

MOUNTING AND OPERATING INSTRUCTIONS



EB 20b

Translation of the original manual



**Ball valve BR 20b DIN and ANSI version
to combine with actuators**

February 2022 edition



Note regarding this installation and operating manual

This Installation and Operating Manual (EB) provides guidance for safe assembly and operation.

The notes and instructions in this EB are binding when handling PFEIFFER devices. The figures and illustrations in this EB are examples and must therefore be considered as such.

- ⇒ For safe and correct use, read this EB carefully prior to use and keep it for later reference.
- ⇒ In the case of questions that go beyond the scope of this EB, please contact the After Sales Service at PFEIFFER Chemie-Armaturenbau GmbH.
- ⇒ This manual only applies to the ball valve itself, the respective additional manual applies for the mounted actuator.

Definition of signal words

 DANGER

Hazardous situations that lead to death or serious injuries

 WARNING

Situations that can lead to death or serious injuries

 NOTE

Property damage and malfunctions

 Info

Additional information

 Tip

Recommended action

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1 Safety instructions and safety measures

Intended use

The PFEIFFER ball valve BR 20b is manually operated in combination with an actuator for the regulation of the volume flow, control and regulation of fluid, gaseous or vaporous media.

- The ball valve and its actuator are designed for precisely defined conditions (e.g. operating pressure, utilised medium, temperature).

Therefore the operator must make sure that the ball valve is only used when the conditions of use comply with the design criteria defined in the order, see also the pressure-temperature diagram.

If the operator would like to use the ball valve in other applications or environments, they must contact PFEIFFER.

- Manual ball valves are only intended for use, after installation in a pipe system, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.
- Automated ball valves are only intended for use, after installation in a pipe system and after connecting the drive to the control, to cut off the media, let it flow through or regulate it within the permitted pressure and temperature limits.
- The data sheet contains the permissible pressure and temperature range for these ball valves ► TB 20b.
- The safety regulations that apply to the pipe system in which the valves are installed and to the control system to which the actuator is connected also apply to the ball valves.

This manual only provides safety instructions that are to be observed additionally for ball valves.

There may be additional safety instructions in the manuals for the actuator assemblies.

- It is assumed that this chapter is observed when using the valve as intended.

Reasonably foreseeable erroneous use and unintended use

The ball valve is not suited for the following areas of use:

- Use outside of the technical data and the limits defined by the design.
- Use outside of the limited defined by the peripheral devices installed on the ball valve.
- Use outside any further limiting performance data on the type plate.

Furthermore, the following activities are considered unintended use:

- Use of third-party spare parts.
- Performance of maintenance and repair work that is not described.

Qualification of operating personnel

The ball valve may only be disassembled, dismantled, assembled and commissioned by qualified specialist personnel trained in

pressurised pipes who are familiar with the assembly, commissioning and operation of this product.

- Specialist personnel in terms of this installation and operating manual are persons who, on the basis of their vocational education, knowledge and experience and knowledge of the relevant standards, are capable of evaluating the assigned tasks and identifying possible hazards.

Personal protective equipment

Depending on the utilized medium, PFEIFFER recommends the following protective equipment:

- Protective garments, protective gloves and eye protection when using hot, cold, aggressive and/or corrosive media.
- Hearing protection when working near the valves.
- Request additional protective equipment from the plant operator.

Prohibition of modifications

Changes to the product are not permitted without consulting PFEIFFER. Non-compliance invalidates the product guarantee. PFEIFFER shall not be held liable for any resulting property damage or personal injury.

Protective devices

In the case of a power supply failure, the automated ball valve automatically switches to a certain fail-safe position, see "Fail-safe positions" in Chapter "3 Design and principle of operation".

- The fail-safe position corresponds to the effective direction and is indicated on the type plate of PFEIFFER actuators, see the actuator documentation.
- The valve is to be included in the equipotential bonding of the plant.

Warning of residual risks

To prevent personal injury or property damage, the operator and operating personnel must use suitable measures to prevent the hazards that can result from the flow medium and operating pressure as well as the signal pressure and moving parts of the ball valve.

- Therefore, the operator and operating personnel must observe all the hazard information, warning information and information in this installation and operating manual.

Obligation of the operator to exercise diligence

The operator is responsible for proper operation as well as compliance with the safety regulations.

- The operator is responsible for providing operating personnel with this installation and operating manual as well as the applicable documents and to provide instructions on proper operation.
- Furthermore, the operator must ensure that operating personnel and third parties are not endangered.

It is not the responsibility of PFEIFFER and therefore when using the ball valve ensure that:

- The ball valve is only used as intended as described in this chapter.
- An actuator unit that is subsequently installed on the ball valve is adapted to it and the max. torque is observed, and is correctly adjusted in the end positions, and in particular in the opening position of the ball valve.
- The pipe system and control system are properly installed and regularly checked. The wall thickness of the ball valve body is measured such that an additional load of the usual magnitude is taken into account for a pipe system installed properly in this way.
- The valve is connected properly to these systems.
- The customary flow rates in continuous operation are not exceeded in this pipe system.
- PFEIFFER is contacted in the case of abnormal operating conditions, such as vibrations, hydraulic shock, cavitation and also large amounts of solid matter in the medium, especially abrasive matter.

Obligation of operating personnel to exercise diligence

Operating personnel must be familiar with this installation and operating manual and the applicable documents and comply with the indicated hazard information, warning information and other information. Furthermore, operating personnel must be familiar with the applicable regulations concerning occupational safety and accident prevention and observe them.

Applicable standards and directives

- The ball valves fulfil the requirements of the European Pressure Equipment Directive 2014/68/EU and the European Machinery Directive 2006/42/EC. In the case of ball valves provided with a CE marking, the Declaration of Conformity provides information about the conformity assessment procedure that was used. The corresponding declarations of conformity are available in the Annex of this EB, see chapter "14 Certificates".
- According to an ignition hazard assessment according to DIN EN ISO 80079-36, PFEIFFER ball valves do not have any own potential ignition sources and therefore are not subject to Directive 2014/34/EU.
CE marking based on this standard is not permitted. The inclusion of valves in the equipotential bonding of a plant applies independently of the directive for all metal parts in potentially explosive areas.
Ball valves with plastic lining (PFA, PTFE, EPDM, etc.) through which chargeable media flows during operation, must be provided with an electrostatically dissipative plastic lining whose surface resistance does not exceed a value of $1 \text{ G}\Omega$ ($10^9 \Omega$) in accordance with DIN EN ISO 80079-36.

1.1 Notes regarding possible severe personnel injury

DANGER

Hazards and ineffectiveness of the warranty!

In the case of non-compliance with the following hazard and warning information, hazards may arise and the warranty provided by PFEIFFER may become invalid.

- ⇒ Observe the following hazards and warning information.
- ⇒ Contact PFEIFFER in the case of questions.

Hazards and damage due to unsuitable ball valves!

Ball valves whose permissible pressure/temperature range (=“rating”) is not sufficient for the operating conditions can pose a danger to the user and cause damage to the pipe system.

- ⇒ Only operate ball valves whose permissible pressure/temperature range (=“rating”) is sufficient for the operating conditions, see the data sheet ► TB 20b.

Risk of bursting of the pressure equipment!

Ball valves and pipes are pressure equipment. Improper opening can cause the bursting of ball valve components.

- ⇒ Observe the maximum permissible pressure for the ball valve and plant.
- ⇒ Before working on the ball valve, depressurise the concerned plant parts and the ball valve.
- ⇒ Before removing the ball valve from the pipe, completely release the pressure in the pipe so that the medium does not escape uncontrolled from the line.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.
- ⇒ Empty the medium from the concerned plant parts and ball valve. (Wear protective equipment)

1.2 Notes regarding possible personnel injury

WARNING

Hazards due to incorrect ball valve use!

The incorrect use of the ball valve can represent a hazard for the user and cause damage to the pipe system that are then no longer the responsibility of PFEIFFER.

- ⇒ The lining selected for the parts of the ball valve that come into contact with the media must be suitable for the utilised media, pressures and temperatures.

Danger of burning due to hot or cold components and pipes!

Depending on the utilised medium, ball valve components and pipes can become very hot or very cold and cause burns upon contact.

- ⇒ Ball valves must be protected against contact in the case of operating temperatures $>+50^\circ\text{C}$ or $<-20^\circ\text{C}$ together with the pipe connections.

⚠ WARNING**Danger of crushing due to moving parts!**

The ball valve contains moving parts (actuator and switching shaft as well as the hand lever) that can lead to crushing if reaching into it.

- ⇒ Do not reach into the bracket during operation.
- ⇒ When working on the ball valve, interrupt and lock pneumatic energy and the control signal.

Danger of injury during the switching operation if performing test runs on ball valves not installed in the pipe!

- ⇒ Do not reach into the ball valve. This can result in serious injuries.

Danger of injury due to venting the actuator!

During operation, when regulating or opening and closing the ball valve, the actuator can be ventilated.

- ⇒ Install the ball valve such that the actuator does not ventilate at eye level.
- ⇒ Use suitable silencers and plugs.
- ⇒ Wear eye protection when working near the valve.

Danger of injury due to preloaded springs!

Ball valves that are equipped with spring preloaded actuators are under mechanical tension.

- ⇒ Before working on the actuator, release the compression from the preloaded springs, see the corresponding actuator documentation.

Danger of injury due to residual medium in the ball valve!

When a ball valve must be removed from a pipe, medium can escape from the pipe or the ball valve.

- ⇒ In the case of media that is harmful to health or hazardous, the pipe must be completely emptied before a ball valve can be removed.
- ⇒ Pay attention to the afterflow of residuals or residuals that remain in dead spots of the ball valve.

Danger of injury due to the releasing of body screw connections!

If the body screw connections must be released, medium can escape from the ball valve.

- ⇒ The screw connections on the connection of the body parts may only be released or loosened after the ball valve has been removed.
- ⇒ During reassembly, tighten the screws according to Table 15-1 in Chapter "15-1-1 Tightening torques" using a torque wrench.

Dangers due to use as an end fitting!

During normal operation, in particular with gaseous, hot and/or hazardous media, spraying medium can cause hazards. It must be kept in mind that the media is usually hazardous!

- ⇒ A blind flange must be assembled on the free connecting pieces or the ball valve must be secured against unauthorised actuation.
- ⇒ If a ball valve used as an end fitting in a pressurised line is opened, this may only be done with extreme caution so that the escaping medium does not cause any damage.

⚠ WARNING**Deviation of the breakaway and actuating forces due to non-actuation of the ball valve!**

Depending on the period of time of non-actuation, the breakaway and actuation forces can deviate considerably from the actuating power data in the data sheet.

It is recommended to actuate the ball valve at regular intervals.

- ⇒ In consideration of the design, actuation must take place during the year.
- ⇒ Indicate the duration of non-actuation when making an enquiry, so that this condition is taken into consideration in the actuator design.
- ⇒ In the case of retrofitted actuators by the operator, the correct actuator design as regards the duration of non-actuation is no longer the responsibility of PFEIFFER.

1.3 Notes regarding possible property damage

! NOTE**Damage to the ball valve due to contamination!**

Contamination (e.g. solid particles) in the pipes can damage the ball valve.

- ⇒ The plant operator is responsible for cleaning the pipes in the plant.
- ⇒ Rinse the pipes prior to commissioning.
- ⇒ Observe the maximum permissible pressure for the ball valve and plant.

Damage to the ball valve due to unsuitable medium properties!

The ball valve is designed for a medium with certain properties. Other media can damage the ball valve.

- ⇒ Use the ball valve only in media that complies with the design criteria.

Damage to the ball valve due to plant vibrations!

- ⇒ If necessary, secure hand-operated ball valves in the case of plant vibrations with a locking device to prevent it from moving by itself.

Damage to the ball valve and leakage due to excessively high or low tightening torques!

The ball valve components must be tightened with defined torques. Deviating torques can lead to ball valve leakage or damage.

- ⇒ Excessively tightened components are subject to increased wear.
- ⇒ Insufficiently tightened components can cause leakage.
- ⇒ Observe the tightening torques, see Table 15-1 in Chapter "15.1.1 Tightening torques".

NOTE

Damage to the ball valve due to an impermissible pressure increase!

The ball valve body may contain small amounts of medium in the closed and open position.

- ⇒ Use a ball valve with an optional relief bore if it is possible that the closed area of the ball filled with medium can heat up due to external heat. This prevents an impermissible pressure increase due to a change in the condition of the unit.

Damage to the ball valve due to unsuitable tools!

Unsuitable tools can damage the ball valve.

- ⇒ Suitable tools are required to work on the ball valve, see Chapter "15.1.3 Tools".

Damage to the ball valve due to unsuitable lubricants!

Unsuitable lubricants can corrode and damage the surface.

- ⇒ The ball valve material requires suitable lubricants, see Chapter "15.1.2 Lubricants".

Instructions for retightening the body screws

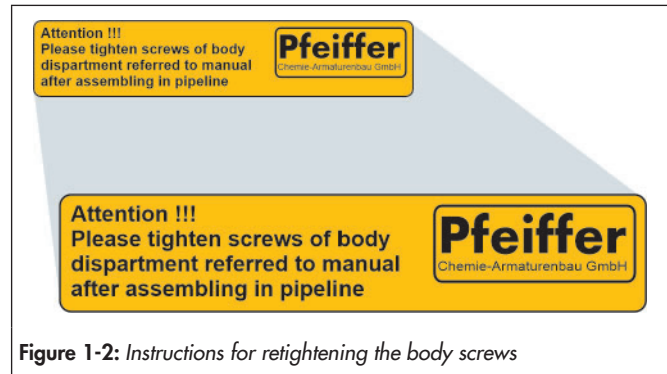
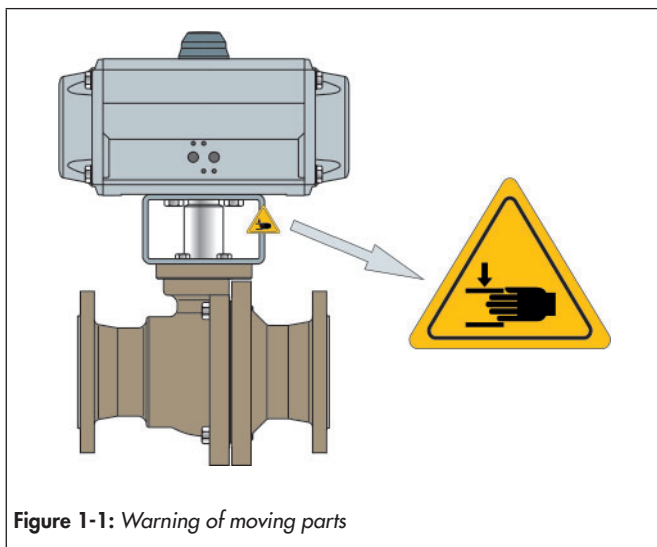


Figure 1-2: Instructions for retightening the body screws

1.4 Warning notes on the device

Warning of moving parts



There is a danger of crushing due to the rotary movements of the actuator- and switching shaft when reaching into the bracket as long as the pneumatic power is connected to the actuator.

2 Markings on the device

Each ball valve usually has the following marking.

Table 2-1: Marking on the type plate and on the body of the valve

Pos.	For	Marking	Remark
1	Manufacturer	PFEIFFER	Address see Chapter "1.5.4 Service"
2	Valve type	BR (and number value)	e.g. BR 20b = Series 20b, see the PFEIFFER catalogue
3	Body material	e.g. EN-JS 1049	No. of the material standard according to DIN EN 1563 (previous: GGG 40.3)
	Lining	e.g. PFA	Material marking of the lining "PFA"
4	Size	DN (and number value)	Number value in [mm], e.g. DN 50/ number value in [inches], e.g. NPS2
5	Maximum pressure	PN (and number value)	Number value in [bar] at room temperature
6	Max. permissible operating temperature	TS (and number value)	PS and TS are related values here at the max. permissible operating temperature with the max. permissible operating overpressure, see also the Pressure-Temperature Diagram ▶ PT 20b-01 and ▶ PT 20b-02
	Max. permissible operating pressure	PS (and number value)	
7	Test pressure	PT (and number value)	The test pressure must be observed depending on the device
8	Manufacturer number from 2018	e.g. 381234/001/001	<p>38 1234 /001 /001</p> <ul style="list-style-type: none"> Valve no. within the item Item in the order Order Year of manufacture (38=2018, 39=2019, 30=2020, 31=2021 etc.)
	Manufacturer number 2009 to 2017	e.g. 211234/001/001	<p>21 1234 /001 /001</p> <ul style="list-style-type: none"> Valve no. within the item Item in the order Order Year of manufacture (29=2009, 20=2010, 21=2011, 22=2012 etc.)
	Manufacturer number until 2008	e.g. 2071234/001/001	<p>207 1234 /001 /001</p> <ul style="list-style-type: none"> Valve no. within the item Item in the order Order Year of manufacture (205=2005, 206=2006, 207=2007 etc.)
9	Flow coefficient	e.g. kvs 10	(DIN) = value, Cv (ANSI) = value (optional)
10	Characteristic curve	e.g. %	% = equal percentage, lin = linear (optional)
11	Test point number	e.g. F123201-1	Specified by the customer
12	DataMatrix code		
13	Conformity	CE	Conformity is certified separately by PFEIFFER
	Code No.	0035	"Notified body" according to EU Directive = TÜV Rheinland Service GmbH
14	Flow direction	➔	Attention: see the note in Chapter "5.4 Installing the ball valve in the pipe"

i Info

Markings on the body and the type plate must be permanent so that the valve remains identifiable.

2.1 Type plates

2.1.1 Ball valve type plates

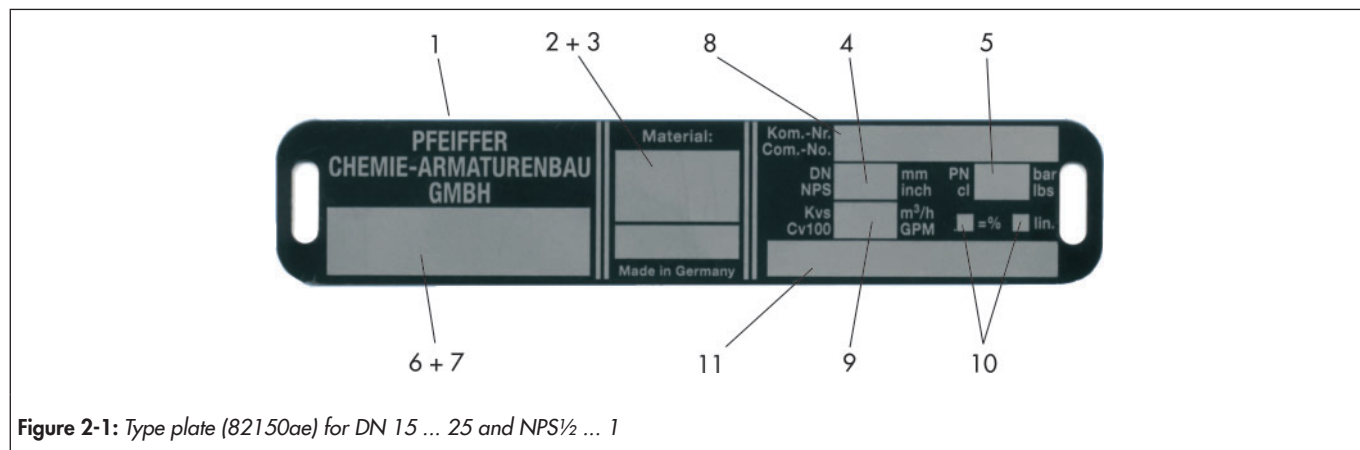


Figure 2-1: Type plate (82150ae) for DN 15 ... 25 and NPS 1/2 ... 1

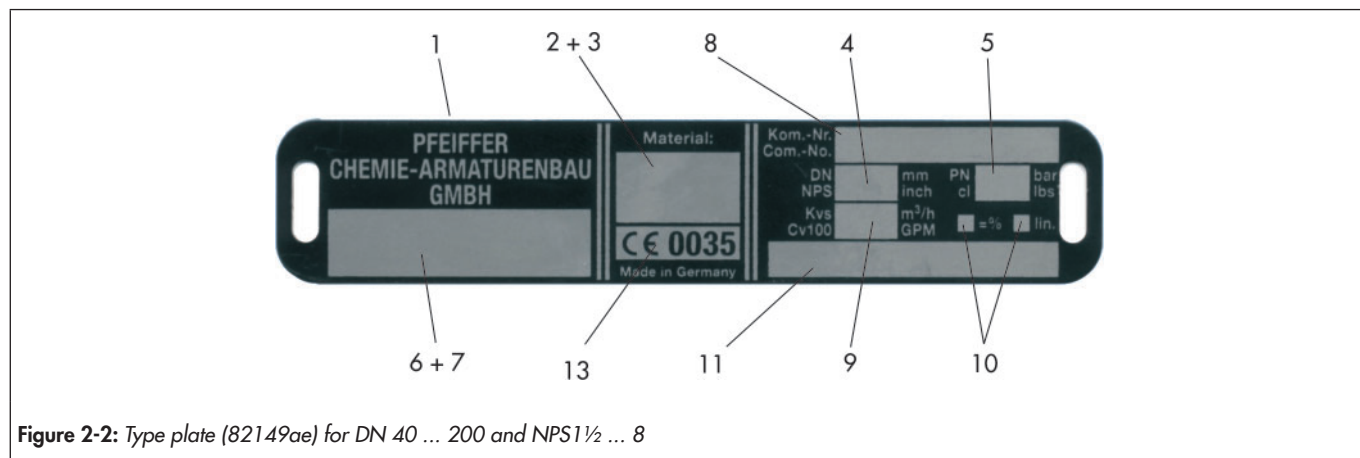


Figure 2-2: Type plate (82149ae) for DN 40 ... 200 and NPS 1 1/2 ... 8

2.1.2 Actuator type plate

See the corresponding actuator documentation.

2.2 Material marking

The ball valves are marked on the body with material specification, see "Table 2-1: Marking on the type plate and on the body of the valve".

Further specifications can be requested from PFEIFFER.

3 Design and principle of operation

Function and principle of operation

The media can flow in both directions through the BR 20b ball valve with full passage.

The ball (3) with its cylindrical passage is swivel-mounted around the switching shaft. The ball swivel angle influences the flow through the area freed between the body and the ball channel. When the ball valve is open, the full cross section is freed.

The ball (3), in the PFA lined body, is sealed by replaceable seal rings (4).

The switching shaft is sealed by PTFE V-ring packing (5). The spring washers (8) located above the packing provide the pre-tensioning.

The switching shaft that leads outside is fit up to DN 100/NPS4 with a hand lever. Optionally, a pneumatic rotary actuator or a manual gear can be installed.

Info

The ball valve can also be used for control purposes see the data sheet ► DB 20a-kd.

Fail-safe position

Depending on the mounting of the pneumatic rotary actuator, the ball valve has two fail-safe positions that are activated when the pressure is released as well when the supply air fails:

- **Ball valve with fail-close actuator [FC]:**
Upon air failure, the ball valve is closed. The ball valve opens when the signal pressure increases, acting against the force of the springs.
- **Ball valve with fail-open actuator [FO]:**
Upon air failure, the ball valve is opened. The ball valve closes when the signal pressure increases, acting against the force of the springs.

Changing the fail-safe position

The fail-safe position of the actuator can be reversed if required, for this purpose see the installation and operating instructions for the respective pneumatic actuator.

Operating elements and functions

The BR 20b ball valve can be selected in the following versions:

- With a hand lever (DN 15 up to 100 or NPS1 up to 4).
- With a manual gear.
- With PFEIFFER rotary actuator BR 31a.
- With rotary actuators from other manufacturers (for details see the respective data sheet).

3.1 Variants

- Body made of other materials, e.g. 1.4571

- Use as a control ball valve with calibrated seat ring (\leq DN 100)
- PFA-conductive lining
- Stainless steel heat pack
- Various ball and seal ring materials
- FDA-compliant sealing material
- Two-part ball/switching shaft
- Customer-adapted versions

3.2 Additional fittings

Strainer

PFEIFFER recommends installing a strainer in front of the ball valve. A strainer prevents the solid content in the medium from damaging the ball valve.

Bypass and shut-off valve

PFEIFFER recommends installing a shut-off valve in front of the strainer as well as behind the ball valve and to create a bypass. By means of the bypass, the entire plant does not have to be de-commissioned during maintenance and repair work on the ball valve.

Insulation

The ball valves can be insulated to reduce the passage of heat energy. If necessary, observe the notes in Chapter "5.4 Installing the ball valve in the pipe".

Grip protection

In the case of conditions of use that require a high level of safety (e. g. if the ball valve is freely accessible to untrained specialist personnel), PFEIFFER offers a safety guard to prevent the risk of crushing due to moving parts (actuator- and switching shaft).

The risk assessment of the plant by the operator will indicate if the installation of this protective device is required for the safe operation of the ball valve in the plant.

3.3 Attachments

The following accessories are available for the ball valve either individually or in combinations:

- Locking device
- Switching shaft extension (100 mm standard)
- Pneumatic or electric rotary actuator
- Positioner (with the control ball valve option)
- Limit switch
- Solenoid valves
- Filter - reducing station
- Control ball valve with calibrated seat ring

Other additional equipment is possible according to specifications on request.

3.4 Technical data

The type plates of the ball valve and actuator offer information about the valve version, see Chapter "2 Markings on the device".

i Info

Detailed information is available in the data sheet ► TB 20b.

3.5 Ball valve assembly

The BR 20b ball valves in the "DIN" version have design differences with respect to the "ANSI" version so that they cannot be documented in one construction manual.

- The assembly of the DIN ball valve DN 15 is described in chapter 3.5.1.
- The assembly of the DIN ball valve DN 25 ... 100 is described in chapter 3.5.2 .
- The assembly of the DIN ball valve DN 150 ... 200 is described in chapter 3.5.3 .
- Chapter 3.5.4 describes the assembly of the ANSI ball valve.

Preparation of the assembly

To assemble the ball valve, all parts must be prepared, e. g. the parts are carefully cleaned and placed on a soft mat (rubber mat or other).

Keep in mind that plastic parts are almost always very soft and very delicate, and in particular the sealing surfaces may not be damaged.

! NOTE

Damage to the ball valve due to unsuitable lubricants!

Unsuitable lubricants can corrode and damage the surface. The ball valve material requires suitable lubricant. A suitable lubricant must be selected for grease-free ball valves, especially for use with oxygen.

⇒ For suitable lubricant, see Chapter "15.1.2 Lubricant".

i Info

The position and arrangement of the individual parts shown in the drawings must be observed during assembly.

3.5.1 Assembly of the DIN ball valve, DN 15

3.5.1.1 Assembly of the body halves

- ⇒ Place both body halves (1 and 2) with the flange facing downward on an even and clean work surface, so that the inside of the ball valve is easy to reach.
- ⇒ Insert the seal rings (4a and 4b) in the body halves (1 and 2).

i Info

The seal rings may not be installed without clearance. To achieve the tightness of the ball valve, the seal rings must be installed in their seat with sufficient clearance. If this is not possible, please contact PFEIFFER.

- ⇒ Place the ball (3) on the seal ring of a body half (1 or 2).
- ⇒ Place the bearing bushing (22) and V-ring packing (5) with a slightly rotary movement over the stem of the ball. The number of packing rings can be found on the drawing, see Figure 3-1.
- ⇒ Insert the ball stem with the V-ring packing into the packing space in the body.

Make sure that the ball (3) and V-ring packing (5) are clearly fitted in the body.

- ⇒ Place the second body half onto the previously described body half, so that it centres itself on the ball stem and the V-ring packing as well as the seal ring.

i Info

Make sure that the V-ring packing is not squashed at the side by the body halves.

- ⇒ Fasten the body sections together with screws (10), washers (12) and nuts (11) so they are hand-tight.

i Info

- Depending on the nominal size, stud bolts with nuts or screws can be used.
- The final screw connection of the body halves is performed during a subsequent assembly step.

3.5.1.2 Final assembly of the ball valve

- ⇒ Clamp the ball valve in a vice for further assembly with the base body flange (1).

! NOTE

Damage to the flange due to improper handling!

- ⇒ Do not damage the housing flange, especially the sealing surfaces.

- ⇒ Place the set of spring washers (8) over the ball stem onto the V-ring packing. The arrangement and quantity of the spring washers can be found on the drawing, see Figure 3-1.
- ⇒ Insert the bearing bushing (7) into the stuffing box flange (6).
- ⇒ Place the pre-assembled stuffing box flange on the body and adjust with screws (9).

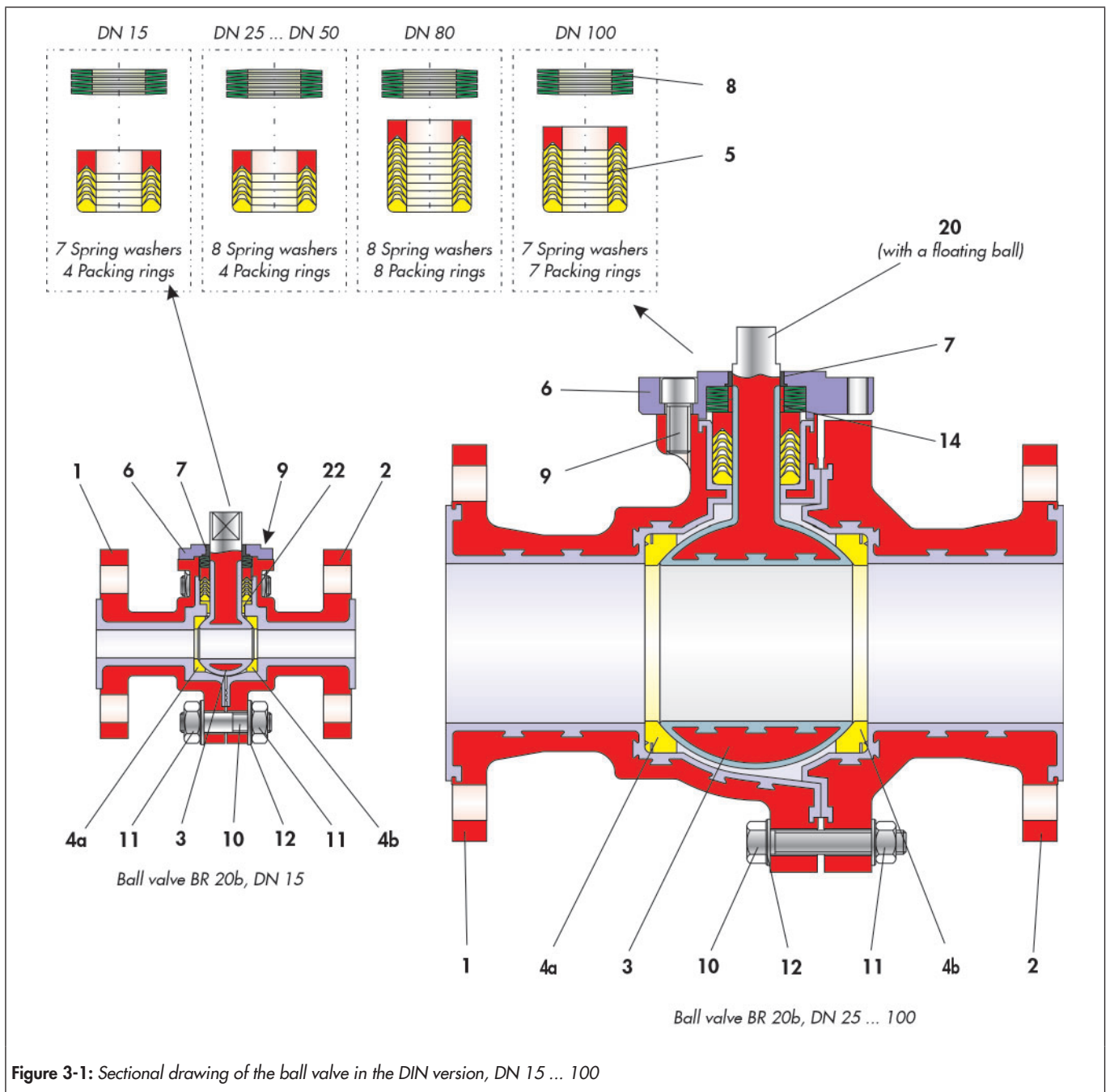


Figure 3-1: Sectional drawing of the ball valve in the DIN version, DN 15 ... 100

Table 3-1: Parts list of the ball valve in the DIN version, DN 15 ... 100

Pos.	Designation
1	Main body with lining
2	Body with lining
3	Ball with coating
4	Seat ring
5	V-ring packing
6	Stuffing box flange
7	Bearing bush
8	Set of spring washers

Pos.	Designation
9	Screw
10	Screw / stud bolt
11	Nut
12	Washer
14	Bush
20	Shaft
22	Bearing bush

Design and principle of operation

- ⇒ Tighten the screws evenly in a criss-cross pattern until a gap between 1 - 2 mm has formed between the stuffing box flange and the body.

i Info

The final screw connection of the stuffing box is performed during a subsequent assembly step.

- ⇒ Tighten the nuts (11) on the body sections (1 and 2).

i Info

For the tightening sequence and tightening torques of the respective nominal sizes, see Figure 15.1 and Table 15.1 in Chapter "15.1.1 Tightening torques".

- ⇒ To complete the assembly, tighten the screws (9) on the stuffing box (6) evenly and in a criss-cross pattern.

i Info

Prior to the leak test, actuate the valve a few times so that the ball can centre on the seal rings and provide an optimal seal.

3.5.2 Assembly of the DIN ball valve, DN 25 ... 100

3.5.2.1 Preassembly of the ball valve

- ⇒ Place the base body (1) with the flange facing downward on an even and clean work surface, so that the inside of the ball valve is easy to reach.
- ⇒ Insert the seal ring (4a) into the base body.

i Info

The seal rings may not be installed without clearance. To achieve the tightness of the ball valve, the seal rings must be installed in their seat with sufficient clearance. If this is not possible, please contact PFEIFFER.

Preassembly of the ball valve with the one-part ball/switching shaft

- ⇒ Insert the ball (3) with the shaft tilted into the packing space.

i Info

The nominal size bore of the ball faces the same direction as the base body bore while being inserted.

For further assembly, see Chapter "3.5.2.2 Final assembly of the ball valve".

Preassembly of the ball valve with the two-part ball/switching shaft

- ⇒ Insert the switching shaft (20) tilted into the packing space.
- ⇒ Insert the ball (3) such that the slit in the ball sits perfectly on the dihedron of the switching shaft (20).

i Info

The nominal size bore of the ball is transverse to the base body bore while being inserted.

For further assembly, see Chapter "3.5.2.2 Final assembly of the ball valve".

3.5.2.2 Final assembly of the ball valve

- ⇒ Place the body (2) with the flange facing downward on an even and clean work surface, so that the inside of the ball valve is easy to reach.
- ⇒ Insert the seal ring (4b) into the body.

i Info

The seal rings may not be installed without clearance. To achieve the tightness of the ball valve, the seal rings must be installed in their seat with sufficient clearance. If this is not possible, please contact PFEIFFER.

- ⇒ Place the body (2) with the preassembled seal ring (4b) on the base body (1) and push together carefully.
- ⇒ Turn the body (2) such that the bores in both body halves (1 and 2) lie above each other.
- ⇒ Push the washer (12) over the lightly lubricated screws (10) and adjust the body halves (1 and 2).
- ⇒ Place the washers (12) over the screw ends and tighten hand-tight with nuts (11).

i Info

- Depending on the nominal size, stud bolts with nuts or screws can be used.
- The final screw connection of the body halves is performed during a subsequent assembly step.

- ⇒ Clamp the ball valve in a vice for further assembly with the base body flange (1).

! NOTE

Damage to the flange due to improper handling!

- ⇒ Do not damage the housing flange, especially the sealing surfaces.

- ⇒ Center the ball shaft (3) in the packing area with the V-ring packing bottom ring (5).
- ⇒ Push the bottom ring to the oval body base.

i Info

Push the bottom ring in with more force, therefore use a suitable auxiliary tool for assembly.

- ⇒ Use this auxiliary tool also to insert the V-ring packing (5) V-ring by V-ring into the body. The arrangement and quantity of the V-rings can be found on the drawing, see Figure 3-1.
- ⇒ Tighten the screws (10) and nuts (11) on the body sections (1 and 2).

i Info

For the tightening sequence and tightening torques of the respective nominal sizes, see Figure 15.1 and Table 15.1 in Chapter "15.1.1 Tightening torques".

- ⇒ Place the bushing (14) on the V-ring packing.
- ⇒ Place the set of spring washers (8) over the bushing (14) onto the V-ring packing. The arrangement and quantity of the spring washers can be found on the drawing, see Figure 3-1.
- ⇒ Push the bearing bushing (7) into the stuffing box flange (6).
- ⇒ Place the stuffing box flange with the bearing bushing over the switching shaft onto the body.
- ⇒ Evenly adjust the stuffing box flange with lightly lubricated screws (9) and tighten in a criss-cross pattern.

i Info

Prior to the leak test, actuate the valve a few times so that the ball can centre on the seal rings and provide an optimal seal.

3.5.3 Assembly of the DIN ball valve, DN 150 ... 200

3.5.3.1 Assembly of the body halves

- ⇒ Place both body halves (1 and 2) with the flange facing downward on an even and clean work surface, so that the inside of the ball valve is easy to reach.
- ⇒ Drive the pin (21) into the base body (1).
- ⇒ Insert the seal rings (4a and 4b) in the body halves (1 and 2).

i Info

The seal rings may not be installed without clearance. To achieve the tightness of the ball valve, the seal rings must be installed in their seat with sufficient clearance. If this is not possible, please contact PFEIFFER.

- ⇒ Place the V-ring packing (5) in the PTFE bushing (17). The arrangement and quantity of the V-rings can be found on the drawing, see Figure 3-2.
- ⇒ Push the bushing (15) carefully over the packing (7) and the PTFE bushing (17).

When this packing unit is preassembled, the bottom ring of the packing (7) protrudes past the bushing (15).

Preassembly of the ball valve with the one-part ball/switching shaft

- ⇒ Place the ball (3) on the seal ring of a body half (1 or 2).
- ⇒ Place the preassembled packing unit with a slightly rotary movement over the stem of the ball.
- ⇒ Insert the ball stem with the packing unit into the packing space in the body.

Make sure that the ball (3) and packing unit are clearly fitted in the body.

For further assembly, see Chapter "3.5.3.2 Final assembly of the ball valve".

Preassembly of the ball valve with the two-part ball/switching shaft

- ⇒ Place the preassembled packing unit with a slightly rotary movement over the switching shaft (20).
- ⇒ Insert the switching shaft with the packing unit into the packing space of a body half (1 or 2).
- ⇒ Insert the ball (3) on the seal ring such that the slit in the ball sits perfectly on the dihedron of the switching shaft (20).

Make sure that the ball (3) with switching shaft (20) and packing unit are clearly fitted in the body.

For further assembly, see Chapter "3.5.3.2 Final assembly of the ball valve".

3.5.3.2 Final assembly of the ball valve

- ⇒ Place the second body half onto the previously described body half, so that it centres itself on the ball stem and the V-ring packing as well as the seal ring.

i Info

Make sure that the V-ring packing is not squashed at the side by the body halves.

- ⇒ Fasten the body halves together with screws (10), washers (12) and nuts (11) so they are hand-tight.

i Info

- Depending on the nominal size, stud bolts with nuts or screws can be used.
- The final screw connection of the body halves is performed during a subsequent assembly step.

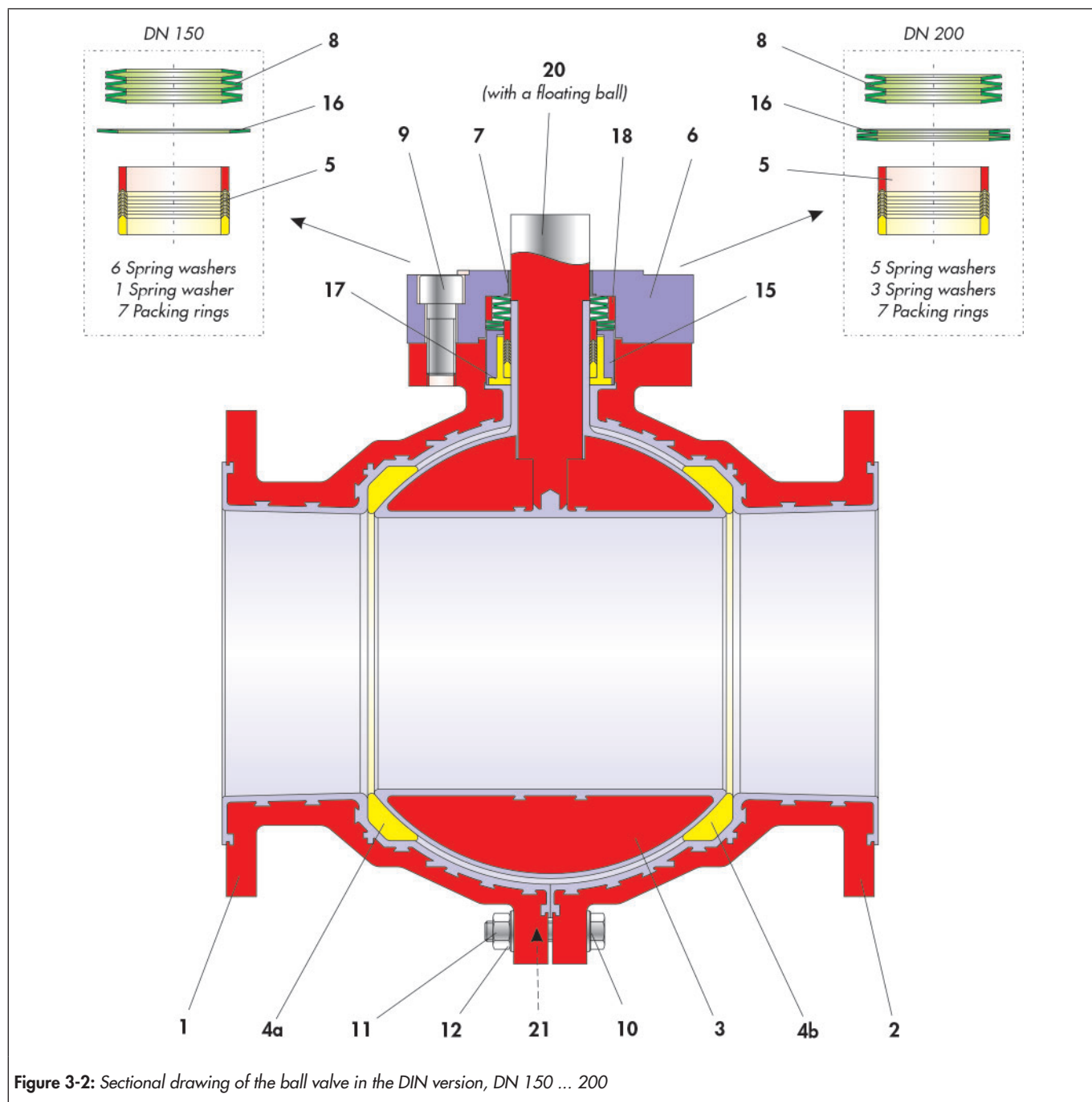


Table 3-2: Parts list of the ball valve in the DIN version, DN 150 ... 200

Pos.	Designation
1	Body with lining
2	Body with lining
3	Ball with coating
4	Seat ring
5	V-ring packing
6	Stuffing box flange
7	Bearing bush
8	Set of spring washers
9	Screw

Pos.	Designation
10	Screw / stud bolt
11	Nut
12	Washer
15	Bush
16	Spring washer
17	Bush
18	Center ring
20	Shaft
21	Pin

- ⇒ Fasten the body halves together with screws (10), washers (12) and nuts (11) so they are hand-tight.

i Info

- Depending on the nominal size, stud bolts with nuts or screws can be used.
- The final screw connection of the body halves is performed during a subsequent assembly step.

- ⇒ Clamp the ball valve in a vice for further assembly with the base body flange (1).

! NOTE

Damage to the flange due to improper handling!

- ⇒ Do not damage the housing flange, especially the sealing surfaces.

- ⇒ Place the spring washer(s) (16) on the bushing (15). The location and quantity of the spring washer(s) can be found on the drawing, see Figure 3-2.
- ⇒ Place the centring ring (18) on the spring washer(s) (16).
- ⇒ Insert the set of spring washers (8) in the centring ring until reaching the bottom ring of the V-ring packing. The arrangement and quantity of the spring washers can be found on the drawing, see Figure 3-2.
- ⇒ Insert the bearing bushing (7) into the stuffing box flange (6).
- ⇒ Place the pre-assembled stuffing box flange on the body and adjust with screws (9).
- ⇒ Tighten the screws evenly in a criss-cross pattern until a gap between 1 - 2 mm has formed between the stuffing box flange and the body.

i Info

The final screw connection of the stuffing box is performed during a subsequent assembly step

- ⇒ Tighten the screws (10) and nuts (11) on the body halves (1 and 2).

i Info

For the tightening sequence and tightening torques of the respective nominal sizes, see Figure 15.1 and Table 15.1 in Chapter "15.1.1 Tightening torques".

- ⇒ To complete the assembly, tighten the screws (9) on the stuffing box (6) evenly and in a criss-cross pattern.

i Info

Prior to the leak test, actuate the valve a few times so that the ball can centre on the seal rings and provide an optimal seal.

3.5.4 Assembly of the ANSI ball valve

3.5.4.1 Assembly of the body halves

- ⇒ Place both body halves (1 and 2) with the flange facing downward on an even and clean work surface, so that the inside of the ball valve is easy to reach.
- ⇒ Drive the pin (21) in the case of NPS6 and NPS8 into the base body (1).
- ⇒ Insert the seal rings (4a and 4b) in the body halves (1 and 2).

i Info

The seal rings may not be installed without clearance. To achieve the tightness of the ball valve, the seal rings must be installed in their seat with sufficient clearance. If this is not possible, please contact PFEIFFER.

- ⇒ Place the V-ring packing (5) in the PTFE bushing (17). The arrangement and quantity of the V-rings can be found on the drawing, see Figure 3-3.
- ⇒ Push the bushing (15) carefully over the packing (7) and the PTFE bushing (17).

When this packing unit is preassembled, the bottom ring of the packing (7) protrudes past the bushing (15).

Preassembly of the ball valve with the one-part ball/switching shaft

- ⇒ Place the ball (3) on the seal ring of a body half (1 or 2).
- ⇒ Place the preassembled packing unit with a slightly rotary movement over the stem of the ball.
- ⇒ Insert the ball stem with the V-ring packing into the packing space in the body.

Make sure that the ball (3) and V-ring packing (5) are clearly fitted in the body.

For further assembly, see Chapter "3.5.4.2 Final assembly of the ball valve".

Preassembly of the ball valve with the two-part ball/switching shaft

- ⇒ Place the preassembled packing unit with a slightly rotary movement over the switching shaft (20).
- ⇒ Insert the switching shaft with the V-ring packing into the packing space of a body half (1 or 2).
- ⇒ Insert the ball (3) on the seal ring such that the slit in the ball sits perfectly on the dihedral of the switching shaft (20).

Make sure that the ball (3) with switching shaft (20) and V-ring packing (5) are clearly fitted in the body.

For further assembly, see Chapter "3.5.4.2 Final assembly of the ball valve".

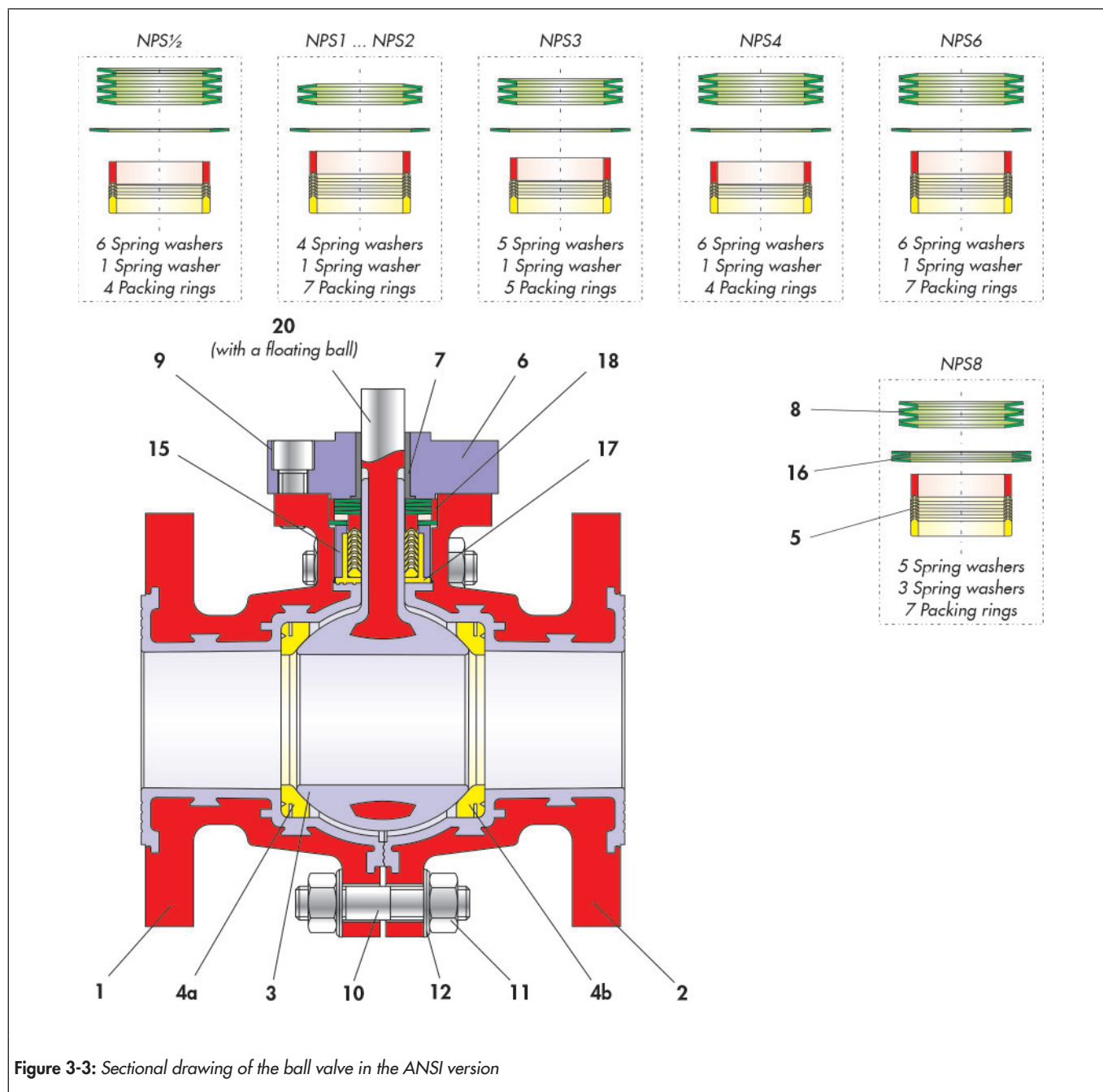


Figure 3-3: Sectional drawing of the ball valve in the ANSI version

Table 3-3: Parts list of the ball valve in the ANSI version

Pos.	Designation
1	Main body with lining
2	Body with lining
3	Ball with coating
4	Seat ring
5	V-ring packing
6	Stuffing box flange
7	Bearing bush
8	Set of spring washers
9	Screw

Pos.	Designation
10	Screw / stud bolt
11	Nut
12	Washer
15	Bush
16	Spring washer
17	Bush
18	Center ring
20	Shaft
21	Pin

3.5.4.2 Final assembly of the ball valve

- ⇒ Place the second body half onto the previously described body half, so that it centres itself on the ball stem and the V-ring packing as well as the seal ring.

i Info

Make sure that the V-ring packing is not squashed at the side by the body halves.

- ⇒ Fasten the body halves together with screws (10), washers (12) and nuts (11) so they are hand-tight.

i Info

- Depending on the nominal size, stud bolts with nuts or screws can be used.
- The final screw connection of the body halves is performed during a subsequent assembly step.

- ⇒ Clamp the ball valve in a vice for further assembly with the base body flange (1).

! NOTE

Damage to the flange due to improper handling!

- ⇒ Do not damage the housing flange, especially the sealing surfaces.

- ⇒ Place the spring washer(s) (16) on the bushing (15). The location and quantity of the spring washer(s) can be found on the drawing, see Figure 3-3.
- ⇒ Place the centring ring (18) on the spring washer(s) (16).
- ⇒ Insert the set of spring washers (8) in the centring ring until reaching the bottom ring of the V-ring packing. The arrangement and quantity of the spring washers can be found on the drawing, see Figure 3-3.
- ⇒ Insert the bearing bushing (7) into the stuffing box flange (6).
- ⇒ Place the pre-assembled stuffing box flange on the body and adjust with screws (9).
- ⇒ Tighten the screws evenly in a criss-cross pattern until a gap between 1 - 2 mm has formed between the stuffing box flange and the body.

i Info

The final screw connection of the stuffing box is performed during a subsequent assembly step

- ⇒ Tighten the screws (10) and nuts (11) on the body halves (1 and 2).

i Info

For the tightening sequence and tightening torques of the respective nominal sizes, see Figure 15.1 and Table 15.1 in Chapter "15.1.1 Tightening torques".

- ⇒ To complete the assembly, tighten the screws (9) on the stuffing box (6) evenly and in a criss-cross pattern.

i Info

Prior to the leak test, actuate the valve a few times so that the ball can centre on the seal rings and provide an optimal seal.

4 Shipment and on-site transport

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

! NOTE

Damage to the ball valve due to improper transport and storage!

- ⇒ Handle, transport and store ball valves with lining with particular care.
- ⇒ Use protective caps to protect the delicate sealing surfaces in particular.

4.1 Accepting delivery

Perform the following steps after receiving the goods:

- ⇒ Check the scope of supply. Compare the delivered goods with the delivery note.
- ⇒ Check the supply for transport damage. Report transport damage to PFEIFFER and the transport company (see the delivery note).

4.2 Unpacking the ball valve

Carry out the following steps:

- ⇒ Unpack the ball valve directly before lifting for installation into the pipe.

i Info

The packaging protects the scratch-sensitive plastic lining of the ball valve against damage.

- ⇒ Leave the ball valve on the pallet or in the transport container for on-site transport.
- ⇒ The protective caps on the ball valve inlet and outlet prevent foreign matter from entering the ball valve and damaging it. Furthermore, they are used to protect the sealing surfaces. Only remove the protective caps prior to installation in the pipe.
- ⇒ Dispose of the packaging properly.

4.3 Transporting and lifting the ball valve

! DANGER

Danger due to falling of suspended loads!
Do not stand under suspended loads.

! WARNING

Overturning of the lifting equipment and damage to the load lifting equipment by exceeding the lifting capacity!

- Only use approved lifting equipment and load lifting equipment whose lifting capacity corresponds at least to the weight of the ball valve including the actuator.
- Take the weights from the respective data sheet.

Danger of injury due to the tipping of the ball valve!

- Observe the centre of gravity of the ball valve.
- Secure the ball valve against tipping and twisting.

! NOTE

Damage to the ball valve due to improper fastening of the sling!

The screwed-in lifting eyes on actuators are used only for actuator assembling and disassembling as well as for lifting the actuator without the ball valve. These lifting eyes are not intended for lifting the complete ball valve.

- ⇒ When lifting the ball valve, make sure that the entire load is carried by the sling that is fastened to the ball valve body.
- ⇒ Do not fasten the load-bearing sling to the actuator, hand wheel or other components.
- ⇒ Do not use the control air lines, accessories or other components with safety functions for suspension or damage them.

4.3.1 Transporting

The ball valve can be transported using lifting equipment such as a crane or a forklift.

- ⇒ Leave the ball valve on the pallet or in the transport container for transport.
- ⇒ Ball valves that weigh more than approx. 10 kg should be transported on a pallet (or supported similarly) (also to the installation site). The packaging protects the scratch-sensitive lining of the ball valve against damage.
- ⇒ Comply with the transport conditions.

Transport conditions

- ⇒ Protect the ball valve against external influences, such as impacts.
- ⇒ Do not damage the corrosion protection (paint, surface coating). Repair damage immediately.
- ⇒ Protect the ball valve against moisture and dirt.

4.3.2 Lifting

When installing the ball valve in the pipe, larger ball valves can be lifted using lifting equipment such as a crane or forklift.

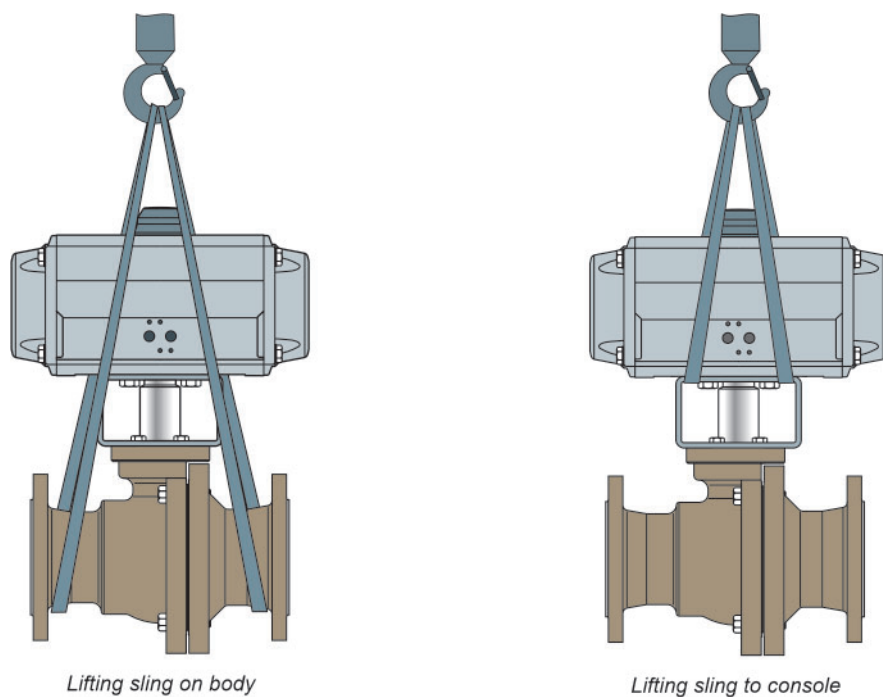


Figure 4-1: Lifting points on the ball valve

Conditions for lifting

- ⇒ Use a hook with a safety clamp as the suspension element so that the sling cannot slip off the hook during lifting and transport, see Figure 4-1.
- ⇒ Secure the sling against shifting and slipping off.
- ⇒ Fasten the sling such that it can be removed again after installation in the pipe.
- ⇒ Avoid swinging and tipping the ball valve.
- ⇒ In the case of interruptions in work, do not leave the lifting equipment suspended in the air for a long period of time.
- ⇒ Lift the ball valve aligned in the same direction in which it will be installed in the pipe.
- ⇒ Always lift the ball valve in the centre of gravity of the load to prevent uncontrolled tipping.
- ⇒ Make sure that any slings between the lifting eyes on the rotary actuator and suspension element are not loaded. These slings are used only to secure the load against turning over while lifting. Before lifting the ball valve, pretension this sling so it is taut.

⚠ WARNING

Danger due to incorrect lifting and transport!

The lifting points for the lifting slings shown in the schematic drawing serve as examples for most valve variants. On site the conditions for lifting and transporting the valve can change however.

- ⇒ The operator makes sure that the valve is lifted and transported safely.

4.3.3 Lifting points on the body

- ⇒ Fasten a lifting sling to each flange of the housing and on the suspension element (e.g. hook) of the crane or forklift, see Figure 4-1. When doing so, ensure the safety, bearing capacity and length of the lifting slings
- ⇒ In the case of an actuator with a lifting eye: fasten additional lifting slings to the lifting eye on the actuator and on the suspension element.
- ⇒ Lift the ball valve carefully. Check if the load lifting equipment holds.
- ⇒ Move the ball valve at a constant speed to the installation site.
- ⇒ Install the ball valve in the pipe, see chapter 5.4.
- ⇒ After installation in the pipe: check that the flanges are firmly tightened and that the ball valve holds in the pipe.
- ⇒ Remove the lifting slings.

4.3.4 Lifting points on the bracket

- ⇒ Fasten a lifting sling to the bracket and the suspension element (e.g. hook) of the crane or forklift, see Figure 4-1. When doing so, ensure the safety, bearing capacity and length of the lifting slings.
- ⇒ In the case of an actuator with a lifting eye: fasten additional lifting slings to the lifting eye on the actuator and on the suspension element.

- ⇒ Lift the ball valve carefully. Check if the load lifting equipment holds.
- ⇒ Move the ball valve at a constant speed to the installation site.
- ⇒ Install the ball valve in the pipe, see chapter 5.4
- ⇒ After installation in the pipe: check that the flanges are firmly tightened and that the ball valve holds in the pipe.
- ⇒ Remove the lifting slings.

4.4 Storing the ball valve

NOTE

Damage to the ball valve due to improper storage!

- ⇒ Comply with the storage conditions
- ⇒ Avoid long storage periods
- ⇒ In the case of deviating storage conditions and a longer storage period, contact PFEIFFER

Info

PFEIFFER recommends checking the ball valve and the storage conditions regularly during a longer storage period.

- ⇒ In the case of storage prior to installation, the ball valve should normally be stored in a closed room where it is protected against harmful influences such as impacts, dirt or moisture. A room temperature of $25^{\circ}\text{C} \pm 15^{\circ}\text{C}$ is recommended.
- ⇒ In particular, the actuator and the plastic lined sealing surfaces of the flange ends for the pipe connection may not be damaged by mechanical or any other influences.
- ⇒ Do not stack the ball valves.
- ⇒ Prevent condensation in damp rooms. Use a desiccant or heater.
- ⇒ The ball valve must be stored in its protective packaging and/or with the protective caps on the connection ends.
- ⇒ Ball valves that weigh more than approx. 10 kg should be stored on a pallet (or supported similarly).
- ⇒ Ball valves are usually delivered in a completely open position. They must be stored in the position in which they were delivered. The actuating device must not be actuated.
- ⇒ Do not place any objects on the ball valve.

5 Installation

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task. The following instructions apply additionally for ball valves. Observe chapter "4.3 Transporting and lifting the ball valve" for transport to the installation site.

5.1 Installation conditions

Operator level

The operator level for the ball valve is the front view on all operating elements of the ball valve including the attachments from the perspective of operating personnel.

The plant operator must make sure that operating personnel can carry out all work after the device is installed safely and can access it easily from the operator level.

Pipe routing

The guidelines applicable on site apply for the installation of ball valves in the pipe.

Install the ball valve such that there is low vibration and no mechanical stress. Observe the sections "Installation orientation" and "Support and mounting" in this chapter.

Install the ball valve so there is enough space to replace the actuator and ball valve as well as to perform maintenance work.

Do not position the lined ball valves with the slid-on heat pack directly in front of the pipe elbow.

Installation position

The ball valve can be installed in any installation position. PFEIFFER recommends however to install the ball valve in general so that the actuator points up in a vertical position.

In the following versions, the ball valve with actuator must be installed facing upwards or a corresponding support must be provided:

- Nominal sizes \geq DN 100 / NPS4
 - Ball valve with a stem extension or insulating part for temperatures below -10°C .
- ⇒ In the case of deviations from this installation position, contact PFEIFFER.

Support and mounting

The plant manufacturer is responsible for the selection and implementation of a suitable support or mounting for the installed ball valve as well as the pipe.

Venting

Vents are screwed into the exhaust air connections of pneumatic and electropneumatic devices to ensure that the generated exhaust air can be released to the outside (protection against overpressure in the device). Furthermore, vents allow the intake of air (protection against underpressure in the device).

- ⇒ Carry out venting on the side that faces away from the operator level.
- ⇒ When connecting the attachments, make sure that they can be accessed from the operator level safely and easily.

5.2 Preparing for assembly

Ball valves with lining must be handled, transported and stored with particular care, see Chapter "4 Delivery and on-site transport".

Perform the following steps after receiving the goods:

- ⇒ Check the scope of supply. Compare the delivered goods with the delivery note.
- ⇒ Check the supply for transport damage. Report transport damage to PFEIFFER and the transport company (see the delivery note).

Ensure the following conditions prior to assembly:

- The ball valve is clean.
- The ball valve data on the type plate (type, nominal size, material, nominal pressure and temperature range) matches the plant conditions (nominal size and nominal pressure of the pipe, medium temperature, etc.). For details about the marking, see Chapter "2 Markings on the device".
- Desired or required additional fittings, see Chapter "3.2 Additional fittings", are installed or prepared as far as necessary before the assembly of the ball valve.

5.3 Assembling the ball valve and actuator

Ball valves are supplied in working order. In individual cases, the actuator and ball valve are delivered separately and must be assembled. The tasks are listed below that are necessary for assembly and prior to the commissioning of the ball valve.

WARNING

Danger and damage due to retrofitting an actuator unit!

The subsequent fitting of an actuator unit can pose a danger to the user and cause damage to the pipe system.

- ⇒ Adapt the torque, rotation direction, actuation angle and adjustment of the "OPEN" and "CLOSED" end stops to the ball valve.

⚠ WARNING**Danger and damage due to use of an electrical actuator!**

- ⇒ Make sure that the actuator in the end positions is turned off by the limit switch signal.
- ⇒ If shut-off takes place in an intermediate position due to the signal of the torque switch, use this signal in addition for an error message. The fault must be remedied as soon as possible, see Chapter "8 Faults".
- ⇒ For further instructions, see the electrical actuator manual.

Danger and damage due to high external loads on an actuator unit!

Actuators and gears are not "stepladders".

- ⇒ Do not apply loads to the actuator units from the outside. This can damage or destroy the ball valve.

Danger and damage due to heavy actuator units!

Actuators and gears that are heavier than the weight of the ball valve can pose a danger to the user and cause damage to the pipe system.

- ⇒ Support these actuators and gears if they generate a bending stress on the ball valve due to their size and/or installation situation.

! NOTE**Damage to the ball valve due to the incorrect setting of the end stops!**

The actuating device is adjusted to the operating data specified in the order.

- ⇒ The adjustment of the "OPEN" and "CLOSED" end stops is the responsibility of the user.

5.4 Installing the ball valve in the pipe

5.4.1 General

- ⇒ Transport the ball valve in its original packaging to the installation site and unpack it only there.
- ⇒ Inspect the ball valve and actuator for transport damage. Do not install damaged ball valves or actuators.
- ⇒ A functional test is to be carried out at the beginning of installation for manually-operated ball valves: the ball valve must close and open correctly. Detected malfunctions must be fixed before commissioning, see Chapter "8 Faults".
- ⇒ Handle the ball valve with care and observe the instructions for the flange connection.
- ⇒ Only install ball valves whose pressure classes, connection type (flow rate), type of lining and connection dimensions match the conditions of use, see the corresponding marking on the ball valve.
- ⇒ The counterflanges must have smooth sealing surfaces. Other shapes must be agreed upon with PFEIFFER.

- ⇒ The ball valve can be used in both directions if a direction arrow is not applied.

⚠ DANGER**Danger due to exceeding the limits of use!**

Exceeding the limits of use can pose a danger to the user and cause damage to the pipe system.

- ⇒ No ball valve may be installed whose permissible pressure/temperature range is not sufficient for the max. permissible operating conditions.
- ⇒ The limits of use are marked on the ball valve, see Chapter "2 Markings on the device".
- ⇒ The permissible range is defined in Chapter "1 Safety instructions and safety measures".

- ⇒ The connection ends of the pipe must align with the ball valve connections and have plane-parallel ends. Connection flanges that are not plane parallel can damage the PFA lining during installation.
- ⇒ The connection data for the actuator unit match the data of the control, see the type plate(s) on the actuator unit.
- ⇒ Prior to installation, clean the ball valve and the connected pipe of any contamination, in particular solid foreign matter.
- ⇒ The sealing surfaces on the flange connection and any utilized flange seals are free of all contamination during installation.
- ⇒ Optionally, an arrow is marked on the body. The direction of the arrow must correspond to the direction of flow in the pipe.
- ⇒ When pushing the ball valve and any used flange seals into an already assembled pipe, the distance between the pipe ends is measured such that all contact surfaces of the ball valve and seals remain undamaged.
- ⇒ The flange connections are tightened evenly and in a criss-cross pattern in at least three steps.

i Info

All flange connections are tightened using a torque wrench and ensures that the required tightening torques are reached, but not exceeded see Table 15-2 or Table 15-3 in Chapter "15.1.1 Tightening torques".

- ⇒ The PFA plastic sealing surfaces tend to flow, observe the yellow notice sign on the ball valve, see Chapter "1.4 Warning notes on the device". After installation in the pipe, retighten the body screws according to the respective tightening torques, see Table 15-1 in Chapter "15.1.1 Tightening torques".
- ⇒ Vents are screwed into the exhaust air connections of pneumatic and electropneumatic devices to ensure that the generated exhaust air can be released to the outside (protection against overpressure in the device).
Furthermore, vents allow the intake of air (protection against underpressure in the device).

- ⇒ Carry out venting on the side that faces away from the working area of operating personnel.
- ⇒ When installing peripheral devices, make sure that they can be operated from the working area of operating personnel.

5.4.2 Installing the ball valve

i Info

The ball valve is lined with PFA.

- ⇒ Handle the ball valve with particular care and observe the instructions for the flange connection.

Protect the lined ball valve surfaces in particular prior to/during installation.

- ⇒ Transport the ball valve in its original packaging to the installation site and unpack it only there.

- ⇒ Lift the ball valve with suitable lifting equipment at the installation site, see chapter "4.3 Transporting and lifting the ball valve".
- ⇒ Close the ball valve in the pipe for the duration of the installation.
- ⇒ Remove the protective caps on the ball valve openings prior to installation.
- ⇒ Observe the flow direction of the ball valve. An optional arrow on the ball valve shows the flow direction, otherwise it can be used in both directions.
- ⇒ Clean the sealing surfaces on the ball valve and pipe.
- ⇒ Use correct flange seals.

i Info

The sealing surfaces on the ball valve body are lined with plastic.

- ⇒ Flange seals made of PTFE are recommended.
- ⇒ Counterflanges have smooth sealing surfaces. Other flange shapes must be agreed upon with PFEIFFER.

! NOTE

Deformation of the pipes damages the ball valve!

- ⇒ Prevent or fix the deformation of the pipes.

- ⇒ Screw the pipe together with the ball valve without tension.
- ⇒ After installing the ball valve, open it slowly in the pipe.

! NOTE

Damage to the ball valve due to a sudden pressure increase and resulting high flow speed!

Open the ball valve slowly in the pipe during commissioning.

- ⇒ Check the correct function of the ball valve.

5.4.3 Installation instructions for lined gate ball valves with heat pack

i Info

When installing the lined ball valves with heat packs in the pipe, a corresponding straight outlet pipe section must be included.

- If the bolted joint of the body must be retightened, this outlet section allows the heat pack to be moved away from the ball valve.
- As a result, the heat line does not need to be shut off. We recommend flexible connections for connecting the heating jacket to the heat line.

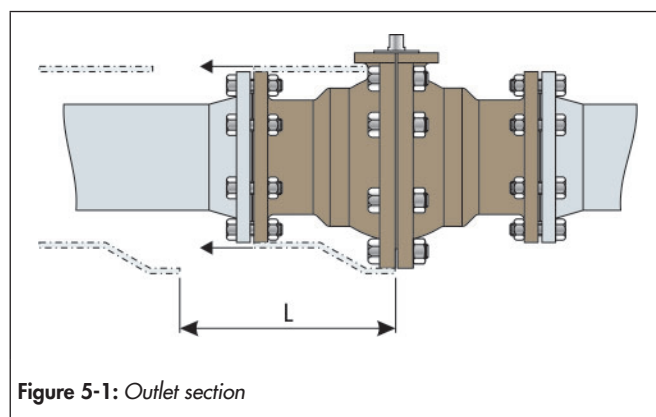


Figure 5-1: Outlet section

- ⇒ The values in the following table are intended as a guide to dimension the outlet section (L).

Table 5-1: Outlet section

DN	15	25	40	50	80	100
L	195	240	300	345	465	525

5.5 Checking the assembled ball valve

5.5.1 Functional test

! WARNING

Danger of injury due to pressurised components and escaping medium!

- ⇒ Do not loosen the screw of an optional test connection while the ball valve is pressurised.

Danger of crushing due to moving actuator- and switching shaft!

- ⇒ Do not reach into the bracket as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the bracket to hinder the operation of the actuator- and switching shaft.

- ⇒ If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.
- ⇒ Prior to disassembly of the actuator, bring the ball valve into the fail-safe position.

Danger of injury due to escaping exhaust air!

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection when working near the valve.

- ⇒ At the end of installation, perform a functional test with the control signals:

The ball valve must close and open correctly according to the control commands. Detected malfunctions must be fixed before commissioning, see Chapter "8 Faults".

! WARNING

Danger due to improperly executed control commands!

Incorrectly executed control commands can cause serious injuries or even death and cause damage to the pipe system.

- ⇒ Check the actuator unit and control command., see chapter "8 Faults".

5.5.2 Pressure test of the pipe section

The pressure test was already performed on the ball valves by PFEIFFER. Observe the following for the pressure test of a pipe section with installed ball valves:

- ⇒ First carefully rinse newly installed pipe systems in order to wash out all foreign matter.
- ⇒ Ensure the following conditions for the pressure test:
 - Ball valve open: the test pressure may not exceed the value $1.5 \times PN$ (according to the type plate).
 - Ball valve closed: the test pressure may not exceed the value $1.1 \times PN$ (according to the type plate).

If a ball valve leaks, observe chapter "8 Faults".

i Info

The plant operator is responsible for performing the pressure test. After Sales Service at PFEIFFER can provide you with support for the planning and implementation of a pressure test specific to your plant.

5.5.3 Swivelling movement

The rotary movement of the actuator- and switching shaft must be linear without any jerky movements.

- ⇒ Open and close the ball valve. When doing so, observe the movement of the actuator shaft.
- ⇒ Set the maximum and minimum control signal in succession to check the end positions of the ball valve.
- ⇒ Check the display on the position indicator.

5.5.4 Fail-safe position

- ⇒ Close the signal pressure line.
- ⇒ Check whether the ball valve moves to the fail-safe position, see "Fail-safe positions in Chapter "3 Design and principle of operation".

6 Start-up

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

WARNING

Danger of burning due to hot or cold components and pipe!

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

Danger of injury due to pressurised components and escaping medium!

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

Danger of crushing due to moving actuator- and switching shaft!

- ⇒ Do not reach into the bracket as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the bracket to hinder the operation of the actuator- and switching shaft.
- ⇒ If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.
- ⇒ Prior to disassembly of the actuator, bring the ball valve into the fail-safe position.

Danger of injury due to escaping exhaust air!

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection when working near the valve

Commissioning/recommissioning

- ⇒ The PFA plastic sealing surfaces tend to flow. After commissioning and reaching the operating temperature, tighten all flange connections between the pipe and ball valve with the corresponding tightening torques, see Table 15-2 and Table 15-3 in Chapter "15.1.1 Tightening torque".
- ⇒ Retighten the screws of the body joint, see Table 15-1 in Chapter "15.1.1 Tightening torques".
- ⇒ Open the ball valves slowly in the pipe. Opening slowly prevents a sudden increase in pressure and a resulting high flow speed that damages the ball valve.
- ⇒ Check the correct function of the ball valve.

Ensure the following conditions prior to commissioning/recommissioning:

- The ball valve is installed properly in the pipe, see Chapter "5 Assembly".
- The leak and function tests have been completed successfully, see Chapter "5.1 Installation conditions".
- The current conditions in the concerned plant section correspond to the design of the ball valve, see Intended use in Chapter "1 Safety instructions and safety measures".

7 Operation

As soon as the commissioning/recommissioning work is complete, see Chapter "6 Commissioning", the ball valve is ready for operation.

WARNING

Danger of burning due to hot or cold components and pipe!

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

Danger of injury due to pressurised components and escaping medium!

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

Danger of crushing due to moving actuator- and switching shafts!

- ⇒ Do not reach into the bracket as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the bracket to hinder the operation of the actuator- and switching shaft.
- ⇒ If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.
- ⇒ Prior to disassembly of the actuator, bring the ball valve into the fail-safe position.

Danger of injury due to escaping exhaust air!

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection when working near the valve.

Observe the following points during operation:

- ⇒ The PFA plastic sealing surfaces tend to flow. After commissioning and reaching the operating temperature, tighten the body screws with the corresponding tightening torques, see Table 15-1 in Chapter "15.1.1 Tightening torques".
- ⇒ Tighten all flange connections between the pipe and ball valve, if necessary, with the corresponding tightening torques according to Table 15-2 or Table 15-3 in Chapter "15.1.1 Tightening torques".
- ⇒ The ball valve/actuator unit must be actuated with the control signals.
- ⇒ Ball valves that were delivered from the factory with an actuator are precisely adjusted. The user is responsible for any changes they make.

- For the manual operation or manual override of the actuator (if present), normal manual forces are sufficient and the use of extensions to increase the actuation torque is not permitted.
- In the case of ball valves with a hand lever, the position of the hand lever indicates the location of the bore in the ball. The hand lever moves in general parallel to the bore. Special versions are to be taken from the respective order.
 - Hand lever 90° transverse to the pipe: ball valve closed.
 - Hand lever parallel to the pipe: ball valve open.

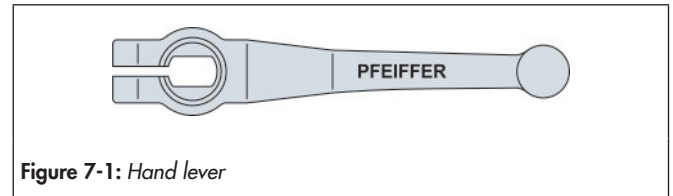


Figure 7-1: Hand lever

DANGER

Danger of injury due to jerky operation of the ball valve!

The failure to observe these warnings can cause extreme danger for persons or for the pipe system.

- ⇒ Do not open and close the ball valve suddenly to prevent pressure surges and/or a temperature shock in the pipe system.
- If a ball valve leaks, observe chapter "8 Faults".

8 Malfunction

When rectifying the faults, chapter "1 Safety instructions and safety measures" must be observed.

8.1 Detecting and rectifying errors

Type of fault	Possible cause	Measures
Leaks in the pipe connection	The flange connection of the lined ball valve is leaky	<p>Tighten the flange screws.</p> <hr/> <p>! NOTE</p> <p>An excessive tightening torque when retightening the flange screws can damage the ball valve and pipe!</p> <p><i>The permissible torque for retightening the pipe flange screws is limited.</i></p> <hr/> <p>Retighten the flange connection with the respective tightening torque, see Table 15-2 or Table 15-3 in Chapter "15.1.1 Tightening torques".</p> <p>If necessary, increase the tightening torque to max. 20%.</p>
	The flange connection is still leaky after retightening	<p>Loosen the flange connection and remove the ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Check the plane parallelism of the flange connection and correct if it is not sufficient.</p> <p>Check the surfaces on all flanges. If the plastic lining is damaged, replace the ball valve together with its flange seals, if available.</p> <p>Check the flange seals. If the seals are damaged, replace them.</p>
Leaks in the body parts	The body section connection loosened	Retighten the flange connection with the respective tightening torque, see Table 15-1 in Chapter "15.1.1 Tightening torques".
	Body parts untight after retightening	Replace the body sealing and/or ball valve, see chapter "1 Safety instructions and safety measures".
Increased medium flow rate with the ball valve closed	Leakage in the closed position	Remove and inspect the ball valve, see chapter "1 Safety instructions and safety measures".
	The ball valve is damaged	<p>Repairs are necessary.</p> <p>Remove the ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Request spare parts from PFEIFFER, see Chapter "15.2 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs".</p>
Leaks in the switching shaft sealing	Medium escapes	<p>! DANGER</p> <p>Danger of injury due to escaping medium!</p> <p><i>To protect operating personnel from danger, depressurise the line on both sides of the ball valve, see Chapter "1 Safety instructions and safety measures".</i></p>
	Medium escapes from the stuffing box	<p>Remove the ball valve, see chapter "1 Safety instructions and safety measures".</p> <p>Disassemble the ball valve and replace the switching shaft sealing.</p> <p>Request spare parts from PFEIFFER, see Chapter "15.2 Spare parts".</p> <p>For the required repair instructions, see Chapter "12 Repairs".</p>

Type of fault	Possible cause	Measures
Malfunction	The actuator unit or control does not react	Check the actuator unit and control command.
	The actuator and control are OK	Remove and inspect the valve, see chapter "1 Safety instructions and safety measures". Remove the actuator unit and measure and check the ball valve torque.
	The ball valve is damaged	Repairs are necessary. Remove the ball valve, see chapter "1 Safety instructions and safety measures". Request spare parts from PFEIFFER, see Chapter "15.2 Spare parts". For the required repair instructions, see Chapter "12 Repairs".
Problems in the actuator unit	The pneumatic actuator must be removed	Disconnect the connection to the control pressure. Remove the actuator from the ball valve (observe the "Safety instructions and safety measures", see the included actuator unit manuals).

i Info

- In the case of faults that are not listed in the table, contact the After Sales Service at PFEIFFER.
- Spare parts must be ordered indicating all the data according to the valve marking. Only original parts from PFEIFFER Chemie-Armaturenbau GmbH may be installed.
- If it is determined after removal that the PFA lining is not sufficiently resistant for the medium, parts must be selected made of a suitable material.

8.2 Carrying out emergency measures

In the case of a power supply failure, the ball valve automatically switches to the preset fail-safe position, see "Fail-safe positions" in Chapter "3 Design and principle of operation".

The system operator is responsible for emergency measures.

In case of a ball valve fault:

- Close the shut-off valves upstream and downstream of the ball valve so that no medium flows through the ball valve.
- Troubleshoot the error, see chapter "8.1 Detecting and rectifying errors".
- Rectify the fault that can be fixed as indicated in the instructions provided in this installation and operating manual. For faults that cannot be fixed, contact the After Sales Service at PFEIFFER.

Recommissioning after faults

See Chapter "6 Commissioning".

9 Servicing

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

The following documents are required in addition for the maintenance of the ball valve:

- Installation and operating manual for the installed actuator, e.g. ► EB 31a for BR 31a rotary actuators or the corresponding actuator documentation of other manufacturers.

! WARNING

Danger of burning due to hot or cold components and pipe!

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

Danger of injury due to pressurised components and escaping medium!

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

Danger of crushing due to moving actuator- and switching shaft!

- ⇒ Do not reach into the bracket as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the bracket to hinder the operation of the actuator- and switching shaft.
- ⇒ If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.
- ⇒ Prior to disassembly of the actuator, bring the ball valve into the fail-safe position.

Danger of injury due to escaping exhaust air!

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection when working near the valve.

Danger of injury due to preloaded springs!

Actuators with preloaded actuator springs are pressurised.

- ⇒ Release the compression from the preloaded springs before working on the actuator, see the corresponding actuator documentation.

Danger of injury due to residual medium in the ball valve!

When working on the ball valve, residual medium can escape and, depending on the medium properties, cause injuries (e.g. scalding, chemical burns).

- ⇒ Wear protective garments, protective gloves and eye protection.
- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.

! NOTE

Damage to the ball valve due to excessively high or low tightening torques!

The ball valve components must be tightened with specific torques. Excessively tightened components are subject to increased wear and can damage the plastic lining. Insufficiently tightened components can cause leakage.

- ⇒ Observe the tightening torques, see Table 15-1 in Chapter "15.1.1 Tightening torques".

Damage to the ball valve due to unsuitable tools!

- ⇒ Only use tools approved by PFEIFFER, see Chapter "15.1.3 Tools".

Damage to the ball valve due to unsuitable lubricants!

- ⇒ Only use lubricants approved by PFEIFFER, see Chapter "15.1.2 Lubricants".

i Info

The ball valve was checked by PFEIFFER prior to delivery.

- Certain test results certified by PFEIFFER are no longer valid when disassembling the ball valve. This includes the test for seat leakage and the leak test (outer tightness).
- If maintenance and repair work is performed without approval from the After Sales Service of PFEIFFER, the product guarantee will be voided.
- Only use original parts from PFEIFFER as spare parts that correspond to the original specification.
- Wear parts are not covered by the warranty.

9.1 Periodic tests

- ⇒ Depending on the conditions of use, the ball valve must be checked at defined intervals in order to take remedial measures prior to possible malfunctions. The plant operator is responsible for preparing a suitable test plan.
- ⇒ PFEIFFER recommends the following inspections that can be carried out during operation:

Test	Measures in the case of a negative test result
If present, check the optional test connection for tightness. WARNING! Danger of injury due to pressurised components and escaping medium! Do not loosen the screw of the test connection while the ball valve is pressurised.	Decommission the ball valve, see chapter "10 Decommissioning". Contact the After Sales Service at PFEIFFER for repairs, See chapter "12 Repairs".
Check the switching shaft sealing for tightness from the outside.	The switching shaft sealing with a PTFE V-ring packing is preloaded with a set of spring washers and is therefore maintenance free.

Test	Measures in the case of a negative test result
Check the rotary movement of the actuator- and switching shaft for smooth movement.	If the actuator- and switching shaft are blocked, remove the blockage. WARNING! If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time) they can release unexpectedly and move uncontrolled. This can lead to crushing if reaching into them. Before trying to release a blockage of the actuator- and switching shaft, interrupt and lock the pneumatic energy and the control signal. Release the residual energy of the actuator (spring tension or compressed air reservoir) before releasing the blockage, see the corresponding actuator documentation.
If possible, check the fail-safe position of the ball valve by briefly interrupting the power supply.	Decommission the ball valve, see chapter "10 Decommissioning". Then determine the cause and remedy it, see Chapter "8 Malfunctions".
Check pipe connections and seals of the ball valve and actuator for leaks.	Regular maintenance work on the ball valve is not necessary, but when checking the pipe section, no medium may escape from the flange and screw connections of the body or from the switching shaft sealing.

9.2 Maintenance work

- ⇒ The ball valve must be prepared before all maintenance work, see Chapter 12 "Repairs".
- ⇒ After all maintenance work, the ball valve must be checked prior to recommissioning, see Chapter "5.5 Checking the mounted ball valve".

9.2.1 Replacing the seal rings and ball

- ⇒ Check the condition of the ball and seal rings.
- ⇒ Remove the seal rings (4) as described in Chapter "12.3 Replacing the seal rings and ball". Check the seal rings as well as all plastic parts for damage and if in doubt replace them.
- ⇒ Also remove the ball (3). Check the ball as well as all plastic parts for damage and if in doubt replace them.

9.3 Ordering spare parts and consumables

Information about spare parts, lubricants and tools can be received from the After Sales Service at PFEIFFER.

Spare parts

Information on spare parts can be found in Chapter "15.2 Spare parts".

10 Decommissioning

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

WARNING

Danger of burning due to hot or cold components and pipe!

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

Danger of injury due to pressurised components and escaping medium!

- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.

Danger of crushing due to moving actuator- and switching shaft!

- ⇒ Do not reach into the bracket as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the bracket to hinder the operation of the actuator- and switching shaft.
- ⇒ If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.
- ⇒ Prior to disassembly of the actuator, bring the ball valve into the fail-safe position.

Danger of injury due to escaping exhaust air!

During operation, when regulating or when opening and closing the ball valve, exhaust air can escape, for example from the actuator.

- ⇒ Wear eye protection when working near the valve.

Danger of injury due to residual medium in the ball valve!

When working on the ball valve, residual medium can escape and, depending on the medium properties, cause injuries (e.g. scalding, chemical burns).

- ⇒ Wear protective garments, protective gloves and eye protection.
- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.
- ⇒ Bring the ball valve into the open position so the pressure is released from the ball.

Observe the following points during decommissioning:

To decommission the ball valve for maintenance and repair work or for disassembly, perform the following steps:

- ⇒ Close the valves upstream and downstream of the ball valve so that no medium flows through the ball valve.
- ⇒ Empty the pipe and ball valve completely.
- ⇒ Shut off the pneumatic power and lock it, to depressurise the actuator.
- ⇒ Let the pipe and ball valve components cool down or warm up.

11 Removal

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

WARNING

Danger of burning due to hot or cold components and pipe!

Ball valve components and pipes can become very hot or very cold during operation and cause burns upon contact.

- ⇒ Let the components and pipes cool down or warm up.
- ⇒ Wear protective garments and protective gloves.

Danger of crushing due to moving actuator- and switching shaft!

- ⇒ Do not reach into the bracket as long as the pneumatic power is connected to the actuator.
- ⇒ Before working on the ball valve, interrupt and lock pneumatic energy and the control signal.
- ⇒ Vent the actuator.
- ⇒ Do not allow the jamming of objects in the bracket to hinder the operation of the actuator- and switching shaft.
- ⇒ If the actuator- and switching shaft are blocked (e.g. due to "seizure" if not actuated for a long period of time"), release the residual energy of the actuator (spring tension) before releasing the blockage, see the corresponding actuator documentation.
- ⇒ Prior to disassembly of the actuator, bring the ball valve into the fail-safe position.

Danger of injury due to residual medium in the ball valve!

When working on the ball valve, residual medium can escape and, depending on the medium properties, cause injuries (e.g. scalding, chemical burns).

- ⇒ Wear protective garments, protective gloves and eye protection.
- ⇒ Do not loosen the screw of the optional test connection while the ball valve is pressurised.
- ⇒ Remove the ball valve in the open position so the pressure is released from the ball.

Danger of injury due to preloaded springs!

Actuators with preloaded actuator springs are pressurised.

- ⇒ Release the compression from the preloaded springs before working on the actuator, see the corresponding actuator documentation.

Prior to disassembly, make sure that the following conditions are met:

- The ball valve is decommissioned, see chapter "10 Decommissioning".

11.1 Removing the ball valve from the pipe

- ⇒ Loosen the flange connection.
- ⇒ Remove the ball valve from the pipe, see Chapter "4.3 Transporting and lifting the ball valve".

WARNING

If a used valve is sent to PFEIFFER for service:

The valves must be decontaminated properly in advance.

- ⇒ When returning a used valve, include the safety data sheet for the medium as well as confirmation of decontamination of the valve. Otherwise the valve will not be accepted.

Tip

PFEIFFER recommends documenting the following contamination data in the form FM 8.7-6 "Declaration regarding the contamination of PFEIFFER valves and components".

11.2 Disassembling the actuator

See the corresponding actuator documentation.

12 Repairs

If the ball valve no longer works properly or if it does not work at all, it is defective and must be repaired or replaced.

! NOTE

Damage to the ball valve due to improper maintenance and repair!

- ⇒ Do not perform maintenance and repair work on your own.
- ⇒ Contact the After Sales Service at PFEIFFER for maintenance and repair work.

In special cases, certain maintenance and repair work may be performed.

The work described in this chapter may only be performed by specialist personnel qualified to perform the corresponding task.

The following instructions apply additionally for ball valves. For decommissioning and disassembly, observe Chapter "10 Decommissioning" and Chapter "11 Disassembly".

i Info

Please note when repairing!

Influences from the process medium and residues can affect the torque for body connections when old balls and seals are reused, see Table 15-1 in Chapter "15.1.1 Tightening torques".

12.1 Replacing the V-ring packing in the case of a DIN ball valve, DN 15 ... 100

If a leak is found in the stuffing box (6), the PTFE rings of the V-ring packing (5) could be defective.

- ⇒ Check the condition of the V-ring packing.
- Disassemble the ball valve to remove the packing. For this purpose, observe Chapter "1 Safety instructions and safety measures".
- ⇒ Place the ball valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (9) and remove the stuffing box flange (6) with the bearing bushing (7) carefully.
- ⇒ Remove the spring washers from the set of spring washers (8).
- ⇒ Remove the bushing (14).
- ⇒ Remove the V-ring packing (5).
- ⇒ Check the PTFE rings of the V-ring packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter 3.5.1 and 3.5.2.

12.2 Replacing the V-ring packing in the case of a DIN ball valve, DN 150 ... 200

If a leak is found in the stuffing box (6), the PTFE rings of the V-ring packing (5) could be defective.

- ⇒ Check the condition of the V-ring packing.
- Disassemble the ball valve to remove the packing. For this purpose, observe Chapter "1 Safety instructions and safety measures".
- ⇒ Place the ball valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (9) and remove the stuffing box flange (6) with the bearing bushing (7) carefully.
- ⇒ Remove the spring washers from the set of spring washers (8).
- ⇒ Remove the centring ring (18).
- ⇒ Remove the spring washer(s) (16) and bushing (15).
- ⇒ Remove the V-ring packing (5) and bushing (17).
- ⇒ Check the PTFE rings of the V-ring packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter 3.5.3.

12.3 Replacing the V-ring packing in the case of a ANSI ball valve

If a leak is found in the stuffing box (6), the PTFE rings of the V-ring packing (5) could be defective.

- ⇒ Check the condition of the V-ring packing.
- Disassemble the ball valve to remove the packing. For this purpose, observe Chapter "1 Safety instructions and safety measures".
- ⇒ Place the ball valve on an even and clean work surface so that the packing space is easy to reach.
- ⇒ Loosen the screws (9) and remove the stuffing box flange (6) with the bearing bushing (7) carefully.
- ⇒ Remove the spring washers from the set of spring washers (8).
- ⇒ Remove the centring ring (18).
- ⇒ Remove the spring washer(s) (16) and bushing (15).
- ⇒ Remove the V-ring packing (5) and bushing (17).
- ⇒ Check the PTFE rings of the V-ring packing as well as all plastic and graphite parts for damage and, in the case of doubt, replace them.
- ⇒ Assemble the ball valve as described in Chapter 3.5.4.

12.4 Replacing the seal ring of the ball

If the ball valve leaks in the passage, the seal ring (4) and/or the ball (3) is defective.

- ⇒ Check the condition of the seal ring and ball.

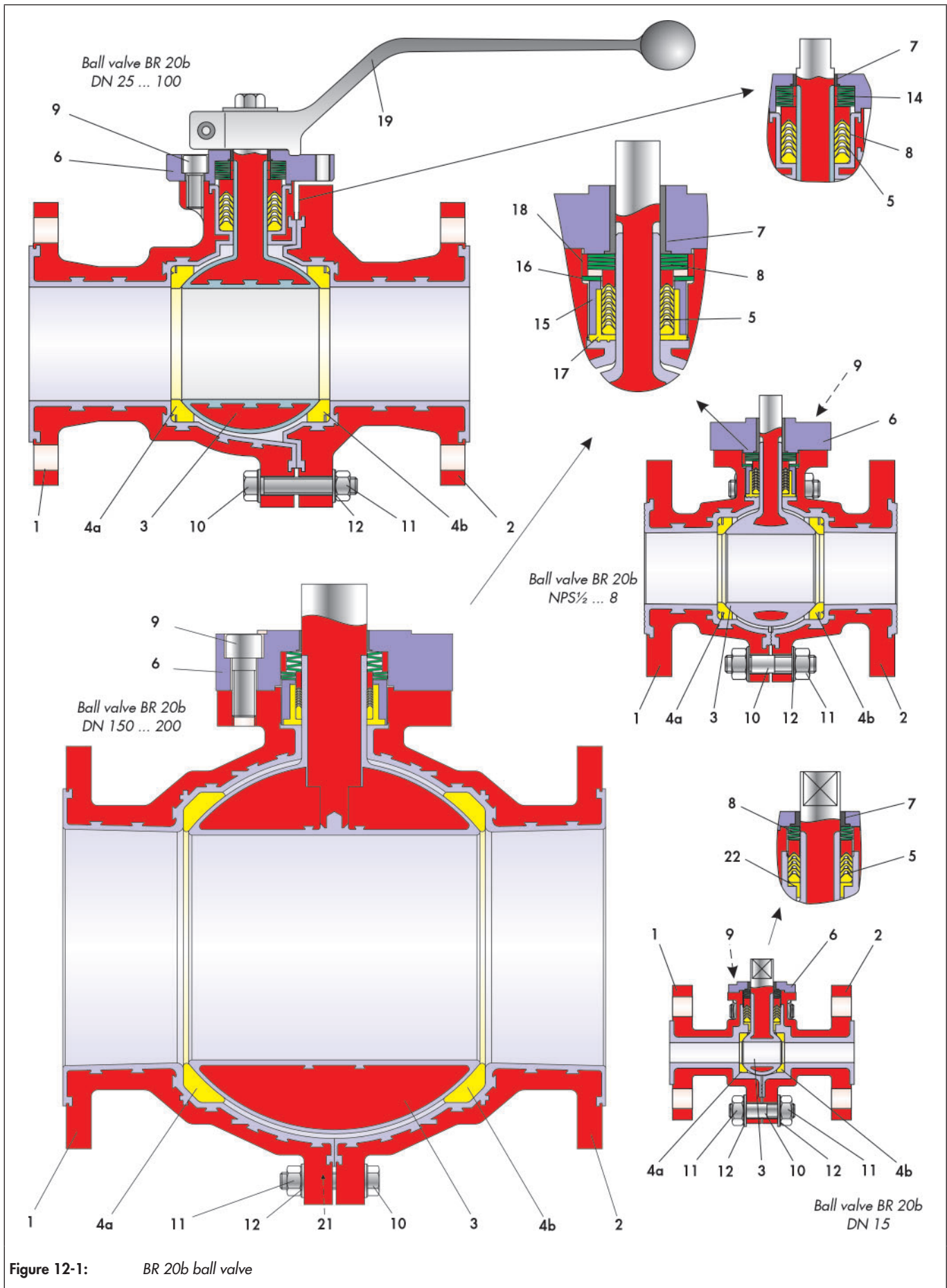


Figure 12-1: BR 20b ball valve

Table 12-1: Parts list

Pos.	Designation
1	Main body with lining
2	Body with lining
3	Ball with coating
4	Seat ring
5	V-ring packing
6	Stuffing box flange
7	Bearing bush
8	Set of spring washers
9	Screw
10	Screw / stud bolt
11	Nut

Pos.	Designation
12	Washer
14	Bush
15	Bush
16	Spring washer
17	Bush
18	Center ring
19	Lever
20	Shaft
21	Pin
22	Bearing bush

Disassemble the ball valve to remove the seal ring and ball of the ball valve. For this purpose, observe Chapter "1 Safety instructions and safety measures".

- ⇒ Disassemble the ball valve as described in Chapter 12.1, Chapter 12.2 and Chapter 12.3.
- ⇒ Place the ball valve with the flange on the body side (1) facing downward on an even and clean work surface, so that the body connection nuts (11) are easy to access.
- ⇒ Undo the nuts (11).
- ⇒ Carefully remove the side body (2).
- ⇒ Check the seal rings and ball as well as all plastic parts for damage and, in the case of doubt, replace them.

i Info

The seal rings may not be installed without clearance. To achieve the tightness of the ball valve, the seal rings must be installed in their seat with sufficient clearance. If this is not possible, please contact PFEIFFER.

- ⇒ Assemble the ball valve as described in Chapter 3.5.1, Chapter 3.5.2, Chapter 3.5.3 and Chapter 3.5.4.

12.5 Additional repairs

- ⇒ In the case of additional major damage, it is recommended to have repairs performed by PFEIFFER.

12.6 Sending devices to PFEIFFER

Defective ball valves can be sent to PFEIFFER for repair.

Proceed as follows to send devices:

⚠ WARNING

Danger due to a contaminated ball valve!

- ⇒ When returning a used valve to PFEIFFER for service, decontaminate the valve properly in advance.
- ⇒ When returning a used valve, include the safety data sheet for the medium as well as confirmation of decontamination of the valve. Otherwise the valve will not be accepted.

💡 Tip

PFEIFFER recommends documenting the following contamination data in the form FM 8.7-6 "Declaration regarding the contamination of PFEIFFER valves and components".

- ⇒ Include the following information for returns:
 - Manufacturer number
 - Ball valve type
 - Article number
 - Nominal size and version of the ball valve
 - Manual valve/automated valve
 - Medium (designation and consistency)
 - Medium pressure and temperature
 - Flow rate in m³/h
 - Bench range of the actuator
 - Number of actuations (year, month, week or day)
 - Installation drawing if available
 - Completed declaration regarding contamination. This form is available at ► www.pfeiffer-armaturen.com.

13 Disposal

- ⇒ For disposal, observe the local, national and international regulations.
- ⇒ Do not dispose of old components, lubricant and hazardous materials with domestic waste.

14 Certificates

The declaration of conformity is available on the following pages:

- Declaration of conformity according to Pressure Equipment Directive 2014/68/EU for automated valves, see page 14-2.
- Declaration of conformity according to Pressure Equipment Directive 2014/68/EU for manually operated valves, see page 14-3.
- Declaration of conformity for completed machinery according to Machinery Directive 2006/42/EC for the ball valve with actuator BR 20b, see page 14-4.
- Declaration of conformity for partly completed machinery according to Machinery Directive 2006/42/EC for ball valve with free switching shaft BR 20b, see page 14-5.

The printed certificates correspond to the status at the time of printing. Further optional certificates are available upon request.

DECLARATION OF CONFORMITY

As per Pressure Equipment Directive 2014/68/EU
TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , D47906 Kempen, Germany
declares that:	Type 20b PFA-lined Ball valves (BR 20b) with stuffing box packing as well as with adjustable packing <ul style="list-style-type: none"> • with pneumatic/ electric/ hydraulic actuator • with free shaft end for subsequent mounting of an actuator
<ol style="list-style-type: none"> The valves are pressure accessories within the meaning of the Pressure Equipment Directive 2014/68/EU and conform with the requirements of this Directive. They may only be operated observing the Installation and operating instructions ► EB 20b delivered together with the valve. <p>The commissioning of these valves is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out. (See ► EB 20b, Chapter 1 for ball valves intended for dead-end service)</p>	

Applied standards:

AD 2000 Regulations	Regulations for pressurized valve body parts
----------------------------	--

Type designation and technical features:

PFEIFFER Data sheet ► TB 20b NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalogue.
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Applied conformity assessment procedure:

Conforming to Annex III of the Pressure Equipment Directive 2014/68/EU, Module H

Name of notified body:

Identification number of the notified body:

TÜV Rheinland Service GmbH Am Grauen Stein 51101 Köln Germany	0035
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These Declarations become invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the ball valve or the <Intended use> described in ► EB 20b, Chapter 1 of the operating instructions, and considerably change the valve or an assembly delivered with it.

Kempen, 1. September 2022



Stefan Czayka
 Head of Quality Management/IMS Representative

DECLARATION OF CONFORMITY

As per Pressure Equipment Directive 2014/68/EU
TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , D47906 Kempen, Germany
declares that:	Type 20b PFA-lined Ball valves (BR 20b) with stuffing box packing as well as with adjustable packing <ul style="list-style-type: none"> • with lever for 90° operation • with worm gear and handwheel
1. The valves are pressure accessories within the meaning of the Pressure Equipment Directive 2014/68/EU and conform with the requirements of this Directive. 2. They may only be operated observing the Installation and operating instructions ► EB 20b delivered together with the valve. (See ► EB 20b, Chapter 1 for ball valves intended for dead-end service)	

Applied standards:

AD 2000 Regulations	Regulations for pressurized valve body parts
----------------------------	--

Type designation and technical features:

PFEIFFER Data sheet ► TB 20b NOTE: This Manufacturer's Declaration applies to all valve types listed in this catalogue.
--

Applied conformity assessment procedure:

Conforming to Annex III of the Pressure Equipment Directive 2014/68/EU, Module H

Name of notified body:

Identification number of the notified body:

TÜV Rheinland Service GmbH Am Grauen Stein 51101 Köln Germany	0035
---	------

These Declarations become invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the ball valve or the <Intended use> described in ► EB 20b, Chapter 1 of the operating instructions, and considerably change the valve or an assembly delivered with it.

Kempen, 1. September 2022



 Stefan Czayka
 Head of Quality Management/IMS Representative

EU DECLARATION OF CONFORMITY TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH , 47906 Kempen, Germany
declares for the listed products that:	<p>Type 20b Ball Valve (BR20b)</p> <ul style="list-style-type: none"> • with a Type 31a Quarter-turn Actuator (BR31a) • with a rotary actuator of a different make <p>Prerequisite: the unit was sized and assembled by PFEIFFER Chemie-Armaturenbau GmbH. The serial number on the valve refers to the entire unit.</p>
<p>1. It complies with all applicable requirements stipulated in Machinery Directive 2006/42/EC.</p> <p>2. In the delivered state, the valve with actuator is considered to be final machinery as defined in the above mentioned directive.</p> <p>The start-up of these units is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

Referenced standards:

- a) VCI, VDMA, VGB: "Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, Mai 2018" [German only]
- b) VCI, VDMA, VGB: "Zusatzdokument zum Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen vom Mai 2018" [German only], based on DIN EN ISO 12100:2011-03

Product description and technical features:

Tight-closing ball valve for aggressive media, particularly for strict requirements in chemical applications, automated with a single or double-acting piston actuator for butterfly valves, ball valves and other valves with rotating throttle bodies.


For product descriptions refer to:
 PFEIFFER data sheet for Type 20b Valve ▶ TB 20b
 PFEIFFER data sheet for Type 31a Actuator ▶ TB 31a
 PFEIFFER mounting and operating instructions for Type 20b Valve ▶ EB 20b
 PFEIFFER mounting and operating instructions for Type 31a Actuator ▶ EB 31a
 PFEIFFER safety manual for Type 20b Valve ▶ SH 20
 PFEIFFER safety manual for Type 31a Actuator ▶ SH 31a

Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components and do not fall within the scope of the Machinery Directive as specified in § 35 and § 46 of the Guide to Application of the Machinery Directive 2006/42/EC issued by the European Commission.

This declaration becomes invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the control valve or the intended use (▶ EB 20b, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 28 May 2021



Stefan Czayka
 Head of Quality Management/IMS Representative

DECLARATION OF CONFORMITY

TRANSLATION



The manufacturer	PFEIFFER Chemie-Armaturenbau GmbH, 47906 Kempen, Germany
declares for the listed products that:	Type 20b Ball Valve (Type 20b) <ul style="list-style-type: none"> • with free shaft end
<p>1. In the delivered state, the valve prepared for mounting on a rotary actuator (not a clearly defined actuator system) is considered to be partly completed machinery as defined in the Machinery Directive 2006/42/EC.</p> <p>Machinery is considered to be partly completed machinery when the machinery manufacturer has not determined all required specifications such as model type, thrusts, torques etc.</p> <p>The start-up of these units is only permitted after the valve has been installed from both sides in the pipeline and a risk of injury can be ruled out as a result.</p>	

Referenced standards:

- a) VCI, VDMA, VGB: "Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, Mai 2018" -- [German only]
- b) VCI, VDMA, VGB: "Zusatzdokument zum Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen vom Mai 2018" [German only], based on DIN EN ISO 12100:2011-03

Product description and technical features:

Tight-closing ball valve for aggressive media, particularly for strict requirements in chemical applications.

For product descriptions refer to:
 PFEIFFER Data Sheet for Type 20b Ball Valve ▶ TB 20b
 PFEIFFER Mounting and Operating Instructions for Type 20b Ball Valve ▶ EB 20b

Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components and do not fall within the scope of the Machinery Directive as specified in § 35 and § 46 of the Guide to Application of the Machinery Directive 2006/42/EC issued by the European Commission.

This declaration becomes invalid when modifications are made to the ball valves and/or assemblies that affect the technical data of the ball valve or the intended use (▶ EB 20b, section 1) and considerably change the valve or an assembly delivered with it.

Persons authorized to compile the technical file:

Kempen, 22 November 2021



 Stefan Czayka
 Head of Quality Management/IMS Representative

15 Annex

15.1 Tightening torques, lubricant and tools

15.1.1 Tightening torques

15.1.1.1 Body halves

When screwing the body sections together (1 and 2), observe the sequence of the screw connections and the tightening torques for the respective nominal sizes.

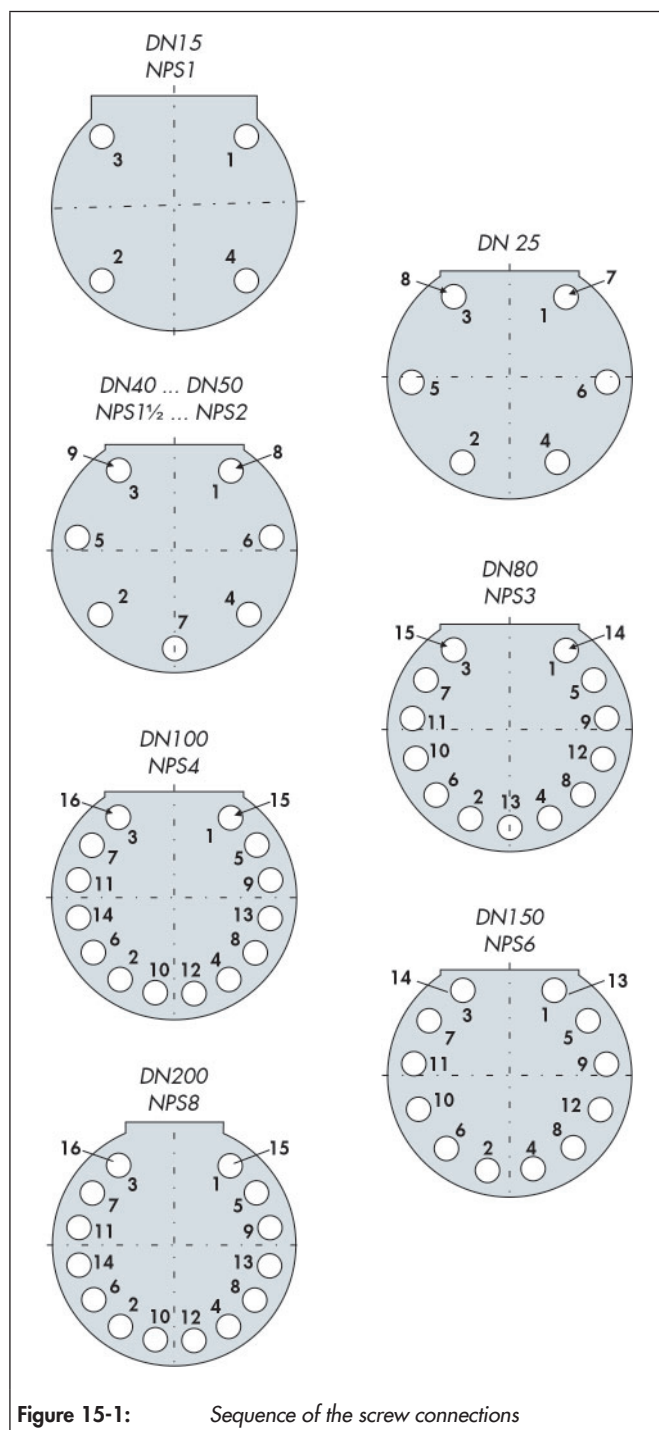


Table 15-1: Tightening torques for body connections

Nominal size	Connection	Tightening torque
DN 15	1 to 4	25 Nm
DN 25 / NPS1	1 to 6	25 Nm
	7 to 8	35 Nm
DN 40 / NPS1½	1 to 7	25 Nm
	8 and 9	35 Nm
DN 50 / NPS2	1 to 7	30 Nm
	8 and 9	40 Nm
DN 80 / NPS3	1 to 13	35 Nm
	14 and 15	40 Nm
DN 100 / NPS4	1 to 14	35 Nm
	15 and 16	45 Nm
DN 150 / NPS6	1 to 12	40 Nm
	13 and 14	45 Nm
DN 200 / NPS8	1 to 14	50 Nm
	15 and 16	60 Nm

i Info

When these instructions are followed correctly, the sealing when the medium flows through the switching shaft as well as proper function are ensured.

Influences such as pressure, temperature, as well as the use of other PFA material can lead to a change in these assembly instructions.

15.1.1.2 Flange connections

Table 15-2: Tightening torques for the DIN flange connections

DN [mm]	25	40	50	80	100	150	200
MA [Nm]	25	50	60	65	75	100	150

Table 15-3: Tightening torques for the ANSI flange connections

NPS [inch]	1	1½	2	3	4	6	8
MA [Nm]	15	30	40	65	50	80	120

15.1.2 Lubricant

Table 15-4: Recommended lubricant

Use	Temperature range	Lubricant
Screws and nuts	-10 ... +200°C	Microgleit, GP350 Not suitable for grease-free ball valves or for use with oxygen
Stem sealing and parts in contact with media	-10 ... +200°C	Water-free grease (e.g. halo-carbon TM)

15.1.3 Tools

Suitable tools are required to work on the ball valve. Unsuitable tools can damage the ball valve.

15.2 Spare parts

PFEIFFER recommends spare part sets for "Commissioning" and for "2-year operation", see Chapter:

- "15.2.1 Spare parts of the ball valve in the DIN version, DN 15" on page 15-3,
- "15.2.2 Spare parts of the ball valve in the DIN version, DN 25 ... 100" on page 15-4,
- "15.2.3 Spare parts of the ball valve in the DIN version, DN 150 ... 200" on page 15-5 and
- "15.2.4 Spare parts of the ball valve in the ANSI version, NPS½ ... 8" on page 15-6.

15.2.1 Spare parts of the ball valve in the DIN version, DN 15

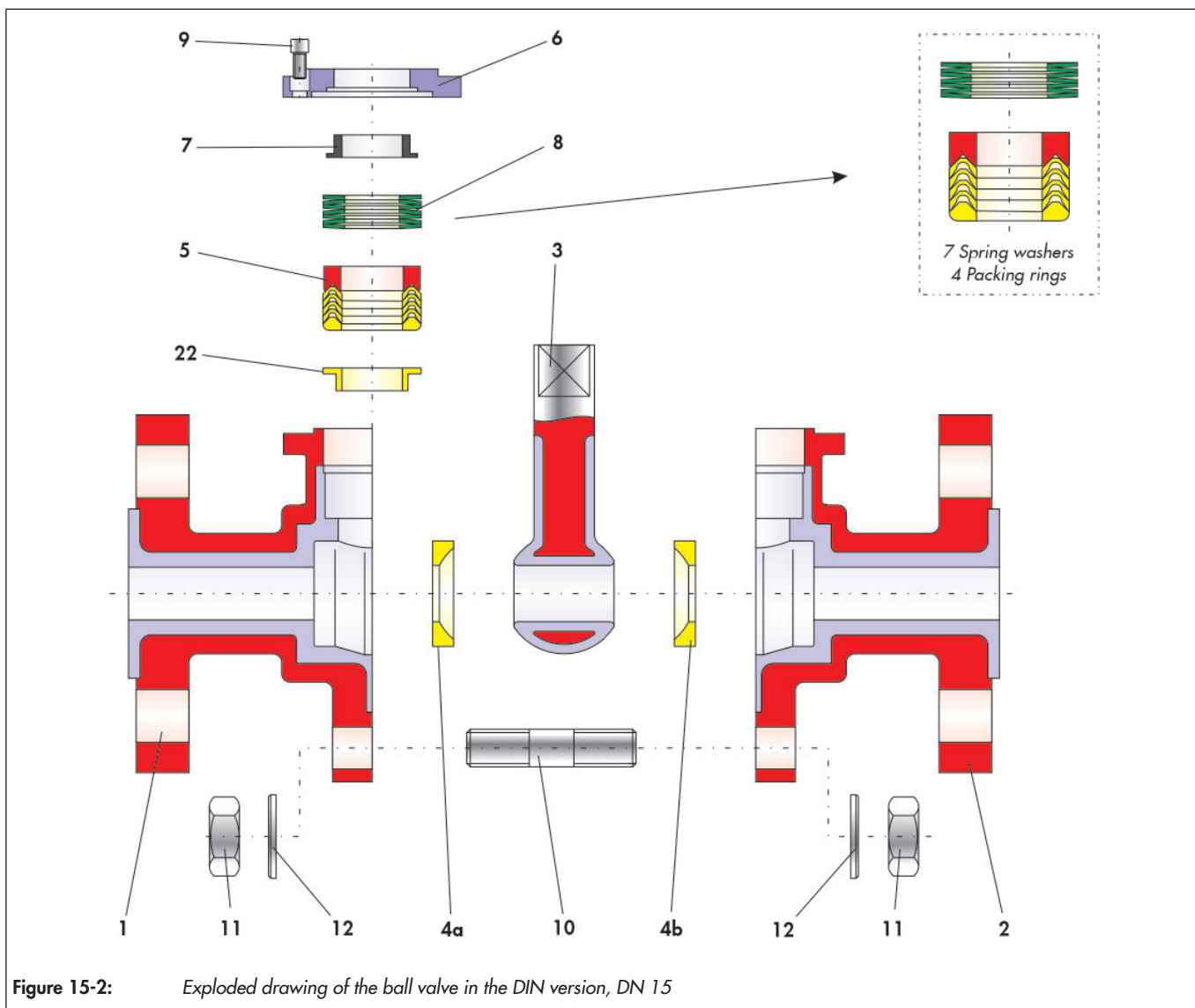


Table 15-5: Recommend spare parts for the ball valve in the DIN version, DN 15

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Body with lining	EN-JS 1049 / PTFE		
2	Body with lining	EN-JS 1049 / PTFE		
3	Ball with coating	1.4313 / PFA		•
4	Seat ring	PTFE	•	•
5	V-ring packing	PTFE / 1.4305	•	•
6	Stuffing box flange	1.4308		
7	Bearing bush	PTFE with carbon	•	•
8	Set of spring washers	1.8159 / DeltaTone	•	•
9	Screw	A4-70		
10	Screw / stud bolt	A4-70		
11	Nut	A4-70		
12	Washer	A4		
22	Bearing bush	TFM	•	•

15.2.2 Spare parts of the ball valve in the DIN version, DN 25 ... 100

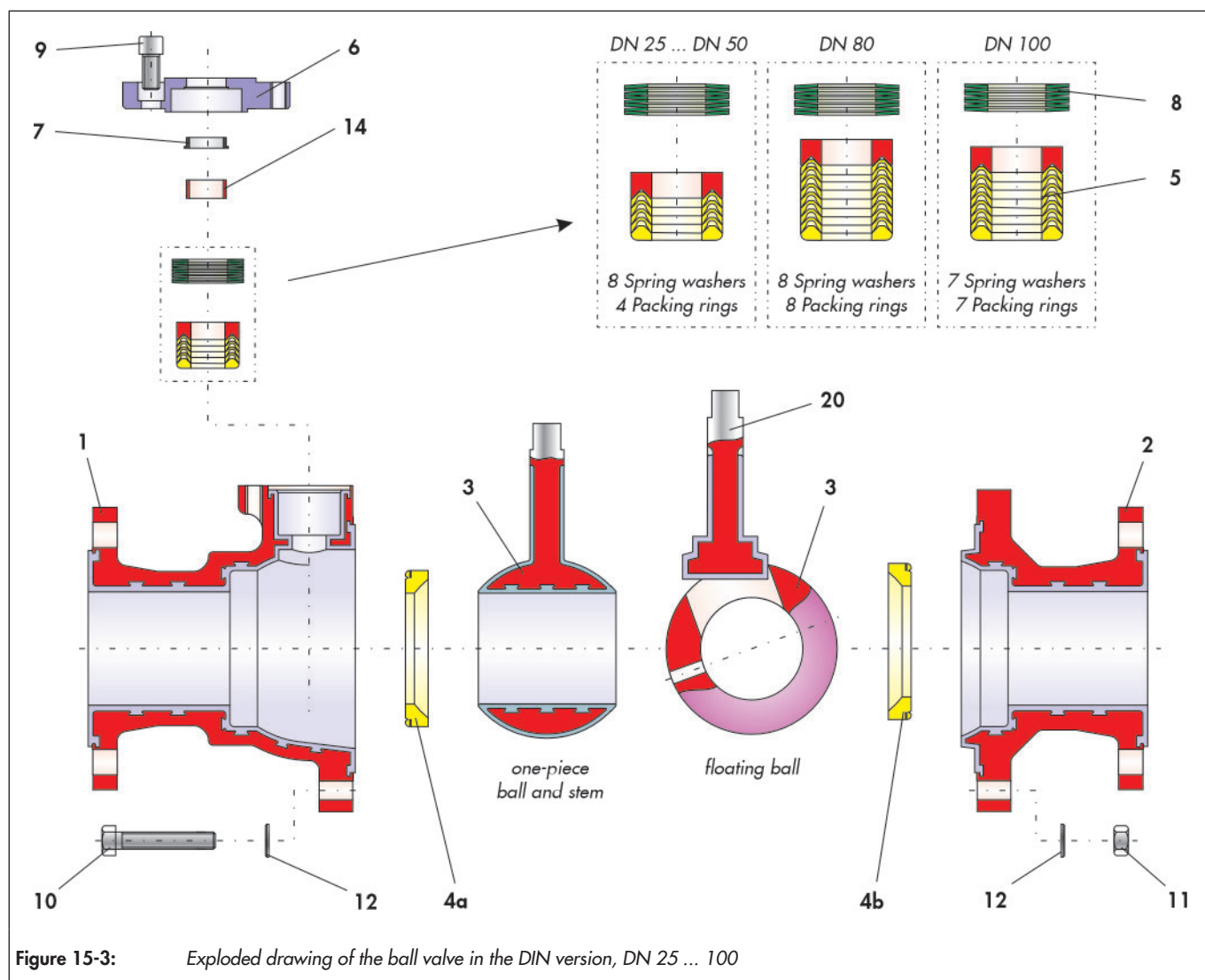


Table 15-6: Recommend spare parts for the ball valve in the DIN version, DN 25 ... 100

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Main body with lining	EN-JS 1049 / PFA		
2	Side body with lining	EN-JS 1049 / PFA		
3	Ball with coating	1.4313 / PFA		•
4	Seat ring	PTFE	•	•
5	V-ring packing	PTFE / 1.4305	•	•
6	Stuffing box flange	1.4308		
7	Bearing bush	PTFE with carbon	•	•
8	Set of spring washers	1.8159 / DeltaTone	•	•
9	Screw	A4-70		
10	Screw / stud bolt	A4-70		
11	Nut	A4-70		
12	Washer	A4		
14	Bush	1.4301		
20	Shaft	1.4313		•

15.2.3 Spare parts of the ball valve in the DIN version, DN 150 ... 200

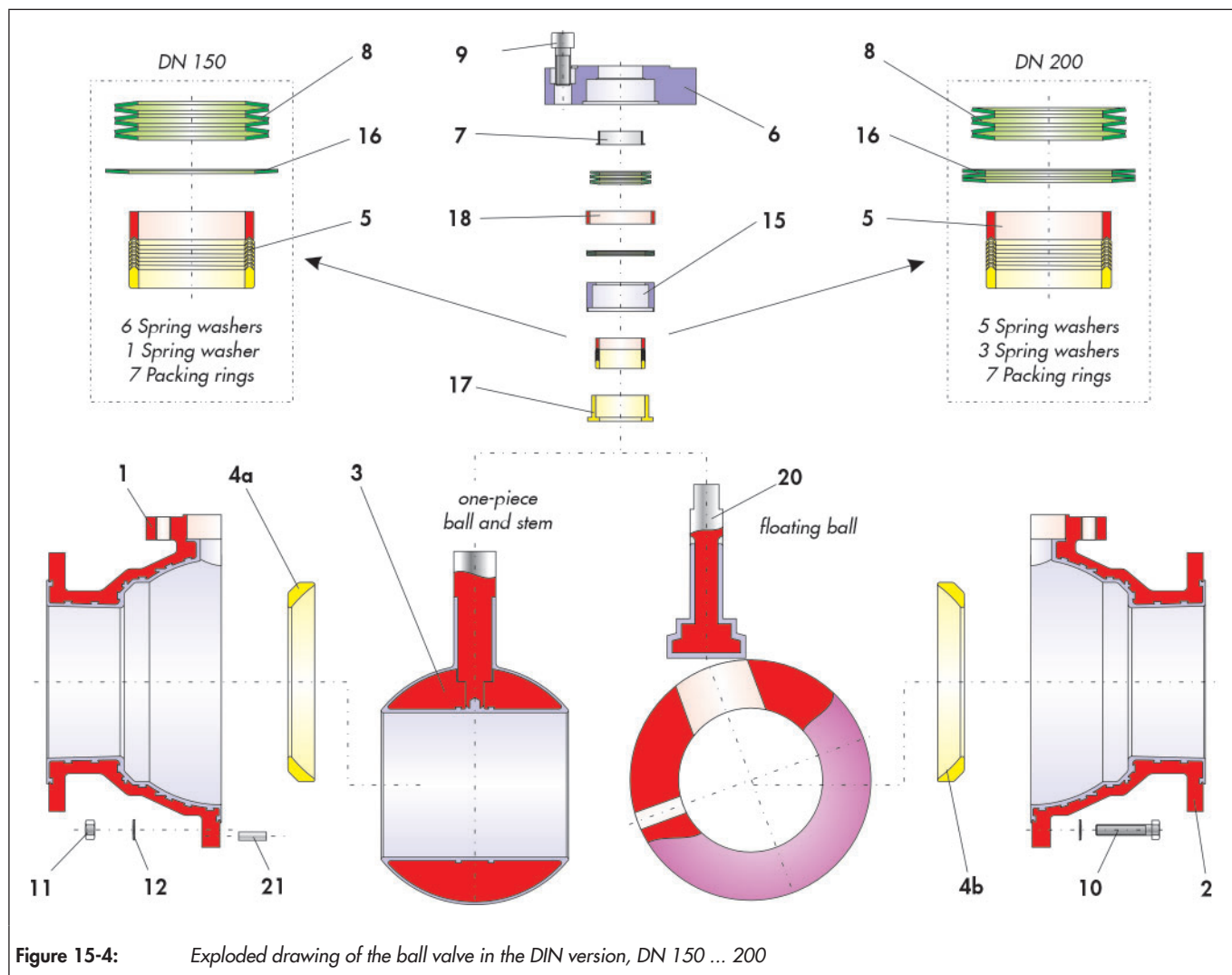


Table 15-7: Parts list of the ball valve in the DIN version, DN 150 ... 200

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Body with lining	EN-JS 1049 / PFA		
2	Body with lining	EN-JS 1049 / PFA		
3	Ball with coating	1.4313 / PFA		•
4	Seat ring	PTFE	•	•
5	V-ring packing	PTFE / 1.4305	•	•
6	Stuffing box flange	1.4305		
7	Bearing bush	PTFE with carbon	•	•
8	Set of spring washers	1.8159 / DeltaTone	•	•
9	Screw	A4-70		
10	Screw / stud bolt	A4-70		
11	Nut	A4-70		
12	Washer	A4		
15	Bush	1.4301	•	•
16	Spring washer	1.4310	•	•
17	Bush	PTFE	•	•
18	Center ring	1.4301		•
20	Shaft	1.4313 / PFA		•
21	Pin	1.4301		

15.2.4 Spare parts of the ball valve in the ANSI version, NPS½ ... 8

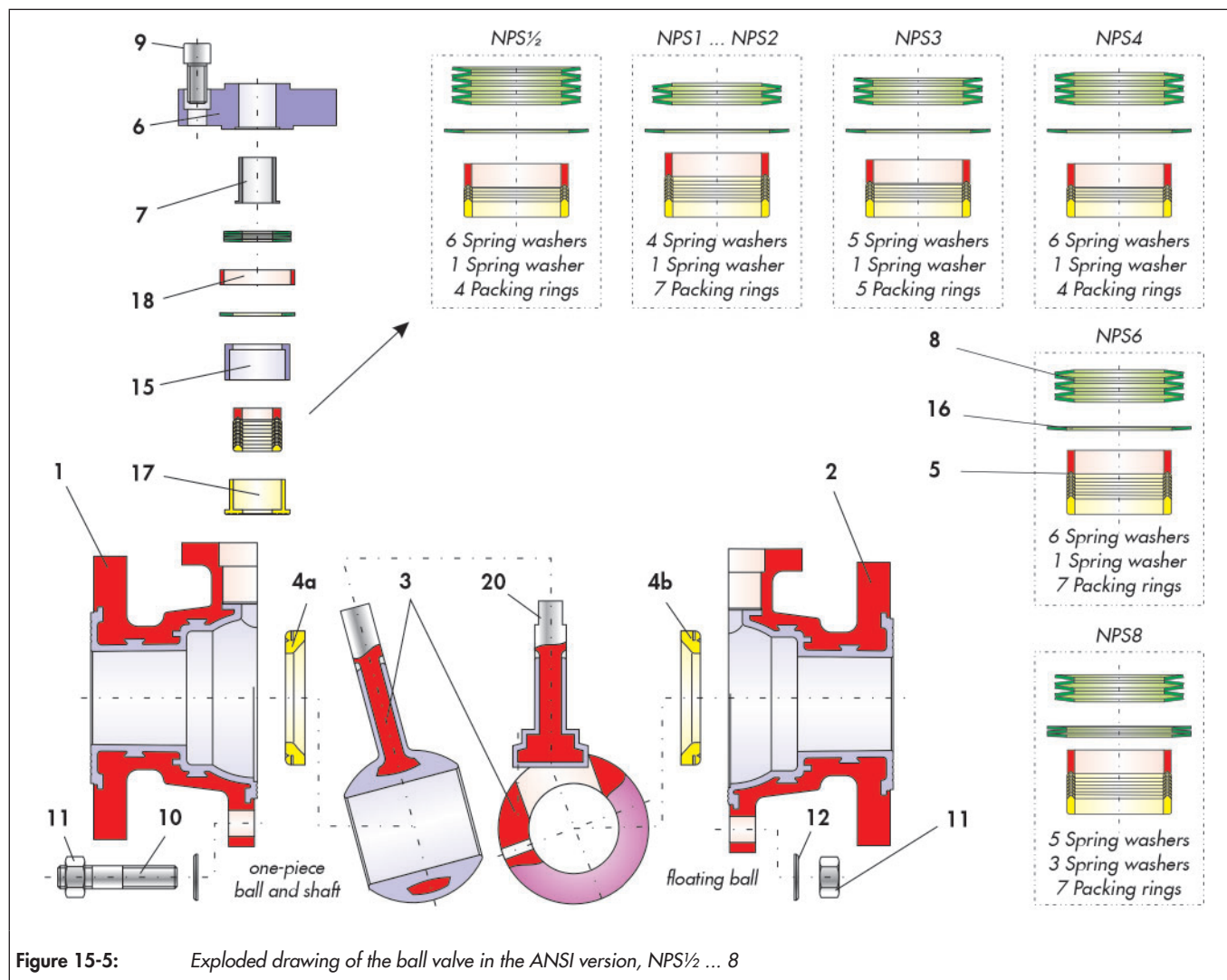


Table 15-8: Parts list of the ball valve in the ANSI version, NPS½ ... 8

Pos.	Designation	Material	In the spare parts set for commissioning	In the spare parts for 2 year operation
1	Body with lining	EN-JS 1049 / PFA		
2	Body with lining	EN-JS 1049 / PFA		
3	Ball with coating	1.4313 / PFA		•
4	Seat ring	PTFE	•	•
5	V-ring packing	PTFE / 1.4305	•	•
6	Stuffing box flange	1.4305		
7	Bearing bush	PTFE with carbon	•	•
8	Set of spring washers	1.8159 / DeltaTone	•	•
9	Screw	A4-70		
10	Screw / stud bolt	A4-70		
11	Nut	A4-70		
12	Washer	A4		
15	Bush	1.4301	•	•
16	Spring washer	1.4310	•	•
17	Bush	PTFE	•	•
18	Center ring	1.4301		•
20	Shaft	1.4313 / PFA		•
21	Pin	1.4301		

15.3 Service

For maintenance and repair work as well as malfunctions or defects, contact the After Sales Service at PFEIFFER for support.

E-mail

The After Sales Service can be reached at the e-mail address

▶ sales-pfeiffer-de@samsongroup.com.

Necessary data

Provide the following information in the case of questions and for troubleshooting:

- Manufacturer number
- Ball valve type
- Article number
- Nominal size and version of the ball valve
- Manual valve/automated valve
- Medium (designation and consistency)
- Medium pressure and temperature
- Flow rate in m³/h
- Actuator signal pressure
- Number of actuations (year, month, week or day)
- Installation drawing if available
- Completed declaration regarding contamination. This form is available at ▶ www.pfeiffer-armaturen.com.

Further information

The indicated <data sheets> and further information are available, also in English, at the following address:

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