vahn-tech
international

Ball Valves Installation, Operation & Maintenance Manual

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1. SCOPE

1.1. The aim of this manual is to familiarize the users with standard VAHN-TECH Trunnion Mounted Ball Valves and to aid in correct handling, installation , operation, maintenance and troubleshooting of the valves.

VAHN-TECH INTERNATIONAL RECOMMENDS TO

- Read the manual carefully before opening the shipment and installation of the valve.
- Refer respective general assembly drawings for ascertaining the design, as valves may vary in features and design as required by the customer.
- Study check lists, cautions and illustrations carefully.

2. INTRODUCTION

2.1. VAHN-TECH International Trunnion Mounted Ball valves come with side entry type, two-piece, bolted & welded type body constructions and with flanged (Raised face/Ring type joint) and butt weld ends. In addition, VAHN-TECH International supplies Trunnion Mounted Ball Valves with three piece bolted body / welded body type constructions also.

2.2. Salient features of VAHN-TECH Trunnion Mounted Ball Valve:

- Double Block and Bleed

This is a standard feature in VAHN-TECH International Trunnion Mounted Ball Valves (TMBV), which enables checking the leak tightness of the valve seats in the open and closed positions, after installation.

- Cavity Pressure Relief

VAHN-TECH International TMBV has seats designed to relieve any excessive pressure that builds up in the valve body cavity automatically into the flow path.

- Anti-blowout Stem

VAHN-TECH International TMBV are designed with anti-blow out stem arrangement in which the stem is inserted from inside the body.

- Sealant Injection

Sealant injection system is provided for seat and stem regions for emergency shut off / leak arrest on valves of sizes 8” and above for full bore valves and 10” and above in case of reduced bore valves.

- Optional Features

VAHN-TECH International also provides TMBV with double piston design, which allows the down-stream seat to seal with pressure acting from the upstream side of the valve. It aids in better sealing even during leakage through upstream seat.

VAHN-TECH International TMBV can also be provided with extended stem/ drives for buried service valves.

3. TECHNICAL ASSISTANCE

3.1. Should you have any queries, feel free to contact VAHN-TECH International sales representatives.

3.2. While contacting our representatives, please furnish the following details for better assistance:

- Valve size and Class rating / Name plate details
- Valve serial number

4. DELIVERY

4.1. VAHN-TECH International TMBV are shipped with the balls in fully open position for the protection of the ball and seat ring surfaces (except for valves fitted with suitable actuation for fail close applications , in which case, valves are shipped in fully closed condition).

4.2. Please check the packing slip attached to the packing container.

4.3. The valve identification details can be found on the name plate and on the body of the valve as cast lettering or on the flange.

4.4. The valves are supplied with end protectors covering the ports to avoid damage to internals due to presence of any foreign particles before installation.

4.5. Hand wheels for gear operated valves are usually dismantled and packed separately. The key is kept in its slot and held in position using an adhesive tape.

CHECK

- Tag numbers and details of valves at delivery
- Valves thoroughly for any damages during transit.
- Condition of end protectors.
- Extension lines and column, if any.

In case of any discrepancies in the above mentioned details or in case of any kind of damage to the valve on delivery, please contact VAHN-TECH International for assistance.

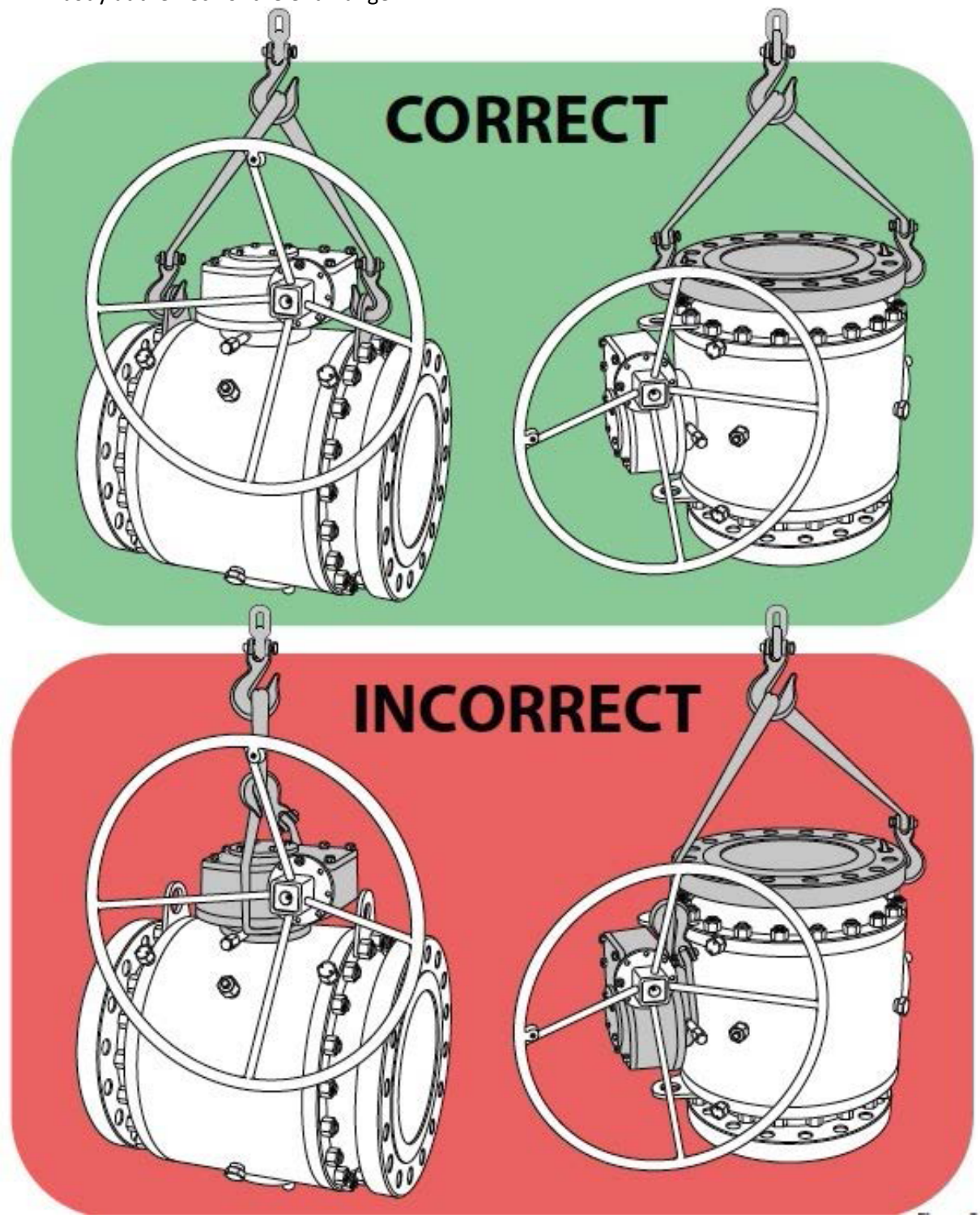
5. VALVE HANDLING & STORAGE

5.1. Handling

5.1.1. Valve shall be properly supported and secured before moving, to prevent possible damage to valve, property or harm to personnel.

5.1.2. Do not drag the valve on the ground while transporting. A minimum of one foot height from the ground is to be maintained while moving the valve.

5.1.3. Valves shall not be slung around the valve port for transportation. Lifting lugs are provided for the purpose on valves of size 8" and above. If need arises, the valve may be slung around the valve body at the neck of the end flange.



5.1.4. The crane wire should not be slung around the actuator / gear unit to avoid any load acting on it. Also, ensure that while handling the valve, no external load acts on the actuator/gear unit.

5.1.5. Valves shall not be handled with the hand wheel keyed / fixed to the gear unit. The hand wheel shall be dismantled before handling and transporting the valve.

5.1.6. Extreme care shall be taken to check that the sealant fittings, body vent fittings, stem, gear units etc. are not bent, pinched or damaged during handling.

5.2. Storage

5.2.1. Clean the valves and ensure that end protectors are in place before the valves are stored, as dry contaminants like dust, sand, grit etc. can scratch the metal seating surfaces and the soft inserts, leading to leakages on full pressure operation.

5.2.2. Valves shall be stored in a covered area which is dust free, low humid and well ventilated.

5.2.3. The valve shall always be maintained in an ambience with temperature higher than the dew point temperature at the storage location, so as to avoid collection of water droplets on the valve surface.

5.2.4. Do not keep the valve directly on the floor. Valve shall be placed on a wooden pallet such that it is at least at a height of 6 inches from the floor.

5.2.5. Care should be exercised not to damage the extended portions of the stem housing, gear unit / actuator while storage.

5.2.6. Do not apply tar, grease or any other material inside the valve, as it could impair the performance of the valve.

⚠ CAUTION

Improper storage and/or handling may cause ball/seat damage or deformation of stem or seat, which will affect sealing and operational torque of the valve.

🚫 DO NOT

- Store the valve outdoors.
- Store valve without end protectors.
- Place or drag the valve on the ground/concrete floor.
- Place valve in positions that may damage the valve or its accessories.
- Sling the valve with direct contact with actuator/gear unit during handling.
- Operate the valve without cleaning it properly.

6. VALVE INSTALLATION

6.1. General

6.1.1. Carefully unpack the valve and check for tags or identification plates, etc.

6.1.2. If the name plate and/ or tag is lost or destroyed during shipment or while in storage or if it is not legible, contact your distributor or the factory for assistance before installing the valve.

6.1.3. Look for any special warning tags or plates attached to or accompanying the valve and if any, take appropriate action.

6.1.4. VAHN-TECH International TMBV are bi-directional valves and can be installed for flow in either directions.

6.1.5. Valves can be mounted in a horizontal (with stem upwards only) or vertical position depending on Pipeline routing, VAHN-TECH does not recommend installing the valve with the actuator on the underneath side because dirt in the pipline may enter the body cavity and damage the gland packing.

Fig. 3. VAHN-TECH International Ball Valve installing on pipeline

6.1.6. It is recommended to remove all foreign particles from the pipe line by flushing it with a suitable fluid. Corrosion inhibitors shall be added to the flushing medium to prevent any corrosion due to trapped fluids.

> ⚠ CAUTION
>
> If valve is not cleaned or if cleaning is done only after valve installation, valve cavities may form a natural trap in the piping system and any impurity not dissolved or washed out by the flushing fluid / line fluid may settle in such cavities and adversely affect valve performance.

6.1.7. Remove the end protectors and protective sheath within the flow boree of the valve, wherever provided.

6.1.8. After removal of end protectors, thoroughly clean valve ports / cavities and ensure the flange gasket faces are free from dust or debris. For cavity flushing procedure, refer section 8.2

6.1.9. Gasket contact faces of the valve and pipe flanges shall be inspected thoroughly for scratches/ defects. Scratches, if any, shall be corrected by grinding the surface or by rubbing with emery sheet.

6.1.10. After cleaning, operate the valve for at least two complete cycles before installing.

6.1.11. The valve shall be in the open position during installation process, except in case of fail close valves, in which case additional care shall be taken not to damage the ball surface by any debris.

6.1.12. The pipes must be properly aligned and provisions made to minimize stresses from thermal expansion. Always review pipe manufacturer's recommendations.

6.1.13. In cases of pipes with long overhangs, adequate support/jacks shall be provided at the flange ends of the pipe so as to avoid bending of pipes due to weight of the valve.

6.1.14. Refer Appendix – B for special considerations to be taken during installation of valves with extended stem.

6.2. Flanged ends

6.2.1. Refer section A1 for applicable standards.

6.2.2. Align the bolt holes of the valve end flange and pipe flange.

6.2.3. Insert gasket (not supplied with the valve) and tighten the bolts. Flange bolts shall be tightened evenly, using a torque wrench, in cross rotation to prevent damage to flanges.

6.2.4. Bolts should be lubricated for ease of installation.

6.2.5. For sequence of tightening of bolts, refer section A2.

⚠ CAUTION

The improper alignment of the pipe and the valve during installation can lead to unbalanced tightening of the flanges which may cause excessive stress on the bolts and lead to leakage.

6.2.6. For larger flanged valves, which are provided with foot support, supporting base / pedestal shall be placed beneath the valve after the alignment and bolting of the pipe and the valve flanges. The foot support need not be bolted to the floor.

6.3. Welded ends

6.3.1. Refer section A1 for applicable standards.

6.3.2. Pipe ends must be machined to make them smooth, clean and free from burrs.

6.3.3. Keep the valve in open position before installation. If the valve must remain in the closed position extra care should be exercised to avoid weld spatter falling on the ball surface.

6.3.4. Alignment of the valve with the pipe must be as accurate as possible so as to get most favorable condition for weld deposition.

6.3.5. All welding should be in accordance with any code or jurisdictional regulations applicable to the construction of the piping system.

⚠ CAUTION

Temperature in excess of 100°C in the seat ring area will result in seat damage. Temperature indicating crayons or laser temperature indicators shall be used to monitor and control the temperature in this area during welding.

⊘ DO NOT

Do not stress-relieve welds as the temperature in the S O-ring seal region can exceed 100°C, leading to failure of seals. If stress relieving is required as per the piping code, the valve shall be purchased with transition / pup pieces.

6.4. Cleaning and Testing

6.4.1. Clean the pipeline by flushing the system with a compatible liquid, to remove any dry contaminants, sand, dirt etc. that may be present so as to avoid any minor leakages due to scratches formed on the sealing surfaces by these contaminants

6.4.2. While testing the pipeline ensure that the media is clean and free from sand, dirt, pebbles etc. Add corrosion inhibitors to the testing media to avoid any internal corrosion of the valve.

6.4.3. Operate the valve once to check for smooth operation.

6.4.4. If no obvious problems are observed, the test pressure may be applied and leak tightness and operability may be checked.

CAUTION

- Faulty installation may lead to valve and/or pipeline damage.
- Avoid contact with the valve closure element during cycling.
- During shell test, the valve shall be in partially open position so as to prevent the seat from being subjected to the shell test pressure.

CHECK

- Installation of the valve as per the piping drawing.
- End protectors are not removed before installation.
- General pipe and valve cleanliness.
- Face to face / end to end dimensions.
- Conformance of piping connectors with relevant standards or norms
- Parallelism of piping flanges or piping connectors
- Alignment of the bolt holes of the pipe and valve flanges.
- For the availability of sufficient space and its accessories and for easy operation.
- The suitability and efficiency of valve and accessories supports

7. VALVE OPERATION

7.1. General

7.1.1. Operational life of the valve can be maximized if the valve is used within the rated range, in accordance with pressure, temperature, and corrosion data.

7.1.2. For understanding the internal construction refer to the general assembly drawing of the valve.

CAUTION

Trunnion Mounted Ball Valves are quarter-turn valves, i.e., 90° rotatiion of the ball makes the valve either fully open or fully closed.

VAHN-TECH International TNBV are not intended for throttling service. These valves shall be used for full flow of fluid and / or for complete shut-off of the line only. Use of these valves with ball in partially open condition would wear out / erode the ball and seats.

7.1.3. Trunnion Mounted Ball Valves do not rely on stem actuating force to provide tight shut-off. They require correct positioning of the closure element to seal properly. Closing travel shall not be stop - ped until a positive stop is reached.

7.2. Actuation

7.2.1. Mechanism: The stem of the valve is rotated using a wrench/ handle for small valves and by a gear unit in case of larger valves. Hydraulic/pneumatic actuators can also be used for the purpose. A flat milled projection of the stem, called the tang, engages with a slot milled on the ball, so as to rotate the ball with the stem.

CAUTION

Do not peek inside or keep hands in the ball cavity / internals of an installed valve. A remotely actuated valve might get closed without warning.

7.2.2. Wrench operated valves shall be opened or closed, by turning the handle by a quarter turn (90°).

- Valve in Open Position – the handle is in parallel (in-line) with the valve or pipeline.
- Valve in Close Position – the handle is perpendicular (crossed) with the valve or pipeline.

7.2.3. Gear units are provided on valves for easier operation. Usually, clockwise operation is for closing and counter clockwise for opening of the valve. The position of the valve can be noted using the position indicator provided on top of the gear unit. The number of turns will depends on the gear unit used. The gear units are self-locking type, i.e., the line fluid will not make the valve to rotate. The gear units have mechanical stopper screws for setting the exact open and close positions which are factory set. Refer section 11.1 for correcting the mechanical stoppers if required.

7.2.4. Electric actuators, which give a multi-turn output, are fitted on the gear unit. The actuator drives the gear unit which in turn rotates the stem. Electrically actuated valves are provided with declutching mechanism for manual operation of the valve. For electric actuators, VAHN-TECH International recommends to strictly adhere to the instructions as per actuator manufacturer's manual.

7.2.5. Pneumatic gas/ hydraulic gas over oil actuators are fitted directly on the valve, without a separate gear unit, as these actuators have built-in quarter turn mechanisms. For actuators, VAHN-TECH International recommends to strictly adhere to the instructions as per actuator manufacturer's manual.

CAUTION

In case, valves are supplied as bare stem, as per customer requirements, ensure that connecting devices for actuators does not exert any axial or radial loads on the valve stem, as it may lead to bending of the stem and excessive loading on the ball. This in turn can cause the torque to increase and may lead to failure of seats too.

7.3. Sealing

7.3.1. Trunnion Mounted Ball Valves are upstream sealing valves. Both the seat ring assemblies are capable of axial movement in the pipeline. The seat rings are kept pressed to the ball by means of seat springs.

7.3.2. Additional sealing is provided by the line fluid, which further presses the seat ring on to the ball. This aids the double block and bleed feature for VAHN-TECH International TMBV, in fully open and fully closed position.

7.4. Cavity relief

7.4.1. VAHN-TECH International TMBV are provided with cavity pressure relief feature. In the event of build up of pressure in the valve cavity, the seats push back and the cavity pressure gets relieved to the flow passage.

7.5 Sealant Charging

7.5.1. For emergency leakage arrest, sealant injectors are provided on valves of sizes 8”and above for both metal seated and soft seated valves. Stem sealant injectors are located in the body-stem housing for arresting stem leakage and seat sealant injectors are placed near the cover butt-weld ends on both body and body-connectors for arresting leakage at ball-seat sealing region.

7.5.2. Stem: Special graphite based thick sealant can be screwed inside after removing grub screw in the sealant injector. This sealant forms a packing around the stem and hence seals the region above it from any line media. Once this packing is injected, online replacement of the top ring is possible. Refer sections 11.3 for procedure.

7.5.3. Seat: The sealant charged passes through the injector, a check valve and through a small hole into the seat ring and reaches the seating surface of the seat ring, which c ontacts the ball. The charge gets uniformly distributed through a circular groove. This provides emergency sealing. Refer sections 11.4 for procedure.

7.6. Fire Safety

7.6.1. In the event of fire, the soft seals may burn out. In this condition, the spring loaded seat housing will make contact with the ball to provide a fire safe metal sealing. Valves are designed to meet the fire safety requirements of reputed standards like ISO-1049 7, API-6007 and API-6FA.

DO

Ensure that the valves in the pipeline affected by a fire are replaced as soon as possible for satisfactory performance.

CAUTION

- Use the valve only for applications for which it is designed / recommended for, so as to avoid unexpected failure of the valve.
- Suspended particles in the line fluid may damage the soft components in the valve.

8. PERIODIC MAINTENANCE

8.1. Introduction

8.1.1. For enhanced life of the valve and better operability, VAHN-TECH International recommends periodic inspection and maintenance of the valves as per the procedure explained below.

8.1.2. The frequency of observation depends on the application. VAHN-TECH International recommends that valves be inspected every 50 cycles or three months (whichever is earlier) for smooth operation and leak free performance. This is recommended for stored valves also.

8.1.3. It is advisable to maintain a record of the performance of the valve.

8.1.4. Use genuine VAHN-TECH International Valves spare parts only for maintenance and replacements.

8.2. Double block and bleed and Cavity flushing procedure.

8.2.1. Keep the valve in fully open or fully close position.

8.2.2. Open the vent side valve.

8.2.3. Open the drain provided in the bottom of the valve and drain the cavity fluid completely.

8.2.4. Allow flushing medium (compatible / inert fluid like nitrogen) into the body cavity through the vent hole, allowing for drainage through the drain valve. This prevents accumulation of dirt/debris in the body cavity which could lead to erosion of internal sealing surface.

8.2.5. Close the vent valve and allow the flushing fluid to be drained completely.

8.2.6. Check for any leakage through the seat sealing region. Referto section 9 for troubleshooting if required.

CAUTION

- Fluids draining out of the drain and vent plugs may be at a high pressure.VAHN-TECH International recommends that the medium be bled out slightly for reducing the pressure. For the purpose drain and vent plug assemblies are provided with a bleed facility. Hence before removing the drain / vent plugs , unscrew the outer screw to bleed out the fluids in the drain partially.
- When assembling back the drain / vent valves, ensure that the threads are not damaged. Replace the plugs in case the threads are damaged.

8.3. Operability and Torque

8.3.1. Check for ease of operation of the valve.

8.4. Stem Leakage

8.4.1. Any major leakage at the stem region can easily be detected by observing unexpected pressure drop in the pipe line.

8.4.2. Low leakage rates of the fluid in the stem region may be detected using soap bubbles, after removing the actuator / gear unit.

8.5. Sealant charging

8.5.1. Sealant may be charged if some passing of media is found across the seats.

9. TROUBLE SHOOTING:

9.1. The table below lists common problems encountered with VAHN-TECH International TMBV, the probable causes, and recommended remedy to the problems. However judgment and experience must be applied when working on the valves in actual field site conditions.

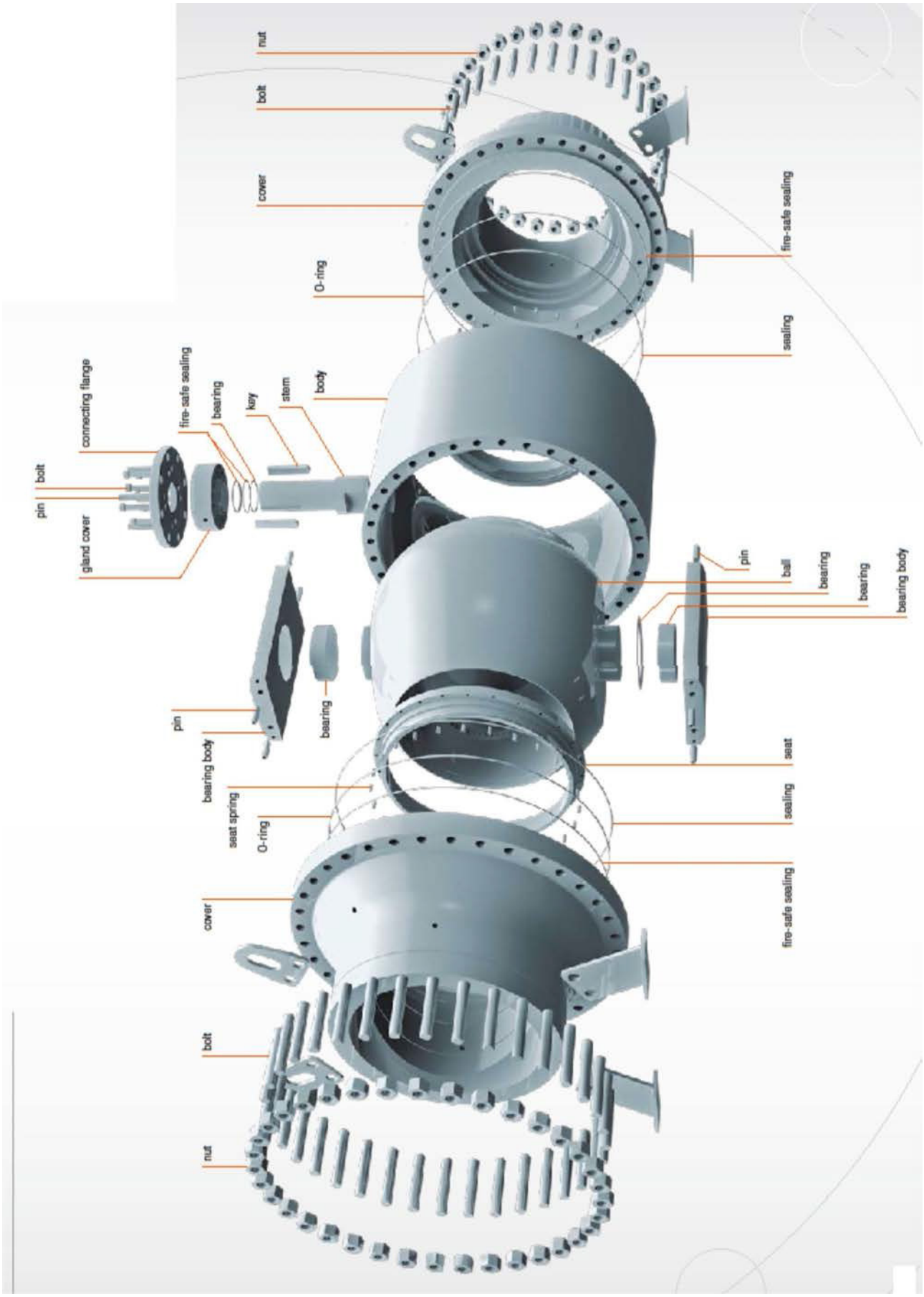
9.2. The maintenance procedures to be followed are described insection 10.

Table 1. Troubleshooting check list

SI NO.	Problem	Possible Cause	Recommendation
1	External leakage at body connector joint	Bolts loose / failure	Replace/ tighten bolts (ref. Appendix-A)
		Body seal failure	Dismantling of valve (ref.11.5)
2	Quick increase of valve leakage in closed position	Wrong adjustment of end stops.	Adjust stopper screws (ref. 11.1)/ of limit switches
		Damage of sealing surfaces.	Sealant injection would provide emergency sealing (ref.11.4)/ Dismantling(ref.11.5)
3	Leakage through gland	Damage on stem seals.	Stem seal replacement (ref. 11.2) Stem sealant injection (ref. 11.3)
		Loose gland bolting	Tighten the gland cap screws till it butts on the valve body, after removing the gear unit (if any).
4	Progressive increase of the torque or Sticking points along stroke	Deposits on the surfaces.	Flush cavity in open position (ref.8.2)/ Dismantling (ref.11.5)
		Blockage of the seats	Charge sealant and rotate by small angles till the operation is smooth.
5	Drop in line pressure/minor leakage	Wear out of seat	Check impurities in the line fluid. Seat sealant injection (ref. 11.4)
6	Leakage under fire.*	Nonmetallic parts burned off.	Sealant injection (ref. 11.3, 11.4.) / Dismantling- replace valve /soft parts during periodic maintenance. (ref.11.5)
7	Difficult to operate when operated after long duration	Gripping of ball and seats	Charge sealant to both seats and try to break open manually. (ref. 11.4)
8	Sealant Fitting leakage	Check Valve is not seating properly	Clean or replace the Check Valve after the pressurizing line.

*It may be noted that under fire valve may not seal completely, though the leakage rate expected to be within limits set by standards.

10. VALVE DETAILS:



11. MAINTENANCE PROCEDURES:

CAUTION

For your safety, it is important that these precautions be taken before removal of the valve from the line or before dismantling.

- De-pressurize the line before removing the bolting.
- Wear protective clothing or equipment appropriate for the line fluid.
- Ensure cavity pressure is relieved.
- Cycle the valve several times before dismantling to relieve pressure completely

11.1. Gear stopper adjustment procedure

11.1.1. Loosen the stoppers to allow additional rotation of the valve stem.

11.1.2. Open the drain valve in the center cavity located at the bottom of above ground valves and on the extension housing for buried valves.

11.1.3. The pressure will be released from the center cavity of the valve.

11.1.4. Once the flow of media has stopped through vent/drain (except for the leakage past the seat), rotate the valve in either direction from the original stop settings to locate a point where the leakage stops.

11.1.5. Rotate clockwise and anti clockwise to locate two points where the leakage begins. Mark both the locations and operate the valve to a position halfway between the two marks.

11.1.6. Close the vent valve. Actuate the valve exactly 90° and set the other stop.

11.2. Stem seal replacement procedure

CAUTION

It is desirable that the valve (both bore and cavity) be relieved of pressure prior to seal replacement. If it is not possible, get in touch with VAHN-TECH International or their authorised service representative for additional information.

11.2.1. Ensure that no pressure is trapped inside the valve and exercise the following steps for replacing the stem seal.

11.2.2. Mark the open and close positions of the gear unit and remove it; preferably without disturbing the mechanical stopper screws in the gearbox.

11.2.3. Remove the key and its retainer screw and washer, if provided.

11.2.4. Loosen all the hexagonal cap screws which holds the gland and remove the gland from its place.

11.2.5. Clean the packing area.

11.2.6. Inspect the stem bore on body and stem for damage like scratches and correct them by rubbing with emery sheet.

11.2.7. Insert a new set of graphite packing and place the gland over it.

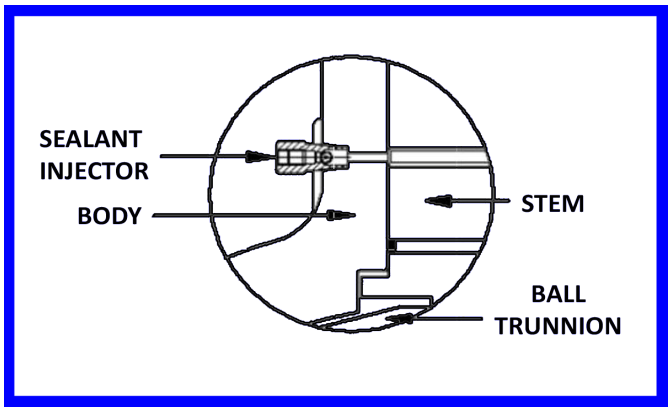
11.2.8. Tighten cap screws uniformly to a torque depending on the size of the screw.

11.2.9. Pressurize the system and check for leak using soap bubbles.

11.2.10. Re-assemble the key and gear unit. Ensure that the positions of the stoppers are correct. (Refer section11.1 for correction)

11.3. Secondary sealant injection procedure – Stem

Fig.5. Stem Sealant Injection



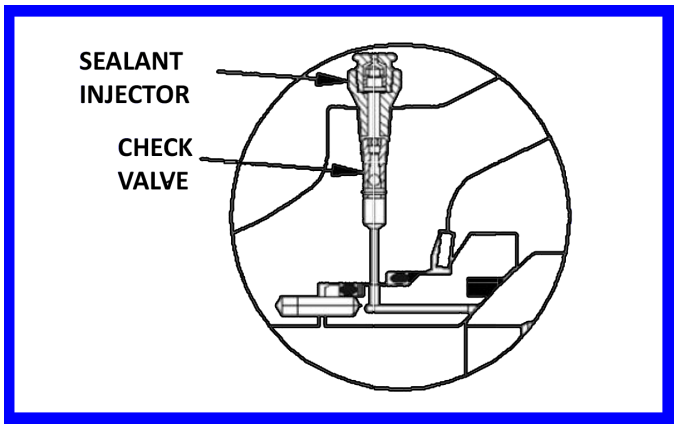
11.3.1. Remove grub screw (Fig.6.)

11.3.2. Insert graphite based sealant.

11.3.3. Place the grub screw and tighten. Tightening will pressurize the sealant in the stem.

11.4. Secondary sealant injection procedure – Seat ring

Fig.6. Seat Sealant Injection



⚠ CAUTION

Before injecting sealant into the valve, ensure the valve is fully open or close.

11.4.1. The sealant shall be charged using a sealant gun.

11.4.2. Attach the gun loaded with sealant on the sealant injector (fixed on the valve) (Fig.7.) and charge the sealant.

11.4.3. While charging, try rotating the ball through a small angle (say 10°) and return it back to its original position.

11.4.4. Remove the gun. The check valve will prevent the back flow of the sealant.

11.4.5. Check and ensure that there is no leakage across the seats.

EXPERTS NOTE

Sealant to be used is Nordstrom 1033 sealant. This is available in bulk, gunpak and stick grades (generally for stem sealant).

This can be used for liquid and gaseous aliphatic hydrocarbon service suitable for gasoline, kerosene, fuel oils, crude distillates, aviation fuel, jet fuel, and natural gas at a temperature range of –40°C to + 260°C.

For other specific flow media, consult VAHN-TECH International.

CAUTION

Nordstrom 1033 sealant is not suitable for use with aromatic solvents, strong acids and alkalis, and steam.

11.5. Dismantling procedure

CAUTION

Once dismantled the soft seals, packing and o-rings shall be changed. Ensure they are available.

11.5.1. Depressurize the line and open the valve to drain the line.

11.5.2. Before removal from the line, cycle (open and close) the valve to relieve residual pressure in the body cavity.

11.5.3. Valves shall be slung properly before loosening flange bolts.

11.5.4. Place the valve on a platform or base and transport to the repair shop.

11.5.5. Before dismantling, cycle (open and close) the valve several times to clear it of fluid; then flush with water.

11.5.6. Close the valve completely and remove handle/gear unit.

11.5.7. Secure body in a suitable clamping device, without damaging it.

11.5.8. Loosen the body-body connector interface bolting and remove the body connector.

11.5.9. Remove the seat ring from the body and body connector.

11.5.10. Lift the ball/bearing block sub assembly using a nylon rope or using eye-bolts (for large sizes). If the ball is intended for reuse, place it on the seat ring and suitably cover it so that it is not damaged.

11.5.11. Remove the key from the stem.

11.5.12. Remove gland bolts from the valve body. Remove the packing and clean the packing area. Take care not to damage sealing surfaces on body or gland.

11.5.13. Carefully push valve stem down into the valve body and withdraw it through the open end and remove the thrust bearing from stem.

CAUTION

- Before removal of the valve, ensure that the line is fully depressurize.
- Improper handling may cause ball / seat damage or deformation of stem or seat, which will affect sealing and operational torque of the valve.
- Ensure that the dismantled components are kept in a clean place so that there will be no damage to the components.

11.6. Assembly Procedure

11.6.1. Inspect and clean all parts (Fig. 7.) to make sure they are free of dust, grit or other material. New set of o-rings and seals shall be used once the valve is dismantled.

11.6.2. Apply a good lubricant compatible with the fluid service,such as silicone grease, to bearing blocks, seats, seal, ball and stem.

11.6.3. Refer to the exact seat ring design, as per the general assembly drawings and assemble it according -ly.

Fig.7. Major components of valve before assembly

CAUTION

In case of crimped seat design, if the seat is damaged, the seat ring / housing shall not be reused. New seat ring assemblies shall be procured.

11.6.4. Assemble the seat sealing elements to the seat rings.

Fig.8. Seat ring assembly inserted into the body

11.6.5. Place a seat spring in the body bore and place one seat ring into the body as shown in Fig. 8. Insert the seat ring assembly so that it rests on the seat spring. Care should be taken so that the o-ring does not fall out or get misaligned inside the valve.

Fig.9. Stem being inserted into the body

11.6.6. Assemble thrust bearing, o-ring and backup ring on the stem. Carefully insert upper end of stem into body of valve (Fig.9.) and maneuver into the opening in top of valve.

Fig.10. Gland packing inserted into the body

11.6.7. Assemble packing as mentioned in section 11.2.6 to 11.2.8. Do not tighten the cap screws now. (Fig.10.)

11.6.8. Assemble the thrust washer and bearing blocks onto the ball. Check if the clearance between the bearing block and ball is minimum (i.e., it is not very loose). If it is not so the trunnion bearings in the bearing block have to be changed. Make sure the locating pins in the bearing lock are in position.

11.6.9. Rotate stem so that stem bottom is lined-up axially with the valve and ball and bearing blocks can be fully inserted.

11.6.10. Place ball-bearing block assembly into the body (Fig.11.).

Fig.11. Ball-bearing block assembly inserted into the body

For small sizes For large sizes (using eye-bolts)

11.6.11. Place second seat spring in the body connector and insert the seat ring (Fig.12.)

Fig.12.
Seat ring being inserted into the connector

Fig.13.
Connector being placed on the body.

11.6.12. Place the body seal in the body and place the connector in such a way to locate the dowel pins,pressed into the bearing blocks, on the holes provided in the body. (Fig.. 13)

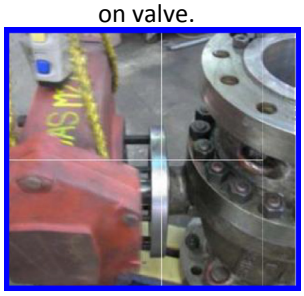
Fig.14.
Valve interface flange tightened using a torque wrench

11.6.13. Tighten the interface flange bolting as mentioned in the section A2. (Fig.15.)

Fig.15.
Mounting of gear units on valve.

11.6.14. Place the key in the stem slot and retain it with the washer and bolt.

11.6.15. Fix the gear unit / handle onto the valve stem. (Fig.15.)



11.6.16. In case the drain and vent plug assemblies are dismantled, clean the threads of the plugs and assemble the plugs. Ensure that the sealant injectors are assembled on the threaded sealant charging holes.

11.6.17. Cycle valve open and close to turn ball slowly with a gentle back and forth motion, building gradually to a full quarter turn. By rotating slowly, the seat lips will assume a permanent seal shape against the ball and prevent damage to the seals.

11.6.18. After assembly, the valve shall be tested for leakage across the seats and through the stem seals. Instructions given for handling, installation, cleaning and testing given in Sections 5 and 6 shall be strictly followed.

CAUTION

- Improper handling may cause ball/seat damage or deformation of stem or seat, which will affect sealing and operational torque of the valve.
- Faulty installation may lead to valve and/or pipeline damage.
- Ensure that the soft parts are changed once they are removed from the valve.
- Avoid contact with the valve closure element during cycling.

EXPERTS NOTE

VAHN-TECH International welded Trunnion Mounted Ball Valves are completely sealed type valves. These valves are welded together using submerged arc welding techniques to provide good quality, leak resistant welds. VAHN-TECH Internationals welded valves cannot be dismantled at site and hence the service ability of these valves is restricted to replacements of stem seals and sealant injection at seats and stem seals for leak arrest /emergency shut off.

12. SPARES & SEALANTS

12.1. Spares

12.1.1. Following spares may be maintained for quick repairs / emergencies:

12.1.1.1. One soft seal kit comprising of O-rings, backup rings , nylon insert, gland packing and gasket

12.1.1.2. For valves in prolonged service, in addition to the above, one set of bearings and thrust washers may be maintained.

12.2. Sealants

12.2.1. Sufficient quantities of suitable seat and stem sealants may be maintained for charging to avoid passing of media across valve seats or valve stem seals, as an emergency means of arresting leakage.

APPENDIX A

TECHNICAL INFORMATION

A1. References

Pressure-Temperature Ratings:

API 6D	Specification for pipeline valves (gate-, plug-, ball- and check valves.
ASME B 16.34	Valves: flanged, threaded and welding ends

Face to face dimensions:

API 6D	Pipe flanges and flanged fittings
ASME B 16.10	Face-to-face and end-to-end dimensions of valves
BS 2080	Specification for, Face-to-face, centre-to-face, end-to-end and centre-to-end dimensions of flanged and butt-welding end steeel valves for the petroleum, petrochemical and allied industries

End connections:

ASME B16.5	Pipe flanges and flanged fittings (NPS ½ through NPS 224)
ASME B16.47	Large diameter steel flanges (NPS 26 through NPS 60)
ASME B16.25	Butt welding ends

Fire Test:

API 6FA	Specification for Fire Test of Valves
API 607	Fire Test for Soft Seated Quarter-Turn valves

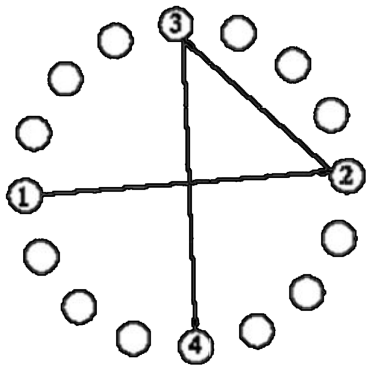
A2. Tightening Sequence & Torque.

The tightening sequence for all possible number of bolting is beyond the scope of this manual. However, the logic to be followed is explained below

A2.1. Tighten the first four nuts in the sequence shown in Fig. 17. This helps in correct location of the mating parts.

A2.2. Using a wrench, tighten the first four nuts in the same sequence slightly.

A2.3. Tighten the other bolts inthe sequence shown in Fig.18, the same way.



SFig.16. Initial tightening

A2.4. The sequence goes clockwise around the bolt pattern.

A2.5. Tighten to torque specified in the table finally, in the same sequence.

A2.6. Ensure the recommended torque in all bolting.

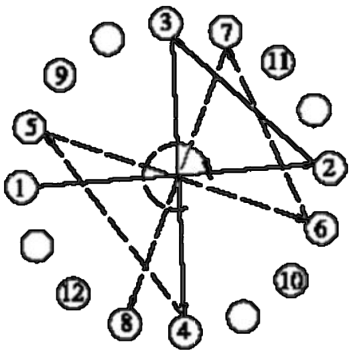


Fig.17. Sequence of tightening

THREAD SIZE, in	TORQUE a , lbf.ft	
	B7/B7M/L7 /L7M/B16	(B8/B8M) CL.2
1/4	6	
5/16	10	
3/8	20	
7/16	30	
1/2	55	
9/16	60	
5/8	100	90 [b]
3/4	190	170 [b]
7/8	290	260 [b]
1	390	470 [b]
1.1/8	570	260 [b]
1.1/4	800	630 [b]
1.3/8	110	750 [b]
1.1/2	1400	950 [b]
1.5/8	1800	1200 [b]
1.3/4	2300	1500 [b]
1.7/8	2800	1850 [b]
2	3400	2250 [b]
2.1/4	4900	3250 [b]

Table 2. Tightening Torque Values (Inch series)

THREAD SIZE	TORQUE IN Nm (+20%)	THREAD SIZE	TORQUE IN Nm (++ 20%)
M4	2	M30	9433
M5	4	M33	12662
M6	7	M36	16336
M8	18	M39	21009
M10	34	M42	26228
M12	58	M45	32991
M14	92	M48	40229
M16	140	M52	49666
M18	196	M56	62777
M20	273	M60	78000
M22	375	M64	95551
M24	473	M70	126440
M27	688	M72	130001

Table 3. Tightening Torque Values (Metric series)

APPENDIX B

SPECIAL CONSIDERATIONS IN VALVES WITH EXTENDED STEM

- In valves with extended stem, do not sling around pipes provided for draining venting and sealant injection, while handling. See Fig.19.
- Through out the installation process, support for the extended stem (housing) should be maintained.
- After installation, fill the extension column with compatible oil to prevent internal corrosion, if required. This can be filled through the opening in the extensio n column which are plugged with a 3/8" NPT plug. When the plug is assembled, ensure that the threads of the plug are not damaged.
- Check whether the sealant charging pipes are connected properly and filled with sealant.

CAUTION

Instructions indicated for handling shall be strictly followed to avoid damage to valve components resulting in malfunction of the valve.

Fig.18. Handling a welded end valve with an extended stem

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