Certificate No:
TAA00002RN

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Automatic Gas Detection System

with type designation(s)
Fixed Gas Sampling System GDS-10000,
Fixed Gas Sampling & Detection System GDS-20000,
Repeater GSM-100

Issued to
GASTRON Co., Ltd.
Kyunggi-do, **Republic of Korea**

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.

Location classes:

Type	Temperature	Humidity	Vibration	EMC	Enclosure
Fixed Gas Sampling System GDS-10000	B	B	A	B	B
Fixed Gas Sampling & Detection System GDS-20000	B	B	A	B	B
Repeater GSM-100	B	B	A	B	B

Issued at **Høvik** on **2021-03-23**
This Certificate is valid until **2023-03-22**.
DNV local station: **Seoul**

Approval Engineer: **Frode Nygård**

for **DNV**

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 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.

Product description

Gastron fixed gas detection systems GDS-10000 series and GDS-20000 Series detect presence of flammable gases, toxic gases or oxygen levels and modular design that can monitor various spaces onboard.
The systems are designated as modular design with combinations as follows:

1. Type designation GDS-10001 Gas Sampling Panel is designed to measure the presence of combustible HC gas, oxygen and hydrogen sulphide for Pump Room and Water Ballast Tanks.
2. Type designation GDS-20001 Gas Sampling Panel (LNG) is designed to measure the presence of combustible HC gas in local areas.
3. Type designation GDS-20002 Gas Detection Panel is designed to detect the presence of combustible HC gas in local areas.
4. Type designation GSM-100 Repeater Panel can be used as option for both GDS-10000 series and GDS-20000 series.

The following components/hardware are included in this type approval:

Unit no.	Product	Description	GDS-10000	GDS-20000
GDS-10001	Panel Enclosure	Cabinet, Sampling Panel(COT)	x	
GDS-20001	Panel Enclosure	Cabinet, Sampling Panel(LNG)		x
GDS-20002	Panel Enclosure	Cabinet, Detection Panel(LNG)		x
GSM-100	Repeater Panel	Screen 7” TFT LCD	x	x
X2 Pro 15*	Touch screen monitor	Built in HMI	x	x
TM241CE40U**	PLC Main	PLC logic controller	x	x
TM3AI8***	AI Module	Module 8 analog inputs	x	x
TM3DQ16R***	DI Module	Module 16 relay outputs	x	x
CSF300-24	DC Power Supply	PS (output current 13.0 A)	x	x
GTC-700 COMMON	Common Unit	Module analog inputs & RS485		x
GTC-700 AI	AI Unit	Module 8 analog inputs		x
GTC-700 RS485	RS485 Unit	Module RS485		x
NMP830KNE	Sampling pump	Diaphragm sampling pump	x	
NO26ANE	Sampling pump	Vacuum sampling pump	x	x
K-307 SERIES	Solenoid valve		x	x
PFM-7 SERIES	Flow meter		x	x
AM-150C	Mist Separator		x	x
KAF-201	Air filter		x	x
KAW-201	Regulator		x	x
FR-100	Flame arrester		x	x
GIR-3000(CH4)	Gas Detector	IR Type Meth. Vol%	x	x
GTD-2000Ex(CH4)	Gas Detector	Catalytic Type Meth. Vol%	x	
GTD-2000Tx(O2)	Gas Detector	Oxygen. 0-30%vol	x	
GTD-2000Tx(H2S)	Gas Detector	Hydrogen sulphide. 0-100ppm	x	

Refer to separate type approval certificate: *TAA000008D, **TAA00002K0, ***TAA00000VM,
GIR-3000; GTD-2000Ex; GTD-2000Tx(O2); GTD-2000Tx(H2S), TAA00001KW (temperature class D)

Place of manufacture

Gastron Co.,Ltd
23, Gunpocheomdansaneop 1-ro, Gunpo-si,
Gyeonggi-do, 15881, Korea

Application/Limitation

System arrangement and application to be in accordance with relevant parts of DNV GL Rules.

Connected gas detectors shall be type approved by DNV or MED approved.

The type approval does not cover the external piping system.

Installations in hazardous area to be approved in each case according to DNV GL Rules.

The following documentation of the actual application of the systems is to be submitted for approval in each case:

- System block diagram, incl. power supply arrangement
- Project-specific functional description, incl. clear description of Cause&Effects (only GDS-20002)
- Software version and list of components/quantities, incl. reference to type approval certificate
- Test program for certification (when required as stated in this certificate)
- Arrangement drawing showing location of suction points and central units, including external piping data (only GDS-20002)

When the type approved software is revised (affecting all future deliveries) DNV is to be informed by forwarding updated software version documentation. 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.

Product certificate
With exception of the system type stated below, the GDS-10001, GDS-20001 and GDS-20002 is to be certified for each delivery according to Pt.4 Ch.9 Sec.1.
The certification test is to be performed at the manufacturer of the application system before the system is shipped to the yard. After the certification the clause for application software control will be put into force.

For GDS-10001, GDS-20001 and GDS-20002 systems consisting of one central unit for detection and alarm with no automatic safety actions are exempted from requirement for product certification provided the delivery is covered by this type approval certificate.

Ex installations to be approved in each case according to the Rules and Ex-Certification/ Special Condition for Safe Use listed in valid Ex-certificate issued by a notified/recognized Certification Body.

Ex-certification is not covered by this certificate and the following paragraph, which is for information only, is based on information received from the manufacturer, but not verified by DNV.

Information on Ex-Certification received from manufacturer – Not verified by DNV		
Equipment	Certified	Certificate No.
GTD-2000Ex	Ex d IIC Gb T5 (Ta -20°C to +60°C)	IECEx SIR 08.0003 Issue No.9
GTD-2000Ex	⟨Ex⟩ II 2G Ex d IIC Gb T5 (Ta -20°C to +60°C)	SIRA 08ATEX1003 Issue No.8
GTD-2000Tx GIR-3000	Ex d IIC Gb T6 (Ta -20°C to +60°C)	IECEx SIR 08.0003 Issue No.9
GTD-2000Tx GIR-3000	⟨Ex⟩ II 2G Ex d IIC Gb T6 (Ta -20°C to +60°C)	SIRA 08ATEX1003 Issue No.8

Clause for application software control
Current software versions for system (software history doc. no. GQ-1905-005-1) are V4.3, HMI V42.138.
All changes in software including application configuration are to be recorded as long as the system is in use on board.
Documentation of major changes are to be forwarded to DNV for evaluation and approval before implemented onboard.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNVGL-CG-0339, December 2019.
In-House DNV Type Approval Functional Test.

Tests for HC gas detectors and O_2 gas detector have been carried out according to standards as in KR MED-certificate: MED-MB-9003-13

For the bridge mounted components the 'Acoustic noise and signals' were measured according to sections 11.1 of IEC 60945, 4th edition (2002) with enclosure models as above.

For the bridge mounted components the 'Compass safe distance' was measured according to section 11.2 of IEC 60945 4th edition (2002) in the enclosure models type as below with the following results:

- Repeater Panel GSM-100: minimum compass safe distance: 50 cm

Marking of product

Components are marked with product name, product number, serial number and revision.
System software is visible on HMI.
Application software (configuration file) is visible on HMI.

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