMS COMPACT, Sample Probe (with Calibration port) (SP)	00	2022-09-29
50118-3001	ShipCEMS COMPACT, System Diagram	00	2022-09-29
50118-5001	ShipCEMS COMPACT, Termination Drawing - Overview	00	2022-09-29
50118-5002	ShipCEMS COMPACT, Termination Diagram, Power distribution	00	2022-10-04
50118-5003	ShipCEMS COMPACT, Termination Diagram, Signal distribution	00	2022-09-04
50118-5005	ShipCEMS COMPACT, Termination Diagram, Sample Probe (SP)	00	2022-09-29
50118-5006	ShipCEMS COMPACT, Termination Diagram, Condensation drain tank alarm	00	2022-09-29
50118-6001	ShipCEMS COMPACT, System Block Diagram, P&ID - Distribution overview	00	2022-09-29
50118-6002	ShipCEMS COMPACT, System Block Diagram, Sign & Power - Distr. overview	00	2022-09-29
50118-8201	ShipCEMS COMPACT, Network Map	00	2022-09-29
PDST2500-30	Product Data Sheet T2500-30 CEMS analyser	A1	-
	Type approval assessment report, DNV Sandefjord		2021-05-26
	Type approval assessment report, DNV Örebro		2022-08-24

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.
 Functional testing according to factory acceptance test procedure FAT

Marking of product

The products to be marked with:

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

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