DNV·GL

Certificate No:
TAA00002U4

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Miscellaneous Transmitter

with type designation(s)
G6111 PAH SENSOR

Issued to
Green Instruments A/S
Brønderslev, Nordjylland, 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:

Temperature	**A**
Humidity	**B**
Vibration	**A**
EMC	**A**
Enclosure	**IP68**

Issued at **Høvik** on **2020-08-25**
This Certificate is valid until **2025-08-24**.
DNV GL local station: **Denmark CMC**

for **DNV GL**

Approval Engineer: **Frode Nygård**

Marta Alonso Pontes
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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.

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Job Id: **262.1-033692-1**
Certificate No: **TAA00002U4**

Product description

UV-fluorometer for measurements of polycyclic aromatic hydrocarbons (PAH) in water.

Power supply: 24VDC (+/-15%)
Signal Interface: 0/4…20mA analog output
RS-232 digital output
Connector: M12 industrial connector with 1m fixed cable
Enclosure Material: Black PVC
Protection: IP68

Software version: 1.0.0

Type	Component	Measurement	Low Range	High Range
G6111 PAH SENSOR	$PAH_{(phe\ equivalents)}$	Fluorescence	0 – 100 µg/l	0 – 800 µg/l

The measuring range is depending on the washwater flow rate and can be adjusted in accordance with the requirements of Resolution MEPC.259(68) adopted on 15. May 2015 "2015 Guidelines for exhaust gas cleaning systems - Section 10 "Washwater".
The PAH sensor is intended for installation on-board vessels operating an exhaust gas cleaning system (EGCS). The PAH sensor is found to be in compliance with the requirements of Resolution MEPC.259(68) - 2015 Guidelines for exhaust gas cleaning adopted on 15 May 2015, Chapter 10, "Washwater".
G6111 PAH sensor meet the following requirements:
- Principle of detection for $PAH_{PHE\ Eq}$ (MEPC.259(68), 10.1.3.3)
- Measurement range for $PAH_{PHE\ Eq}$ (MEPC.259(68), 10.1.3.3)
- Turbidity influences on $PAH_{PHE\ Eq}$ (MEPC.259(68), 10.2.3)

The operating temperature is from 0°C to 55°C

Application/Limitation

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.

Product certificate
If specified in the Rules, ref pt. 4 Ch. 9 Sec 1. the control and monitoring system in which the above listed hardware is used shall be delivered with a product certificate. The certificate can be issued either by the sensor manufacturer or the manufacturer of the application system before the product is shipped to the yard. The test shall be done according to a test program following the sensor manufacturer's instruction. After certification, the clause for software control will be put into force.

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.

Correct on-board configuration and integration into the wash water monitoring system will still be subject to verification against the requirements of MEPC.259(68) for each delivery and is to be tested during commissioning after installation.
The PAH sensor shall be installed, operated and calibrated in accordance with the requirements and intervals as specified in the Product brief description.

Type Approval documentation

Tests carried out

Applicable tests according to DNV GL CG-0339, December 2019.
Tests according to the relevant parts of the referenced MEPC resolution.

Marking of product

The products to be marked with:
- manufacturer name
- product type
- serial number
- power supply ratings
- measurement range

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