DNV·GL

Certificate No:
TAP00001K6

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible Hoses of Metallic Material with permanently fitted couplings

with type designation(s)
MW22, DW32, DW72

Issued to
Senior Flexonics GmbH
KASSEL, Germany

is found to comply with
DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV GL rules for classification – Ships Pt.5 Ch.6 Chemical tankers
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 :

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Type:	Temperature range:	Max. working press.:	Sizes:
MW22	-196°C to + 550°C	see manufacturer's instructions	DN 8 [5/16"] to DN 300 [12"]
DW32	-196°C to + 550°C	see manufacturer's instructions	DN 100 [4"] to DN 300 [12"]
DW72	-196°C to + 550°C	see manufacturer's instructions	DN 12 [1/2"] to DN 80 [3"]

Issued at **Hamburg** on **2018-10-31**
This Certificate is valid until **2023-10-30**.
DNV GL local station: **Essen**

Approval Engineer: **Guido Friederich**

for **DNV GL**

Olaf Drews
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.

Product description

Stainless steel corrugated hoses, single wall with end fittings providing the following design types:
Corrugated hose without braiding, single or double braiding.
The corrugated hoses may be provided with e.g. following end fitting types:

End fitting type	Standard
Pipe socket with collar flange	DIN EN 1092-1
Nipple with male thread	DIN EN ISO 228
Nipple with male thread	DIN EN 10226-1
Malleable cast iron nipple, male thread	DIN EN 10226-1
Sleeve with female thread	DIN EN 10226-1
Tube socket	DIN EN 10305-4 / DIN EN ISO 8434-1

Other end connection types: see manufacturer's instruction

MW22 U0 Corrugated hose - No brading	MW22 U1 Corrugated hose - One brading	MW 22 U2 Corrugated hose - Two bradings

Materials [1,2] / DN	Austenitic stainless steels	
	Hose	Brading
DN 8 – DN 100	1.4404 / AISI 316 L	
DN 12 – DN 300	1.4541 / AISI 321	1.4301 / AISI 304
DN 125 – DN 300	1.4571 / AISI 316 Ti	

DW 72 [32] U0 Corrugated hose - No brading	DW 72 [32] U1 Corrugated hose - One brading	DW 72 [32] U2 Corrugated hose - Two bradings

Materials [1,2] /DN	Austenitic stainless steels	
	Hose	Brading
DN 12 – DN 300	1.4571 / AISI 316 Ti	1.4301 /AISI 304

Notes:
[1] Depending on service and operating requirements as well as DNV GL Rules applicable for flexible hose installation material certificates including relevant material properties to be issued with the following certificate type:
Refer to DNV GL Rules Pt.1, Ch.3, Sec. 5.

Certificate type	Standard and DNV GL Rule compliance
TR (test report)	EN 10204 – 2.2
DNV GL Certificate VL Certificate	Certificate confirming compliance with DNV GL Rules and relevant material standard, validated and signed by a DNV GL Surveyor
Material certificate (MC)	Certificate confirming compliance with DNV GL Rules and relevant standard, issued by the manufacturer

[2] Flexible hoses subjected to cryogenic applications shall be provided with material certificates for the relevant minimum design temperature covering material properties at the additional specified test temperature, in particular charpy impact test results. See DNV GL Rules Pt. 5 Ch.7 – Liquefied gas tankers, Section 6 - Materials

Application/Limitation

The metal hose assemblies are type approved for the following applications:

Piping systems classed within in DNV GL PipeClass I; Class II, Class III.

Installation

For installation the manufacturer's instruction and DNV GL Rules Pt. 4 Ch.6 – Piping systems, Section 9 are to be mandatory observed.

Tests carried out

The following tests have been carried out.
Test standard: ISO 10380

- Pressure impulse test, test medium liquid nitrogen at teste temperature of -196°C
- Tightness test, test pressure in amount of 1,5 times the design pressure
- Burst pressure test, test pressure in amount of 5 times the design pressure

Type Approval documentation

Marking of product

The flexible hose including end fittings shall at least be marked with:

	Marking scope	**Example**
Hose and end fitting	Manufacturer name	Senior Flexonics
	Nominal size	DN 100
	Working pressure	40 bar
	Type designation	DW 72

Periodical assessment

For retention of the type approval certificate periodical assessments shall be carried out at production places by DNVGL surveyor.

The objective of the periodical assessment is to verify that the design and production conditions for the type approval have not been altered.

Main scope of the assessment:

- verification of the production and quality control system
- review of quality control documentation of recent deliveries
- review of drawings in production to verify any design changes which may have an impact on data specified in the type approval certificate, performance and range of application
- verification of the product marking

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

End of certificate