

Installation and Maintenance Manual

V800 Series

Ball Valve

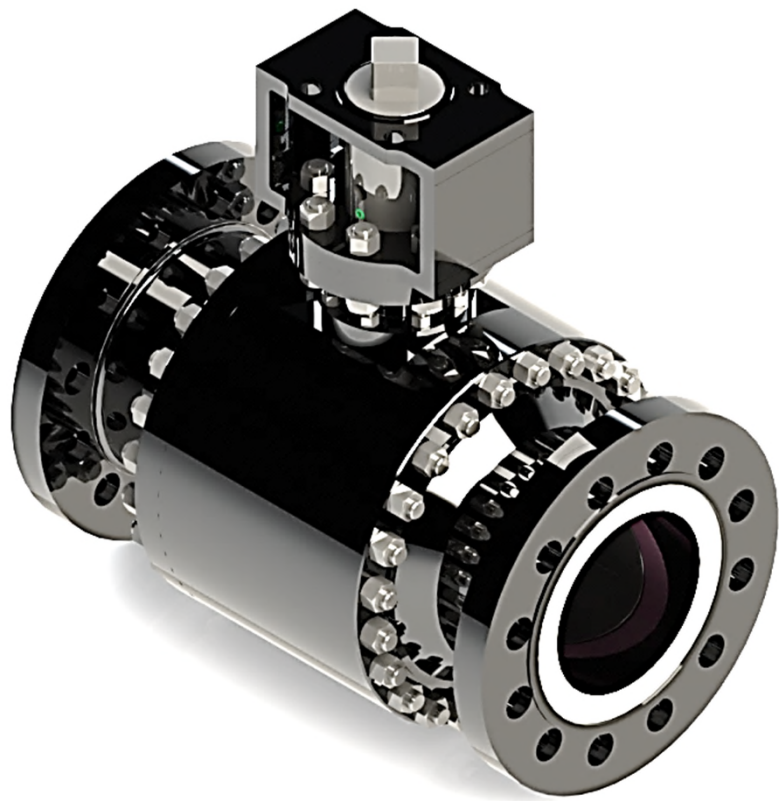


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Terms Concerning Safety

The safety terms Warning, Caution and Note are used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

Warning : indicates that death, serious personal injury and/or substantial property damage can occur if proper precaution are not taken.

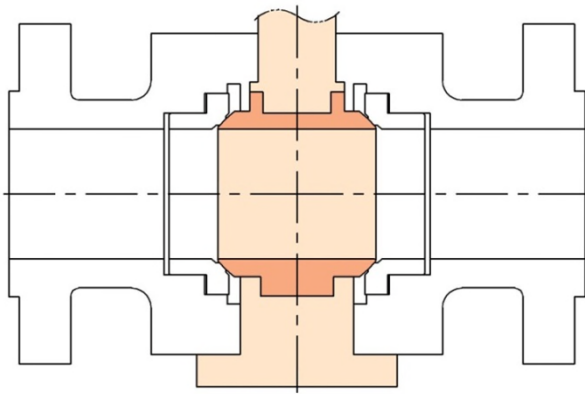
Caution : indicates that minor personal injury and/or property damage can occur if proper precaution are not taken.

Note : indicates and provides additional technical information which may not be obvious, even to qualified personnel.

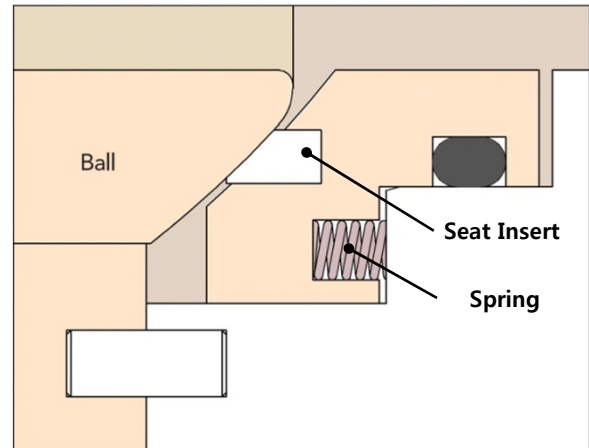
1. Introduction

1-1 General

- This manual provides ball valve installation, operation, maintenance instructions and parts information.
- The UNICON Trunnion Mounted Ball Valve is a general purpose valve used for long-range natural gas, oil, petrochemical, and other chemical industry pipeline system.
- UNICON manufactures the complete quality of ball valves, and can provide the exact ball valves and actuators to meet the customer demanding application.
- Our Trunnion Ball Valves are available in an extensive range of designs, materials, sizes and pressure classes and are in full conformance with ANSI, API and NACE specifications.
- Overdesigned wall thickness and adaptation of high strength bolts are convenient for valve maintenance and sufficient to bear the stress of pipe.
- The internal parts of valve are carefully designed and selected to ensure reliability under all kinds of service condition. Since a variety of materials are available, UNICON valves can be used with various fluids and gases.



Trunnion-Mounted Ball



Seat Ring

1-2 Personnel qualification

Transport, installation, commissioning, maintenance or repair must only be performed by trained or instructed personnel.

⚠ Warning

In order to ensure successful and safe operation of our valves the entire operation manual must have been read through and understood prior to installation and commissioning. Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death. If you have any questions about problems arise, contact UNICON office.

1-3 Principle of Operation

The main function of the Trunnion Mounted Ball Valve is to cut off or connect the flow of fluid in a pipeline system.

Via the manual hand wheel or other driving device, application of torque force allows the ball to rotate 90 degrees, enough to align the ball bore to the centerline passage of the ball valve body, thus allowing fluid to pass through it.

2. Pre-Inspection

Before installation of valve to the 'Pipe Line', it is recommended to inspect a valve closely as below.

2-1. Inspecting Valve & Accessory

- Ensure any damage that might be occurred during the transportation.
- Remove the protection cover of valve just before installation and clean a dust or harmful particles with an air blaster or smooth dust cloth / clean towel.
- Check the tightness of all kinds of bolts and nuts.

2-2. Inspecting Pipeline

- Remove foreign materials such as a rust, welding chip, etc, which remain in the pipe or flange.
- Make sure the clearness of pipe flange and gasket surface.

Caution :

When the fluid is flowing through the line, any foreign material is subject to scratch the seat and inner body, so that the scratch may cause leakage and shortening of the valve lifetime.

To avoid product damage, inspect the valve before installation for any damage or any foreign material that may have collected in the valve body.

Also remove any pipe scale, welding slag, or other foreign material from the pipeline.

3. Installation

It is recommended to install valves on horizontal piping in a upright position.

3-1 Check the following items before valve mounting

1. Service conditions should be within the valve specifications.
2. Valve flanges should correspond with piping flanges.
3. Gasket contact surfaces of pipes and valve flanges must be thoroughly inspected to make sure no scratch or any other indication of flaw is found.
4. The appropriate length should be kept between pipe flanges for the valve face-to-face dimensions including gasket thickness.
5. The valve and pipe center should be aligned accurately.
6. Bolt holes of flanges should be arranged symmetrically lined up against the center line of flanges.

⚠ Caution

Before installation, the connecting pipes should be cleaned to remove any foreign object such as sand dust and welding spatters from the connecting pipe interior.

⚠ Caution

Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

7. Remove flange covers from valves just before installation.
8. Check all stud bolts / nuts after installation and retighten them, if needed.

⚠ Caution

Piping should be flushed before test operation, with valves open to assure removal of any foreign object that could damage valves. DO not operate valve during flushing.

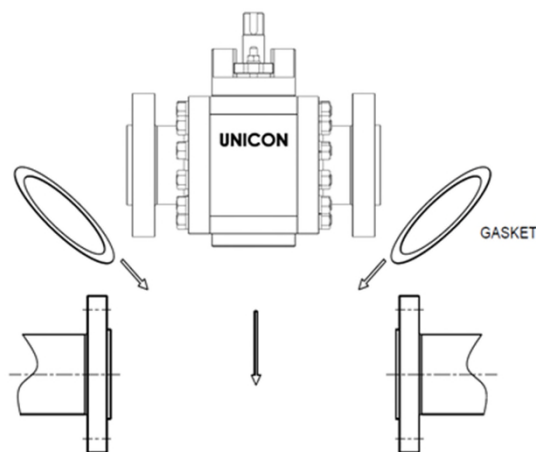


Figure 1. Installation

3-2 Installation Procedure

1. Make sure that pipes should be aligned accurately.
2. The length between piping flanges should correspond with the valve face-to-face including gasket thickness.
3. Place the valve between pipe flanges.
Install two stud bolts at the bottom of the flanges lightly.
4. Insert gaskets between valve and pipe flanges.
5. Make sure the correct alignment of gaskets which are placed on bottom flange bolts between valve and pipe flanges.

6. Stud bolts through the other bolt holes and tighten them lightly.
7. Tighten bolts evenly, gradually and alternately in a star pattern as shown below. (See. Fig. 2)
The ends of all tightened bolts should protrude equally beyond the nuts.
8. Raise the line temperature and pressure gradually on test operation Retighten the stud bolts / nuts, if needed.

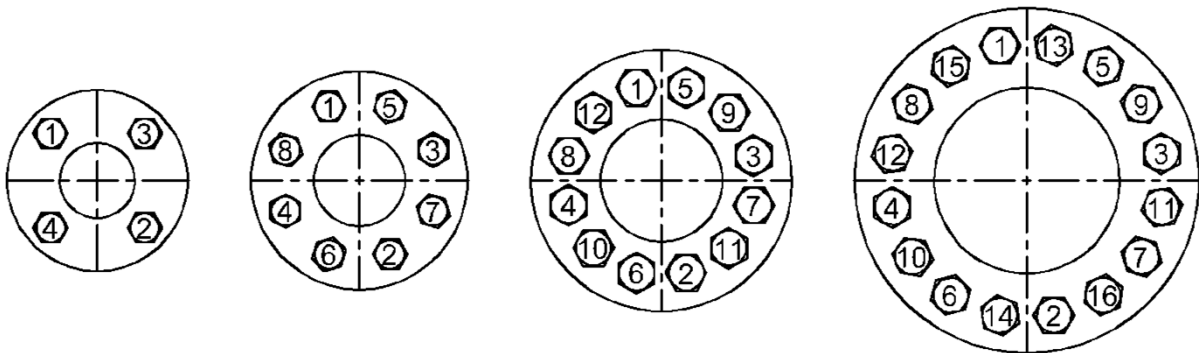


Figure 2. Flange Bolt Tightening Sequence

⚠ Warning

Personal injury or system damage may result if the ball valve is installed where service conditions could exceed the limits given in the Specifications. Additionally, physical damage to the ball valve may result in personal injury or property damage due to escaping of accumulated fluid. To avoid such injury and damage, install the ball valve in a safe location.

4. Operation

The valve is only intended to block or allow flow through the pipeline. The valve should only be used in either fully open or fully closed position. Do not use this valve to regulate flow by partially opening or partially closing the valve.

The valve should not stay in a semi-open or semi-closed state for more than two minutes. Do not use the ball valve in process conditions where the pressure, temperature, media and other technical conditions exceeds the limitations set by the valve's specification.

⚠ Warning

To avoid possible personal injury, equipment damage, or leakage due to fluid, make certain the ball valve is installed as instructed in the Installation.

 Caution

If the ball valve is equipped with test connection port, make sure that it is fully closed before pressurizing the valve.

1. Check that proper installation is completed and any downstream equipment has been properly adjusted.
2. Ensure that the pipeline system is free of foreign material before the startup.
3. Make sure that the ball valve is fully turned to the open position before allowing fluid to pass through the valve.

 Caution

1. *Wear the protective items such as goggles, gloves and working shoes.*
2. *Take safety measures against the toxic, flammable or corrosive fluid.*
3. *Reduce the line pressure to the atmospheric level before retightening packing gland and flange bolts and nuts.*
4. *Operators should take protective measures to prevent direct exposure to the fluid when the fluid spouts out from flange areas.*
5. *Reduce the line pressure to the atmospheric level, when the packing and gaskets are replaced or bolts and nuts are loosened. Operator should take protective measures to prevent direct exposure to the fluid when the fluid spouts out from valves.*
6. *Do not apply the lubricant to the pipes and valves which handle oxygen.*

5. Maintenance

In the maintenance process, take appropriate protective measures, such as wearing protective clothing, oxygen masks, and gloves. Discharge the residual materials inside the valve body before doing repair or maintenance. For electric, hydraulic or pneumatic valves, ensure that these lines are shut off before performing maintenance.

 Warning

Personal injury, equipment damage, or leakage due to escaping fluid may result if seals are not properly lubricated or maintained. Due to normal part wear or damage that may occur from external sources, ball valve should be inspected and maintained periodically. The frequency of inspection, maintenance, and replacement of parts depend upon the severity of service conditions or the requirements of local, state, and federal regulations. Ball valves that have been disassembled for repair must be tested for proper operation before returning it to service.

- Check the tightness of all nuts/bolts.
- Regularly check if the ball valve is set at the desired position whether fully open or fully closed. If the ball valve cannot be switched to either fully open or fully closed position, valve service is required.
- Ensure the electrical continuity of the valve. (if needed)
- Ensure that no leakage is being observed from the valve.
- Frequent observation is recommended under extreme service condition.
- It is advisable to maintain a record of the performance of the valve.
- Mounting studs/nuts of the worm gearbox may be checked for tightness and retightened if necessary.
- Do not use the valve as a ladder or pedestal when reaching equipment located above the valve. Do not hang additional weight to other related accessory of the valve.

Trouble Shooting

Trouble	Possible Causes	Remedial Measure
Disturbed valve operation	Foreign objects may have choked up the valve body cavity and stuck around the ball seat.	Disassemble and inspect the valve components.
Excessive valve torque	Foreign objects may have stuck to the stem.	Remove the foreign object and check the valve
	Foreign objects may have choked up the valve body cavity and stuck around the ball seat.	Flush the valve bore with the fluid with the valve slightly open to remove the built-up objects or disassemble and inspect the valve
	The gland bolts may have been overly tightened.	Once loosen the gland bolts and adequately retighten them to an extent that the leakage does not occur.
Leakage from the packing box area	Loose gland bolts.	Retighten the gland bolts.
	Uneven tightening of the gland bolts.	Once loose the bolts and evenly retighten them.
	Damage on the packing part.	Replace the packing part.
Internal through-bone leakage	Damage on the ball seats.	Disassemble and inspect the valve Replace ball seats.
Abnormal noise or vibration	Loose bolts and nuts.	Retighten the bolts and nuts.

Frequency of maintenance

"Maintenance" means totally manage performance and function of valves and prevent from various damages. Frequency of maintenance depends on the below conditions.

1. Shape of valve
2. Service temperature, class and materials used
3. External effects
4. Frequency of operate
5. Purpose of use
6. Maintenance methods

Maintenance methods of valve

Part	Purpose	Method	Action
Body	To Prevent for external leakage, seat leakage and wrong operation.	Check the surface of seat and gasket for damages with the naked eyes.	Overhaul
	REMARK : Repair by Lapping when the damage is small. If the damage of surface of seating and erosion are big, reprocess or replace it.		
Seat & Ball	To Prevent for seat leakage and operation error.	Check the surface of seat for damages with the naked eyes.	Overhaul
	REMARK : Repair by Lapping when the damage is small. If the damage of surface of seating and erosion are big, reprocess or replace it.		
Stem	To Prevent for external leakage and operation error.	1. Check scratches and seizing. 2. Check the Gland packing-contact of stem for damage.	Overhaul
	REMARK : If packing-contact of stem have damage or flexure or twisting, replace it.		
Bonnet Bolting	To Prevent for loosening and separation of bolting and external leakage.	Check the valve torque and tighten up bonnet bolting again if needed.	
Packing	1. To Prevent for operation error. 2. To Prevent for external leakage by damage of stem.	1. Check dry condition and cleanliness for threaded part of stem. 2. If packing have damage, replace it.	
Gasket	To Prevent for external leakage..	Check loosening of bonnet bolting and tighten up it again if needed.	
REMARK : When valves are supplied to the client, it is optimal conditions that is satisfied with design requirements after inspection and test. But tightening of bolts can be affected by installation or test-run conditions. For the long operation, client definitely needs inspection as above to operate without leakage.			

6. Disassembly / Reassembly

Warning

To avoid personal injury resulting from sudden release of pressure, isolate the ball valve from all pressure and cautiously release trapped pressure inside the valve chamber before attempting disassembly.

Ensure that the middle chamber of the valve is fully depressurized before dismantling or maintaining the valve. Pressure inside the pipe may be released, but the middle chamber may still have residual pressure. Open and close the valve several times to ensure that the pressure in the valve is completely released. If the media conveyed by the valve is toxic, inflammable, or explosive, make sure that there are no residual media left in the valve especially in the middle chamber. Flush the valve with water or the appropriate cleaning solvent to ensure the complete removal of the residual media. Open and close the valve several times while flushing the valve.

Observe proper protective measures when dismantling the valve. If the media conveyed by the valve is toxic, inflammable, or explosive, always wear personal protective equipment to avoid any injury or accident. Keep the working site away from fire, sparks, or ignition especially if the media is combustible.

To disassemble the valve, start disassembling with the last part as outlined in the assembly section. Place the dismantled parts on a soft mat. Do not allow it to have direct contact with the ground.

Mark the dismantled parts correctly to avoid confusion during the assembly. Do not drop or apply excessive force to the valve and its related parts to avoid damage or deformation of the components. If it will not be used for a long time, store the dismantled parts in a safe and dry area in order to protect it and prevent the formation of rust.

6-1. Separation of Valve from the Pipe Line

To repair leaking valve, the valve must be removed from pipe line and then parts must be separated as below

- Before removing the valve from the line, make sure that the line has been fully depressurized.
- Drain all mediums from the pipe.
- Remove the parts and remove the valve from the pipe.
- Once the valve is removed, appropriate isolation of the pipe ends should be undertaken by the operator/contractor to prevent the creation of a combustible mixture where possible, and to prevent the introduction of dirt and debris into the system.
- Mark the location of each part of valve and pipe in order to be installed at same places where they were.

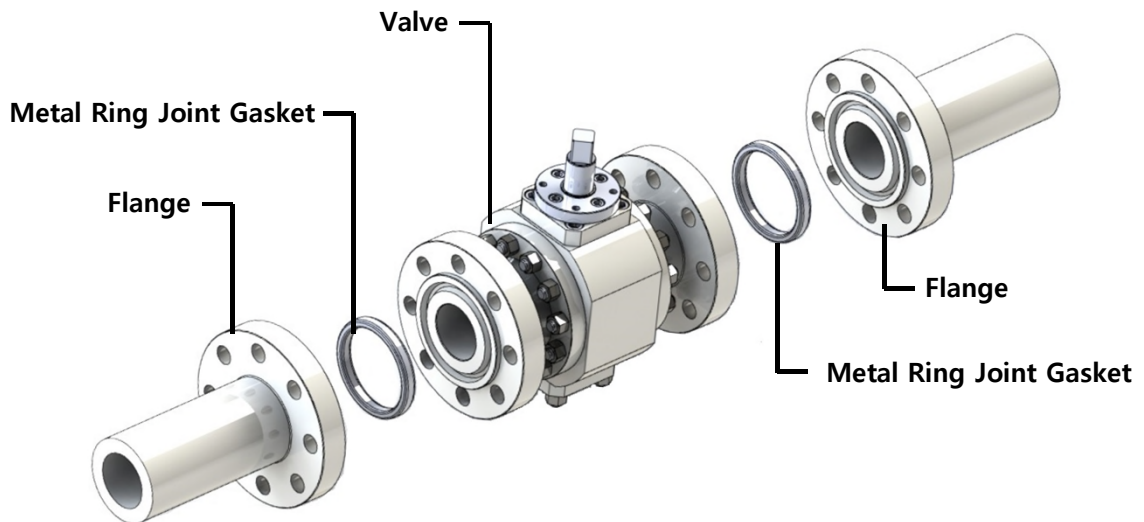


Figure 3. Separation of Valve (RTJ Flange Type)

6-2. Disassembly (See. Fig. 4)

- Unfasten the yoke bolt and then remove operator from body.
- Refer to the appropriate operator instruction manual for actuator removal and replacement procedures.
- Valve shall be positioned vertically by resting body side flanges on clean ground surface (preferably covered with rubber sheet). Ensuring no damage to the bottom / end face / threads as applicable.
- Rotate the ball to fully open position.
- Open the side flange joint by loosening the nuts in sequence.(See. Fig. 2)
Always tighten / loosen the bolts in flange bolt sequence.
- Remove side flange, side flange gasket from body.
- Remove O-ring or graphite(fire safety), spring, spring back-up ring from body.
- Remove packing, packing box and packing flange by loosening bolt.
- Remove bottom flange by loosening bolt.
- Remove stem, ball, guide bush from body & side flange.
- All the components should be stored in a clean place.

6-3. Reassembly (See. Fig. 4)

- Body shall be positioned vertically by resting body side flanges on clean ground surface. (preferably covered with rubber sheet).
- Apply suitable anti-seize grease to bolts.

 Warning

Failure to properly follow the Assembly Instructions could result in ball valve damage, personal injury, and property.

- Before reassembly, inspect the valve for any damage on side flange & all internals.
- Ensure the cleanness of valve.
- Damaged internals to be replaced by genuine & with recommended parts only.

- New set of O-rings and gaskets shall be used once the valve is dismantled.
- Assembly works in reverse order of disassembly.

 Warning

Failure to properly follow the Assembly Instructions could result in ball valve damage, personal injury, and property damage due to escaping process fluid during testing or after installing the ball valves in the pipe line.

Before the performing the assembly work, clean all components of the ball valve and the working area.

Ensure that there are no iron filings, rust, welding slag, and other debris inside the valve. keep all valve parts and the working area clean all throughout the assembly process.

The working area must be padded with any soft material or mat. Do not allow the valve body, its components, or any of its assembled parts to have direct contact with the ground.

Be careful with the lifting and moving of the ball valve's components.

Excessive force applied to the assembly may damage or deform the valve, its related parts, and its components which may cause the ball valve to malfunction.

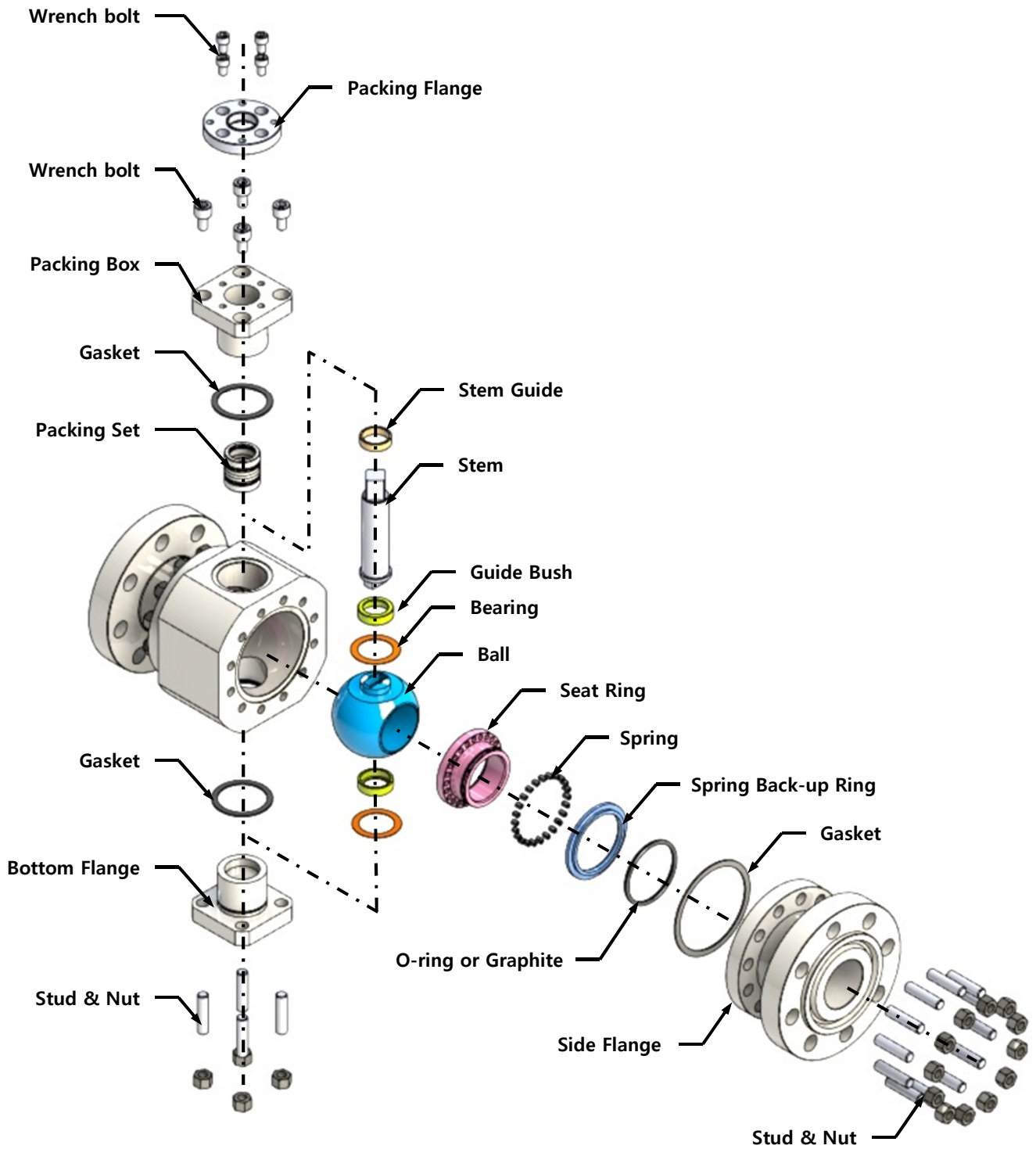


Figure 4. Ball Valve Assembly Drawing

7. Storage

During storage, protect the valves from external effects and dirt. Avoid the formation of condensate through ventilation, desiccant or heating. Protect the connection openings to prevent entry of dirt or foreign matter. The storage room should be dry, dust-free and moderately ventilated. Storage temperature frost-free up to +25°C.

8. Packing

Warning

Valves that have come in contact with health-threatening media at the customer must be decontaminated prior to packaging.

Pack the valves so that any coatings or accessories such as plug-in devices, controllers and sensors cannot be damaged through subsequent transport.

Protect connection openings to prevent the entry of dirt. Use the packing material in accordance with the applicable regulations and observe country specific regulations.

9. Transport

Valves that can be no longer be moved by hand must be transported with lifting equipment suitable for the weight to be moved.

Transport the valves by using Eyebolts if available. Do not hook up lifting equipment to accessories such as hand wheels, control lines, pressure gages or flange bores. When using suspension belts, these must be placed around the valve body, providing edge protection and ensuring even weight distribution.