

# TYPE APPROVAL CERTIFICATE

Certificate No:  
**TAP00000CF**  
Revision No:  
**5**

## This is to certify:

**That the Valve for Liquefied Gas**

with type designation(s)

**ZRK 3, ZRD 3, ZRD SS, SR 30.40, SR 50.40, SR 55.40, SR99, HSR 30.160**

Issued to

**RITAG Ritterhuder Armaturen GmbH & Co. Armaturenwerk KG**  
**OSTERHOLZ-SCHARMBECK, Germany**

is found to comply with

**DNV rules for classification – Ships Pt.4 Ch.6 Piping systems**  
**DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers**  
**DNV class programme DNV-CP-0186 – Type approval – Valves**

## Application :

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

Issued at **Hamburg** on **2023-04-18**

for **DNV**

This Certificate is valid until **2028-04-17**.

DNV local unit: **Bremerhaven**

Approval Engineer: **Ana Cristina Do Carmo Insfran**

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**Sven Klinger**  
**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

Cryogenic Check Valves, Cryogenic Dual Plate Check Valves

Valve type	DN	PN
ZRK 3	DN 50 – DN 200 DN 2" – DN 8"	PN 16 – PN 40 / ANSI Class 150 – 300
*ZRD 3	DN 50 – DN 200 DN 2" – DN 8"	PN 16 – PN 40 / ANSI Class 150 – 300
*ZRD SS	*DN 2"	*PN 100 / ANSI Class 600
SR 30.40	DN 15 – DN 200 DN ½" – DN 8"	PN 6 – PN 40 / ANSI Class 150 – 300
SR 50.40	DN 15 – DN 200 DN ½" – DN 8"	PN 6 – PN 40 / ANSI Class 150 – 300
SR 55.40	DN 15 – DN 200 DN ½" – DN 8"	PN 10 – PN 40 / ANSI Class 150 – 300
SR 99	DN 15 – DN 200 DN ½" – DN 8"	PN 16 – PN 40 / ANSI Class 150 – 300
HSR 30.160	DN 25 – DN 50 DN 1" – DN 2"  < DN 50 – DN 200 < DN 2" – DN 8"	PN 400 / ANSI Class 2500  PN 250 / ANSI Class 1500

Design temperature range: -165°C to +20°C

### Materials:

Valve item	EN Material	ASTM Material
Valve body	1.4404, 1.4408, 1.4571	SA 182 F 316L
Plate	1.4404, 1.4408, 1.4571	SA 182 F 316L, SA 351 CF8M
Spring	1.4571	
Seal	NBR, EPDM, FKM, PTFE, metallic	

Materials for fabrication of pressure retaining valve items such as valve body and bonnet shall be supplied by DNV Approved Material Manufacturers.  
 All material properties shall comply with requirements specified in DNV Rules Materials & Welding Pt.2 Ch. 1 to Ch. 4.

Materials for valve bodies and bonnet to be installed in cryogenic systems, e. g. LNG, as well as in ship's gas fuel systems shall comply with DNV Rules Pt.5 Ch.7 – Liquefied gas tankers, Section 6 – Materials of construction, quality control and marking.

For cryogenic application material certificates shall provide material properties for the relevant minimum design temperature, in particular Charpy impact test results according to DNV Rules Pt. 5 Ch. 7, Table 4.

### Application/Limitation

Valve operating media include nitrogen and cryogenic liquefied gases including LNG.

#### Limitation

Valves shall not be used for media specified as toxic and/or dangerous fluids.

## Type Approval documentation

Type Approval Application dated on 2023-02-23  
 Type Approval Assessment Report dated on 2023-04-03  
 Appendix to Application form to Type Approval – production site  
 Cryogenic Test Report - Nr. 2023029/ Cry- 17.02.21-01 dated on 2023-02-17  
 Drawings nr: dated on 2023-03-09  
 9800020479 (GA-DNV-1200XXXX-01\_001); 9800020898 (GA-DNV-1200XXXX-02\_001);  
 9800020364 (GA-DNV-1200XXXX-03\_001); 9800020065 (GA-DNV-1200XXXX-04\_001);  
 9800020XXX (GA-DNV-1200XXXX-05\_001); 9800020XXX (GA-DNV-1200XXXX-06\_001);  
 9800020XXX (GA-DNV-1200XXXX-07\_001); 9800020XXX (GA-DNV-1200XXXX-08\_001);  
 9800020XXX (GA-DNV-1200XXXX-09\_001); 9800020XXX (GA-DNV-1200XXXX-10\_001);  
 9800020XXX (GA-DNV-1200XXXX-11\_001); 9800020XXX (GA-DNV-1200XXXX-12\_001);  
 9800020XXX (GA-DNV-1200XXXX-13\_001); 9800020XXX (GA-DNV-1200XXXX-15\_001);  
 9800020XXX (GA-DNV-1200XXXX-16\_001); 9800020XXX (GA-DNV-1200XXXX-18\_001);  
 9800020XXX (GA-DNV-1200XXXX-17\_001); 9800020XXX (GA-DNV-1200XXXX-19\_001);  
General drawings:  
 99211035, dated: 12.07.2006 / 99211006, dated: 28.12.2005 / 99214006, dated: 06.12.2005 /  
 99213026, dated: 17.12.2013 / 94203789, dated 10.01.2006 / 94203466, dated 12.12.2012 /  
 94111180, dated 13.02.2013 / 94110034, dated 11.08.2015 / 94202394, dated 25.06.2007  
 94203463, dated 24.05.2012 / 94111186, dated 12.02.2013 / 94110037, dated 25.09.2016/  
 94001302, dated 15.04.2015 / 94000506, dated 27.04.2009 / 94111191, dated 25.06.2013 /  
 94110080, dated 02.11.2012  
 Pressure test report-No: 13-031254, dated 17.12.2013  
 Dye Penetrant test report-No.: 13-031254, dated 17.12.2013  
 Cold shock test report-No.: 13-031254, dated 09.12.2013  
 GL-Ref. No: 13-031254, Legacy GL Approval Certificate 61 696-14 HH  
Drawings:  
 99211010 dated on 2006-01-26  
 99211075 dated on 2008-01-23  
 99211035 dated on 2006-07-12  
 99211157 dated on 2009-12-10  
 Cryogenic test report Nr.: Cry-28.07022-01 and Cry-28.07.22-02 dated on 2022-07-28  
 Test report/ Inspection – MTC\_12000943-05\_001-CCS dated on 2022-02-09  
 Test report/ Inspection – MTC\_12000943-06\_001-CCS dated on 2022-02-09  
 BKW Report \_ Nr. 4922-40927 Rev. 0 dated on 2022-04-29

## Tests carried out

Pressure test, Dye Penetrant test, Cold shock test, Cryogenic test

## Production testing

- I. Application for Liquefied gas tankers
1. Certification of valves [ DN ≥ 100 or Working temperature < -55°C]  
 For all valves having a nominal Diameter DN ≥ 100 or a working temperature below -55°C a product certificate has to be issued by DNV based on the following scope of tests and according to:  
 DNV Rules Pt. 5 Ch. 7 – Liquefied gas tankers, Section 5, Item 13.2

<u>Type of test</u>	<u>Test pressure</u>
Shell (body) strength	1,5 times the design pressure
Seat tightness test	1,1 times the design pressure
Functional test	Design / work pressure

### Pt. 5 Ch. 7, Section 1, Table 7 – Certification of components

<u>DN ≥ 100 or Working temperature &lt; -55°C</u>	<u>Type of certificate / Issued by</u>
	VL Certificate / DNV

2. Additional cryogenic testing – 10 % of the batch  
 In addition, cryogenic testing consisting of valve operation and leakage verification for a minimum of 10% of each type and size of valve intended to be used at a working temperature below -55°C shall be carried out. (Cryogenic testing is subject to DNV approved test plan.)

3. Material certification of valves working temperature < -55°C  
 DNV Rules Pt. 5 Ch. 7 – Liquefied gas tankers

Pt. 5 Ch. 7, Section 1, Table 8 – Certification of material quality and testing  
 Material certificates of valve bodies

Valve nominal diameter  
 DN ≥ 100  
 DN < 100

Type of Certificate / Issued by  
 VL Certificate / DNV  
 W Works Certificate / Manufacturer

### Production testing - continuation

4. Certification of valves [ Working temperature ≥ -55°C]  
 For all valves intended for use at a working temperature ≥ -55°C a works certificate has to be issued based on the tests listed above and according to DNV Rules Pt. 5 Ch. 7 – Liquefied gas tankers, Section 1

Valve nominal size  
 DN < 100 mm

Type of certificate / Issued by  
 W Works Certificate / Manufacturer

Material certificates (valve bodies)  
 W Works Certificate, issued by Manufacturer

### Important Note:

For valves intended to be installed in ship's gas fuel systems certification requirements according to DNV Rules Pt. 6 Ch.2 Section 5 – "Gas fuelled ship installations" are to be observed. These are different to applicable requirements provided in DNV Rules Pt. 5 Ch. 7– Liquefied gas tankers.

- II. Application in machinery piping systems  
 Valves intended to be installed in piping system listed in DNV Rules Pt.4 Ch.6 – Section 1 shall be certified according to DNV Rules Pt.4 Ch.6 – Piping systems, Section 9

Valve nominal size / Pressure rating  
 DN > 100 mm / PN > 16 bar  
 DN ≤ 100 mm / PN ≤ 16 bar

Type of certificate / Issued by  
 VL Certificate / DNV  
 W Works Certificate / Manufacturer

Ship side valves DN > 100 mm  
 regardless of pressure rating

VL Certificate / DNV

Material certificates (valve bodies)  
 In accordance with DNV Rules Pt.4 Ch.6 – Piping systems, Section 2 – Table 3

Note: Each valve is subject to final inspection at manufacturer's workshop in the presence of a DNV Surveyor

### Marking of product

For traceability to this type approval, each check valve is to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Size
- Max. design pressure(s) or pressure class

### 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 Type Approval are complied with. Refer to DNV CP-0338, Sec.4.

- The certificate is only valid if required periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

### END OF CERTIFICATE