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Operation manual for trunnion mounted Split-Body ball valves DN25 – DN300 with equipment and accessories

DTR-TB.05_EN

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Contents

0	Registry of changes	3
1	Introduction	4
2	Legal advice.....	4
2.1	Copyright.....	4
2.2	General legal advice	4
3	Safety precautions and rules	5
3.1	Scope of application.....	5
3.2	Use.....	5
3.3	Safety rules.....	5
4	Introduction	6
4.1	General.....	6
4.2	Application	6
4.3	Valve type.....	7
4.4	Design and operating principle	7
4.5	Technical parameters.....	7
4.5.1	Work temperature range – TO	7
4.5.2	PS;PO-TS;TO chart.....	8
4.5.3	Maximum torque	10
4.6	Valve version	10
4.6.1	Aboveground.....	10
4.7	Anti-corrosion protection.....	11
4.7.1	External surfaces	11
4.7.2	Internal surfaces	11
4.8	Functional components.....	11
4.8.1	Antistatic protection	11
4.8.2	Fire Safe protection.....	11
4.8.3	Anti Blow of stem protection.....	11
4.8.4	Drive attachment.....	12
4.8.5	Double block and bleed (DBB)	12
4.8.6	Emergency additional lubrication system	12
4.9	Equipment components.....	12
4.9.1	Base.....	12
4.9.2	Transport grips.....	12
4.9.3	Additional lubrication system	12
4.10	Equipment configuration.....	13
4.11	Factory testing	14
4.12	Marking.....	14
5	Delivery	16
5.1	Inspection of delivery	16
5.2	Packaging.....	16
5.3	Transport.....	16
5.4	Storage	17
6	Installation in systems.....	17

6.1	Introduction.....	17
6.2	Unpacking and preparation for installation	17
6.2.1	Unpacking	17
6.2.2	17
6.2.3	Preparation for installation.....	18
6.3	Fastening during handling.....	19
6.3.1	Fastening without grips	19
6.3.2	Fastening with grips	19
6.4	Assembly positions.....	20
6.5	Flange ends valve assembly	21
6.6	Welded ends valve assembly	22
7	Finished installation or prefabrication tests.....	23
7.1	System strength and tightness test.....	23
7.2	Draining and drying.....	25
7.2.1	Draining.....	25
7.2.2	Drying.....	25
8	Operation of the valve	26
8.1	General.....	26
8.2	Medium	26
8.3	Relation of operating pressure (PO) to operating temperature (TO).....	26
8.4	Valve control	27
8.5	Maintenance	27
8.6	DBB.....	27
8.7	Emergency additional lubrication system.....	28
8.7.1	Required components.....	28
8.7.2	Preparations.....	28
8.7.3	Servicing procedures.....	28
8.7.4	End notes	29
8.7.5	Consumption table for the additional lubrication system.....	30
8.8	Troubleshooting	31
8.9	Warnings	31
9	Accessories.....	32

0 Registry of changes

Revision	No. change	Responsible for change	Date of the change	Point of the document	Scope of changes
01	Z-083/19	ASN	28.06.2019	The entire document	Change of the company name

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 cut-off fittings.

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 fittings 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 fittings 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 fittings.

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.

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BROEN

VALVE TECHNOLOGIES

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 fittings 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 cut-off fittings 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	50; 80; 100; 150; 200; 250; 300	16, 25, 40, 63, 100	150, 300, 600	flanged, FxF
	50; 80; 100; 150; 200; 250; 300	16, 25, 40, 63, 100	150, 300, 600	welded, WxW
	25; 50; 80; 100; 150; 200; 250; 300	160; 250; 320; 400	900; 1500; 2500	flanged, FxF
	25; 50; 80; 100; 150; 200; 250; 300	160; 250; 320; 400	900; 1500; 2500	welded, WxW

4.4 Design and operating principle

The ball valve type AH is designed as a steel screwed body with external anti-corrosion protection and the ball seated between two seals made of PTFE, PTFE+C, POM, PEEK+C or O-rings (NBR, HNBR, FKM) 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 drive (attachment for part-turn drives acc. to EN ISO 5211). The ball valve is open when the indicator mark on the stem face or the indicator on the transmission / drive 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

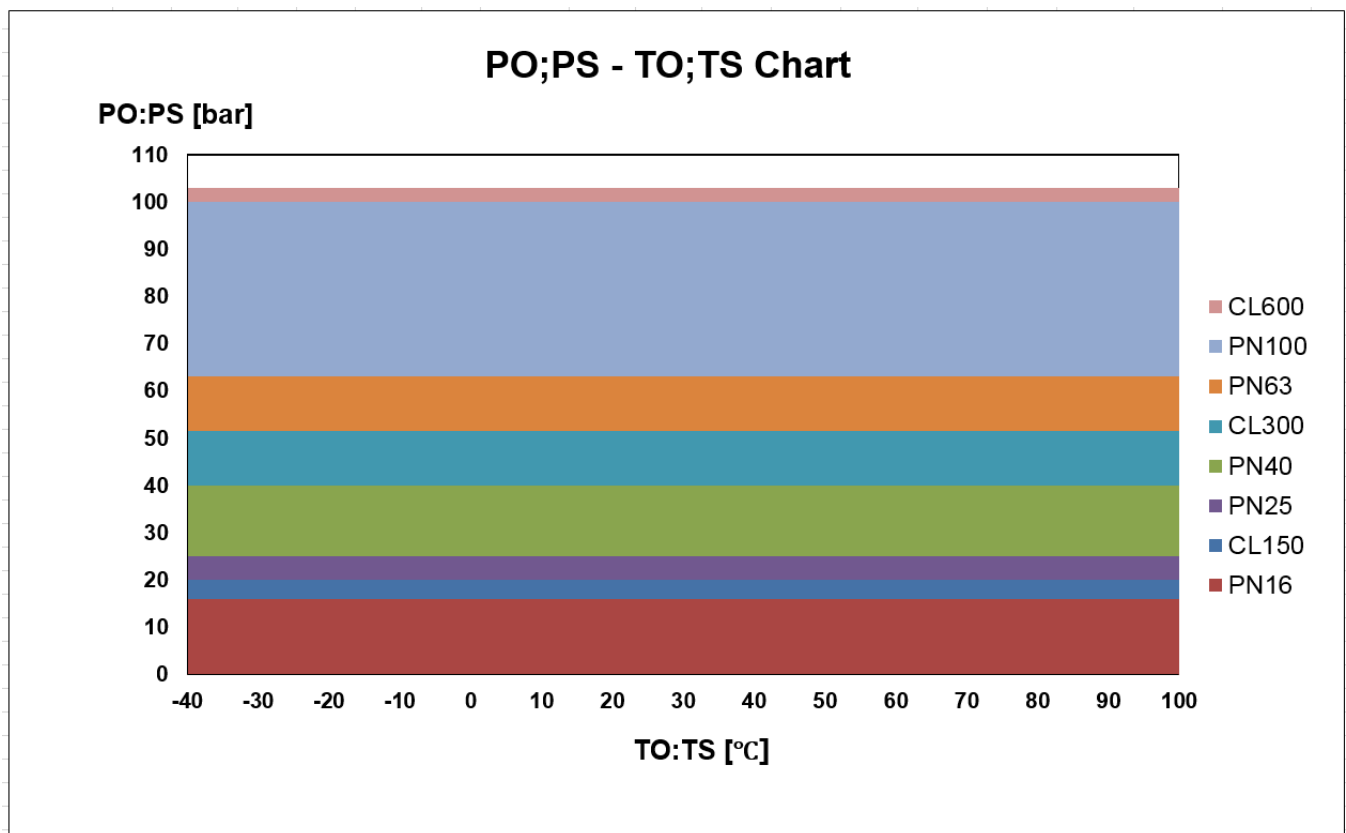
4.5.1 Work temperature range – TO

Temperature range – TO	Ball valve types
-40 ÷ +100°C	AH

4.5.2 PS;PO-TS;TO chart

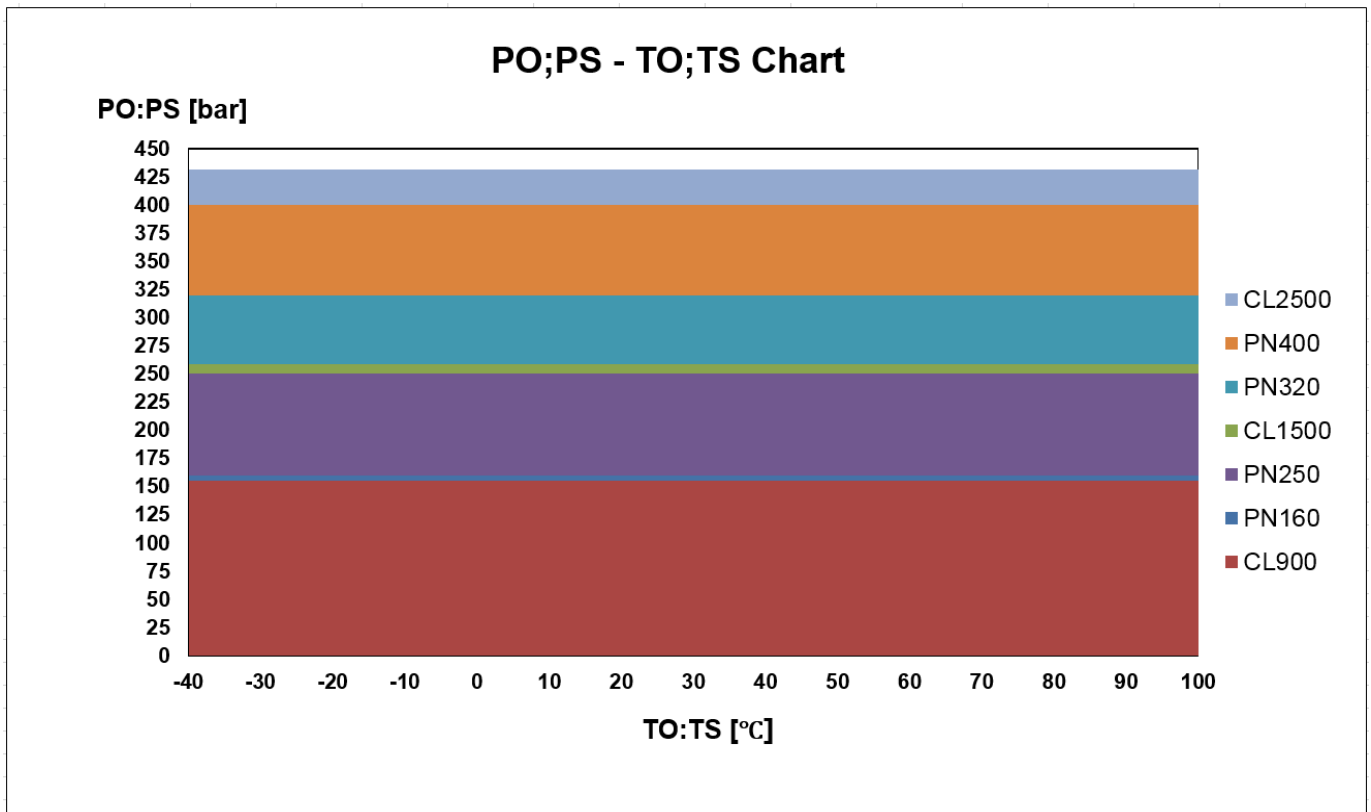
**For temperature range:
 -40 ÷ +100°C**

TO;TS [°C]	PO; PS [bar]							
	PN16	PN25	PN40	CL150	CL300	PN63	PN100	CL600
-40	16	25	40	20	51,5	63	100	103
-30	16	25	40	20	51,5	63	100	103
-20	16	25	40	20	51,5	63	100	103
-10	16	25	40	20	51,5	63	100	103
0	16	25	40	20	51,5	63	100	103
10	16	25	40	20	51,5	63	100	103
20	16	25	40	20	51,5	63	100	103
30	16	25	40	20	51,5	63	100	103
40	16	25	40	20	51,5	63	100	103
50	16	25	40	20	51,5	63	100	103
60	16	25	40	20	51,5	63	100	103
70	16	25	40	20	51,5	63	100	103
80	16	25	40	20	51,5	63	100	103
90	16	25	40	20	51,5	63	100	103
100	16	25	40	20	51,5	63	100	103



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

TO;TS [°C]	PO; PS [bar]						
	CL900	PN160	PN250	CL1500	PN320	PN400	CL2500
-40	155	160	250	259	320	400	431
-30	155	160	250	259	320	400	431
-20	155	160	250	259	320	400	431
-10	155	160	250	259	320	400	431
0	155	160	250	259	320	400	431
10	155	160	250	259	320	400	431
20	155	160	250	259	320	400	431
30	155	160	250	259	320	400	431
40	155	160	250	259	320	400	431
50	155	160	250	259	320	400	431
60	155	160	250	259	320	400	431
70	155	160	250	259	320	400	431
80	155	160	250	259	320	400	431
90	155	160	250	259	320	400	431
100	155	160	250	259	320	400	431

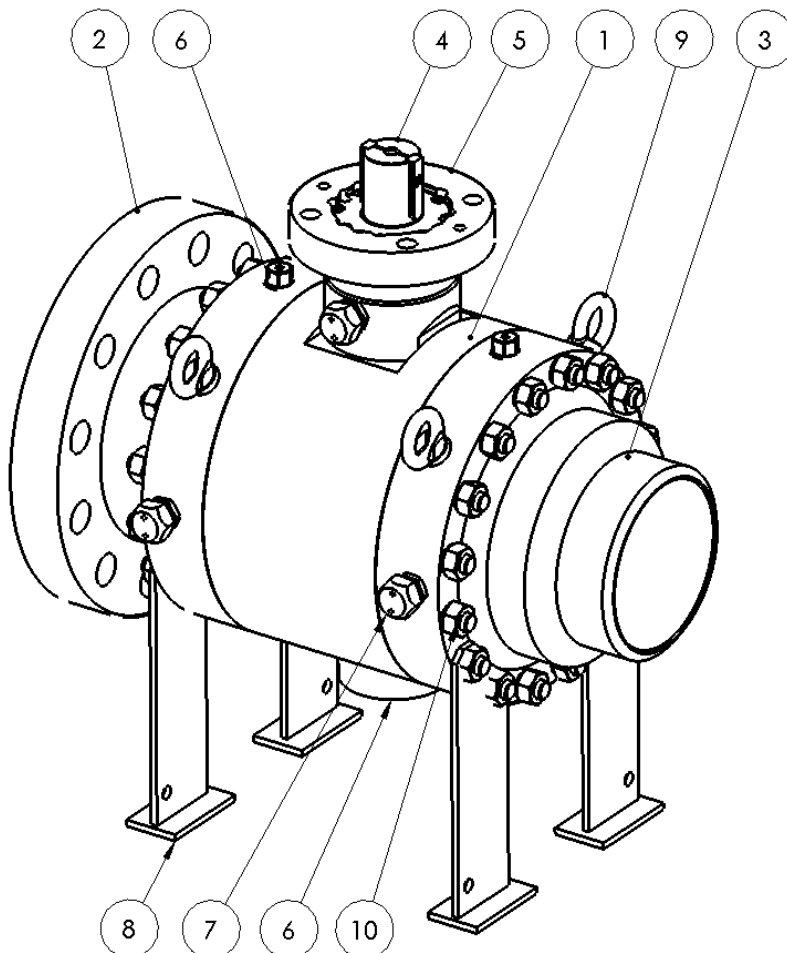


4.5.3 Maximum torque

The maximum torque (M max) value for switching of a given valve type and DN is presented in data sheets. The value is limited due to the mechanical strength of switched components. The actual valve opening torque depends on the operating parameters (PO, TO, medium, switching frequency, etc.).

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 drive attachment acc. to EN ISO 5211 (see 4.8.4)
- 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)
- 10 – Bolts & Nuts

4.7 Anti-corrosion protection

4.7.1 External surfaces

The ball valve underground 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.

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 Drive attachment.

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

Valves with drive 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 fitting 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 Additional lubrication system

The additional lubrication extension includes two lines 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 switched by lever

ISO F – valve switched by drive; adaptation for the drive acc. to EN ISO 5211

SDA – emergency additional lubrication system

PO – base

UT – transport grip

Valve type	DN	Ends	DBB	CH	ISO F	SDA	PO	UT
AH	25, 50, 80, 100	FxF	X	X(1)	X(2)	X(3)	(X)	(X)(4)
		WxW	X	X(1)	X(2)	X(3)	(X)	(X)(4)
	150, 200, 250, 300	FxF	X	(X)	X	X	X	X
		WxW	X	(X)	X	X	X	X

[1] Available as a standard:

DN50: CL150 – CL900, PN16 – PN160

DN80: CL150 – CL600, PN16 – PN100

[2] Available as a standard:

DN50: CL1500 – CL2500, PN250 – PN400

DN80: CL900 – CL2500, PN160 – PN400

DN100: CL150 – CL2500, PN16 – PN400

[3] Available as a standard:

DN100: CL300 – CL2500, PN63 – PN400,

[4] Available as a standard:

DN80: CL1500 – CL2500, PN250 – PN400

DN100 : CL900 – CL2500, PN160 – PN400

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%).

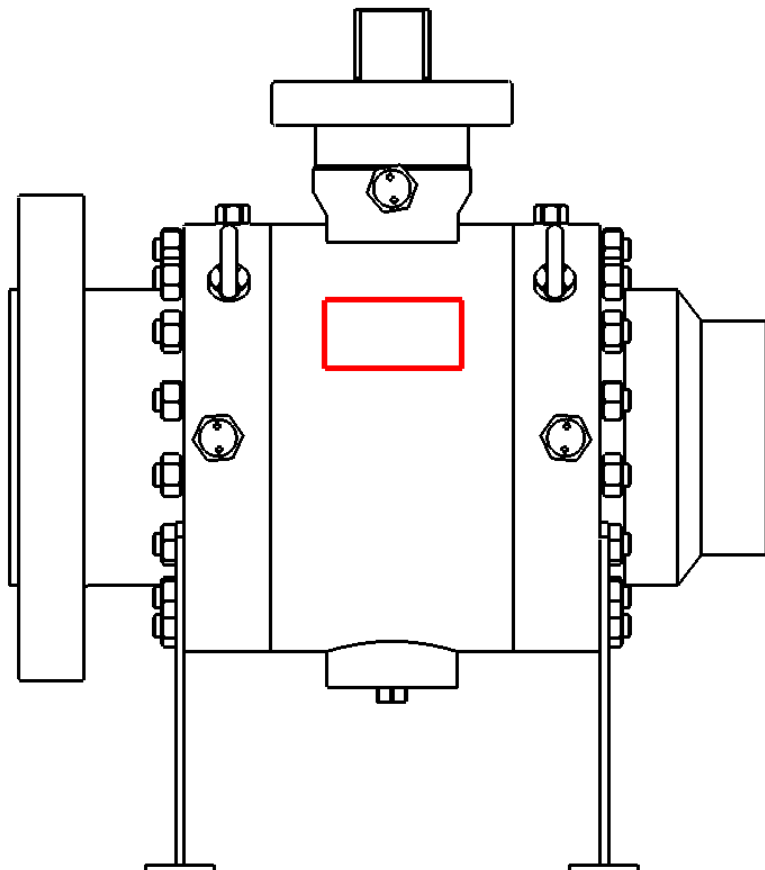
Standard tests of the valve:

- 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.

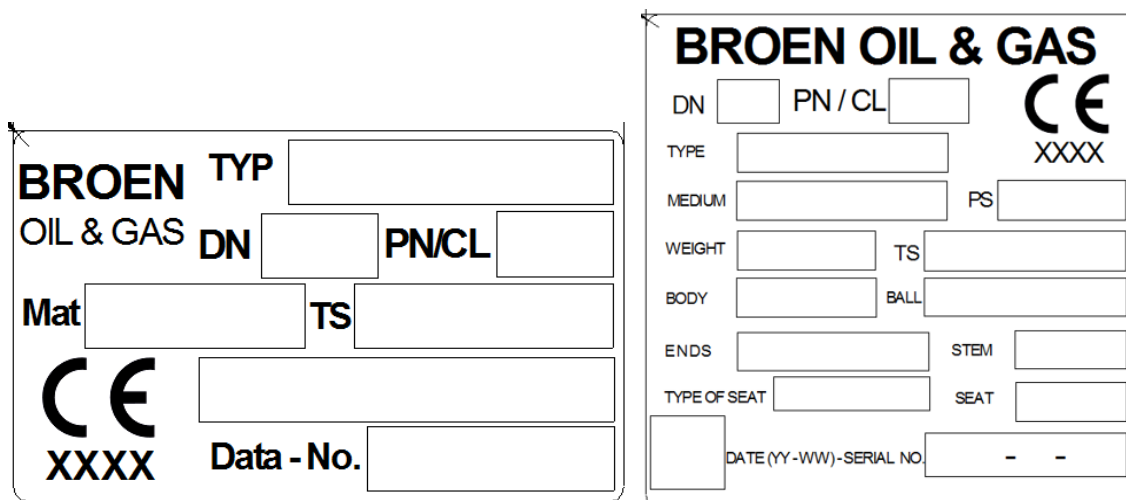
4.12 Marking

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



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



BROEN POLAND sp. z o.o.	- name of the valve manufacturer;
DN:	- nominal diameter of the bore;
PN / CL:	-PN or CL marking characterizing the dimensions and strenght of the valve for information purposes;
CE XXXX	- CE marking with the number of the notified body that has carried out the conformity assessment (mark of compliance with national and international regulations);
TYPE:	- designation characterizing the type , design of the ball valve;
MEDIUM:	- medium;
PS:	- maximum allowable pressure;
WEIGHT:	- weight of the ball valve;
TS:	- the lowest / highest temperaturę allowed for the operation of the ball valve
BODY:	- body material;
BALL:	- ball material;
ENDS:	- connection ends material;
STEM:	- stem material;
TYPE OF SEAT:	- ball sealing type: PMSS together with the SPE or DPE sealing system;
SEAT :	- ball sealing material;
<input type="checkbox"/>	- a field for additional marking, eg by the inspector of the Inspection Body;
DATE – SERIAL NO :	- production date (08 year of construction of the ball valve, 36 week in a given year, 043 serial number);

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

6.2.3 Preparation for installation

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 drive;

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)

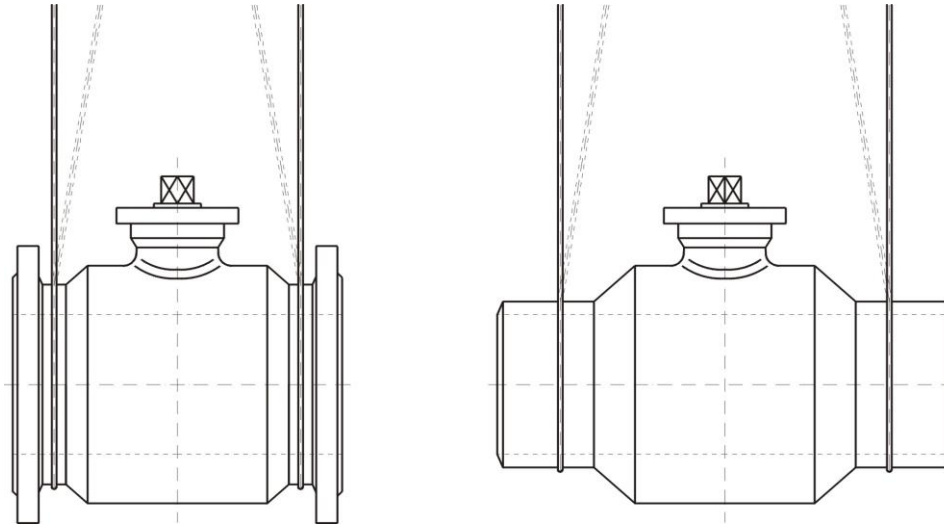
The preservative must be removed!!!



6.3 Fastening during handling

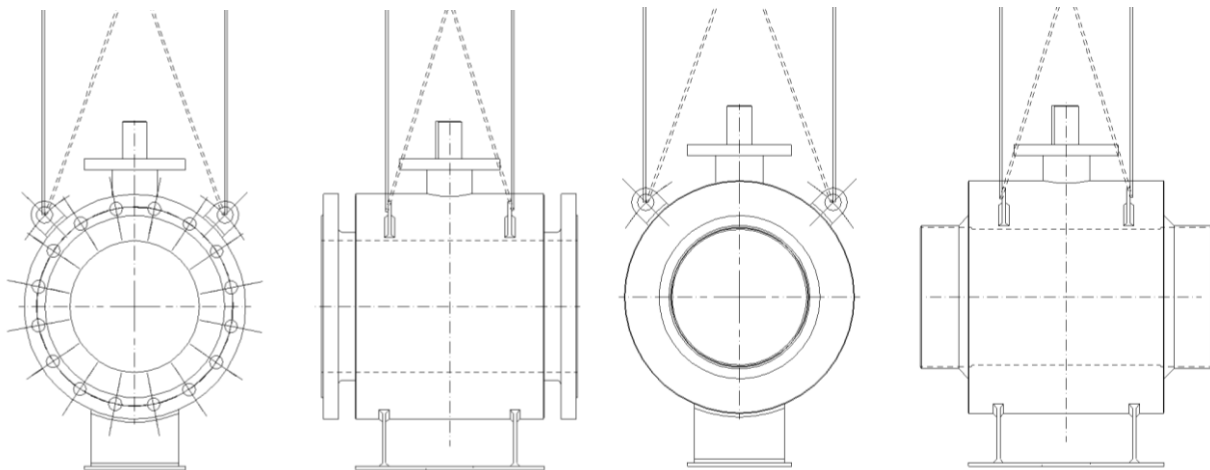
6.3.1 Fastening without grips

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.



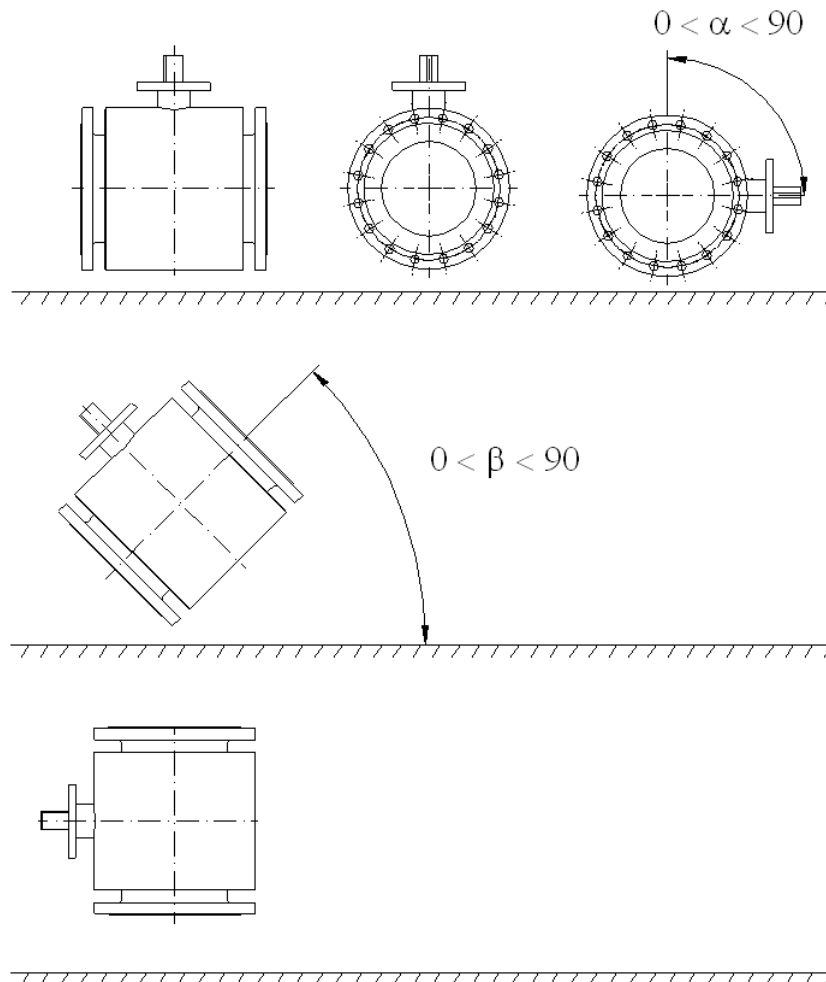
Handle with extreme caution!!!
Lifting components must not press and/or rest against the accessory!!!



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!!!



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 as type 01 or 11 (other types are available on request); the flange material is group 8E3.

The flanges of the ball valve are made in accordance with 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 fittings!!!



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]
25	25 - 40
50; 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 fittings!!!



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_{inst.} – test pressure of the pipeline installation

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

	$PT_{inst.} \leq PS$	$PS \leq PT_{inst.} \leq 1,1xPS$	$1,1xPS \leq PT_{inst.} \leq 1,5xPS$
Time [h]	without limits	max. 48h	max. 2h
Comments	-	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	Repeal ball valve for a angle $\alpha=75^\circ$ in relations to the open position – max. 2h	α
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 – see table „Permissible duration of the test of the pressure pipeline installation”	
8	Repeal ball valve for a angle $\alpha=15^\circ$ in relations to the open position – max. 30min	α
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 – see table „Permissible duration of the test of the pressure pipeline installation”	
12	Repeal ball valve for a angle $\alpha=75^\circ$ in relations to the open position – max. 2h	α
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

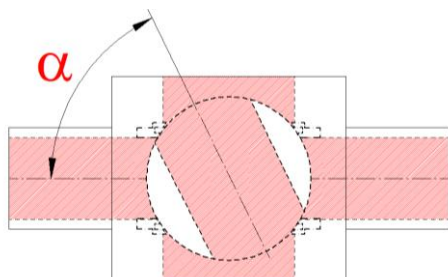
Thoroughly drain and dry the system with the valve after tests!!!



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**.



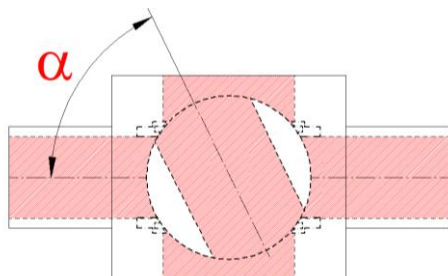
- Feed compressed air or other suitable medium eg. nitrogen, natural gas etc. at the **max pressure of 8 bar**.
- Remove the plug (see 8.6).
- Wait until air or other suitable medium stop running out from the opening and only air is discharged.
- Switch the valve into the “open” position.
- Twist in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

8 Operation of the valve

8.1 General

Operate the ball valve in accordance with the requirements for cut-off fittings in the open or closed position. Leaving or operating the 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 drive).

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	25; 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 set 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 0.

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 drive must be installed on the stem.

Switching 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.

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 when the ball is open or closed. This enables testing the closing seal without putting the valve out of operation.

The valves for overground installation must be drained by partially switching the valve (by a min of 30°) and then switching it to closed or open.

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 untwist the drain plug completely – the plug can be blown out!!!
Maximum plug twist off: 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

**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 \emptyset 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 switch 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 3.A.II. or seal in accordance with the procedure in 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 [cm³]	Agent volume for the entire valve w/o column [cm³]	Agent volume for the entire additional lubrication system per one holder A [cm³]
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

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 drive type	Replace with a direct drive

8.9 Warnings

Do not disassemble any components which are integral parts of the ball valve!!!



Do not disassemble the drive without written permission or participation of the BROEN POLAND sp. z o.o. Service!!!



Do not adjust the positions of the drive stops without written permission or participation of the BROEN POLAND sp. z o.o. Service!!!



9 Accessories

"Accessory" is a component such as:

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

Accessories (b) and (c) are connected to ball valves by the part-turn drive attachment acc. to EN ISO 5211. The size and type of attachment for part-turn drives 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.