Certificate No:
TAA0000379

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Emission Monitoring System

with type designation(s)
CEMS-SH2020

Issued to
Nantong Sanhe Energy Technology CO., Ltd,
Nantong, Jiangsu, China

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.

Temperature	**A**
Humidity	**B**
Vibration	**A**
EMC	**A**
Enclosure	**B (IP44)**

Issued at **Hamburg** on **2022-09-19**
This Certificate is valid until **2027-09-18**.
DNV local station: **Nantong**

Approval Engineer: **Jens Dietrich**

for **DNV**

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.

Product description

CEMS-SH2020
Continuous Emission Monitoring System Gas Analysis Cabinet contains the following components:
-Sample Gas valve
-Sample Gas Cooler
-Calibration Valve
-Sample Gas Cooler
-Sample Gas Pump
-Gas Filter
-Gas Analyser
-Flow Meter
-Check Valve

Technical data:
-Measure gases; SO_2, CO_2
-Measuring principle: NDIR (CO_2) and DOAS (SO_2)
-Measuring ranges CO_2 : 0…25vol.%, SO_2: 0…100ppm
-Response time ≤ 30s
-Accuracy <2% FS
-Ambient temperature 0…50°C
-Degree of protection: IP44
-Power supply: 220VAC, 50/60Hz.

Approval conditions

The Type Approval covers hardware listed under Product description.

As long as the units are covered by this Type Approval, a product certificate according to Pt.4 Ch.9 Sec.1 will not be required. Correct configuration and set up for each delivery to be tested during commissioning after installation onboard. The software version needs to be recorded in the OMM.
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 for evaluation and approval before implemented on board. Certification of modified functionality may be required for the particular vessel.

The Marine Exhaust Gas Monitor System CEMS SH2020 is found to be suitable as a continuous monitoring system of SO_2 and CO_2 according MEPC.340(77), “2021 Guidelines for exhaust gas cleaning adopted on 26. November 2021, Chapter 6 “Emission Testing”.

The SH2020 shall be installed, calibrated and operated in compliance with the manufacturer’s instructions and in accordance with the requirements of the NO_X Technical Code 2008 (NTC2008), Chapter 5 and associated appendices.

The SH2020 system meets the following requirements:

- Principle of detection for CO_2 (MEPC.340(77), 6.2)
- Accuracy (NTC2008, App. III, 1.6)
- Precision (NTC2008, App. III, 1.7)
- Noise (NTC2008, App. III, 1.8)
- Zero and span drift (NTC2008, App. III, 1.9/1.10)
- Calibration curve (NTC2008, App. IV, 5.5.1)
- The equivalence of the sensors for SO_2 (UV-DOAS alternative to NDUV or NDIR) have been demonstrated to the satisfaction of DNV.

For SO_2 and CO_2 monitoring according MEPC.340(77) the calibration interval with calibration gas could be prolonged up to one week without exceeding the zero and span drift to ensure that the requirements of 1.7 to 1.10 of appendix III of the NO_X Technical Code 2008 are met.

In order to completely fulfil the requirements of MEPC.340(77) for “continuous emission monitoring” additional equipment (i.e. data recording and processing device) will have to be installed.

Tests carried out

Applicable tests according to DNV CG-0339, August 2021.
Functional performance test witnessed by DNV Nantong.

Marking of product

Type plate on cabinet showing: Maker, CEMS, Type SH2020, Analyzer Type: JA180, serial number, measuring ranges, output signals, 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