Certificate no.:
TAP00002XH

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Ball-, Butterfly-, Globe- and Check- Valves

with type designation(s)
DQ67F, DQ347F, DQ367F, DD363Y, DJ61Y, DJ541Y, DH64Y, DH44Y

issued to
Hubei Taihe Petrochemical Equipment Co., Ltd.
Yichang, Hubei, 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:
DQ67F, DQ347F, DQ367F	-196°C ~ +150°C	Class: 150, 300, 600	2", 6", 12"
DD363Y	-196°C ~ +150°C	Class 150, 300	8", 20"
DJ61Y, DJ541Y	-196°C ~ +150°C	Class 150, 600	2", 12"
DH64Y, DH44Y	-196°C ~ +150°C	Class 300, 600	2", 6", 12"

Issued at **Hamburg** on **2024-10-02**
This Certificate is valid until **2029-10-01**.
for **DNV**
DNV local unit: **Wuhan NB & CMC**

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.

Product description

Ball-, Butterfly-, Globe- and Check- Valves for applications in various cryogenic (LNG) and natural gas system installations as well as in machinery piping systems.

Cryogenic ball valve type DQ67F, DQ347F and DQ367F

Technical requirements:
Design: API 6D and ASME B16.34
Structural length: ASME B16.10
Ende connection size: ASME B16.25
Valve inspection and test: API 598
Low temperature: BS 6364
Pressure and temperature: ASME B16.34
Fire resistance: API 607, API 6FA, ISO10497

Temperature: -196°C up to 150°C

Working Medium[1]: LNG, Liquid nitrogen

Materials: type DQ67F

Valve part	Material	Standard
Body	F316	ASTM A182
Stem	XM-19	ASTM A182
Ball	F316 +STL20	ASTM A182
Extended bonnet	F316	ASTM A182
Seat	F316+PCTFE	ASTM A182
Gasket	304 + Graphite	-

Size: 2” (NPS2) Pressure: Class 300

Materials: type DQ347F

Valve part	Material	Standard
Body	CF3M	ASTM A351
Stem	XM-19	ASTM A182
Ball	F316 +STL20	ASTM A182
Extended bonnet	CF3M	ASTM A351
Seat	F316+PCTFE	ASTM A182
Gasket	304 + Graphite	-

Size: 6”(NPS6) Pressure: 150 LB

Materials: type DQ367F

Valve part	Material	Standard
Body	CF3M	ASTM A351
Stem	XM-19	ASTM A182
Ball	F316	ASTM A182
Extended bonnet	CF3M	ASTM A351
Seat	F316 + PCTFE	ASTM A182
Gasket	304 + Graphite	-

Size: 12” (NPS 12 Pressure: Class 600

Cryogenic butterfly valve type DD363Y

Technical requirements:
Design: ISO 21159-2018
Structural length: ISO 21159-2018
Ende connection size: ASME B16.25
Valve inspection and test: API 598
Low temperature: BS 6364
Pressure and temperature: ASME B16.34

Temperature: -196°C up to 150°C

Working Medium[1]: LNG, Liquid nitrogen

Materials:

Valve part	Material	Standard
Body	CF3 / CF8M	ASTM A351
Butterfly plate	CF8M	ASTM A351
Stem	XM-19 Inconel 718	ASTM A182
Seat	F316 + STL6	ASTM A182
Gasket	316 SS + Graphite	-

Size: 8” (NPS8) and 20” (NPS20) Pressure: Class 150 and Class 300

Cryogenic globe valve type DJ61Y and DJ541Y

Technical requirements:
Design: API623, ASME B16.34, BS6364
Structural length: ASME16.10
Ende connection size: ASME B16.25
Valve inspection and test: BS6364
Low temperature: BS 6364
Pressure and temperature: ASME B16.34

Temperature: -196°C up to 150°C

Materials type DJ61Y:

Valve part	Material	Standard
Body	F304+STL12	ASTM A182
Flap	F304+STL6	ASTM A182
Stem	F304	ASTM A182
Extended valve cover	F304	ASTM A182
Gasket	304	-

Size: 2” (NPS2) Pressure: Class 150

Materials type DJ541Y

Valve part	Material	Standard
Body	CF8+STL6	ASTM A182
Large valve disc	F304+STL12	ASTM A182
Stem	F304	ASTM A182
Valve cover	CF8	ASTM A351
Gasket	304	-

Size: 12” (NPS12) Pressure: Class 600

Cryogenic check valve type DH64Y and DH44Y

Technical requirements:
Design: API594, ASME B16.34, BS6364

Structural length: ASME16.10
Ende connection size: ASME B16.25
Valve inspection and test: API598
Low temperature: BS6364
Pressure and temperature: ASME B16.34

Temperature: -196°C up to 150°C

Working Medium[1]: LNG, Liquid nitrogen

Materials type DH64Y and DH44Y

Valve part	Material	Standard
Body	CF8 CF8+STL6	ASTM A351 ASTM A351
Valve flap	F304 CF8 CF8 + STL12	ASTM A182 ASTM A351 ASTM A351
Valve cover	CF8	ASTM A351
Gasket	See below*	-

Size: 2” (NPS2); 6” (NPS6); 12” (NPS12); Pressure: Class 300 and Class 600

*The gasket of the 2" check valve is a metal wrapped gasket-304+graphite
The gasket of the 6" check valve is a metal wrapped gasket-304+graphite
The gasket of the 12" check valve is an octagonal ring-304

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

Note:
[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)

Installation

The following valve connections are permitted for installation in liquefied gas applications (including LNG):
Flange connections in accordance with recognized standards.
For all types of valves connections, the requirements in DNV Rules Pt. 5 Ch. 7 – Liquefied gas tankers, Section 5 shall be observed.

Type Approval documentation

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 and BS6364 (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.

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 13.1.1 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 ≥ 100 or Working temperature < -55°C	Type of certificate / Issued by Product Certificate (PC) / DNV

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°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

For traceability to this type approval the products are to be marked with:
- Manufacturer's name or trade mark
- Valve type designation
- Size
- Maximum design pressure and temperature
- Arrow to indicate direction of flow on one way flow valves

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