



Type Approval Certificate

[Emission Sensor]

Initial Approval 26 July 2023

Manufacturer Danfoss IXA A/S
Marsvej 5, DK-6000 Kolding, Denmark

Product Description Emission Sensor (Type : MES1001 and MES1001 MARPOL)
" See Appendix 1 "



Approval Condition " See Appendix 1 "

THIS IS TO CERTIFY that the above-mentioned product has been approved in accordance with the relevant requirement of this Society's Rules and / or of the recognized standards as follows.

Pt. 6, Ch. 2, Art. 301 of the Rules for Classification of Steel Ships.

This Certificate is valid until 25 July 2028
Issued at Busan, Korea on 26 July 2023



This certificate is signed electronically in accordance with IMO FAL.5/Circ.39/Rev.2. Validation and authentication of the certificate can be confirmed from "<http://e-cert.krs.co.kr>" by using the tracking No(ME23032981115) and certificate No.(CPH42471-AE001).



KOREAN REGISTER

*General Manager of
Marine & Ocean Equipment Team*

- Note :**
1. This certificate will be valid subject to complying with the approval conditions described on the certificate and/or on the Rules of this Society.
 2. This certificate will be invalid from the expiry date aforementioned unless the extension or renewal has been granted to the applicant or the manufacturer.
 3. Any significant modifications or changes in design or construction to the above product without approval from this Society will render this certificate invalid.
 4. Should the specified rules, regulations or standards be amended during the validity of this certificate, the product is to be re-approved by this Society in accordance with the requirements as amended.

Product Description and/or Approval Condition

Date of Issue : 26 July 2023

A. Product Description

1. Product Specification

1) Product Description

- The in Situ Emission Sensor MES1001 and MES1001 MARPOL are a marine emission sensor intended for measuring gases in various maritime applications. The marine emission sensor measures the content of these gases: NO_x, SO₂ and NH₃ in the engine exhaust gas.

The sensor unit is mounted on the wall of the exhaust pipe and measures the exhaust gas passing the sensor probe.

A) Specification

- Power Supply : 24VDC \pm 25%
- Technology : UV absorption spectroscopy (UV-DOAS)
- Input / Output : 4 x analogue output(4 - 20 mA)
Digital inputs: 2 (relay controlled)
Digital outputs: 2 (relay controlled)
- Range : NO - 0 ~ 1500 ppm
NO₂- 0 ~ 500 ppm
SO₂- 0 ~ 1000 ppm
NH₃- 0 ~ 100 ppm
- Communication interface : Modbus TCP/IP, RS-422
- Software Version : 5. x. x (Refer to Doc.100591-REP)

2. Approved Drawings and Documents

1) Approved Drawings

- Data Sheet for MES1001, Doc. No. 100300-DSH Rev. I
- Data Sheet for MES1001 MARPOL, Doc. No. 101222-DSH Rev. B
- Drawing No. 100100-PRD Rev. E7
- Drawing No. 100101-PRD Rev. A2
- Drawing No. 100131-PRD Rev. E1
- Drawing No. 100133-PRD Rev. F
- Drawing No. 100171-PRD Rev. G
- Drawing No. 100446-PRD Rev. A
- Drawing No. 100567-PRD Rev. B
- Drawing No. 101067-PRD Rev. A

3. Test Reports, etc.

1) Test Reports

- Report No. 120-32700-1 dated 2020-12-01
- Report No. DANAK-19/15872 dated 2015-11-19
- Report No. 100592-REP-A dated 2018-01-09
- Report No. 120-34782 dated 2020-11-27
- Report No. 101301-REP-A dated 2020-09-17
- Report No. 100343-REP-A dated 2016-02-24
- Report No. 100344-REP-A dated 2016-02-06
- Report No. 101163-REP-D dated 2022-04-04
- Report No. 101164-REP-A dated 2022-04-04

2) Manuals

- User Guide, Doc. No. 100320-MAN Rev.H
- Installation Guide, Doc. No. 100310-MAN Rev. E

B. Approval Condition

1. Application & Limitation

- 1) This approval is granted on the basis of the test reports and the approved documentation.
- 2) Degree of protection is to be complied with Rule Pt.6 Ch.1 Sec.2 201.2. (5).

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- 3) The manufacturer is to inform this Society of all kinds of revisions of the equipment including the major change of software. If the changes are recognized to affect functionality of the approved equipment, type test to confirm the reliability of the revised equipment may be performed in the presence of our surveyor.
- 4) Test items have been carried out in accordance with NTC 2008, Appendix III.
 - Accuracy (NTC 2008, Appendix III, Ch. 1.6)
 - Precision (NTC 2008, Appendix III, Ch. 1.7)
 - Noise (NTC 2008, Appendix III, Ch. 1.8)
 - Zero and span drift (NTC 2008, Appendix III, Ch. 1.9 and Ch. 1.10)
 - Calibration curve (NTC 2008, Appendix IV, Ch. 5.5.1)
 - Interference effect (NTC 2008, Appendix IV, Ch. 9)
 - ISO 8178-1:2006, Annex D
- 5) Installation, calibration and operation are to be in accordance with Manufacturer's Instruction and with the requirements as specified in MARPOL Annex VI and NTC 2008.
- 6) The operating ambient temperature should be 0 - 55° C for the sensor and the exhaust gas temperature max. 500° C at the probe.

2. Individual Product Cert. and Drawing Approval Requirement

- 1) Individual Product Certification is not required.

3. Marking

- 1) The product or packing is to be marked with the manufacturer's name and type designation on a suitable position.

4. Others

- 1) Test condition

Test	Condition	Remark
EMC	All locations excluding the bridge and deck zone	-
Temperature	0°C ~ +55°C	-
Vibration	Acceleration $\pm 4.0g$	-
IP Grade	IP 55	-

< End of Certificate >