

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Gas Detector**

with type designation(s)

Type G16 Smoke Density Monitor, Type G26 Ambient Oil Mist Detector

Issued to

**Green Instruments A/S
Brønderslev, Denmark**

is found to comply with

DNV GL 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 GL.****Location classes:**

Type	Temperature	Humidity	Vibration	EMC	Enclosure
Type G16 Smoke Density Monitor	A	B	B	A	B/IP66
Type G26 Ambient Oil Mist Detector	A	B	A	A	B/IP66

This Certificate is valid until **2022-01-16**.Issued at **Høvik** on **2017-01-17**DNV GL local station: **Aalborg**for **DNV GL**Approval Engineer: **Nils Jarem**

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Odd Magne Nesvåg
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.

Product description

Green Instruments' G16/G26 is an opacity monitor for monitoring of the clarity of air or gaseous media. The opacity monitor uses a green light beam based on the principle of light transmission. It is a double-pass system from which a light beam with specific spectral characteristics is projected across the media to be monitored. The amount of light reflected back to the instrument from the reflector after passing through the media is compared with the maximum possible return when light absorbing and scattering media are not present in the area. By calculating the difference between the emitted light and the received light specifications related to the light absorbing or scattering media can be obtained. The Opacity Monitor can be used in two applications:

- Type G16 Smoke Density Monitor: Monitoring the opacity inside a process (e.g. the exhaust emission from the vessels, flue gas, air ducts, etc.)
- Type G26 Ambient Oil Mist Detector: Monitoring Opacity in an open space (e.g. for detecting oil mist leakage in engine/pump room, dust in concentration from industrial processes, etc.)

Approval conditions

The Type Approval covers hardware 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.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, November 2016.
Performance tests according to ASTM D6216-07: Section 7.5 & A.1.3.3, section 7.7, section 7.8 & A1.3.5, section 7.11 & A.1.3.12, section 6.10, section 6.12

Marking of product

The products to be marked with:

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

Job Id: **262.1-024083-1**
Certificate No: **TAA0000024**

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