



Certificate no.:
TAP000032D

TYPE APPROVAL CERTIFICATE

This is to certify:
that the Butterfly Valves

with type designation(s)
HDLV104, HDLV01A

issued to
Shanghai Hudong Marine Valve Manufacture Co., Ltd.
Shanghai, China

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 rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG
DNV class programme DNV-CP-0186 – Type approval – Valves

Application:

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

Type:	Temperature range:	Max. working press.:	Sizes:
HDLV104	-196°C ~ +100°C	see certificate	see certificate
HDLV01A	-196°C ~ +100°C	see certificate	see certificate

Issued at **Hamburg** on **2025-09-09**

This Certificate is valid until **2030-09-08**.

for **DNV**

DNV local unit: **Shanghai**

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

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 USD 300 000.

Product description

Cryogenic Butterfly Valve type: HDLV104 and Cryogenic Globe valve type: HDLV01A for applications in various cryogenic LNG liquid and natural gas vapour system installations as well as in machinery piping systems.

1- Cryogenic Butterfly Valve type: HDLV104

Valve type	Class	Temperature	Nominal Diameter (DN)
HDLV104	150	-196°C ~ 100°C	400, 450, 550, 650, 700
	300		200

Design conditions:

Face to face: API 609

Welding dimensions: ASME B16.25

Test and acceptance: ASME B16.34

Flange connection dimensions DN650-750: ASME B16.47

Flange connection dimensions DN200-600: ASME B16.5

Materials:

Valve part	Material	Standard
Body	CF3M	ASTM A351
Disc	CF8M + STL6	ASTM A351
Bonnet	CF8M	ASTM A351
Stem	XM-19	ASTM A276
Plate	316	ASTM A276
Packing Gasket	PCTFE	-

2- Cryogenic Globe Valve type: HDLV01A

Valve type	Class	Temperature	Nominal Diameter (DN)
HDLV01A	150	-196°C ~ 90°C	15
	300		

Design conditions:

Face to face: ASME B16.10

Welding dimensions: ASME B16.25

Test and acceptance: ASME B16.34

Flange connections: ASME B16.5

Materials:

Valve part	Material	Standard
Body	CF3M + STL6, CF8M + STL6	ASTM A351
Disc	STL6	AMS5894C
Bonnet	CF8M	ASTM A351
Stem	F316+ hard chrome plating	ASTM A182
Packing Gasket	PCTFE	-

Design temperature: Depending on seat materials

Seat design type	Temperature range [°C]
PCTFE	-196°C ~ +100°C

Application

Cryogenic Butterfly Valve type: HDLV104 and Cryogenic Globe valve type: HDLV01A are 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 ASME B16.34
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

Production testing and valve 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 $\text{DN} \geq 100$ 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 13.1.1 and 13.1.2

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 $\geq$ 100 or Working temperature $< -55^{\circ}\text{C}$	<u>Type of certificate / Issued by</u> Product Certificate (PC) / DNV
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2. Additional cryogenic testing – 10 % of each type and size of valve

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 $< -55^{\circ}\text{C}$	Material Certificate (MC) / DNV
DN > 100 , design temperature $\geq -55^{\circ}\text{C}$	Material Declaration (MD) / Manufacturer
DN ≤ 100	Material Declaration (MD) / Manufacturer

4. Certification of valves [DN < 100 and working temperature $\geq -55^{\circ}\text{C}$]

For all valves having a nominal diameter $\text{DN} < 100$ intended for use at a working temperature $\geq -55^{\circ}\text{C}$ 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

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



Job ID: **262.1-042111-1**
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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 DNV-CP-0338, Sec.4.

END OF CERTIFICATE