

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Ball Valve

with type designation(s)
Cryogenic Ball Valve C47/FC47 Series

Issued to
Habonim Industrial Valves and Actuators
Kfar Hanassi, Israel

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 class programme DNVGL-CP-0186 – Type approval – Valves

Application :

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

Temperature range: -196°C to 200°C
Max. working press.: See certificate
Sizes: DN25 and DN100 (Series C47); DN150 (Series FC47)

This Certificate is valid until **2022-01-31**.

Issued at **Høvik** on **2017-02-01**

for **DNV GL**

DNV GL local station: **Oslo Pressure Equipment**

Approval Engineer: **Sinisa Sedlan**

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Marianne Spæren Marveng
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: **262.1-023121-1**
Certificate No: **TAP00000RZ**

Product description

Cryogenic floating ball valves with three piece design. Manually operated (DN25) or pneumatically actuated (DN100 and DN150).

End connections: Flanges PN40 acc. to EN 1092-1 (DN100 and DN150)
Butt weld ends acc. to EN 12627-4 (DN25)

Sizes: 1" (DN 25) : 10FBC47C-666MPG/BW10
4" (DN100) : 40FBC47C-666MPG/PN40-F1
6" (DN150) : 60FBC47C-666MPG-XXX

Materials:

Body	A351 CF8M
Ends	A351 CF8M; A479 316/316L
Bonnet	A351 CF8M; A479 316/316L
Ball	A351 CF8M
Stem	A564 630
Seat	CF PTFE

Application/Limitation

Valves covered by this certificate may be used in under the following design conditions:

Service : General machinery service or LNG/LPG applications - Cryogenic Service
Temperature range : -196 °C to +200 °C
Max. working pressure : 103 bar (DN25); 40 bar (DN100 and DN150)
Sizes and types : As given in Product Description

This certificate does not cover actuators.

Carbon steels and austenitic stainless steel grades (such as 304, 316, 304L and 316L) are not permitted for use in sea water systems.

Material in contact with seawater shall be properly protected. Surface preparation and coating shall be approved by society.

Type Approval documentation

General Assembly Drawing 1" FBC47C SER. VALVE WITH BW10 ENDS, Drawing No. 10-FBC47C-666MPG-BW10, dated 30/03/2016
General Assembly Drawing 4" FBC47C SER. VALVE WITH PN 40 - F1 ENDS - BS, Drawing No. 40-FBC47C-666MPG-PN40-F1-BS Rev.HA00, dated 05/06/2016
General Assembly Drawing 6" FBC47C SER. VALVE WITH FLANGE & XBW ENDS, Drawing No. 60FBC47C-666MPG-PN40-F1-BS Rev.HA00, dated 10/08/2016
Habonim Type Test Programme for 1" Cryogenic Ball Valve (working pressure - 40 Bar), dated 7/7/2016
Type Test Report for Valve size 1" Tag No. 6294960-1, dated 12/07/2016
Type Test Report for Valve size 4" Tag No. 6294961-1, dated 12/07/2016
Type Test Report for Valve size 6" Work Order 6301041, dated 28/09/2016
C47C Cryogenic Series Technical Files - Body Stem Notch calculation Rev.HA, dated Sept. 10
C47C Cryogenic Series Technical Files - Bolt Strength/Stress Calculations Rev.HA, dated Oct. 10
47 Series Technical Files - Bonnet Wall Thickness calculation According to ASME B31.3 Rev.HA, dated Sept. 10
C47C Cryogenic Series Technical Files - ISO PCD Rev.HA, dated Sept. 10

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C47C Cryogenic Series Technical Files - Wall Thickness calculation According to ASME B16.34 Rev.HA, dated Sept. 10
1-1/4" 47C SER. CRYOGENIC F/S BODY, Drawing No. 00-47C-12-164 Rev.HC00, dated 09-08-10
1" 46 SER. F/B F/S B/W SCH10 END, Drawing No. 00-46-10-478 Rev.HA00, dated 20-03-13
1" 47C SER. CRYOGENIC 6" BONNET, Drawing No. 00-47C-10-790-6-B Rev.HC00, dated 06-01-15
1" CRYOGENIC BONNET, Drawing No. 00-47C-10-790-CP Rev.HA00, dated 04/01/2015
1" CRYOGENIC STEM, Drawing No. 00-47C-10-056 Rev.HE03, dated 28-02-13
1" CRYOGENIC STEM FOR 6" BONNET LENGTH, Drawing No. 00-47C-10-056-6 Rev.HA04, dated 28-02-13
4" 47C SER. F/B F/S CRYOGENIC BODY, Drawing No. 00-47C-40-195 Rev.HA00, dated 18-03-12
4" 47 SER. F/S F/B PN40 F1 END FROM BAR, Drawing No. 00-47-40-986-B Rev.HA00, dated 30/01/2014
3" CRYOGENIC 6" BONNET FROM BAR, Drawing No. 00-47C-30-790-6-B Rev.HA00, dated 27\08\09
3" CRYOGENIC STEM, Drawing No. 00-47C-30-056 Rev.HI00, dated 03/11/15
3" CRYOGENIC STEM FOR 6" BONNET LENGTH, Drawing No. 00-47C-30-056-6 Rev.HA02, dated 23-02-13
6" FCB47C/FCB47W/CB47C (PN40) - Bolt Strength/Stress Calculations Rev.HA, dated Sept. 15
6" FCB47W/FCB47C/CB47C Technical Files - Bonnet Wall Thickness calculation Rev.HA, dated Sept. 15
6" FCB47W/FCB47C/CB47C Technical Files - ISO PCD Rev.HA, dated Sept. 15
6" FCB47W/FCB47C/CB47C Technical Files - Wall Thickness calculation According to ASME B16.34 Rev.HA, dated Sept. 15
6" 26C SER. F/B F/S CRYOGENIC BODY, Drawing No. 00-26C-60-195 Rev.HA00, dated 02/02/2015
6" 26 SER. F/B F/S PN40 F1 FLANGED END, Drawing No. 00-26-60-986-912 Rev.HA00, dated 09/08/2016
6" 26 SER. CRYOGENIC BONNET FROM BAR, Drawing No. 00-26C-60-790-B Rev.HC00, dated 19-01-17
6" 26C CRYOGENIC STEM, drawing No. 00-26C-60-056 Rev.HB00, dated 19/01/2017

Tests carried out

Cryogenic test, shell test, seat test

Production Testing

Each valve body shall be subjected to a hydrostatic pressure test at 1.5 times the allowable pressure at room temperature.

In addition each valve shall be subject to seat leakage testing at 1.1 times the design pressure in the valve flow direction.

Testing shall follow procedures and acceptance criteria in EN12266-1.

In addition to the above tests, cryogenic testing consisting of valve operation and leakage verification (to BS6364) for a minimum 10% of each type and size of valve intended to be used at working temperature below -55°C shall be undertaken. (Reference is made DNV GL ship rules Pt.5 ch.7 Sec.5 [13.1.1])

Certification

DN150 valves shall be delivered with product certificate, regardless of minimum design temperature. Other sizes shall be certified by DNV GL when minimum design temperature is less than -55°C (reference is made to DNV GL Ship Rules Pt.5 Ch.7 Sec.1 Table 7). Otherwise manufacturer's certificate may be accepted.

For LNG/LPG applications: Material certificates for valve bodies are required in line with DNV GL Pt.5 Ch.7 Sec.1 Table 8.

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For other applications: Material certificates for valve bodies shall be according to DNV GL Pt.4 Ch.6 Sec.2 Table 3.

Marking of product

For traceability to this type approval the valves are to be marked as a minimum with:

- Manufacturer's name or trade mark
- Type designation
- Max. design pressure or pressure class

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment every second year and before the expiry date of this certificate, to verify that the conditions for the type approval are complied with.

When possible, this assessment may be harmonised with normal surveys for product certification and / or other surveys and audits carried out.

The main elements of the certificate retention survey are:

- 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
- Review of Type Approval documentation and assurance that it is still used as basis for production
- Review of possible changes in design, materials and performance
- Assurance of traceability between manufacturer's product type marking and Type Approval Certificate.

Renewal should be applied for in writing before the certificate expires.