

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Emission Monitoring System

with type designation(s)
M800

Issued to
OPSIS AB
Furulund, Sweden

is found to comply with

Application :

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

Temperature	A
Humidity	B
Vibration	B
EMC	A
Enclosure	Required protection according to DNV GL Rules shall be provided upon installation on board

Issued at **Hamburg** on **2021-10-07**

This Certificate is valid until **2026-10-06**.

for **DNV**

DNV local station: **Sweden CMC**

Approval Engineer: **Didier Girardin**

Joannis Papanuskas
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

Opsis M800 – Emission Monitoring System by Optical, non-contact, cross-duct technique

measures SO₂, CO₂ and NO_x using the reference methods NDUV and NDIR.

M800 Marine System with the main components

Model name/type	Designation	Added info
AR620M	Analyzer	SO ₂ , CO ₂ and NO _x
ER060M	Optical Emitter	
ER062M	Optical Receiver	transmit and receive light over a light path up to 5m
OF060R/OF100B	Optical Fiber Cable	
AC180M	Cabinet	Including control&monitor, keyboard, main power supply
PS150	Power supply	for xenon lamp, data logger, AC unit, Pressure sensor, air-condition (AC181)

Analyser type AR620M: Software Version 7.21

Approval conditions

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

When the hardware is used in applications to be classed by DNV GL, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV GL rules for classification of ships Pt.4 Ch.9 Control and monitoring systems.

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)

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.

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 GL for evaluation and approval before implemented on board. Certification of modified functionality may be required for the particular vessel.

Application/Limitation

The "M800" is found to be suitable as a continuous monitoring system with a sample point switching for up to 9 measuring points

OPSIS M800 was tested to requirements: NO_x Technical Code 2008, "Technical Code on control of emission of nitrogen oxides from marine diesel engines" and Resolution MEPC.259(68) adopted on 15. May 2015, "2015 Guidelines for exhaust gas cleaning systems".

The exhaust gas analyzer "OPSIS M800" is found to be suitable as a component of a continuous monitoring system of NO_x- and SO_x emissions to comply with the requirements of MEPC.259(68) as well as with relevant requirements of Revised MARPOL Annex VI and NTC 2008.

The "OPSIS M800", in combination with other equipment, may be used in the context of:

- Simplified measurement method (Chapter 6.3; NTC 2008),
- Direct Measurement and monitoring method (Chapter 6.4; NTC 2008),
- Continues monitoring of SO_x emissions (Chapter 6; MEPC.259(68))

The "OPSIS M800" meets the following requirements:

- Principle of detection for SO₂ (MEPC.259(68), 6.2)
- Principle of detection for CO₂ (MEPC.259(68), 6.2 and NTC 2008, Appendix III, 3)
- Analyser Performance
- 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)
- The equivalence of the alternative sensors for NO_x (NO + NO₂) have been demonstrated under

surveillance and to the satisfaction of DNV GL in accordance with ISO 8178:2006 Part 1, Annex D.

Component	Sensor type	Typical Range	Max. Range
SO ₂	NDUV	0 – 50 ppm	0 – 50 ppm 0 – 10000 ppm
CO ₂	NDIR	0 – 12 vol.-%	0 – 30 vol.-%
NO ₂	NDUV	0 – 50 ppm	0 – 100 ppm
NO	NDUV	0 – 1000 ppm	0 – 2000 ppm

The “OPSIS M800” shall be installed, calibrated and operated in compliance with the manufacturer’s instructions and in accordance with the requirements and intervals as specified in Revised MARPOL Annex VI and NTC 2008.

For simplified measurement method (Chapter 6.3; NTC 2008), direct Measurement and monitoring method (Chapter 6.4; NTC 2008) the “OPSIS M800” must be operated and calibrated in accordance with the requirements and intervals specified in NOx Technical Code 2008.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, December 2019.

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

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE