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# **Operation manual for trunnion mounted ball valves DN40 – DN1000 with equipment and accessories**

**DTR-TB.01\_EN**

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## Contents

0	Registry of changes .....	4
1	Introduction .....	5
2	Legal advice.....	5
2.1	Copyright.....	5
2.2	General legal advice .....	5
3	Safety precautions and rules .....	6
3.1	Scope of application .....	6
3.2	Use.....	6
3.3	Safety rules.....	6
4	Introduction .....	7
4.1	General.....	7
4.2	Application .....	7
4.3	Valve type.....	7
4.4	Design and operating principle .....	8
4.5	Technical parameters.....	9
4.5.1	Work temperature range – TO .....	9
4.5.2	PS;PO-TS;TO chart.....	10
4.5.3	Maximum torque .....	13
4.6	Valve version .....	14
4.6.1	Aboveground.....	14
4.6.2	Underground.....	15
4.7	Anti-corrosion protection.....	16
4.7.1	External surfaces .....	16
4.7.2	Internal surfaces .....	16
4.8	Functional components.....	16
4.8.1	Antistatic protection .....	16
4.8.2	Fire Safe protection.....	16
4.8.3	Anti Blow of stem protection.....	16
4.8.4	Actuator attachment. ....	17
4.8.5	Double block and bleed (DBB) .....	17
4.8.6	Emergency additional lubrication system .....	17
4.9	Equipment components.....	17
4.9.1	Base.....	17
4.9.2	Transport grips.....	17
4.9.3	Stem extension column .....	17
4.9.4	Drain / air bleed system.....	18
4.9.5	Additional lubrication system .....	18
4.10	Equipment configuration.....	18
4.11	Factory testing .....	19
4.12	Marking.....	19
5	Delivery .....	22
5.1	Inspection of delivery .....	22
5.2	Packaging.....	22

5.3	Transport .....	22
5.4	Storage .....	22
6	Installation in systems.....	23
6.1	Introduction.....	23
6.2	Unpacking and preparation for installation .....	23
6.2.1	Unpacking .....	23
6.2.2	Preparation for installation involves: .....	24
6.3	Fastening during handling .....	25
6.3.1	Fastening without grips .....	25
6.3.2	Fastening with grips .....	25
6.4	Assembly positions.....	26
6.5	Flange ends valve assembly .....	27
6.6	Welded ends valve assembly .....	28
7	Finished installation or prefabrication tests.....	29
7.1	System strength and tightness test.....	29
7.2	Draining and drying .....	31
7.2.1	Draining.....	31
7.2.2	Drying.....	31
8	Operation of the valve .....	32
8.1	General.....	32
8.2	Medium .....	32
8.3	Relation of operating pressure (PO) to operating temperature (TO).....	33
8.4	Valve control .....	33
8.5	Maintenance .....	33
8.6	DBB.....	33
8.7	Emergency additional lubrication system.....	34
8.7.1	Required components.....	34
8.7.2	Preparations.....	35
8.7.3	Servicing procedures.....	36
8.7.4	End notes .....	36
8.7.5	Consumption table for the additional lubrication system.....	37
8.8	Troubleshooting .....	38
8.9	Warnings .....	39
9	Accessories.....	40

## 0 Registry of changes

Revision	Change No.	Introduced by	Date of change	Document section	Scope of change
04	Z-041/15	BKO	19/05/2015	7	Update
05	Z-218/16	KST	10/10/2016	4.2 ; 4.8.1 ; 4.3 ; 4.5.3 ; 4.12 8.7.5	PED Directive Update Adding the information on the valve size Adding the information on valve marking Adding the information on the valve size
06	Z-057/17	PBA	30/03/2017	8.5	Removing the information on AH-4w valve maintenance
07	Z-178/18	MFN	16/11/2018		Company address change
08	Z-191/18	KST	05/12/2018	Whole document	Company name and address change
				4.4, 4.5, 4.10	Adding AH-2cj, AH-2cpj, AH-3j, AH-3jp valves
				4.12	Nameplate update
				8.6	Update of the point regarding DBB
				8.9	Adding warnings pertaining to the use of the valves
09	Z-085/19	ASN	28/06/2019	4.3; 4.5.3	Changing the valve diameter range

## 1 Introduction

This Operation Manual includes all necessary information concerning use, design, shipping, storage, assembly, commissioning and operation of ball valves. The Manual is intended for assembly, service, operating and supervision personnel. The Manual is intended to provide the user with all required information and help in performing all necessary tasks quickly and correctly.

This Manual describes the design of a ball valve and its equipment and optional accessories. The valve type and specific parameters are described in detail further in the Manual.

The aforementioned personnel must read, understand and follow this Manual. The Manual must always be at hand.

It is especially important to read all safety precautions in this Manual.

BROEN POLAND sp. z o.o. shall accept no responsibility for damage and operating faults caused by failure to follow this Operation Manual.

BROEN POLAND sp. z o.o. reserves the right to engineering changes in text and data contained herein to improve ball valve components and equipment.

## 2 Legal advice

### 2.1 Copyright

BROEN POLAND sp. z o.o. is the sole owner of copyright to this Operation Manual.

No information or drawings contained herein may be copied, distributed or used for commercial purposes or disclosed to third parties in part or in whole without authorisation.

### 2.2 General legal advice

Assembly, commissioning, maintenance and supervision shall be carried out only by authorised personnel and in compliance with all safety requirements of relevant standards and regulations of law.

Upon receiving the delivery, check all components (the ball valve, all equipment and/or accessories if present) for any damaged during transport. Only faultless components can be installed and/or used.

Negligence in maintenance or improper maintenance voids the warranty. Only the genuine spare parts guarantee quality, safety and interchangeability.

All unauthorised modifications are strictly prohibited by BROEN POLAND sp. z o.o.. Failure to follow this instruction voids the manufacturer's warranty.

**Failure to follow instructions voids the manufacturer's warranty!!!**



### 3 Safety precautions and rules

**Always follow the precautions and rules contained in this chapter!!!**  
**Failure to follow the precautions and rules voids your warranty rights!!!**



#### 3.1 Scope of application

The ball valve manufactured by BROEN POLAND sp. z o.o. is shut-off ball valve.

This Operation Manual also covers the equipment components installed on the ball valve ("equipment components" definition, see 4.9).

This Operation Manual does not cover the accessories installed on the ball valve ("accessory" definition, see 9).

Depending on the seal system used, the ball valves can be operated with gaseous and/or liquid media.

#### 3.2 Use

Intended use of the product includes compliance with the guidelines and indications of this Manual, as well as compliance with the operation conditions stated on the product nameplate, the declaration of conformity (or the certificate of acceptance) and compliance with valid local OHS and environmental protection regulations.

The ball valve and its equipment have been designed, manufactured and tested in accordance with recognised processes and internal quality parameters of BROEN POLAND sp. z o.o., and they have been released from the factory in faultless condition.

#### 3.3 Safety rules

If the Ball valve and its equipment are operated in an improper manner or against their intended use, they may become a hazard to persons, property and the environment.

All media other than listed and/or used beyond the permitted ranges of pressure and temperature may result in damage and/or leaks which can be hazardous to persons, property and the environment.

The ball valve and its equipment cannot be subjected to any modifications without a written permission from the manufacturer which may become hazardous to persons, property and the environment.

Every person involved in assembly, commissioning, operation and supervision of the ball valves and its equipment must read and understand this Operation Manual in full and they must also have documented qualifications for such work.

This Manual must always be kept at hand in a suitably secure location near the ball valve.

If any faults occur which can be potential safety hazards to persons, property and/or the environment, immediately notify the manufacturer and take proper corrective action.

All work on the ball valve and its equipment, such as repairs, shall only be carried out by the BROEN POLAND sp. z o.o. Service and only when the ball valves are depressurized with the power isolated from the accessories.

All work on the ball valve and its equipment, such as inspection and maintenance, shall only be carried out with extreme caution and in compliance with all applicable OHS rules.

During all work which may result in contamination and/or damage of the ball valve and its equipment, the products must be properly secured against contamination and damage.

## 4 Introduction

### 4.1 General

The ball valve manufactured by BROEN POLAND sp. z o.o. is shut-off ball valve used to close and open the flow of media.

The medium flow direction is irrelevant - the ball valve guarantees bidirectional seal.

The ball valve is intended to cut-off the flow of medium in pipeline systems; it does not feature regulating, control, safety, non-return, directional control or mixing functions.

The type of the working medium conditions the selection of ball valve construction materials and it is listed in the supplied documentation and on the nameplate.

### 4.2 Application

The ball valve manufactured by BROEN POLAND sp. z o.o. is intended for group 1 and 2 media according to the Directive 2014/68/UE. Depending on the seal system used, the ball valve can be operated with gaseous and/or liquid media.

### 4.3 Valve type

This Operation Manual applies to the following ball valve types manufactured by BROEN POLAND sp. z o.o.:

Valve type	DN marking	PN marking	CL marking	Ends
AH-2cj...	40; 50; 65; 80	(6), (10), 16, 25, 40,	150, 300	flanged, FxF
AH-2cpj...	40; 50; 65; 80	(6), (10), 16, 25, 40,	150, 300	welded, WxW
AH-11cj...	100; 125; 150	(6), (10), 16, 25, 40,	150, 300	flanged, FxF
AH-12cj...	100; 125; 150	(6), (10), 16, 25, 40,	150, 300	welded, WxW
AH-14c...	200; 250; 300; 350; 400; 500; 600; 700; 800; 900; 1000	(6), (10), 16, 25, 40,	150, 300	flanged, FxF
AH-15c...	200; 250; 300; 350; 400; 500; 600; 700; 800; 900; 1000	(6), (10), 16, 25, 40,	150, 300	welded, WxW
AH-14cr...	250/200; 300/250; 350/300; 400/350; 500/400; 600/700; 700/600; 800/700; 900/800;	(6), (10), 16, 25, 40,	150, 300	flanged, FxF

	1000/900			
AH-15cr...	250/200; 300/250; 350/300; 400/350; 500/400; 600/700; 700/600; 800/700; 900/800; 1000/900	(6), (10), 16, 25, 40,	150, 300	welded, WxW
AH-3j...	40; 50; 65	63, 100	(400), 600	flanged, FxF
AH-3jp...	40; 50; 65	63, 100	(400), 600	welded, WxW
AH-4w...	80; 100; 150; 200; 250; 300; 350; 400; 500; 600; 700; 800; 900; 1000	63, 100	(400), 600	flanged, FxF
AH-4pw...	80; 100; 150; 200; 250; 300; 350; 400; 500; 600; 700; 800; 900; 1000	63, 100	(400), 600	welded, WxW

The blank "... " can feature the following additional marking letters, e.g.

- Letter „f” – Fire Safe version of the valve
- Letter „r” – reduced bore version of the valve

The information listed in parentheses is available as special products upon ordering.

#### 4.4 Design and operating principle

The ball valve type AH-2cj...; AH-2cpj...; AH-3j...; AH-3jp...; AH-11cj...; AH-12cj...; AH-14c...; AH-15c...; AH-4w...; AH-4pw... is designed as a steel screwed body or fully welded body with external anti-corrosion protection and the ball seated between two seals made of PTFE, PTFE+C, POM, PEEK+C or two o-rings (NBR, HNBR, FKM, FFKM) set in sliding holders supported by springs and sealed against the body. The ball is mounted on rotating trunnions in perpendicular to the direction of flow. The closed ball maintains seal by pressing the ball against the inlet seal. The ball pressure on the seal is generated by the medium pressure and the pressure of the spring under the holder. These valve types are impervious to thermal expansion of their components and they are protected against excessive pressure rise inside the valve body (the valves feature thermal and volumetric compensation).

The ball is turned by the stem which mates with the groove in the ball. The rotational movement of the ball is limited to 90° by a limiter or stops installed in the actuator (attachment for part-turn actuators acc. to EN ISO 5211). The ball valve is open when the indicator mark on the stem face or the indicator on the transmission / actuator is parallel to the valve axis. The flow is cut off by turning the stem clockwise to the stop position. The indicator mark in the closed position is perpendicular to the valve axis.

Depending on the valve type, the body is terminated on both sides with flanged ends or welded ends or threaded ends for connection with a pipeline system (specific ends type, see 4.3).



## 4.5 Technical parameters

Abbreviations:

PS - maximum permissible pressure

PO - operating pressure

TS - maximum permissible temperature

TO - operating (working) temperature

### 4.5.1 Work temperature range – TO

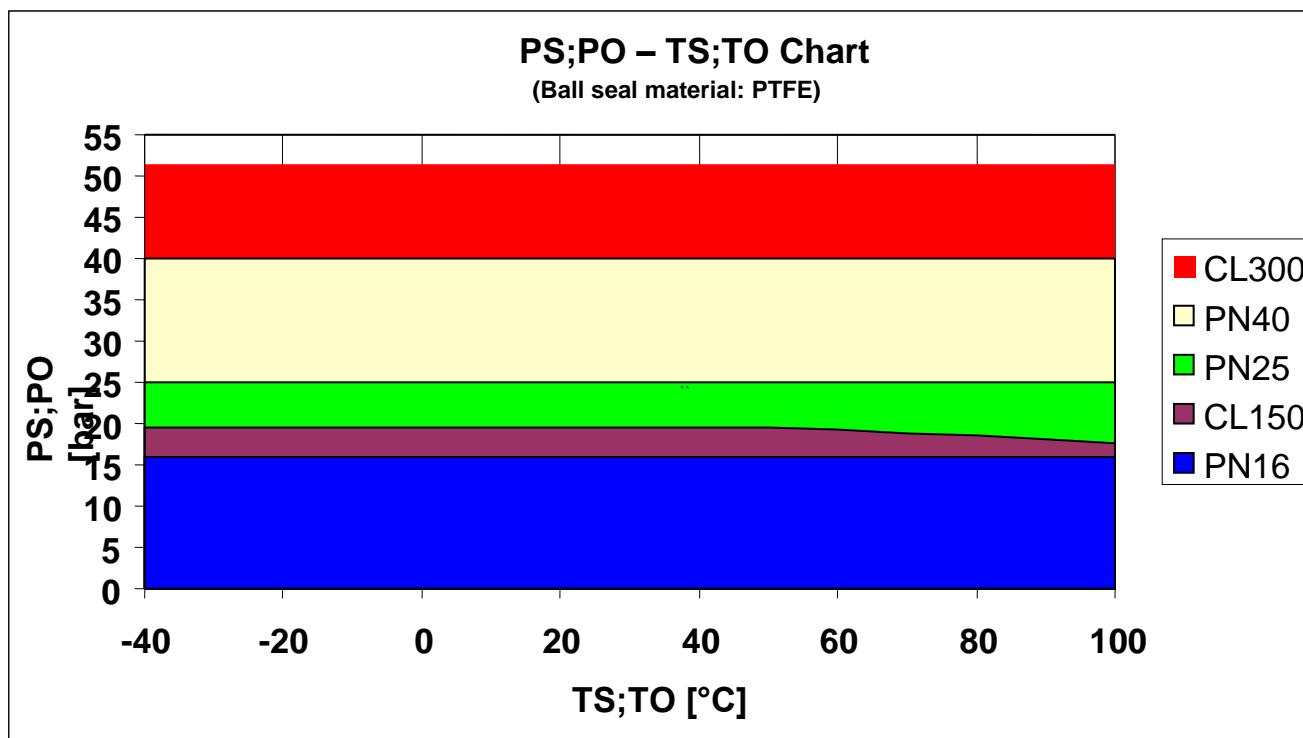
Temperature range – TO	Ball valve types
-30 ÷ +100°C	AH-2cj...; AH-2cpj... AH-11cj...; AH-12cj... AH-14c...; AH-15c... AH-14cr...; AH-15cr... AH-3j...; AH-3jp... AH-4w...; AH-4pw...
-40 ÷ +100°C	AH-2cj...; AH-2cpj... AH-11cj...; AH-12cj... AH-14c...; AH-15c... AH-14cr...; AH-15cr... AH-3j...; AH-3jp... AH-4w...; AH-4pw...
-20 ÷ +150°C	AH-2cj...; AH-2cpj... AH-11cj...; AH-12cj... AH-14c...; AH-15c... AH-14cr...; AH-15cr...
-10 ÷ +200°C	AH-2cj...; AH-2cpj... AH-11cj...; AH-12cj... AH-14c...; AH-15c... AH-14cr...; AH-15cr...

4.5.2 PS;PO-TS;TO chart

For valve type AH-2cj...; AH-2cpj...; AH-11cj...; AH-12cj...; AH-14c...; AH-15c...; AH-14cr...; AH-15cr...

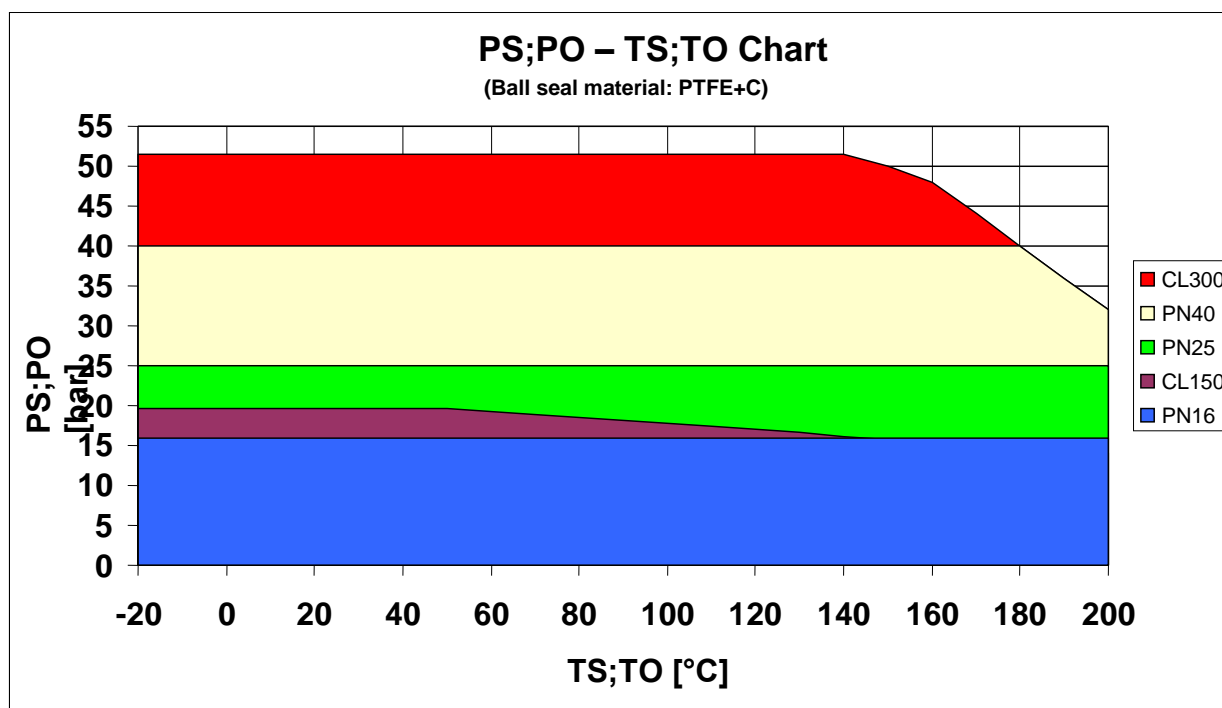
For temperature range:  
 -30 ÷ +100°C and -40 ÷ +100°C

TS;TO [°C]	PS;PO [bar]				
	PN16	PN25	PN40	CL150	CL300
-40	16	25	40	19.6	51.5
-30	16	25	40	19.6	51.5
-20	16	25	40	19.6	51.5
-10	16	25	40	19.6	51.5
0	16	25	40	19.6	51.5
10	16	25	40	19.6	51.5
20	16	25	40	19.6	51.5
30	16	25	40	19.6	51.5
40	16	25	40	19.6	51.5
50	16	25	40	19.6	51.5
60	16	25	40	19.3	51.5
70	16	25	40	18.9	51.5
80	16	25	40	18.5	51.5
90	16	25	40	18.1	51.5
100	16	25	40	17.7	51.5



For temperature range:  
 -20 ÷ +150°C and -10 ÷ +200°C

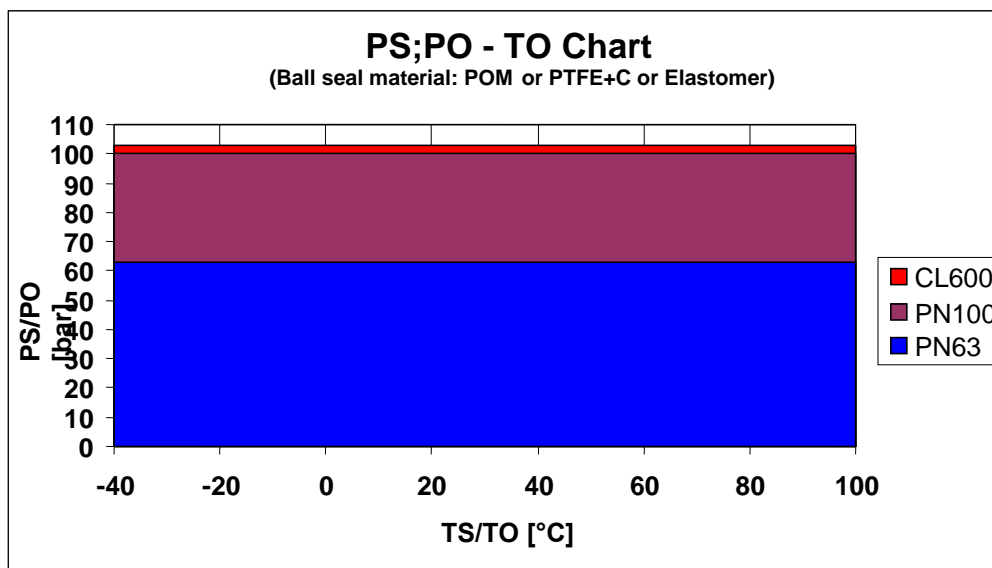
TS/TO [°C]	PS;PO [bar]				
	PN16	PN25	PN40	CL150	CL300
-20	16	25	40	19.6	51.5
-10	16	25	40	19.6	51.5
0	16	25	40	19.6	51.5
10	16	25	40	19.6	51.5
20	16	25	40	19.6	51.5
30	16	25	40	19.6	51.5
40	16	25	40	19.6	51.5
50	16	25	40	19.6	51.5
60	16	25	40	19.3	51.5
70	16	25	40	18.9	51.5
80	16	25	40	18.5	51.5
90	16	25	40	18.1	51.5
100	16	25	40	17.7	51.5
110	16	25	40	17.4	51.5
120	16	25	40	17	51.5
130	16	25	40	16.6	51.5
140	16	25	40	16.2	51.5
150	16	25	40	15.8	50
160	16	25	40	15.4	48
170	16	25	40	15	44
180	16	25	40	14.6	40
190	16	25	36	14.2	36
200	16	25	32	14	32



For valve type AH-3j...; AH-3jp...; AH-4w...; AH-4wp...

**For temperature range:  
 -30 ÷ +100°C and -40 ÷ +100°C**

TS/TO [°C]	PS;PO [bar]		
	PN63	PN100	CL600
-40	63	100	103
-30	63	100	103
-20	63	100	103
-10	63	100	103
0	63	100	103
10	63	100	103
20	63	100	103
30	63	100	103
40	63	100	103
50	63	100	103
60	63	100	103
70	63	100	103
80	63	100	103
90	63	100	103
100	63	100	103



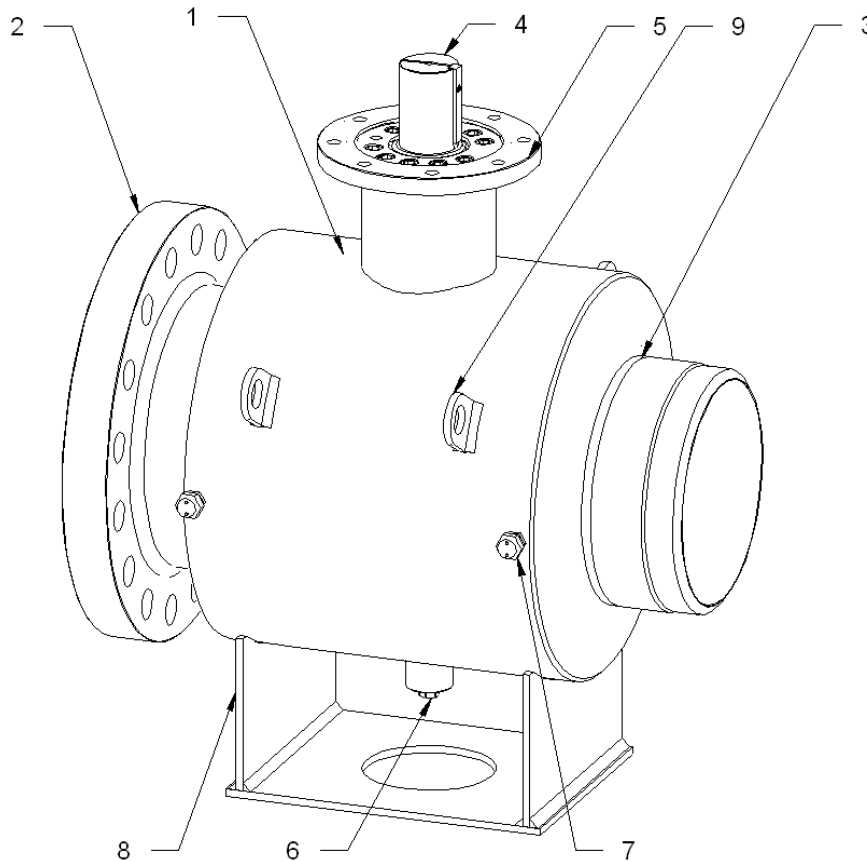
**4.5.3 Maximum torque**

The maximum break away torque (M max) is presented below. The value is limited due to the mechanical strength of operated components. The actual valve opening torque depends on the operating parameters (PO, TO, medium, operating, cycles, etc.).

Valve type	DN	M max [Nm]
AH-2cj... AH2cjp...	40	160
	50	160
	65	300
	80	330
AH-11cj... AH-12cj...	100	650
	125	1400
	150	2500
AH-14c... AH-15c...	200	2500
	250	6000
	300	6000
	350	6000
	400	8000
	500	12000
	600	16000
	700	26500
	800	50000
	900	63000
1000	125000	
Valve type	DN	M max [Nm]
AH-3j... AH-3pj...	40	300
	50	300
	65	300
AH-4w... AH-4pw...	80	500
	100	1000
	150	2500
	200	6000
	250	6000
	300	8000
	350	12000
	400	16000
	500	32000
	600	51000
	700	63000
	800	125000
900	125000	
1000	125000	

## 4.6 Valve version

### 4.6.1 Aboveground



1 – body

2 – flanged end (double-sided FxF is possible, see 4.3)

3 – welded end (double-sided WxW is possible, see 4.3)

4 – stem

5 – cover of actuator attachment acc. to EN ISO 5211 (see 4.8.44.8.4 )

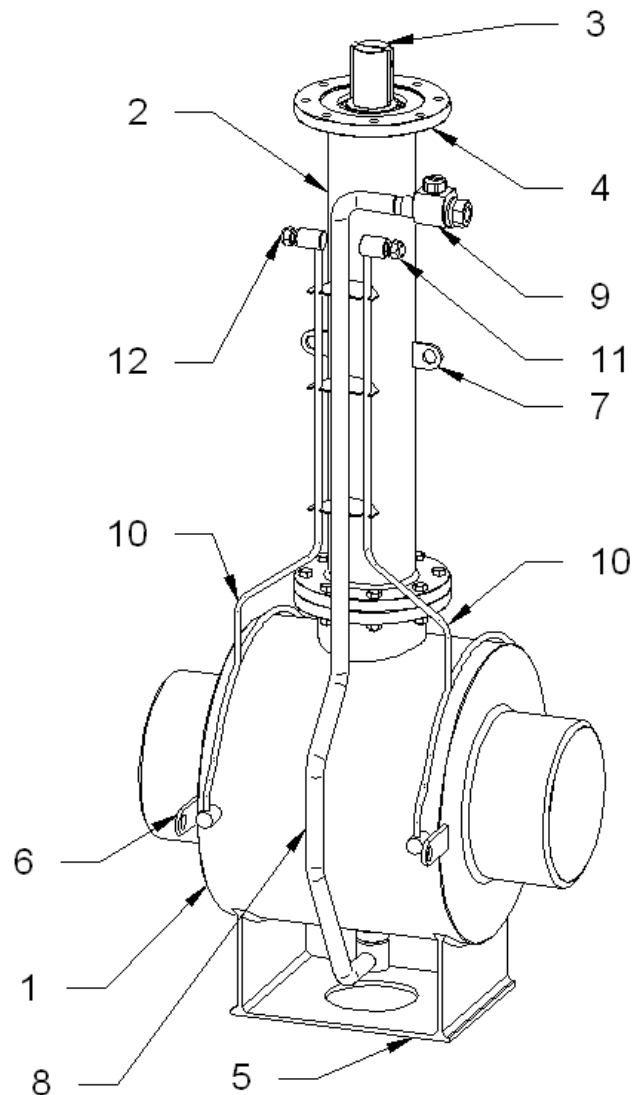
6 – drain / air bleed plug (see 4.8.5 and 8.6)

7 – additional lubrication termination (see 4.8.6 and 8.7)

8 – base (see 4.9.1)

9 – transport grip (see 4.9.2)

#### 4.6.2 Underground



- 1 – ball valve (WxW) - i.e. main valve
- 2 – stem extension column (see 4.9.3)
- 3 – stem
- 4 – cover of actuator attachment acc. to EN ISO 5211 (see 4.8.4)
- 5 – base (see 4.9.1)
- 6 – transport grip on the valve (see 4.9.2)
- 7 – transport grip on the column (see 4.9.2)
- 8 – drain / air bleed system (see 4.9.4)
- 9 – ball valve at the drain / air bleed system termination (see 4.9.4)
- 10 – additional lubrication system (see 4.9.5, 8.7)
- 11 – additional lubrication system termination (see 4.9.5, 8.7)

## 4.7 Anti-corrosion protection

### 4.7.1 External surfaces

The ball valve aboveground version has its external surfaces protected against corrosion with a paint coat (film thickness: approx. 100 µm). Specific components of the valve are protected against corrosion with electroplated coating.

The ball valve underground version has its external surfaces protected against corrosion with a PUR coat (acc. to EN 10290) or another coat as required by the customer. The top part of the columns and the top part of the additional lubrication system is protected against corrosion with a paint coat.

Specific surfaces of the valve, i.e. flange sealing surfaces, butt-welded ends, etc., are protected against corrosion with a preservative used for transport and storage.

### 4.7.2 Internal surfaces

The internal surfaces of the valve body are protected against corrosion with a preservative used for transport and storage.

**The preservation made by the manufacturer protects the valve during transport and storage to a maximum of 6 months!!!**



The components, i.e. the ball, the holders and other internal parts, are protected against corrosion by electroplating and/or as made from stainless or acid-resistant steel.

Detailed information about anti-corrosive coats is provided by BROEN POLAND sp. z o.o..

The grade, type and colour of paint coats can be different on request when ordering.

## 4.8 Functional components

### 4.8.1 Antistatic protection

The antistatic protection conforms to the requirements of EN 1983 API Specification 6D / ISO 14313.

Each valve is designed for group I media acc. to the Directive 2014/68/UE.

### 4.8.2 Fire Safe protection

The Fire Safe protection conforms to the requirements of EN ISO 10497.

The ball valve also features a plate which reads "ISO FT".

Applies to valves with "f" in the nameplate type designation.

### 4.8.3 Anti Blow of stem protection

The Anti Blow of stem system, conforms to the requirements of EN 1983 API Specification 6D / ISO 14313.

Each valve features Anti Blow system.



#### 4.8.4 Actuator attachment.

The attachment for part-turn actuator in accordance with EN ISO 5211 is designed to connect the actuator. This enables installation of different types of actuation.

Valves with actuator attachments, see 4.10

#### 4.8.5 Double block and bleed (DBB)

The Double Block and Bleed conforms to the requirements of API Spec. 6D / ISO 14313.

Detailed description of the function use, see 8.6

Valves with DBB, see 4.10

#### 4.8.6 Emergency additional lubrication system

The emergency additional lubrication system enables special operating service which consists in:

- flushing - washing of the ball-seal interface;
- lubrication of the ball and seals surfaces;
- secondary seal - restoration of lost seal upon damage of the ball and seals surfaces.

Detailed description of the function use, see 8.7

Valves with the feature, see 4.10

### 4.9 Equipment components

#### 4.9.1 Base

The base supports the valve on its foundation to eliminate the impact of the valve weight with the medium on the pipeline system. The base cannot be fastened to the foundation. It must move freely. The foundation only supports the valve by its base. The valve base cannot serve as a pipeline support.

Valves with the feature, see 4.10

#### 4.9.2 Transport grips

The transport grips used for ball valves of lifting components in order to lift the valve. These components must be used first to handle the product (see 6.3).

Valves with the feature, see 4.10

#### 4.9.3 Stem extension column

The stem extension column extends and moves the stem end at a distance from the valve (pipeline) axis. This component is designed only to transfer the actuator torque on the main valve stem and on the accessory mass.

**The column must not be exposed to bending forces and torques!!!**



#### 4.9.4 Drain / air bleed system

The drain / air bleed system features a line (tube) which connects the opening at the lowest point of the main valve body with the ball valve at the end, located on the column. The system is designed to evacuate fluids (liquid or gas) which may accumulate in the main valve body and/or to bleed air from the volume between the main valve body and its ball. The operating parameters of the system are the same as of the main valve. The system is attached to the body and the column.

#### 4.9.5 Additional lubrication system

The additional lubrication extension includes two lines (tubes) which connect the emergency additional lubrication system of the holders (left and right) with the grease terminal (left and right, for both holders respectively). The system feeds operating liquids to the holders and the ball (see 4.8.6). The operating parameters of the system are the same as of the main valve. The transmission pressure of the system is a minimum of 1.5 x PS (PS of the main valve) and a maximum of 2.5 x PS. The system is attached to the body and the column.

### 4.10 Equipment configuration

Legend:

- X – standard version
- (X) – custom version; denotes agreement upon ordering
- FxF – flange ends on both sides
- WxW – welded ends on both sides
- DBB – Double Block and Bleed
- CH – valve operated by lever
- ISO F – valve operated by actuator; adaptation for the actuator acc. to EN ISO 5211
- SDA – emergency additional lubrication system
- PO – base
- UT – transport grip
- KO – stem extension column
- KS – drain / air bleed discharge system and additional lubrication extension system, as a single component

Valve type	Ends	CH	ISO F	SDA	PO	UT	KO	KS [6]
AH-2cj...	FxF	X	(X)	(X) [3]	(X)	(X)	(X)	(X) [3]
AH-2cpj...	WxW	X	(X)	(X) [3]	(X)	(X)	(X)	(X) [3]
AH-3j...	FxF	X	(X)	(X) [3]	(X)	(X)	(X)	(X) [3]
AH-3jp...	WxW	X	(X)	(X) [3]	(X)	(X)	(X)	(X) [3]
AH-11cj...	FxF	X	(X)	(X)	(X)	(X)	(X)	(X) [6]
AH-12cj...	WxW	X	(X)	(X)	(X)	(X)	(X)	(X) [6]
AH-14c...	FxF	(X) [1]	X	(X)	(X) [4]	(X) [4]	(X)	(X) [6]
AH-15c...	WxW	(X) [1]	X	(X)	(X) [4]	(X) [4]	(X)	(X) [6]
AH-4w...	FxF	X [2]	X [2]	X [3]	X [5]	X [5]	(X)	(X) [6]
AH-4pw...	WxW	X [2]	X [2]	X [3]	X [5]	X [5]	(X)	(X) [6]

[1] available only on DN200 PN16, PN25 and CL150 valves

[2] available only on DN80 and DN100 valves in standard; optionally replaced with the actuator attachment, ISO F

- [3] optional on DN80 valve
- [4] base and transport grips available in standard on DN≥400 valves
- [5] base and transport grips available in standard on DN≥150 valves
- [6] base and transport grips are always available with KS

#### **4.11 Factory testing**

The valve has been factory tested in accordance with the requirements of PN-EN 12266-1 and 2 or in accordance with a different specification defined in the order.

All valves are tested (100%).

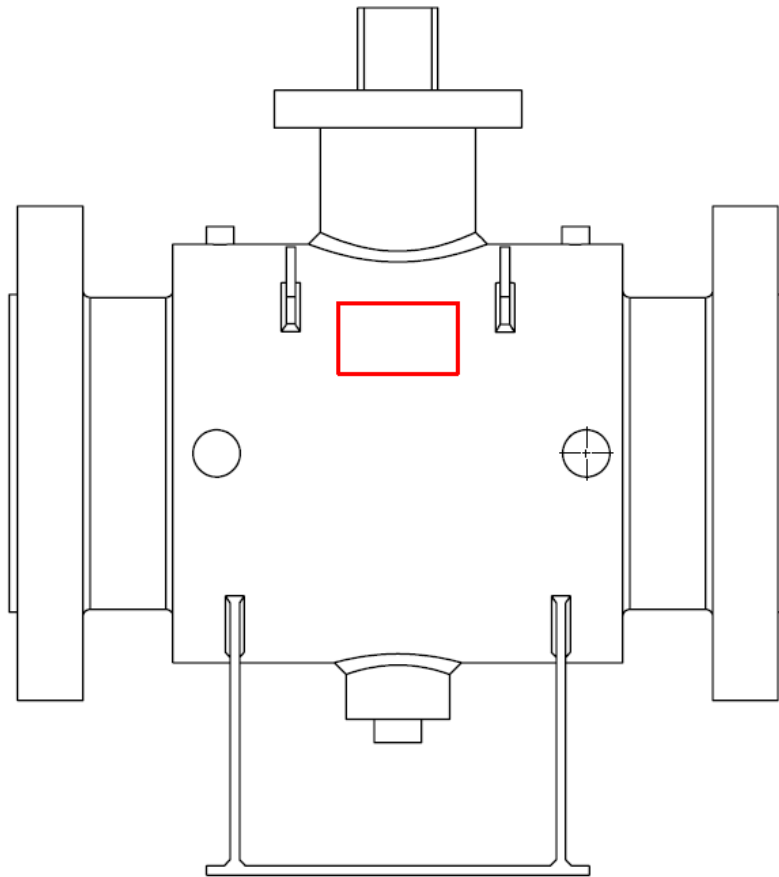
Standard tests of the valve:

- shell strength – P10;
- shell tightness – P11;
- seat tightness – P12; the valve seat tightness has been tested for both flow directions – closing seal class “A” acc. to PN-EN 12266-1 item A.4.3;
- functional test – F20.

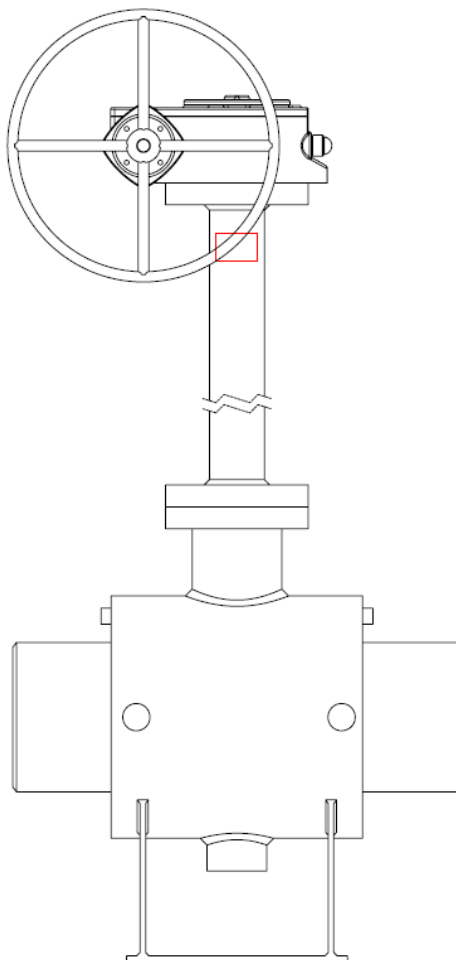
#### **4.12 Marking**

Each ball valve produced by the BROEN POLAND sp. z o.o. has a name plate. The location of the name plate depends on the version of the valve - red marking below.

- Above ground ball valves – name plate on the ball valve body



- Underground ball valves – name plate on the stem extension



Below is an example of a nameplate placed over the valves:

<b>BROEN</b>	<b>TYP</b>	<input type="text"/>
POLAND sp.z o.o. 64-610 ROGOŹNO	<b>DN</b>	<input type="text"/>
	<b>PN/CL</b>	<input type="text"/>
<b>Mat</b>	<input type="text"/>	<b>TS</b>
	<input type="text"/>	
<b>CE</b>	<input type="text"/>	
<b>0062</b>	<b>Data - No.</b>	<input type="text"/>

## 5 Delivery

### 5.1 Inspection of delivery

- The valve should be placed in a durable and/or genuine protective packaging; damage of packaging may indicate damage to the valve; if present, all damage shall be documented by photography.
- The valve ends should be protected by stoppers; remove the stoppers directly before installing the valve in the pipeline system (see 6).
- The valve must be open.
- Check the delivery for completeness and correctness against the shipping list, the enclosed documents and the nameplate markings of the valve and accessory.

### 5.2 Packaging

The valve is contained in a durable packaging. The packaging is made of environmentally-friendly materials which are easy to sort and recyclable. The packaging materials include wood, cardboard, paper and PE film. Disposal of the packaging shall be handled by a recycling company.

### 5.3 Transport

- The valve must be open during transport.
- Exercise extreme caution when unloading or transshipping the valve with or without its equipment and/or accessory; it is best to use the packaging base components to handle the product.
- The valve and its packaging shall be permanently fixed to the transport vehicle and/or protected against movement and falling during transport.
- The customer is responsible for correct unloading and/or transshipment (see the description in 6.3 and 6.4).

**When handling valves equipped with accessories and/or the column with the drain / air bleed discharge and additional lubrication extension system, do not use these components for resting, gripping, lifting, etc.!!!**



Damage caused by improper transport methods does not substantiate warranty claims.

### 5.4 Storage

- The valve ends should be protected by stoppers; remove the stoppers directly before installing the valve in the pipeline system (see 6).
- All uncoated surfaces of the valve shall be preserved with an anti-corrosive agent.
- Store the ball valve in rooms which are protected from weather conditions and corrosive agents; it is best to store on flat surfaces in dry, clean and sheltered areas.
- The valve shall be in a stable position during storage.
- The valve must be open.

**The preservation made by the manufacturer protects the valve during transport and storage to a maximum of 6 months!!!**



## 6 Installation in systems

### 6.1 Introduction

- Notify BROEN POLAND sp. z o.o. about installation of the valve within 6 working days in prior.
- The valve must be installed by a properly trained personnel who have read and understood the requirements of this Manual.
- The valve delivered to the customer is ready for installation on a system following unpacking and removal of all protective components.
- The medium flow direction is irrelevant - the ball valve guarantees bidirectional seal.
- The ball valve can be installed at a termination of the pipeline system only if it is permanently plugged on the outlet end, see the requirements in 6.5; 6.6.
- Standard lifting devices, including all lifting components (i.e. slings, hooks, etc.) must have an adequate lifting capacity, which shall be not less than the weight of the valve or the valve with its equipment and/or accessory. The lifting devices must allow safe manoeuvring.

### 6.2 Unpacking and preparation for installation

#### 6.2.1 Unpacking

Unpacking involves:

- removal of protective packaging components;
- removal of all components which fasten the product to the packaging;
- thorough inspection of the valve and its equipment and/or accessories; if any damage to components or paint coats is found, immediately notify BROEN POLAND sp. z o.o. which will then select the method of repair and release for further installation.

**Remove the protective packaging with professional tools only!!!**



6.2.2 Preparation for installation involves:

- ensuring that the valve is to be installed in the specific point of the system; check the nameplate data against the data in the engineering manuals of the system;
- cleaning the connection point of the pipeline system;
- cleaning the internal voids of the system free of all contaminants;
- disassembly of the ball valve stopping components, i.e.
  - ends stoppers;
  - magnetic bands located in the bore; one or two bands can be installed on each holder;
  - removing the stem position lock if the valve features no actuator;

**Remove the stopping components only directly before installing the valve in the system! Earlier removal may result in permanent damage of the valve!!!**



- ensuring that the valve is in the open position; if it is not, immediately notify BROEN POLAND sp. z o.o. which will then decide to release the product for further installation;

**The valve must be open during installation!!!**



- checking that the interior of the ball valve (the bore) is clean;
- removing the preservative from the ends and internal components of the ball valve; (to remove the preservative use an extraction Gasoline or tinner PLP 00020 Peter-Lacke)

**The preservative must be removed!!!**

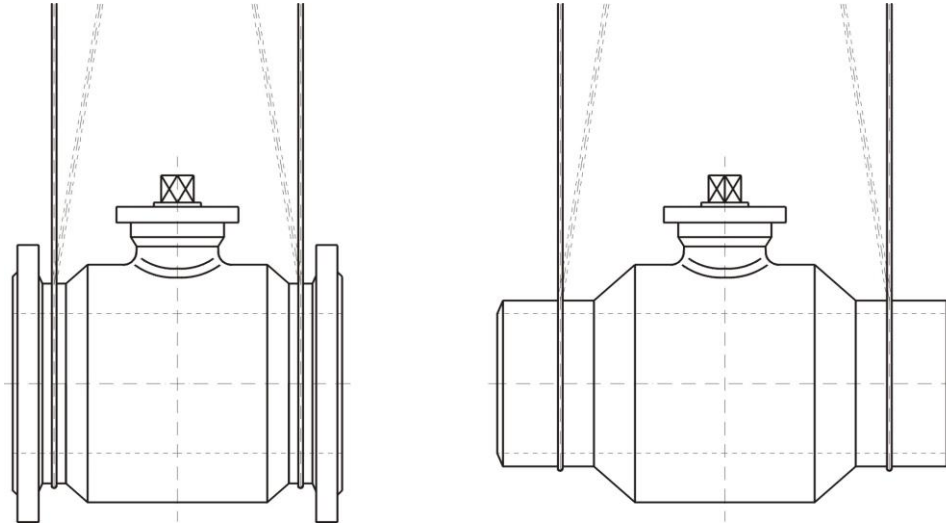




## 6.3 Fastening during handling

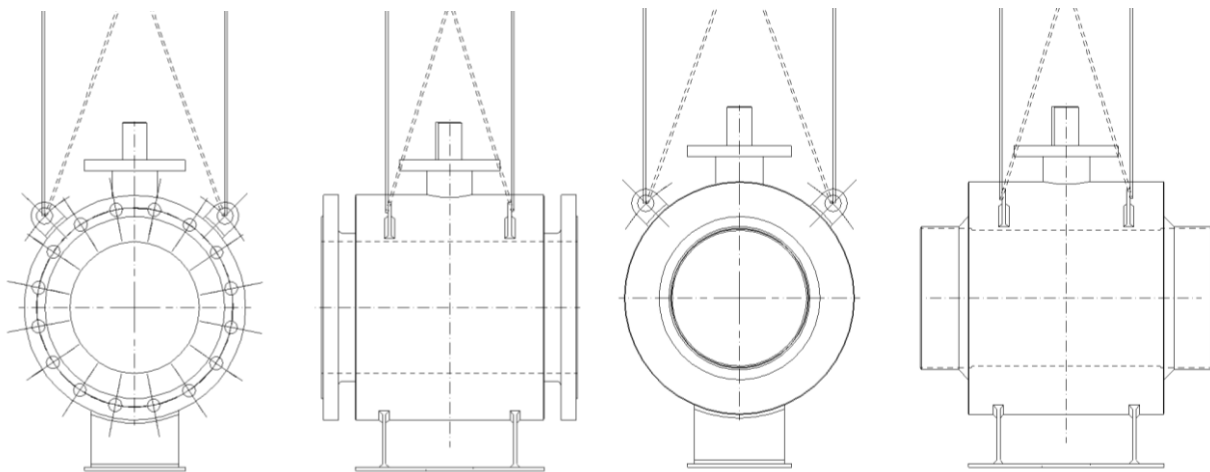
### 6.3.1 Fastening without grips

The ball valve without transport grips must be carried by hand or with standard lifting equipment (see the figure below).



### 6.3.2 Fastening with grips

The ball valve with transport grips must be carried by hand or with standard lifting equipment. Fasten by the grips as shown in the illustrations below.



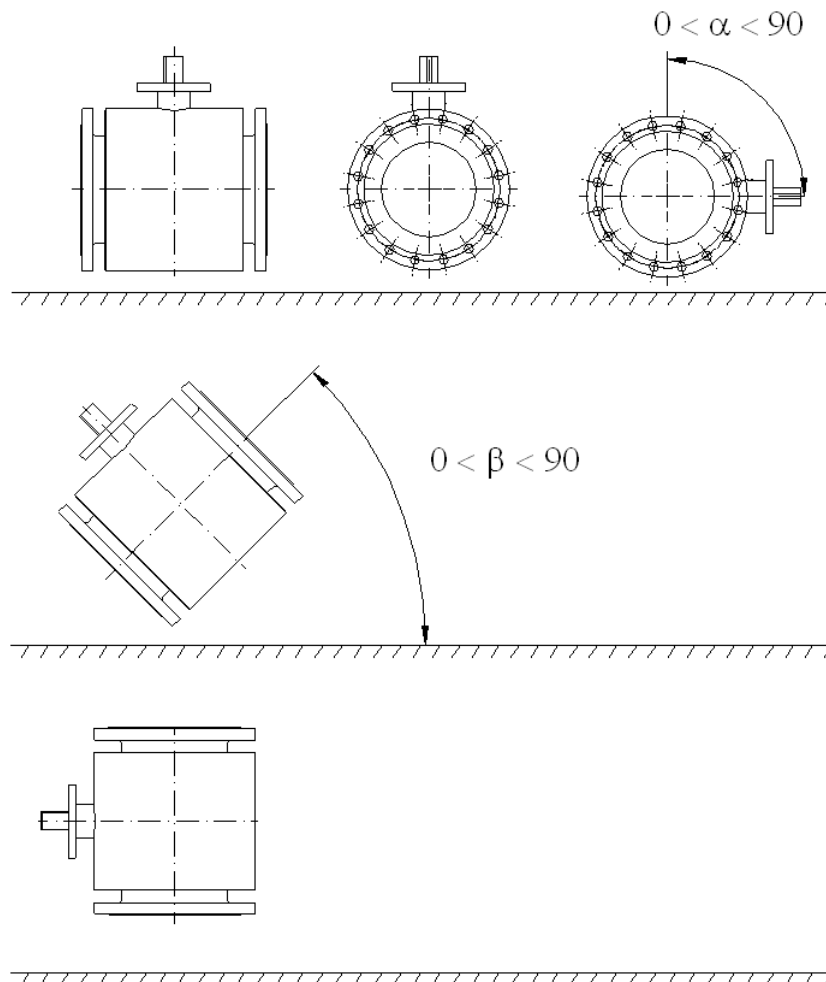
**Handle with extreme caution!!!**  
**Lifting components must not press and/or rest against the accessory!!!**



## 6.4 Assembly positions

The ball valves manufactured by BROEN POLAND sp. z o.o. can be installed in the following positions in the pipeline:

- horizontal: the bonnet can be turned between  $0^\circ \leq \alpha \leq 90^\circ$  (clockwise and counter-clockwise)
- at an angle to the floor, between  $0^\circ \leq \beta \leq 90^\circ$
- vertical



**Do not install the ball valve in any other positions than the shown above.!!!**



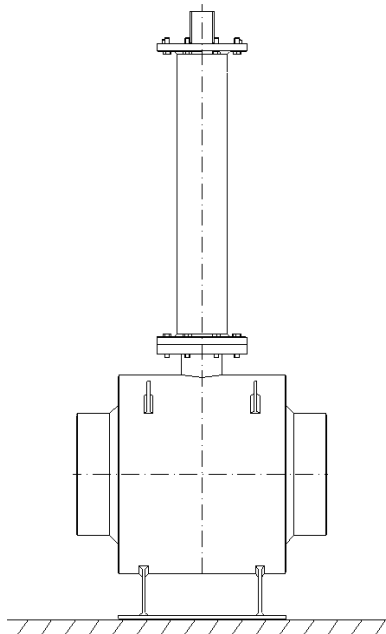
The assembly position of the ball valve can be different following prior agreement with and a written permission from BROEN POLAND sp. z o.o..

If the valve has a base, place it on a foundation which has been dimensioned for the base.

**Do not fasten the valve base to the foundation!!!**



If the valve is equipped with the column, assemble in the vertical position only (see the figure below).



The assembly position of the ball valve with the column can be different following prior agreement with and a written permission from BROEN POLAND sp. z o.o..

## 6.5 Flange ends valve assembly

Follow the requirements in 6.2, 6.3, 6.4 and do the following:

- set the valve in position in the system with a few bolts to safely and correctly place the flange seal;
- install the flange seal;
- install the remaining bolts in the flanges;
- ensure that the valve bore is aligned with the system pipeline bore, as well as all holes in the flanges are aligned;
- ensure that there are no parallelism faults between the flange sealing surfaces;
- tighten the bolts of the flanged connection in the crosswise pattern to the proper torque.

The pipeline system designer is responsible for proper selection of bolts, nuts and flange seals.

The pipeline system designer is responsible for stating the tightening torque values for flanged ends bolts.

The flanges of the ball valve are made in accordance with EN 1092-1 or EN 1759-1 as type 01 or 11 (other types are available on request); the flange material is group 8E3.

The ball valve installed at the termination of the pipeline system requires plugging of the free outlet. The pipeline system designer and builder are responsible for proper stopping.

**Do not operate the valve during installation!!!**  
**The first closing of the valve can only be carried out following thorough cleaning and/or sucking off contaminants left by the installation!!!**  
**Failure to follow these guidelines may result in damage of the seal and leaks of the ball valves!!!**



## 6.6 Welded ends valve assembly

**The valve must be open!!!**



Follow the requirements in 6.2, 6.3, 6.4 and do the following:

- assemble in accordance with the applicable pipeline assembly process;
- align the valve welded end axis with the pipeline axis;
- ensure that the valve end opening is aligned with the pipe opening;
- weld in accordance with the technical requirements of the pipeline and the WPS;
- monitor the valve body temperature during welding at the distance X from the welding location; if 120°C is exceeded, immediately stop welding;

DN	X [mm]
50; 65; 80; 100	50 - 80
DN ≥ 150	100 -120

The ball valve installed at the termination of the pipeline system requires plugging of the free welded end or the free pipe end. The pipeline system designer and builder are responsible for proper stopping.

**Do not operate the valve during installation!!!**  
**The first closing of the valve can only be carried out following thorough cleaning and/or sucking off contaminants left by the installation!!!**  
**Failure to follow these guidelines may result in damage of the seal and leaks of the ball valves!!!**



## 7 Finished installation or prefabrication tests

- Notify BROEN POLAND sp. z o.o. about the finished installation or prefabrication tests within 6 working days in prior.
- The tests must be carried out by a properly trained personnel who have read and understood the requirements of this Manual.
- The finished installation tests should be hydrostatic; pneumatic tests are allowed if there are other engineering reasons or contraindications.
- The tightness tests of the ball valve require a written permission from the manufacturer with the test requirements to prevent damage of the ball valve.

**Test only after thorough cleaning and/or purging of the pipeline system to remove solid and other contaminants!!!**

**Take all safety measures to prevent any potential hazard to persons, property and the environment!!!**



### 7.1 System strength and tightness test

PS – the maximum allowable pressure

PT<sub>inst.</sub> – test pressure of the pipeline installation

The permitted duration of the test pressure of the pipeline installation:

	$PT_{inst.} \leq PS$	$PS \leq PT_{inst.} \leq 1,1xPS$	$1,1xPS \leq PT_{inst.} \leq 1,5xPS$
<b>Time [h]</b>	without limits	max. 48h	max. 2h
<b>Comments</b>	-	Longer time after consultation with the company BROEN POLAND sp. z o.o.	Longer time after consultation with the company BROEN POLAND sp. z o.o.

Test pressure must not be greater than 1,5xPS

**It is not allowed to leave the valve in position “closed” when trying to test the strength of the pipeline!!!**



No.	Description of the operation	Position of the ball
1	Overdrive the ball valve in to the „fully open” ( $\alpha=0^\circ$ )	$\alpha=0^\circ$ 
2	Flood the pipeline installation (pure water or water with a corrosion inhibitor)	
3	Repeat ball valve for a angle $\alpha=75^\circ$ in relations to the open position – <b>max. 2h</b>	$\alpha$ 
4	Fill up liquid in the installation	
5	Put the test pressure in the installation $PT_{inst}$	
6	Overdrive the ball valve in to the „fully open” ( $\alpha=0^\circ$ )	$\alpha=0^\circ$ 
7	The strength test of the pipeline – <b>see table „Permissible duration of the test of the pressure pipeline installation”</b>	
8	Repeat ball valve for a angle $\alpha=15^\circ$ in relations to the open position – <b>max. 30min</b>	$\alpha$ 
9	Reduce the pressure to the required in the pipeline tightness test	
10	Overdrive the ball valve in to the „fully open” ( $\alpha=0^\circ$ )	$\alpha=0^\circ$ 
11	Carry out the leak test – <b>see table „Permissible duration of the test of the pressure pipeline installation”</b>	
12	Repeat ball valve for a angle $\alpha=75^\circ$ in relations to the open position – <b>max. 2h</b>	$\alpha$ 
13	Discharge fluid pressure	
14	Overdrive the ball valve in to the „fully open” ( $\alpha=0^\circ$ )	$\alpha=0^\circ$ 
15	Drain the pipeline installation	
16	Deodorize and drain the ball valve (see point 7.2)	

## 7.2 Draining and drying

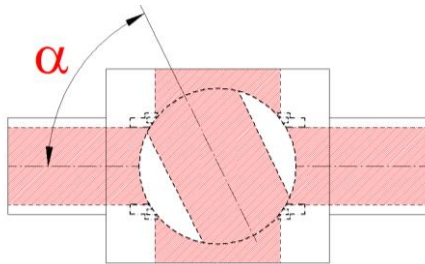
**Thoroughly drain and dry the system with the valve after tests!!!**



### 7.2.1 Draining

Applies only to valves with the drain plug or drain system

- Overdrive the ball valve in to the  $\alpha=75^\circ$  not longer than **2h**.



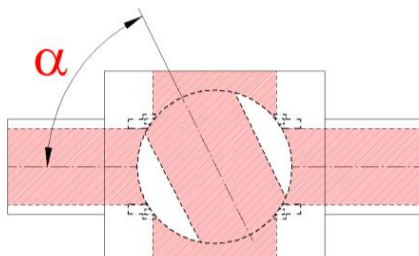
- Feed compressed air or other suitable medium eg. nitrogen, natural gas etc. at the **max pressure of 8 bar**.
- Remove the plug (see 8.6).
- Wait until air or other suitable medium stop running out from the opening and only air is discharged.
- Operate the valve into the “open” position.
- Twist in the plug (see 8.6).

### 7.2.2 Drying

**Dry after draining if possible!!!**



- Overdrive the ball valve in to the  $\alpha=75^\circ$  not longer than **2h**.



- Feed the drying medium (air, nitrogen or other suitable gas) at the **maximum pressure of 2 bar**.
- The drying medium temperature shall be **+60°C maximum**.
- Operate the valve into the open position.

## 8 Operation of the valve

### 8.1 General

Operate the ball valve in accordance with the requirements for shut-off ball valve in the open or closed position. Leaving or operating the ball valve in any other position may damage the ball seal.

Check the ball position on the visual indicator (the mark on the stem or the position indicator on the actuator).

The manufacturer anticipates a life of 20 years for the components of a ball valve which works within the PO-TO operating parameters.

During its operating life the valve should perform at least:

No. of open-close-open cycles	DN
500	125 and higher DN
1000	65; 80; 100
3000	50

The actual valve life shall be carried out after obtaining the physical and chemical data of the valve installation environment and of the flowing medium.

**The valve must be operated back and forth at least every six months!!!**

**If it is not possible to completely cut off the flow, turn the ball by ~50% of the range (i.e. by ~45°) and turn it back!!!**



### 8.2 Medium

See 4.2 and the valve nameplate.

The parameters of the medium shall meet the physical and chemical characteristics in its safety data sheet.

**Do not operate the valve at the temperature below or equal to the medium freezing point at the given operating pressure!!!**

**Do not operate with contaminated media!!!**





### 8.3 Relation of operating pressure (PO) to operating temperature (TO)

The relation of operating pressure (PO) to operating temperature (TO), see 4.5.2.

Protection against exceeding the allowable limits of pressure and temperature:

Where, under reasonably foreseeable conditions, the allowable limits could be exceeded, the pressure equipment shall be fitted with, or provision made for the ball valves of, suitable protective devices, unless the equipment is intended to be protected by other protective devices within an assembly. In case of pressure limiting devices, they must be so designed that the pressure will not permanently exceed the maximum allowable pressure PS.

### 8.4 Valve control

The valve is controlled as follows:

- turning the stem clockwise closes the valve,
- turning the stem counter-clockwise opens it.

A lever or a actuator must be installed on the actuator. A column which extends the stem can also be installed. See the detailed description in 4.9.3.

Operating should be smooth and without any stuttering, yet with a noticeable steady resistance which proves mutual stain at the contact between the ball and the seal, which guarantees that seal is maintained. Exceeding the maximum torque [M max] may result in damage to the ball, the column or the turn angle limiting components.

Maximum torque values [M max], see 4.5.3.

### 8.5 Maintenance

The ball valve is maintenance-free during its operating life. Inspect the condition of the anti-corrosive coating and the condition of the connection between the valve and the system. Protect the valve from mechanical damage and keep it clean, especially at the points which allow monitoring the ball position. Replace the valve during pipeline overhauls if necessary due to the assessment of wear. The valves require no spare parts. Overhaul the valve at the manufacturer.

### 8.6 DBB

Check if installed in the valve, see 4.8.5 and 4.10.

The DBB (Double Block and Bleed) system allows removing the pressure contained between the body and the ball. This enables testing the closing seal without putting the valve out of operation.

The valves for overground installation must be drained by partial operation (by a min of 30°) and then operated to closed position.

Once finished, untwist the drain plug and leave it until the volume between the body and the ball is completely empty. The larger the valve, the longer the complete draining time is.

**Be very careful not to unscrew the drain plug completely – the plug can be blown out!!!**

**Maximum allowed unscrewing of the plug: 2 full turns!!!**



Tightening torques for drain plugs and stoppers

Thread gauge	Wrench size	Maximum torque [Nm]
G ½"	S=17	60
G ¾"	S=21	80
G 1"	S=24	120
G 1 ½"	S=36	400

The valves for underground installation must be drained by partial operation of the main valve (by a min of 30°) and then operated to closed position. Once finished, remove the drain valve stopper and open the drain valve on the column.

Drain ball valve can be equipped with lever or hex nut.

Before operating drain ball valve equipped with hex nut:

- hex nut must be unscrewed;
- after removing hex nut must be turned upside down and installed on a stem;
- use S=41 wrench to operate drain ball valve.

**Exercise extreme caution when draining!!!**

**Do not remain in the line of the medium outlet of the drain system!!!**



Once the volume between the body and the ball has been emptied, close the drain valve on the column and install the stopper.

## 8.7 Emergency additional lubrication system

Check if installed in the valve, see 4.8.6 and 4.10.

### 8.7.1 Required components

- pressure lubricator which produces a minimum pressure of 1.5 x PS, equipped with nozzle for Ø 22 mm mushroom-type grease nipple (acc. to DIN 3404);
- flushing agent – appropriate for the medium and the operating conditions; recommended agent for natural gas: Val-Tex Valve Flush;
- grease – appropriate for the medium and the operating conditions; recommended lubricant for natural gas: Shell 2842;
- sealing compound – appropriate for the medium and the operating conditions; recommended compound for natural gas: Val-Tex 80 or Val-Tex 80+PTFE;

### 8.7.2 Preparations

- identify the valve service type by studying the external symptoms and determine the procedure;
- prepare the lubricator with the injected agent and the nozzle which fits the nipples;
- determine the amount of injected agent in accordance with the consumption table (see 8.7.5);
- remove the plug caps from the valve nipples (the grease nipples feature check valves, so it is not necessary to depressurize the pipeline).

### 8.7.3 Servicing procedures

#### A: BASIC PROCEDURE

Use only if internal leaks are found and contaminants are suspected to be present

##### I. Flush the valve (set the valve to open or close)

- before injecting the agent, try closing or opening the valve to release some contaminants;
- inject the flushing agent and leave it in the valve for the duration specified in the agent technical data to soften hard deposits;
- re-inject the flushing agent.

**If the pipeline is pressurised, use the pressure to blow down or flush softened contaminants with the working medium by closing and opening the valve!!!**



- The amount of the flushing agent required for the operation is two to three times larger than the amounts of lubricants listed in the consumption table (see 8.7.5).

##### II. Lubricate the surfaces of the ball and the seals (the ball must be set in the closed or open position):

- feed the grease with the lubricator at the amount listed in the consumption table (see 8.7.5);
- you can move the ball in the first injection stage to improve distribution of the grease;
- finish lubrication when the ball is fully open or closed.

III. If the valve is not tight after lubrication, inject the sealing compound. Proceed as in item II and use regular sealing compound; if this fails to eliminate the leaks, use the special sealing compound.

**Lubrication or additional sealing is effective for the valve position in which the operation is finished, i.e. another operation of the ball valve may require repeating the process to guarantee the tightness of closing!!!**



#### B: SIMPLIFIED PROCEDURE

Use only if internal leaks are found and no contaminants are present

Lubricate in accordance with the procedure in 8.7.3.A.II. or seal in accordance with the procedure in 8.7.3.A.III.

### 8.7.4 End notes

- once the lubrication is finished, carefully plug the valve nipples with caps;
- if the valve is operated underground and features lubrication lines extended to the surface, account for an increased amount of the lubricant or the sealant to fill the lines (calculate from the formula below and from the data in 8.7.5).

8.7.5 Consumption table for the additional lubrication system

Consumption table for lubricant or sealant

DN / NPS	No. of lubrication points on the valve	Agent volume for 1 lubrication point [cm <sup>3</sup> ]	Agent volume for the entire valve w/o column [cm <sup>3</sup> ]	Agent volume for the entire additional lubrication system per one holder A [cm <sup>3</sup> ]
100 / 4	2	20	40	20
150 / 6	4	17.5	70	35
200 / 8	4	22.5	90	45
250 / 10	4	25	100	50
300 / 12	4	30	120	60
350 / 14	4	32.5	130	65
400 / 16	4	40	160	80
500 / 20	4	50	200	100
600 / 24	4	65	260	130
700 / 28	4	80	320	160
800 / 32	4	100	400	200
900 / 36	4	130	520	260
1000 / 40	4	160	640	320

The following formula is used to calculate the amount of lubricant or sealant:

$$X=A+H \text{ [cm}^3\text{]} \quad \text{where:}$$

A – agent volume for the entire additional lubrication system per one holder;

H – column height [cm];

## 8.8 Troubleshooting

PROBLEM	CAUSE	REPAIR METHOD
Flow not tight	1. The valve is not completely closed	Set the valve in the fully closed position
	2. Incorrect setting of the ball turn limiters	Correct the setting (contact BROEN POLAND sp. z o.o.)
	3. Ball seals damaged	Replace the seals (contact BROEN POLAND sp. z o.o.)
	4. Ball surface damaged	Replace the ball (contact BROEN POLAND sp. z o.o.)
Leak at the stem	1. Stem seals damaged	Replace the seals (contact BROEN POLAND sp. z o.o.)
	2. Stem damaged	Replace the stem (contact BROEN POLAND sp. z o.o.)
Opening and closing is difficult	1. Incorrect pressure rise	Verify the pipeline internal pressure
	2. Contaminants at the ball-seal interface	Wash and clean the valve interior
	3. Sediments in the medium deposit on the ball surface	Remove the sediment
	4. Mechanical damage on the ball and seals surfaces	Replace the ball and the seal (contact BROEN POLAND sp. z o.o.)
	5. Foreign body in the valve bore	Remove flow obstruction
	6. Sticking at the stem	Replace the stem, regenerate the body (contact BROEN POLAND sp. z o.o.)
	7. Incorrect actuator type	Replace with a direct actuator

## 8.9 Warnings

**Dismantling any elements that are an integral part of the ball valve is not permitted!!!**



**Dismantling the actuator without the written consent or participation of the BROEN POLAND sp. z o.o. service personnel is not permitted!!!**



**Adjusting the actuator stops position without the written consent or participation of the BROEN POLAND sp. z o.o. service personnel is not permitted!!!**



**The actuators installed on BROEN POLAND sp. z o.o. valves are sealed against unauthorised dismantling. Breaking the seals results in the warranty becoming void!!!**



**Depending on the application, the surfaces of the ball valves, along with the equipment and accessories, may be hot or cold. Physical contact with hot or cold surfaces may cause serious harm and health or life loss. One should always become familiar with the information pertaining to the maximum and minimum valve operating temperature found on the nameplate. Warning and placing the proper marking informing of the possibility of high or low temperatures occurring, as well as protection against their effects, are the sole responsibility of the designer and/or builder of the given installation!!!**



**BROEN POLAND sp. z o.o. is not responsible for any temporary or continuous exceeding of the valve working parameter range and utility application not conforming to the information on the nameplate!!!**



**The correct mounting of the ball valves on the pipeline installation is the sole responsibility of the installer!!!**



**BROEN POLAND sp. z o.o. is not responsible for any damage resulting from improper valve opening or closing, including the results of rapid openings and closings. The minimum valve opening/closing time depends on the nominal diameter, working parameters, as well as other factors, and remains the sole responsibility of a given installation's operator !!!**



## 9 Accessories

"Accessory" is a component such as:

- a) lever
- b) mechanical transmission (planetary gear, screw, etc.)
- c) actuator (electric, pneumatic, electrohydraulic, etc.)
- d) limit position sensor

Accessories (b) and (c) are connected to ball valves or stem extension columns by the part-turn actuator attachment acc. to EN ISO 5211. The size and type of attachment for part-turn actuators is selected by BROEN POLAND sp. z o.o.. The selection depends on the valve types, DN, PN and other operating parameters of specific ball valves.