Certificate no.:
TAP00002U8

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Inert gas generator

with type designation(s)
H-NGS-50, H-NGS-100, H-NGS-200, H-NGS-300, H-NGS-400, H-NGS-500, H-NGS-600, H-NGS-700, H-NGS-800, H-NGS-900, H-NGS-1000

issued to
Headway Technology Group (Qingdao) Co., Ltd.
Qingdao, Shandong Province, China

is found to comply with
DNV rules for classification – Ships Pt.5 Ch.5 Oil tankers
DNV rules for classification – Ships Pt.5 Ch.6 Chemical tankers
DNV rules for classification – Ships Pt.4 Ch.9 Control and monitoring systems
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG
DNV rules for classification – Ships Pt.6 Ch.2 Sec.6 Low flashpoint liquid fuelled engines – LFL fuelled
DNV rules for classification – Offshore units

Application:

Production of inert gas generator for marine and offshore application purposes. Capacity range: 50 to 1000 m3 (based on the model), Nitrogen purity greater than or equal to 95%, dew point: -40°C (See next pages)

Issued at **H□vik** on **2024-09-16**
This Certificate is valid until **2029-09-16**.
DNV local unit: **Qingdao NB & CMC**

Approval Engineer: **Fabian Pirozzi Chiusa**

for **DNV**

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

Inert gas Nitrogen Generator System Model H-NGS complying with the applicable requirements to be installed on oil tankers, chemical tankers, LNG carriers and offshore units.

Characteristics:

- Operating pressure: ≤12bar
- Operating gas temperature range: 4.4 to 55℃
- Dew point: -40℃
- Capacity: 50 to 1000 m3 (based on the model)
- Nitrogen purity: ≥95%
- Compressed air supplement flow rate: 123 to 2464 m3/h (based on the model)
- Power: AC380/440, 50/60Hz & AC220V, 50/60Hz

The nitrogen generator system, with servo equipment including two air compressors, refrigerated dryer, air tank, and nitrogen buffer tank, compromises of:

- Oxygen Analyzer
- Membranes
- NGS Control Unit
- NGS Power Distribution Unit
- Filter
- Valve
- Regulatory Valve
- Flow Meter

Compressor, dryer, air tank, nitrogen buffer tank, and piping system outside the cabinet are not included in this certificate.

The control system hardware is type approved, see Type Approval Certificate No:

PLC	Siemens S7.1215C	TAA000000K
HMI	Beijer X2 PRO 7	TAA00000N8

The following software is included in the Type Approval:

PLC	SiemensS7.1215C	Ver:21.1.006.02
HMI	Beijer X2 PRO 7	Ver:21.1.006.032.1.4

The software number and version are listed in document HMTQW-11 Software Version History.

Approval conditions for Control System

For each delivery of the type approved system, the following project specific documents shall be submitted:

- I050 Power supply arrangement
- S011 Piping and Instrumentation diagram (P&ID)
- I110 List of control and monitored points
- Reference to this Type Approval Certificate

Major changes to the type approved system affecting future deliveries shall be informed to DNV. If the changes are considered 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 version. Minor changes are covered by this type approval.

Product certificate.
Each delivery of the application system is to be certified 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.

Clause for application software control
All changes in software are to be recorded as long as the system is in use on board. Records of major changes are to be forwarded to DNV for evaluation and approval and shall be approved before implemented on board.

Application/Limitation

The Nitrogen Generator System, model H-NGS is intended for production of nitrogen for marine and offshore application purposes.
- Capacity, N2 purity and dry air quality as stated on product description is to be regarded as a nominal range as given by maker and has not been documented as part of this approval. Actual capacity, purity of N2 and quality of dry air is to be tested and documented for each delivery.
- This Type Approval is based on examination of drawings and documentation as listed below.
- Correct configuration and set-up for each delivery to be tested during commissioning after installation.
- Drawings of complete system configuration from air intake to end user(s) are to be submitted by the shipyard for approval as relevant for each separate delivery.
- Design Pressure: 12 barg
- Piping Flange Class GB, DIN, JIS, ANSI threaded/welded
- TAC does not cover the installation of double block and bleed valves, as specified in FSS code Ch.15 [2.2.3.1.2].
- For LNG tankers: dew point of 100% pure nitrogen shall be at least below minus 70℃.

Type Approval documentation

	Drw No	Rev	Title	Date
28	H-NGS-PID-50-1000	A2.3	Nitrogen generator system PID	06.09.2024
24	H-NGS-IO	A.1	I/O List for NGS	19.08.2024
22	H-NGS-RF	A.0	Remote control unit function and alarm list	20.03.2024
23	H-NGS-AF	A.0	Assessment report	28.02.2024
25	NGS-F-24R	A.0	Functional Test Report	16.04.2024
27	H-NGS-QR	A.1	FAT procedure	16.04.2024
20	NGS-F-23EN	A.2	Functional Test	10.11.2023
12	H-NGS-SDI	0	Nitrogen generator system control system functional description	12.10.2023
15	H-NGS-LMP	A.0	LMP List Of Monitored Points	12.10.2023
16	H-NGS-NRCU	A.0	NRCU Nitrogen generator system remote control unit	03.06.2022
17	H-NGS-NPDU	A.0	Nitrogen generator system power distribution unit	03.06.2022
13	HMTQW-11	A.0	Software Version Management	20.05.2020
10	H-NGS-BOM-50-1000	A.0	Bill of Materials for Ocean Guard NGS	03.06.2022
5	H-NGS-NCU	A.0	NCU NITROGEN Control Unit	03.06.2022
8	NGS-M-001EN	A.2	NGS User Manual	06.09.2023
9	H-NGS-AZ	A.0	Dimension Drawing	03.06.2022
3	H-NGS-E	A.0	Electrical drawings	03.06.2022
2	H-NGS-ZZ	A.0	NGS Assembly drawing	03.06.2022
1	H-NGS-MP-50-1000	A.0	Nameplate	15.03.2022

Tests carried out

Documentation	H-NGS-F-24R
Test report title	Functional test report
Date of test	16.04.2024
Location	Headway Technology (Qingdao) Co., Ltd.
Test inert gas generator	
Model	H-NGS-200
Serial No.	N23002T

Marking of product

For traceability to this type approval the products are to be permanently marked:

- Manufacturer`s name or trade mark
- Type designation
- Size
- Reference to DNV TA-Certificate
- Additional marking at manufacturers' option.

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

For retention of the Type approval, a DNV surveyor shall perform periodical assessments for type approvals with a validity period of five years will be required after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is given to DNV-CP-0338.

END OF CERTIFICATE