TYPE APPROVAL CERTIFICATE

Certificate No:
TAP00000T2
Revision No:
2

This is to certify:

That the Ball Valve

with type designation(s)
Z (DIN), Z (ANSI/ASME), ZRB (ANSI/ASME), K/KRB (ANSI/ASME), Z9 (ANSI/ASME WAFER), Z9 (DIN WAFER), Z1L

Issued to
PEKOS FABRICACION, S.L.U.,
Artea, VIZCAYA, Spain

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

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
Z (DIN)	See page 3	PN 10/16/ 25/40	DN 15, 20, 25, 32 40, 50, 65, 80, 100, 125, 150 & 200
Z (ANSI/ASME)	See page 3	Class 150	½", ¾", 1", 1-½", 2", 2-½", 3", 4", 6" & 8"
Z (ANSI/ASME)	See page 3	Class 300	½", ¾", 1", 1-½", 2", 2-½", 3" & 4"
ZRB (ANSI/ASME)	See page 3	Class 150	½"x3/8" , ¾"x½", 1"x¾", 1-½"x1-¼", 2"x1-½", 3"x2-½", 4"x3", 6"x5", 8"x6", 10"x8" & 12"x10"
ZRB (ANSI/ASME)	See page 3	Class 300	½"x3/8" , ¾"x½", 1"x¾", 1-½"x1-¼", 2"x1-½", 3"x2-½", 4"x3" & 6"x5"
K/KRB (ANSI/ASME)	See page 3	Class 600	2" & 2-½"
K/KRB (ANSI/ASME)	See page 3	Class 800	¼", 3/8", ½", ¾", 1", 1-¼", 1-½" & 2"
Z9 (ANSI/ASME WAFER)	See page 3	Class 150	½", ¾", 1", 1-½", 2", 2-½", 3", 4",6" &
Z9 (ANSI/ASME WAFER)	See page 3	Class 300	½", ¾", 1", 1-½", 2", 2-½", 3", & 4"
Z9 (DIN WAFER)	See page 3	PN10/16/25/40	DN15, 20, 25, 32, 40, 50, 65, & 80
Z9 (DIN WAFER)	See page 3	PN10/16	DN100, DN125, 150, & 200
Z9 (DIN WAFER)	See page 3	PN25/40	DN100 & 125
Z1L	See page 3	Class 150	½", ¾", 1", 1-½", 2", 2-½" & 3"

Issued at **Høvik** on **2023-11-24**

This Certificate is valid until **2027-05-11**.
DNV local unit: **Area NB/CMC Iberia**

Approval Engineer: **Maheshraja Venkatesan**

for **DNV**

Digitally Signed By: Zeinab, Sharifi
Location: DNV Høvik, Norway
Signing Date: 27.11.2023

Zeinab Sharifi
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

Standard floating ball valves, 2/3-piece. Full/reduced bore with flanged, threaded or welded ends.
The design and construction of valve ends are in accordance with the following standards:

- Flanged ends : ASME B16.5/ EN 1092-1
- Threaded ends : ASME B1.20.1
- Buttwelding ends : ASME B16.25
- Socket welding ends : ASME B16.11
- Min. wall/body thickness : ASME B16.34/ EN 12516-1
- Bronze alloy valve ends : EN 12516-3/ EN 1092-3

Configuration of valve type, size and pressure ratings:

Valve type	*Size*	*Pressure rating*
Z (DIN) Floating, full bore, 2-piece, split body, flanged end according to EN 1092-1	DN15, 20, 25, 32, 40 & 50	PN10/16/40
	DN65, 80 & 100	PN10/16
	DN65, 80 & 100	PN25/40
	DN125 & 150	PN10/16
	DN125	PN25/40
	DN200	PN10/16
Z (ANSI/ ASME) Floating, full bore, 2-piece, split body, flanged end according to ASME B16.5	½", ¾" & 1"	class 150
	1-½", 2", 2-½", 3" & 4"	class 150
	6" & 8"	class 150
	½", ¾" & 1"	class 300
	1-½", 2", 2-½", 3" & 4"	class 300
ZRB (ANSI/ ASME) Floating, reduced bore, 2-piece, end entry, flanged end according to ASME B16.5	½" x 3/8" & ¾" x ½"	class 150
	1" x ¾" & 1-½" x 1-¼"	class 150
	2" x 1-½", 3" x 2-½" & 4" x 3"	class 150
	6" x 5", 8" x 6", 10" x 8" & 12" x 10"	class 150
	½" x 3/8" & ¾" x ½"	class 300
	1" x ¾"& 1-½" x 1-¼"	class 300
	2" x 1-½", 3" x 2-½" & 4" x 3"	class 300
	6" x 5"	class 300
K/ KRB (ANSI/ ASME) Floating, full bore, 3-piece, split body, NPT/BSPP/BW/SW ends	¼", 3/8", ½", ¾", 1", 1-¼", 1-½" & 2"	class 800
	2" & 2 ½"	class 600
Z9 (DIN WAFER) Wafer floating ball valve, full bore with flange, 2-piece, end entry, flange according to EN 1092-1	DN15, 20, 25, 32, 40, 50, 65, & 80	PN10/16/25/40
	DN100, DN125, 150, & 200	PN10/16
	DN100& 125	PN25/40
Z9 (ANSI/ ASME WAFER) Wafer floating ball valve, full bore with flange, 2-piece, end entry, flange according to ASME B16.5	½", ¾", 1", 1-½", 2", 2-½", 3", 4",6" & 8"	Class 150
	½", ¾", 1", 1-½", 2", 2-½", 3", & 4"	Class 300
Z1L (ANSI/ASME) Floating, full bore, 2-piece, split body, flanged end according to EN 1092-3	½", ¾", 1", 1-½", 2", 2-½" & 3"	Class 150

Materials:

Valve type	*Body & valve ends*	*Ball*	*Stem*	*Sealing materials*
Z (DIN)	1.0619, 1.6220, 1.4408	1.4408/ 1.4401	1.4404/ 1.4401/ A182 Gr. F51/ XM-19	- Ball seat: PTFE/ PTFE+FG/ PTFE+CG - Body seal: PTFE/ PTFE+FG/ PTFE+CG/ Graphite - Stem seal & packing: PTFE+FG, PTFE+CG , PTFE, FKM, NBR, Graphite
Z (ANSI/ ASME)	ASTM A216 Gr. WCC, ASTM A352 Gr. LCC, ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M/ ASTM A182 F316	AISI 316/ AISI 316L/ A182 Gr. F51/ XM-19	
ZRB (ANSI/ ASME)	ASTM A216 Gr. WCC, ASTM A352 Gr. LCC, ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M/ ASTM A182 F316	AISI 316/ AISI 316L A182 Gr. F51/ XM-19	- Ball seat: PTFE/ PTFE+FG/ PTFE+CG - Body seal: PTFE/ PTFE+FG/ PTFE+CG/ Graphite/ FKM - Stem seal & packing: PTFE+FG, PTFE+CG ,

Valve type	*Body & valve ends*	*Ball*	*Stem*	*Sealing materials*
				PTFE, FKM, NBR, Graphite
K/ KRB (ANSI/ ASME)	ASTM A182 F316/ 316L, ASTM A105, ASTM A350 Gr. LF2	ASTM A182 F316/ 316L	AISI 316/ AISI 316L/ A182 Gr. F51/ XM-19	- Ball seat & stem seal: PTFE/ PTFE+FG/ PTFE+CG - Body seal: PTFE/ PTFE+FG/ PTFE+CG/ Graphite - Stem seal & packing: PTFE+CG, FKM, NBR, Graphite
Z9 (DIN WAFER)	EN 10213 GRADES: 1.0619, 1.6220, 1.4408/ EN 10222-2 1.0352/ ASTM A105/ ASTM A350 LF2	1.4408/ 1.4401/ 1.4404	1.4401/ 1.4404	- Ball seat: PTFE/ PTFE+FG/ PTFE+CG - Body seal: PTFE/ PTFE+FG/ PTFE+CG/ Graphite - Stem seal & packing: PTFE+FG, PTFE+CG , PTFE, FKM, Graphite
Z9 (ANSI/ ASME WAFER)	ASTM A352 Gr. LCC/ ASTM A351 Gr. CF8M/ ASTM A479 316 or 316L/ ASTM A182 F316/ ASTM A105/ ASTM A350 LF2	ASTM A351 Gr. CF8M/ ASTM A182 Gr.F316/ F316L	AISI 316/ AISI 316L	
Z1L	Copper alloy AB2 BS1400 (CC333G EN 1982)	Copper alloy AB2 BS1400 (CC333G EN 1982)	MONEL K500 (UNS N05500)	- Ball seat: PTFE - Body seal: PTFE - Stem seal & packing: PTFE+FG - Stem O-ring: FKM

Manufacturing locations

I. Pekos Fabricación – Zaratamo, Pol. Ind. Ugarte, 48480, Vizcaya, Spain
II. Pekos Fabricación – Artea, industrialdea, K3, 48142 Bildosola, Bizkaia, Spain

Application/Limitation

Valves covered by this certificate are approved to be used in ship piping, machinery piping, LNG/LPG and cargo piping systems.

Valves intended for use in fire systems (except type Z9) shall have same non-metallic materials as the qualified fire tested valve, ref. to API 607 Clause 7.2.5. Valves of type Z9 and Z1L shall not be used in cryogenic conditions or fire safe applications.

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. Valves of austenitic stainless steel shall not be used in direct contact with seawater.

The approval does not include actuator and/or other equipment for remote control of the valves.

Maximum pressure-temperature ratings shall be according to ASME B16.34/ EN 12516-1 for the selected construction metallic materials.
Towards Z1L model (bronze alloy valves), the pressure-temperature ratings shall be as per EN 1092-3 as follows:

Temperature (°C)	-10 up to +120	+180	+200	+220
Pressure (bar)	20	20	17.5	1

Temperature ranges for non-metallic sealings:

PTFE/ PTFE+FG/ PTFE+CG	:	-196°C to +250 °C
PEEK	:	- 80°C to +270 °C
PCTFE	:	-196°C to +185 °C
FKM	:	-46°C to +220 °C
FFKM	:	-25°C to +325 °C
NBR	:	-40°C to +120 °C
Graphite	:	-196°C to +450 °C

The approval does not include any operating gear for remote control and actuator part of the valve.

The breakaway torque shall fulfil the requirements set forth in the product standard or specification as applicable, considering the stem material grade & dimensions.

The valve shall be installed according to the manufacturer's instructions.

Valves with threaded joints shall not be used for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur.

Valves with threaded ends for direct connectors of pipe lengths with tapered thread shall be allowed for:
- class I, outside diameter not more than 33.7 mm
- class II and class III, outside diameter not more than 60.3 mm.

Valves with parallel thread ends shall be allowed only for class III applications with outside diameter not more than 60.3 mm.

Valves with socket welded ends in accordance with DNV Pt.4 Ch.6 Sec.9 [6.1]:
- shall not be used in overboard pipes where substantial thickness is required.
- may be used for class I & II pipes with an OD of 88.9 mm and less.
- shall be subject to the Society's consideration in each case for stainless steel pipes

Type Approval documentation

Drawings:

0-36-040300---GV-DNV, rev. 2
001B03600040300I, rev. 02
002B00200040300I, rev. 01
005003600040000, rev. 04
011B03600040000, rev. 03
001B03600050300, rev. 01
002B00200050300I, rev. 00
001A03600065300, rev. 00
002A00100065300, rev. 00
001B03600080300, rev. 00
002B00200080300, rev. 00
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011B03600080000, rev. 04
001B03600100300I, rev. 01
002B00200100300, rev. 1
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005-07-015-C, rev. 2
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002B00200020300, rev. 1
001B03600025300, rev. 02
002B00200025300, rev. 01
005003600025000, rev. 02
011B03600025000, rev. 03

Design & Calculation Dossier Pekos Ball Valves, Rev. 0 dated 2015-09-22
Torque table DC-75-02-10-PF rev. 08
Stem calculation rev. 1 dated 2017-03-28

Body 2 calculation – ZRB dated 2017-03-28, rev. 1
Body 2 calculation – Z full bore dated 2016-02-07, rev. 0
Pressure & Functional test – General procedure PR. 75-02 Rev. 15 June 2016
Pressure-temperature chart dated 2017-04-26 for various gasket materials used
Fire test reports from Lloyds: BBO 1000062/1/A1 dated 2009-12-16, BBO 1000062/2/A1 dated 2009-12-16, BBO 1000062/3/A1 dated 2009-12-16, BBO 1000062/4/A1 dated 2009-12-17, BBO 1000062/5/A1 dated 2009-12-17, BBO 1000062/6/A1 dated 2009-12-17, BBO 1000062/7/A1 dated 2007-11-29 & BBO 1000062/8/A1 dated 2007-11-29
Cryogenic test report nos.: CRY-DNV-1-2-300, CRY-DNV-3-4-300, CRY-DNV-1-300, CRY-DNV-32-40, CRY-DNV-11-2-300, CRY-DNV-2-300, CRY-DNV-21-2-300, CRY-DNV-3-300, CRY-DNV-4-300, CRY-DNV-125-40, CRY-DNV-6-150, CRY-DNV-8-150, CRY-DNV-1-2-800, CRY-DNV-1-2RB-800, CRY-DNV-3-4-800, CRY-DNV-1-800, CRY-DNV-11-2-800, CRY-DNV-2-600, CRY-DNV-21-2-600.

Documentation related to Z9

- C010 – DESIGN CRITERIA S090 – SPECIFICATION OF VALVES dated May 2022
- C020 & C030- ASSMEBLY DRAWINGS / C030 - DETAILED DRAWINGS: 0-50-0150400TTTGV-DNV Rev. 1; 0-50-015040TTTGV-DNV; 0-50-025040TTTGV-DNV Rev. 1; 0-50-032040TTTGV-DNV Rev. 1; 0-50-032040TTTGV-DNV; 0-50-032040TTTGV-DNV; 0-50-065016TTTGV-DNV; 0-50-065016TTTGV-DNV; 0-50-065016TTTGV-DNV; 0-50-065016TTTGV-DNV; 0-50-065016TTTGV-DNV Rev. 1; 0-50-065016TTTGV-DNV Rev. 1; 0-50-065040TTTGV-DNV Rev. 1; 0-50-065040TTTGV-DNV; 0-50-015150TTTGV-DNV; 0-50-015150TTTGV-DNV; 0-50-025150TTTGV-DNV Rev.1; 0-50-040150TTTGV-DNV rev.1; 0-50-040150TTTGV-DNV; 0-50-040150TTTGV-DNV; 0-50-040150TTTGV-DNV; 0-50-100150TTTGV-DNV; 0-50-100150TTTGV-DNV; 0-50-100150TTTGV-DNV; 0-50-015300TTTGV-DNV; 0-50-015300TTTGV-DNV; 0-50-025300TTTGV-DNV Rev. 1; 0-50-040300TTTGV-DNV; 0-50-050300TTTGV-DNV; 0-50-050300TTTGV-DNV; 0-50-050300TTTGV-DNV; 0-50-100300TTTGV-DNV; 001RE5000020300; 002005000020150
- DESIGN AND CALCULATION DOSSIER FOR BALL VALVE Rev.1 dated 05/01/2023
- TECHNICAL DATASHEET for 100% virgin modified PTFE dated 27/04/2010
- GENERAL PROCEDURE - PRESSURE AND FUNCTIONAL TEST
- Pressure-Temperature ratings for non-metallic sealings (5 pages) dated 26-05-22

Documentation related to Z1L

- G.A. drawings 00-3600015150TTTGV P354 and 00-3600040150TTTGV P354
- Pressure/Temperature Graph nos. 1 Rev.00, 2 Rev.00 and 18 Rev.00
- Detailed drawings: 001A03600040150 Rev.03, 002A00200040150A Rev.00, 001A03600080150 Rev.01, 002A00200080150 Rev.1, 001A03600065150 Rev.01, 002A00200065150 Rev.01, 001A03600025150 Rev. 02, 002A00200025150 Rev.03, 001A03600050150 Rev.02, 002A00200050150 Rev.01, 001A03600020150 Rev.01, 002A00200020150A Rev.02, 001A03600015150 Rev. 02, 002A00200015150A.
- DS-5959 Rev. 0 bronze valve datasheet
- Graph No.18, FKM Pressure/Temperature datasheet dated 27/01/2018 rev. 00
- Design And Calculation Dossier for Ball Valves:
  - Design Ref.: 186, Valve Type Floating B.Valve 2pcs Fb 2” Cl.150
  - Design Ref.: 203, Valve Type Floating B.Valve 2pcs Fb 1 ½” Cl.150
  - Design Ref.: 202, Valve Type Floating B.Valve 2pcs Fb 3” Cl.150
- Burst test reports:
  - Certificate Nr.: 35601/1-53907 dated 15/05/2020
  - Certificate Nr.: 37890 / 1-55289-11-2CE dated 26/11/2020
  - Certificate Nr.: 37890 / 1-55289-3CE dated 26/11/2020
  - Lloyd’s report PRJ11100252951 19/05/2020
  - Lloyds PED certificate 0094/PED/MAD/ 0102 ENG dated 28 May 2023

Production Testing and Certification

Production Testing and Certification for the actual intended application shall follow the latest applicable edition of the Rules (as mentioned on the front page of this certificate).

Tests carried out

Fire test, cryogenic test, burst test as per EN 12516-3 (for Z1L model)

Marking of product

Minimum marking requirements shall be as outlined in the standard EN 19 in addition to minimum design temperature towards cryogenic applications.

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 approval are complied with. Reference is made to DNV-CP-0338.