Certificate No:
TAP00002E9

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible hoses of metallic material with permanently fitted couplings

with type designation(s)
HMF-DW00, HMF-DW45

Issued to
HAN KOOK FLEXIBLE CO.
Busan, Korea, Republic of

is found to comply with
DNV rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV class programme DNV-CP-0184 – Type approval – Flexible hoses with permanently fitted couplings

Application :

Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV.

Type:	Temperature range:	Max. working press.:	Sizes:
HMF-DW00	0°C - 100°C	Inner 5 bar, outer 5 bar	DN50/DN80, DN50/DN100 and DN80/DN125
HMF-DW45	0°C - 100°C	Inner 5 bar, outer 5 bar	DN50/DN80, DN50/DN100 and DN80/DN125

Issued at **Høvik** on **2022-05-30**
This Certificate is valid until **2027-05-29**.
DNV local station: **Gimhae Station**

Approval Engineer: **Jane Lozanov**

for **DNV**

Zeinab Sharifi
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

Annular convoluted double wall hose assemblies with one inner and one outer layer of wire braid reinforcement, delivered with flanged connections, constructed from the following materials:

Flange	:	STS316/316L
Pipe	:	STS316/316L
Bellows	:	STS316/316L
Wire braid	:	STS304/304L, STS316/316L
Braid band	:	STS304/304L, STS316/316L
Ring plate	:	STS316/316L
O-ring	:	EPDM
Elbow	:	STS316/316L

Manufacturing location for hoses and end-fittings:
20, Gaya-daero 103beon-gil, Sasang-gu, Busan, Korea

Application/Limitation

This certificate is valid for the specific assembly of hose and coupling type as specified, assembled, and delivered by the holder (named as manufacturer) of this certificate.

Inner hose medium natural gas.
Outer hose medium fresh air.

At elevated temperatures, maximum allowable working pressure is to be reduced according to ISO 10380 Table A.4, as below:

Temperature °C	≤20	50	100
	Reduction Factor		
Grade 304	1	0.88	0.73
Grade 304L	1	0.87	0.72
Grade 316	1	0.90	0.78
Grade 316L	1	0.88	0.74
Grade 321	1	0.92	0.83

Flexible hoses are only to be used in short lengths where it is necessary due to vibrations or flexible mounting of the machinery. They shall not be used where fixed piping is possible/required. Also, flexible metallic hoses shall not be used in systems where they may be subject to high pressure pulsation or vibration.

The hoses must only be fitted on places where they are always accessible for inspection.

All hoses used in fuel oil, lubricating oil and compressed air systems must be possible to shut off from the system.

Leak detection function/ systems are not covered under the scope of this approval.

Welding shall fulfil requirements in DNV-RU-SHIP Pt.2 Ch.4.

Production testing

Each hose assembly shall be hydrostatically tested at a hydrostatic pressure of 1.5 times the maximum working pressure and shall be delivered with the pressure test report with reference to the type approval certificate (product certificate is not required).

Type Approval documentation

Tests carried out

Burst test, pliability, leak tightness test, bending fatigue test and prototype test.

Marking of product

For traceability to this Type Approval, the products are at least to be marked with:

- hose manufacturer's name or trade mark;
- date of manufacture (month/year);
- designation type reference;
- nominal diameter;
- pressure rating;
- temperature rating.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment 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 made to DNV-CP-0338.