

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Needle Valves

with type designation(s)

CRMNV-01, CRNV-01, CRNV-02 and CRNV-03

Issued to

Flowmat Engineering Private Limited
Thirumazhisai, Thiruvallur Dist, Tamilnadu, India

is found to comply with

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

DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers

DNV GL rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG

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.

Temperature range: -165°C (-196°C) to +80°C⁴

Max. working press.: ASME Class 150 and 300 (see certificate)

Sizes: DN 15 (1/2")

Issued at **Hamburg** on **2021-05-07**

This Certificate is valid until **2026-05-06**.

for **DNV**

DNV local station: **Mumbai NB & CMC**

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

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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.

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

1 - 1/2" x 1/2" Monoflange Cryogenic Needle Valves – 150# and 300#.

Type: CRMV-01 for installation in liquefied gas. Valve trim design carried out with valve plug (needle) and stem. Manual valve operation with T-bar handle.

Valve threaded end connections: 1/2 inch NPT female acc. to ANSI B1.20.1

Valve design: ASME B 16.34. BS 6364:1984, ANSI B16.5

Design pressure: ANSI Class 150# and Class 300#

Design temperature: -165°C (-196°C) to +80°C⁴

Size: DN 15 (1/2")

Standard test: BS EN 12266-1:2012; BS 6364:1984

Materials^{1,2}: ANSI Class 150 and ANSI 300

Valve	Material type	Standard
Body	Stainless Steel	ASTM A182/ SS316 /316L
Bonnet	Stainless Steel	AISI 316/ AISI 316L
Stem	Stainless steel	AISI 316
Non-Rotating Tip	Stainless steel	ASTM A564 type 630; (17- 4PH)
Seal	KEL-F	

2 – Cryogenic Needle Vales, Butt Welded, Screwed – 150# and 300#

BS Type: CRNV-01, BB Type: CRNV-02 and SS Type: CRNV-03 for installation in liquefied gas. Valve trim design carried out with valve plug (needle) and stem. Manual valve operation with T-bar handle.

Valve threaded end connections: 1/2 inch NPT female acc. to ANSI B1.20.1

Valve design: ANSI B16.9, BS 6364:1984, ANSI B16.5

Design pressure: ANSI Class 150# and Class 300#

Design temperature: -165°C (-196°C) to +80°C⁴

Size: DN 15 (1/2")

Standard test: BS EN 12266-1:2012; BS 6364:1984

Note: BS- Butt Welded /Screwed ends; BB- Butt Welded both ends; SS- Screwed Ends both sides

Materials^{1,2}: ANSI Class 150 and ANSI 300

Valve	Material type	Standard
Body	Stainless Steel	ASTM A182/ ASTM A479 – 316 / 316L
Bonnet	Stainless Steel	AISI 316L
Stem	Stainless steel	AISI 316L
Non-Rotating Tip	Stainless steel	ASTM A564 type 630; (17- 4PH) /AISI 316L

Seal

KEL-F

Note¹

Materials also according to NACE MR0175 / ISO 15156, for use in H₂S-containing environments in oil and gas production.

Note²

Materials for fabrication of pressure retaining valve items such as valve body and bonnet shall be supplied by DNV Approved Material Manufacturers.

Materials for valve body and bonnet shall comply with DNV GL Rules Pt.5 Ch.7 – Liquefied gas tankers, Section 6 – Materials of construction, quality control and marking.

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

Application

Stainless steel needle valve approved for use as shut off valve in venting and drain lines, instrumentation and accessory lines for pressure measuring instruments and transmitters in ship's machinery piping systems, pressure vessels, fuel systems and cargo piping systems.

Operating media may include non- and flammable gas, natural gas, cryogenic liquefied gases, and LNG.

Limitation

Approved needle valve type with threaded NPT connection³ is not permitted for installation ship's LNG and gas fuel systems with exception for above approved installation in instrumentation and accessory pipelines.

Note³

Screwed couplings complying with recognized standards shall only be used for accessory lines and instrumentation lines with external diameters of 25 mm or less. See DNV GL Rules Pt.5 Ch.7 – Liquefied gas tankers, Section 5, Item [8.2.1.3] // IGC Code Chapter 5, Item [5.8.2.3]

Note⁴

Type approval for cryogenic valves is based on a minimum design temperature of -165°C according to DNV GL Rules Pt.5 Ch.7 – Liquefied gas tankers and related IGC Code.

For an optional requested valve design temperature below -165°C down to -196°C additional specific valve design conditions are to be agreed with the flag state administration of the particular ship scheduled for installation of cryogenic valves having a design temperature of -196°C.

Tests carried out

Test standards:
DNV GL Pt. 5 Ch. 7 Liquefied gas tankers
DNV GL Rules Pt.4 Ch.6 – Piping systems
DNV GL CP-0186 – Valves
BS EN 12266-1:2012 Hydrostatic Testing
BS6364:1984 – Cryogenic testing

Purpose

Title

Hydrostatic Pressure Test

To confirm the pressure containing capability of the shell against internal pressure

Test pressure = 1,5 times the design pressure

No leakage is permitted.

Seat tightness

to confirm the capability of the seats to comply with the specified leakage rate at the manufacturer's site in the direction(s) for which the valve is designed

No visible leakage.

Seat tightness

Seat tightness test at cryogenic temperature, test temperature - 196°C, test fluid liquefied nitrogen and helium.

Test standard BS EN 12266-1:2012 / BS6364:1984 / DNV GL Rules Pt.5 Ch.7

Functional test

Function test of completed assembled valve.

Type Approval documentation

Production testing and certification

- I. Application for Liquefied Gas Tankers
1. Certification of valves [DN $\geq$ 100 or Working temperature $< -55^{\circ}\text{C}$]
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 13.1

<u>Type of test</u>	<u>Test pressure</u>
Shell strength	1,5 times the design pressure
Tightness test of pressure bearing housing	1,1 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

DN $\geq$ 100 or Working temperature $< -55^{\circ}\text{C}$	<u>Type of certificate / Issued by</u> VL Certificate / DNV GL
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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. DNV GL Rules Part 5, Ch. 7, Section 5, Div. 13.1.2 (Production testing), for valves used for isolation of instrumentation in piping not greater than 25 mm, unit production testing need not to be witnessed by the surveyor. Records of testing shall be available for review.

3. Material certification of valves working temperature $< -55^{\circ}\text{C}$
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 $\leq$ 100	W Works Certificate / Manufacturer

4. Certification of valves [Working temperature $\geq -55^{\circ}\text{C}$]
For all valves intended for use at a working temperature $\geq -55^{\circ}\text{C}$ 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

Production testing and certification – continuation

II. Application in Gas as Fuel Systems

For each valve intended to be installed in ship's gas fuel supply systems a product certificate is to be issued based on the following scope of tests and according to DNV GL Rules Part 6, Chapter 2, Section 5 – Gas fuelled ship installations – Gas fuelled

Type of test	Test pressure
Shell strength	1,5 times the design pressure
Tightness test of pressure bearing housing	1,1 times the design pressure
Seat tightness test	1,1 times the design pressure
Functional test	Design / work pressure

Valves in LNG / Gas Fuel System – Table 3 Certification required

<u>Valve design conditions - Test and certification</u>	<u>Type of certificate / Issued by</u>
Design temperature < 0°C / DNV GL Pt.5 Ch.7 irrespective of size	VL Certificate / DNV GL
Design pressure > 10 bar/ DNV GL Pt.5 Ch.7 irrespective of size	VL Certificate / DNV GL
Design pressure ≤ 10 bar Design temperature ≥ 0°C	Works certificate / Manufacturer

Material certificates

DNV GL Pt. 6 Ch.2 Section 5 – Gas fuelled ship installations
Table 4 Certification of material quality and testing

Design temperature < 0°C ≥ 0°C	<u>Type of certificate / Issued by</u> VL Certificate / DNV GL W Works Certificate / Manufacturer
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III. Application in general machinery piping systems

For 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

<u>Valve nominal size / Pressure rating</u>	<u>Type of certificate / Issued by</u>
DN ≤ 100 mm / PN > 16 bar	VL Certificate / DNV GL
DN ≤ 100 mm / PN ≤ 16 bar	W Works Certificate / Manufacturer

Material certificates (valve bodies)

In accordance with DNV GL Rules Pt.4 Ch.6 – Piping systems, Section 2 – Table 3

Marking of product

Each valve shall be clearly marked for identification. The identification marking may be performed on the body or on a plate of non-corrosive material. When a metallic plate is used, the plate shall be permanently fixed to the body.

Identification marking on the body shall be located to non-stressed areas and shall be clearly legible.

The identification marking shall as a minimum include the following:

- Manufacturers name or trademark
- Valve type designation
- Size / Nominal diameter
- Maximum design pressure and temperature / Pressure rating
- Arrow to indicate direction of flow

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 DNVGL-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