

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible Hoses of Metallic Material with permanently fitted couplings

with type designation(s)

HYDRA RS 321L12, RS 330L12, RS 331L12, RS 430L12/L22/L42/L52/L92, RS 531 L12/L22

Issued to

Witzenmann GmbH
PFORZHEIM, Germany

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems

DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition July 2015

Application :

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

The hoses may be used for: Lube -, Cargo- and Fuel oil, Gaseous fuel, Compressed air, Steam and Condensate, Fresh water and Sanitary, Exhaust lines from engines and Liquefied Gas (see cert.)

Temperature range: -196 / -55 to 450°C (see cert.)

Max. working press.: 0,05 bar(absolute) to 250 bar (depending on type and size, see cert.)

Sizes: DN 6 to DN 300 mm (see cert.)

This Certificate is valid until **2019-12-31**.

Issued at **Høvik** on **2015-11-13**

for **DNV GL**

DNV GL local station: **Essen**

Approval Engineer: **Tom Berg-Nielsen**

Marianne Spæren Marveng
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

Corrugated stainless steel hoses, stainless steel single or double braided with couplings.

Materials:

	W.No	DIN std.	eqv. AISI
<i>Hose / Couplings</i>	1.4541	DIN EN 10028-7	321
	1.4404		316L
	1.4435		316Ti
	1.4571		
	1.0037		
	1.0038		
	1.0460		
	1.0345		
	1.0425		
	1.0254		
	1.0255		
	1.0718		
<i>Braiding</i>	1.4301	DIN EN 10028-3	304
	1.4306		304L
	1.4571	DIN EN 10088-3	316Ti

Application/Limitation

The hoses can be used in short lengths in the following systems on board:

- Lubricating -, Cargo - and Fuel oil systems
- Gas fuel systems
- Compressed air systems
- Steam and condensate systems
- Fresh and sanitary systems
- Exhaust lines from engines
- Cargo oil lines
- Liquefied gas at min. service temperature -196°C (Type: RS321, RS330, RS331 and RS430 hoses made of materials with WNo. 1.4301, 1.4306, 1.4435, 1.4541 and 1.4571 see remark

Temperature range:

- RS321, RS330, RS331 and RS430 hoses made of materials with WNo. 1.4301, 1.4306, 1.4404, 1.4541 and 1.4571 : -196°C to 450°C
- Other hoses: -55°C to 450°C

At elevated temperatures, the maximum allowable pressure has to be reduced with the following factors:

	Temperature °C											
	-196	-55	20	50	100	150	200	250	300	350	400	450
Stainless steel	1	1	1	0,95	0,85	0,77	0,71	0,67	0,63	0,60	0,58	0,57
Carbon steel	-	1	1	1	1	0,89	0,81	0,72	0,65	0,59	0,54	0,50

Maximum working pressure:

	RS 321	RS 330	RS 331	RS 430				
DN	L12	L12	L12	L12	L22	L42	L52	L92
6 mm	100 bar	-	150 bar	-	-	-	-	-
8 mm	65 bar	-	100 bar	-	-	-	-	-
10 mm	65 bar	-	100 bar	-	-	-	-	-
12 mm	50 bar	-	65 bar	-	-	-	-	-
16 mm	50 bar	-	65 bar	-	-	-	-	-
20 mm	40 bar	-	40 bar	65 bar	100 bar	-	-	-
25 mm	40 bar	-	50 bar	50 bar	100 bar	-	-	-
32 mm	20 bar	-	25 bar	65 bar	65 bar	-	-	-
40 mm	20 bar	-	40 bar	40 bar	65 bar	-	-	-
50 mm	16 bar	-	25 bar	50 bar	65 bar	-	-	-
65 mm	16 bar	-	25 bar	25 bar	50 bar	-	-	-
80 mm	10 bar	-	16 bar	16 bar	25 bar	-	-	-
100 mm	6 bar	20 bar	10 bar	10 bar	16 bar	-	-	-
125 mm	-	16 bar	-	10 bar	16 bar	-	-	-
150 mm	-	6 bar	-	-	-	10 bar	16 bar	16 bar
200 mm	-	-	-	-	-	10 bar	16 bar	16 bar
250 mm	-	-	-	-	-	6 bar	10 bar	10 bar
300 mm	-	-	-	-	-	4 bar	6 bar	6 bar

Maximum working pressure:

	RS531	
DN	L12	L22
5 mm	150 bar	200 bar
6 mm	200 bar	250 bar
8 mm	200 bar	250 bar
10 mm	150 bar	200 bar
12 mm	100 bar	200 bar
16 mm	140 bar	200 bar

Flexible hoses are only to be used where it is necessary due to vibrations or flexible mounting of the machinery.

The hoses must only be fitted on places where they are always accessible for inspection.
It must be possible to shut off from the system all hoses used in the fuel oil, lubricating oil and compressed air systems.

The hoses are not to be used in bilge- and ballast systems.

The hoses may not be used in systems subjected to high-pressure impulses

Regarding LNG/LPG:

Gas supply piping within machinery spaces shall be equipped with a gastight external enclosure (not covered by this type approval).

Gas supply piping within machinery spaces may be accepted without a gastight external enclosure on the following conditions:

- 1 Engines for generating propulsion power and electric power shall be located in two or more machinery spaces not having any common boundaries unless it can be documented that a single casualty will not affect both spaces.
- 2 The gas machinery space shall contain only a minimum of such necessary equipment, components and systems as are required to ensure that the gas machinery maintains its function.
- 3 A fixed gas detection system arranged to automatically shut down the gas supply, and disconnect all electrical equipment or installations not of a certified safe type, shall be fitted. The hoses are to be mounted according to the manufacturer's instructions, and the hoses are to be supplied with end couplings from the manufacturer.

Hoses intended for liquefied gas applications are to be delivered with the manufacturer's product certificate.

The Rules Pt.4 Ch.6 Sec.6 D, Pt.5 Ch.7 and the respective Government Authorities Regulations are to be complied with.

Each hose is to be hydraulically pressure tested to 1, 5 times the maximum working pressure before installation/delivery.

Type Approval documentation

Tests carried out

The following tests are done according to Legacy DNV TAP5-791.80:
Burst test, Bending Fatigue test, Static Bending test.

Marking of product

For traceability to this type approval each hose is to be marked with:

- Manufacturers name or trade mark
- Type designation

Periodical assessment

For retention of the Type Approval, DNV GL Surveyor shall perform a survey every second year, to verify that the conditions for the type approval are complied with and to witness a burst test on a selection of sizes. Obtained burst pressure shall at least be:

- 5 times maximum working pressure for hoses intended for liquefied gasses
- 4 times maximum working pressure for hoses approved for other applications.

The tests are to be performed with the type of couplings fitted that is Type Approved with the hoses.

END OF CERTIFICATE