

TYPE APPROVAL CERTIFICATE**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

Issued to

**RITAG Ritterhuder Armaturen GmbH & Co. Armaturenwerk
KG****Osterholz-Scharmbeck, 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.4 Ch.6 Piping systems****DNV GL class programme DNVGL-CP-0186 – Type approval – Valves****Application :****Products approved by this certificate are accepted for installation on all vessels classed by
DNV GL.**Issued at **Hamburg** on **2018-03-14**for **DNV GL**This Certificate is valid until **2023-03-13**.DNV GL local station: **Bremerhaven**Approval Engineer: **Guido Friederich**.....
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.



Job Id: **262.1-022632-3**
 Certificate No: **TAP00000CF**
 Revision No: **3**

Product description

Cryogenic Check Valves, Cryogenic Dual Plate Check Valves

Valve type	ZRK 3	ZRD 3 / SS	SR 30.40	SR 50.40	SR 55.40	SR 99
DN	DN 50 - DN 200			DN 15 - DN 100		
	DN 2" - DN 8"			DN ½" - DN 4"		
PN	PN 16 - PN 40 / ANSI Class 150 - ANSI Class 300					
	DN 2"/ ANSI Class 600 / PN 100					

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 GL Approved Material Manufacturers.

All material properties shall comply with requirements specified in DNV GL 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 GL 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 GL 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

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, daed 27.04.2009 / 94111191, dated 25.06.2013 /
- 94110080, dated 02.11.2012

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Tests carried out

- 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-RefNo: 13-031254, Legacy GL Approval Certificate 61 696-14 HH

Production testing

I. Application for Liquefied gas tankers

1. Certification of valves [DN \geq 100 or Working temperature $<$ -55°C]

For all valves having a nominal Diameter DN \geq 100 or a working temperature below -55°C a product certificate has to be issued by DNV GL based on the following scope of tests and according to:

DNV GL Rules Part 5, Chapter 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 \geq 100 or Working temperature $<$ -55°C</u>	<u>Type of certificate / Issued by</u>
	VL Certificate / DNV GL

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 GL approved test plan.)

3. Material certification of valves working temperature $<$ -55°C

DNV GL Rules Part 5, Chapter 7 – Liquefied gas tankers

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

Material certificates of valve bodies

<u>Valve nominal diameter</u>	<u>Type of Certificate / Issued by</u>
DN \geq 100	VL Certificate / DNV GL
DN $<$ 100	W Works Certificate / Manufacturer

4. Certification of valves [Working temperature \geq -55°C]

For all valves intended for use at a working temperature \geq -55°C a works certificate has to be issued based on the tests listed above and according to DNV GL Rules Part 5, Chapter 7 – Liquefied gas tankers, Section 1

<u>Valve nominal size</u>	<u>Type of certificate / Issued by</u>
DN $<$ 100 mm	W Works Certificate / Manufacturer

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

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Production testing - continuation

Important Note:

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

II. Application in machinery piping systems

Valves intended to be installed in piping system listed in DNVGL Rules Pt.4,Ch.6 – Section 1 shall be certified according to DNV GL 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

Ship side valves DN > 100 mm
regardless of pressure rating

Type of certificate / Issued by

VL Certificate / DNV GL

W Works Certificate / Manufacturer

VL Certificate / DNV GL

Material certificates (valve bodies)

In accordance with DNV GL 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-GL 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

A condition for retention of the Type Approval Certificate in its validity period is that periodical assessments are successfully carried out.

The objective of the periodical assessment is to verify that the conditions for the type approval have not been altered. The main scope of the periodical assessment will normally include:

- Verification of the TA applicant's production and quality system w.r.t ensuring continued consistent production of the type approved products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the TA documentation and that this is still used as a basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking

END OF CERTIFICATE