



Certificate no.:
TAA00003CS

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Emission Monitoring System

with type designation(s)
PanGMS

issued to

Panasia Co., Ltd.
Busan, Korea, Republic of

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	A
Vibration	A
EMC	A
Enclosure	B

Issued at **Høvik** on **2024-07-04**

This Certificate is valid until **2026-07-03**.

for **DNV**

DNV local unit: **Gimhae Station**

Approval Engineer: **Thorbjørn Hansen**

.....

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 300,000 USD.



Form code: TA 251

Revision: 2023-09

www.dnv.com

Page 1 of 3

Product description

The Panasia PanGMS is an exhaust gas monitoring system, intended for use in exhaust gas scrubber systems installed to comply with the requirements in MEPC.340(77). The gas monitoring system is housed in a wall mounted IP44 steel enclosure along with all electrical, electronic and pneumatic equipment required to analyze, control and outputs. The system comprises the following main components:

- Sample probe/hose
- Gas analyzer
- Smart display unit

The 4.3" smart display unit analyzes the signal received from gas analyzer and calculates and displays the SO₂/CO₂ ratio. SO₂, CO₂, SO₂/CO₂ ratio, alarm, operating mode, etc. are available on Modbus, intended for external recording.

Main Supply	220VAC 60Hz	
Emergency Supply (Optional)	220VAC 60Hz	
Power Consumption	3300 W (Based on 20M Sample Hose, Changeable)	
Measuring Method	NDIR (Non Dispersive Infra- Red)	
Measuring Gas	SO ₂	CO ₂
Range	0 – 1000 ppm (Changeable)	0 - 25 % V / V
Accuracy	±2% of the reading over the whole measuring range or ±0.3% of full-scale, whichever is larger.	
Measuring Points	1 channel	
Output	RS-485/422 Dry Contact for power failure (PF) Dry Contact for common alarm (CA)	
Operating Temperature	5°C ~ 55°C (Optional : Air Conditioner)	
SW version	FW-PA-1300G-1.0.0	

Place of manufacture

Panasia Co., Ltd
Busan, Republic of Korea

Application/Limitation

The Type Approval covers hardware and software listed under Product description.

Software control

All changes in software are to be recorded as long as the system is in use on board. Re-test of compliance according to MEPC.340(77) maybe required. 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 PanGMS is found to be suitable as a continuous monitoring system of SO₂ and CO₂ according MEPC.340(77) – “2021 Guidelines for exhaust gas cleaning systems” adopted on 26. November 2021.

The PanGMS marine continuous emission monitoring system meets the following requirements:

- Principle of detection MEPC.340(77), 6.2
- Accuracy NTC 2008, Appendix III, 1.6
- Precision NTC 2008, Appendix III, 1.7
- Noise NTC 2008, Appendix III, 1.8
- Zero and span drift NTC 2008, Appendix III, 1.9/1.10
The calibration interval is 1 months without exceeding the zero and span drift.
- Calibration curve NTC 2008, Appendix IV, 5.5.1
- Interference effect NTC 2008, Appendix IV, 9

Approval conditions

When the PanGMS is used in exhaust gas scrubber installations, correct configuration and set up for each delivery to be verified after installation:

- Interface to data logger (correct data logged at the required sampling rate)
- Power fail alarm (PF, terminal C and NO to be used, verify alarm at cable break and power fail)
- Common alarm (CA, terminal C and NO to be used, verify alarm different system fail)

Application/Limitation

When the type approved software is revised (affecting all future deliveries) DNV is to be informed by forwarding updated document no. TA-GMS-001-11 Quality control / Software Version History. If the changes are judged to affect functionality for which rule requirements apply, a new functional type test may be required, and the certificate may have to be renewed to identify the new software version.

Type Approval documentation

Tests carried out

Applicable tests according to DNV CG-0339, August 2021.

Test proof based on MEPC.340(77).

Marking of product

GAS MONITORING SYSTEM

GMS CONTROL PANEL

SERIAL NO.

PANASIA

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

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE