Certificate no.:
TAA00003G0

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Monitoring System

with type designation(s)
T2500 Emissions Analyser

issued to
Tunable AS
Oslo, **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	**B**
Enclosure	**A**

Issued at **Høvik** on **2024-11-28**

This Certificate is valid until **2029-11-27**.

for **DNV**

DNV local unit: **Oslo Maritime and CAP**

Approval Engineer: **Frode Nygård**

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

The T2500 Emissions Analyser is designed for real-time gas analysis and have capabilities to measure multiple variants of gasses such as NO_x, CO, H_2O, CO_2, SO_2, CH_4 or N_2O on request.

This Type Approval Certificate covers the T2500 Emissions Analyser and comprises:
- Gas sample inlet and outlet,
- Gas sample analysis,
- Modbus interface to surrounding systems,
- Ethernet port for service purpose.

The standard system setup-up will include communication between the T2500 Emissions Analyser and customer/application specific controller using Modbus (not covered by this type approval).

Nominal voltage: 24V DC

Place of manufacture

Tunable AS
Kabelgata 8,
0580 Oslo
Norway

Approval conditions

This Type Approval certificate covers hardware listed under Product description.

For installation of the subject system onboard DNV classed vessels, the following project specific documentation of the actual application shall be submitted for information (I) in each case:
- (I) Reference to this Type Approval certificate
- (I) Signal block diagram (shall indicate the physical location of the product listed under Product description)
- (I) Power supply arrangement (may be part of the System block diagram)

The T2500 Emissions Analyser shall be installed, operated and calibrated in accordance with the requirements and intervals as specified in *T2500 Emissions Analyser Operating Manual.*

When T2500 Emissions Analyser is installed onboard DNV classed vessels the correct configuration and set up for each delivery is to be tested during commissioning after installation.

Application/Limitation

This Type Approval certificate does not cover the full system including gas sample lines, power supply arrangement or HMI panel.

The equivalence of the alternative sensors for NOX (NO + NO2) have been demonstrated under surveillance and to the satisfaction of DNV in accordance with paragraph 5.4.2 of the NTC 2008 and ISO 8178-1:2006, Annex D.
See also reference to DNV Statement of Compliance Certificate Doc No.:33557466/DNV

This Type Approval certificate does not cover the full system requirements of MARPOL Annex VI, Regulation 4 & MEPC.340(77), MARPOL Annex VI Regulation 13 and NTC2008.

Installation and performance as required by these regulations shall be verified separately when the T2500 Emissions Analyser is used in installations intended to comply with requirements for SO_2 and CO_2 analyser 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)

DNV shall be informed prior to installation of T2500 Emissions Analyser onboard DNV classed vessels.

Type Approval documentation

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

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