Certificate No:
TAP00002K1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Ball Valve

with type designation(s)
MY4CY, MY4

Issued to
Meca-inox Valves Co., Ltd.
Dalian, Liaoning Province, China

is found to comply with
DNV rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
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.

Type:	Temperature range:	Max. working press.:	Sizes:
MY4CY	-196°C to + 100°C	See	Certificate
MY4	-50°C to + 100°C	See	Certificate

Issued at **Hamburg** on **2022-09-26**

This Certificate is valid until **2027-09-25**.
DNV local station: **Dalian NB & CMC**

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

for **DNV**
Digitally Signed By: Klinger, Sven
Location: DNV GL SE Hamburg, Germany
Signing Date: 27.09.2022

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.

Product description

Ball valve for shut-off applications in various cryogenic (LNG) and natural gas system installations as well as in machinery piping systems.
Valve types and pressure ratings

Valve types	Valve nominal diameter (DN)	Pressure rating (PN)
MY4CY	15, 20, 25, 32, 40, 50 65, 80, 100	PN 50 PN 20
MY4	15, 20, 25, 32, 40, 50, 65, 80, 100	PN 50 PN 20

Materials

Valve item	Material type
Ball valve body	ASTM A182 / F316L
Ball valve end connection	ASTM A182 F316L
Ball valve stem	ASTM A479 / 316L
Ball valve ball	ASTM A351 / CF3M
Ball valve seat	PTFE, Type TF3215

Application

Stainless steel ball valves approved for the use in ships piping, machinery piping, fuel systems and cargo handling piping systems. Operating media include flammable gases, nitrogen and cryogenic liquefied gases including LNG.[1,2]

[1]: Valve designs for use and installation in ammonia (NH3) and methanol (CH3OH) ship fuel systems require additional approval by the flag state administration for each particular ship as these fuels are not covered by the IGF Code at present.
[2]: Valve designs for installation in ship's liquid nitrogen (LN2) systems require additional approval by the flag state administration for each particular ship as liquid nitrogen (LN2) with a design temperature of -196°C is not covered by the IGF Code and IGC Code. The minimum design temperature in the IGF Code and IGC Code is limited to -165°C for LNG, while LN2 is only referred for testing with a test temperature of -196°C.

Limitation

Valves are not approved for liquid and gaseous hydrogen and for media specified as toxic and/or dangerous fluids.[3]

[3]: See United Nations (UN) Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

Tests carried out

Test standards:	DNV Pt. 5 Ch. 7 Liquefied gas tankers DNV Pt. 6 Ch.2 Section 5 Gas fuelled ship installations DNV Rules Pt.4 Ch.6 – Piping systems; DNV Class Programme CP 0186 – Valves API 598 (2016-10) – Valve inspection and testing
Valve test	Purpose
Pressure test	Minimum test pressure = 1,5 times the design pressure Test standard: DNV Pt.4 Ch. 6; DNV CP 0186
Seat tightness	To confirm the capability of the seat with the specified leakage rate Seat tightness test at ambient temperature, test fluid: Nitrogen
Seat tightness	Seat tightness test at cryogenic temperature, test temperature -196°C, test fluid Helium.
Flow and functional test	Flow and functional test at cryogenic temperature, test temperature -196°C.

Type Approval documentation

Scope of type approval documentation kept confidential.
Design drawings
Parts lists with material specifications corresponding to design drawings
Valve Inspection and Test Plan (ITP)
Valve test reports
Type Approval Assessment Report (Manufacturer's Audit)

Production testing and valve certification

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 (PC) shall be issued by DNV based on the following scope of tests and according to:
DNV Rules Part 5, Chapter 7 – Liquefied gas tankers, Section 5, Item 13.2

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

DNV Rules Pt. 5 Ch. 7, Section 1, Table 7 – Compliance documents

DN ≥ 100 or Working temperature < -55°C	Type of certificate / Issued by Product Certificate (PC) / 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.

3. Material certification of valves
DNV Rules Part 5, Chapter 7 – Liquefied gas tankers

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

Valve nominal diameter	Type of Certificate / Issued by
DN > 100, design temperature <-55°C	Material Certificate (MC) / DNV
DN > 100, design temperature ≥ -55°C	Material Declaration (MD) / Manufacturer
DN ≤ 100	Material Declaration (MD) / Manufacturer

4. Certification of valves [DN < 100 and working temperature ≥ -55°C]
For all valves having a nominal diameter DN < 100 intended for use at a working temperature ≥ -55°C a Product Declaration (PD) shall be issued based on the tests listed above and according to
DNV Rules Part 5, Chapter 7 – Liquefied gas tankers, Section 1, Table 7 – Compliance documents

Valve nominal size DN < 100	Type of certificate / Issued by Product Declaration (PD) / Manufacturer

Production testing and valve 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 (PC) shall be issued based on the following scope of tests and according to
DNV Rules Part 6, Chapter 2, Section 5 – Gas fuelled ship installations

1.

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

2. Valves in LNG / Gas fuel system – Table 3 Certification required

Valve design conditions - Test and certification	Type of certificate / Issued by
Design temperature < 0°C / DNV Pt.5 Ch.7 irrespective of size	Product Certificate (PC) / DNV
Design pressure > 10 bar/ DNV Pt.5 Ch.7 irrespective of size	Product Certificate (PC) / DNV
Design pressure ≤ 10 bar Design temperature ≥ 0°C	Product Declaration (PD) / Manufacturer

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

Design temperature	Type of certificate / Issued by
< 0°C	Material Certificate (MC) / DNV
≥ 0°C	Material Declaration (MD) / Manufacturer

III Application in machinery piping systems

Valves intended to be installed in piping systems listed in DNV Rules Pt.4 Ch.6 – Section 1 shall be certified according to
DNV Rules Pt.4 Ch.6 – Piping systems, Section 1, Table 3 Compliance documents – piping components

Valve nominal size / Pressure rating	Type of certificate / Issued by
DN > 100 mm / PN > 16 bar	Product Certificate (PC) / DNV
DN ≤ 100 mm / PN ≤ 16 bar	Product Declaration (PD) / Manufacturer

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

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:

- Manufacturer's name or trademark
- Valve type designation
- Size
- Maximum design pressure and temperature
- Arrow to indicate direction of flow on one-way flow valves

Periodical assessment

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

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.

END OF CERTIFICATE