Certificate No:
TAP00002B3

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible hoses of metallic material with permanently fitted couplings

with type designation(s)
DF-A 1000, DF-A 3000, DF-A 7200

Issued to
Dong Woo FGM Co., Ltd.
Busan, **Republic of Korea**

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV GL class programme DNVGL-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:
DF-A 1000	-10°C to +300°C	20 bar (see page 2)	DN08, 10, 15, 20, 25, 32, 40, 50 and 65
DF-A 3000	-10°C to +300°C	20 bar (see page 2)	DN10, 15, 20, 25, 32, 40, 50, 65, 80, 100, 125 and 150
DF-A 7200	-10°C to +300°C	20 bar (see page 2)	DN08, 10, 15, 20, 25, 32, 40, 50 and 65

Issued at **Høvik** on **2021-05-31**
This Certificate is valid until **2026-05-30**.
DNV local station: **AK Admin Support**

Approval Engineer: **Andreas Hansen**

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 hose assemblies with one outer layer of wire braid reinforcement, delivered with flanged or threaded connections, constructed from the following materials:

Hose	:	SUS 304 / KS D 3698
Braid reinforcement	:	SUS 304 / KS D 3703 and SUS 304 / KS D3576
End pipe	:	SUS 304 / KS D 3576 / ASTM A240M / ASME-SA240
Ferrule	:	SUS 304 / KS D 3536
End fittings	:	SUS 304 / KS D 3705 / ASTM A479 / JIS G 4318

Manufacturing location for hoses and end-fittings:
Dong Woo FGM Co., Ltd.
1581-14, Song Jeong-Dong
Kangseo-Gu, Pusan, Korea (618-270)

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.

The flexible hoses covered by this certificate may be used in freshwater cooling systems, sprinkler systems (fresh water), lubrication oil, fuel oil, hydraulic oil, compressed air, steam (class III) and condensate applications.

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

Temperature	≤20	50	100	150	200	250	300
Reduction factor	1	0.88	0.73	0.66	0.60	0.56	0.52

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.

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.

Hose assemblies covered by this certificate shall not be used in LNG/LPG systems or fuel piping systems.

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

End connections shall fulfil the restrictions in Pt.4 Ch.6 Sec.9 [5] and Pt.6 Ch.2 Sec.5 [11.2] as below:

- Threaded joints having pipe threads where pressure-tight joints are made on the threads:
  1) with parallel or tapered threads, shall comply with requirements of a recognized national or international standard.
  2) shall not be used for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur.
- Mechanical joints other than standard bolted flanges are not covered by this certificate and shall be type approved separately in accordance with DNVGL-CP-0185.

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 and leak tightness test, bending fatigue test, and pressure pulsation 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 DNVGL-CP-0338.