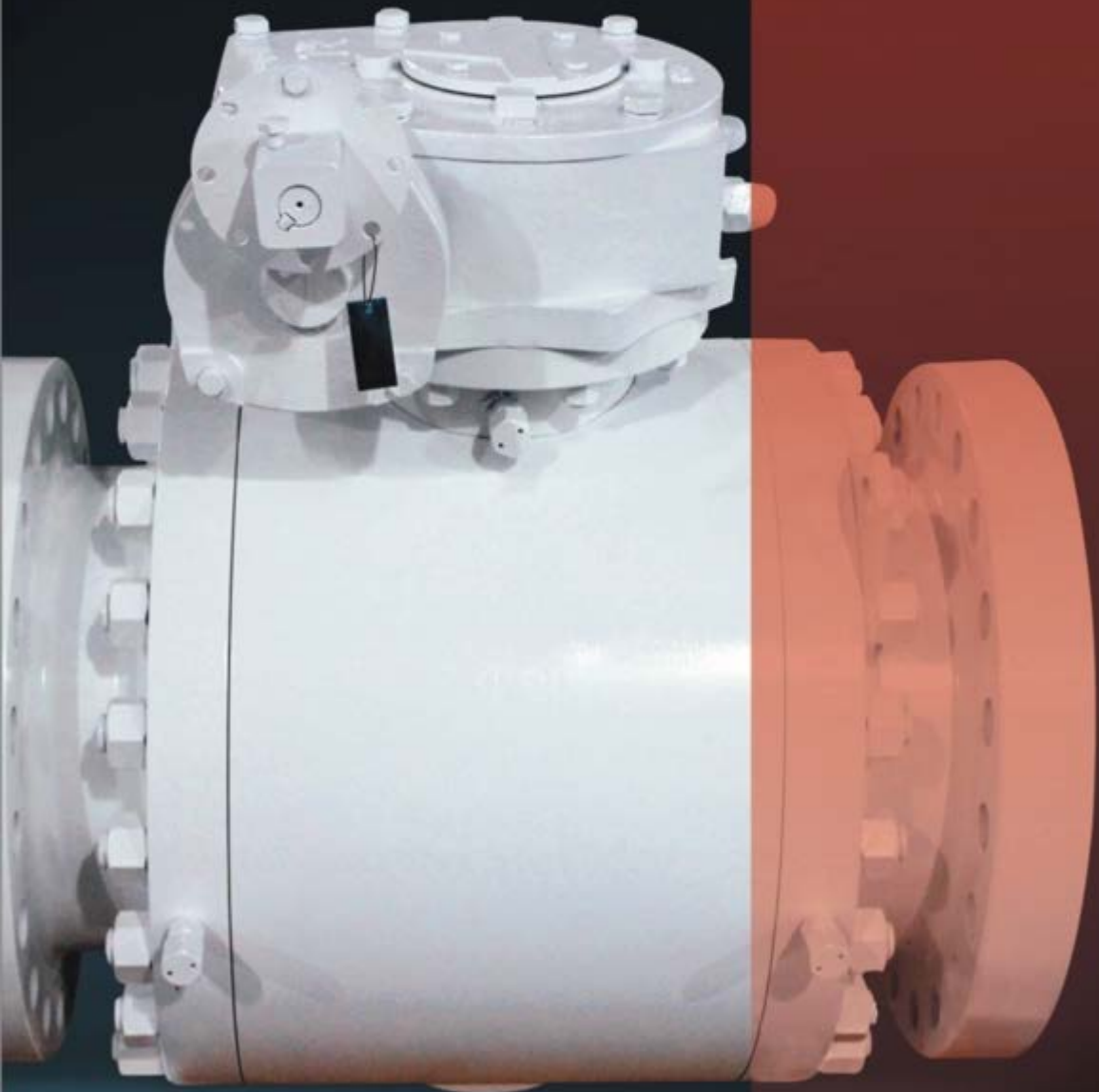


**McSYS**®

BALL VALVE INSTALLATION,  
OPERATION AND MAINTAIN MANUAL



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## 1. GENERAL INFORMATION

- 1.1** The manual is provided to ensure proper installation, operation & maintenance for JMC Ball Valves. The valves are identified by marking on the body and on the nameplate which provide applicable information including size, pressure class, materials, seals and serial number. Reference to the serial number will expedite any request regarding your valve.
- 1.2** MCSYS valves are bi-directional, meaning upstream or downstream could be at either end of the valve(except for metal seated floating ball valves). MCSYS valves are intended for use in horizontal or vertical pipelines with the operating stem in any position.
- 1.3** MCSYS valves are designed, manufactured and tested in accordance with API Spec 6A or 6D unless otherwise specified.

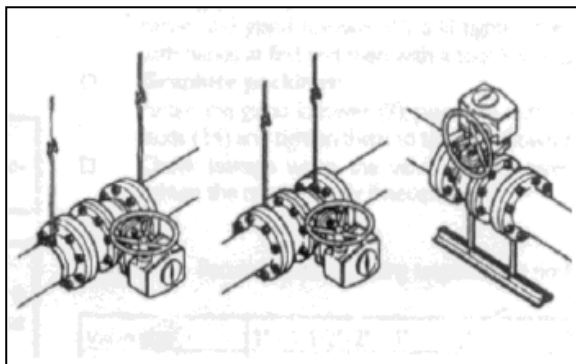
## 2. VALVE INSTALLATION

### 2.1 Unpacking

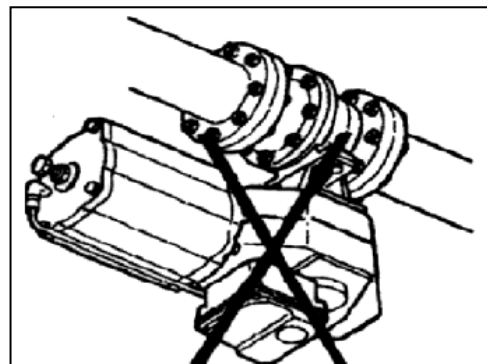
All valves should be inspected on receipt for lost components or damage. Remove end connection protectors and thoroughly inspect interior of valve and end connections for dirt, burrs and welding residues. MCSYS Ball Valves are shipped in the open position to protect sealing surfaces.

### 2.2 Handling

To ensure safety, user must handle the valve with both hands so that the weight of the valve is equally distributed at both ends. The valve may be lifted by slings, end flanges or the integral lift eyes provided on the valve. Never lift the valve using only one lift eye and install the valve with the actuator on the underneath side in the pipeline.



Correct Valve Lifting



Avoid this mounting position

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## 2.3 Installation

- 2.3.1 Orient valve in piping to provide clearance and allow access to the operator.
- 2.3.2 Flanged end valves should be installed using the appropriate gasket and flange conventional installation procedures.
- 2.3.3 Weld end valves should be installed using qualified welders and weld procedures appropriate for the valve materials. Valve should be welded with the ball in the open position. When preheating, welding or stress relieving, temperature of the valve body seat area must not exceed 200°F (94°C).
- 2.3.4 Prior to operating the valve from the open position, the piping should be thoroughly flushed to prevent matter from damaging sealing surfaces.
- 2.3.5 After installation and system testing, the valve should be drained to remove test fluid.

## 3. VALVE OPERATION

- 3.1 MCSYS Ball Valves are designed for full-open to full-closed operation with 90° turn of the valve stem. Unless otherwise stated the valve closes by rotating 90° in the clockwise direction. Ensure that the force applied on the hand wheel of the gearbox or lever shell not exceed 360°.
- 3.2 MCSYS Ball Valves provide block and bleed capability in either the full open position or full closed position. This means that the body cavity pressure can be vented to atmosphere while pressure is maintained in the pipeline.
- 3.3 Clockwise rotation of hand wheel closes the valve and anti-clockwise rotation open the valves for gear operated valves.
- 3.4 For lever operated valves, if the position of the lever is in line with pipeline, then the valve is in open position. The valve is in close position when lever is perpendicular to pipe axis.
- 3.5 Do not disturb the gear box open/close adjustment bolts setting.
- 3.6 After actuator installation, valve should be checked for valve stem alignment. Axial misalignment will result in high operational torque and unnecessary wear on the stem seal.
- 3.7 MCSYS Ball valve shall be fully opened or fully closed.  
In near-closed position, valve seats can be damaged result not to function properly, and fluid flow can be affected on this situation.

#### 4. VALVE MAINTENANCE

- 4.1** Periodically check (depending on the operating environment) for any damage to valve seats, ball and stem of the valve. While doing periodical checks, it is recommended that the seats, gaskets, seals and packing should be replaced by genuine spares. The period is determined by the user depending on the method and usage.
- 4.2** A repaired valve is always subjected to set of tests before installation. Ensure periodical lubrication of gear box with suitable grade of grease.
- 4.3** Sealant injection system is provided on valve seat or stem packing area to carry out temporary shut off for maintenance of other purpose. Sealant injection may not be provided depending on valve types.

#### 5. TROUBLE SHOOTING

Symptom	Possible Fault	Action
Leakage through a closed valve	Ball might not be closed fully	Check ball open/close setting
	Damaged ball surface	Replace the ball
	Damaged seats	Replace seats
Irregular ball movement	Impurities between ball and seats or ball – body cavity and ball seats	Flush the ball from inside/ Clean the sealing surfaces and seats
Valve torque too high	Damaged seats	Replace seats
	High application pressure / temperature	Confirm the application pressure / temperature rating
	Foreign particles in valve	Clean the internals
Water hammer or noisy operation	Error in valve sizing or flow of fluid with high velocity	Confirm valve sizing with respect to flow
Leakage through stem	Gland nut loose	Tighten gland nut
	Damaged stem or seal	Replace stem or seal
Leakage through body-adaptor joint	Damaged o-ring or gasket	Replace o-ring or gasket
	Relaxation of studs	Tighten the studs evenly

#### 6. GENERAL INSTRUCTION FOR DISASSEMBLY AND REASSEMBLY OF VALVES

**!!CAUTION!!**  
 Pipeline and valve must be depressurized by shutting off the valves and the bleed line, then cycling the valve once and leaving it half open to relieve the pressure from the body cavity.

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## 6.1 Disassembly – Trunnion Ball Valves

- a) Valve shall be positioned vertically by resting body side flanges on clean ground surface.
- b) Remove the handle, lever or gear box.
- c) Open the body adapter joint by loosening the nuts in crisscross pattern.
- d) Remove the body seal from the body adapter and body gasket from the body.
- e) Remove the ball from the body and the seats from body and body adapter.
- f) Remove the stem by removing stem holding devices as applicable.
- g) Push stem into body cavity and take it out.
- h) Remove all stem seals.
- i) All the components should be stored in a clean place.
- j) Remove the trunnion by removing the cap screws.
- k) Remove the antistatic spring, the thrust washer, the gasket and the o-ring.
- l) Remove the ball from the body.
- m) Remove bush bearing from bearing bore in ball on both stem and trunnion side.
- n) Remove the o-ring (body adapter) and gaskets (body) from the body adapter.
- o) Remove the seat insert from the body and body adapter.
- p) Remove the springs, seat o-ring from the seat.
- q) Where applicable the sealant injection fittings and drain/vent plugs may be removed for cleaning.

## 6.2 Reassembly – Trunnion Ball Valves

*Before reassembly, inspect the valve for any damage on body-adapter and null internals. Damaged internals to be replaced by genuine & with recommended parts only.*

- a) Follow the same step as mentioned in 6.1-a.
- b) Apply suitable coat to bolting to prevent corrosion.
- c) Insert body seats in position.
- d) Insert the stem seal bottom and the stem o-rings on the stem & install the stem from inside the body.
- e) Insert the top stem seal, the spacer, the disc springs or stem bush into the stem as applicable.
- f) Ensure proper locking of stem with lock nut, washer or mounting plate as applicable.
- g) Align stem A/F parallel with the body bore.
- h) Gently slide the ball over the stem A/F.
- i) Place seal and seat in body adaptor.
- j) Position the gasket with the body and position studs.
- k) Assemble the valve by putting adapter on the body and tighten the body nuts in a crisscross pattern.
- l) Put the operating member i.e. lever/ handle or G.O. in position into body and tighten them.
- m) Ensure open and close smooth operation of valve
- n) Fit the antistatic spring, the thrust washer, the gasket and o-ring.
- o) Fit the bush bearing into the recess in ball on both stem and trunnion side.
- p) Lift the ball and lower it into the body in the appropriate position.

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- q) Locate the trunnion in ball recess and tighten the cap screws.
- r) Lift the valve and place it so that the direction of the flow axis is horizontal.
- s) Locate the dowel pins and place the stem housing on the body, so that the stem housing fits into the bush bearing and stem flats locates in the ball slot.
- t) Place and tighten the cap screws for stem housing.
- u) Fit the body adapter gently upto with seat to the body and tighten the nuts. Put the studs in position into body and tighten them.
- v) Fit the gasket (stem) in the stem housing recess.
- w) Place the gland on the stem housing and tighten the cap screws.
- x) Fit the stem key in stem key way.
- y) For lever operated valves, place the hand coupler with lock and stop plate on the stem and tighten the hex bolt/grub screw. For gear operated valves, place the coupling on the stem, place the bracket on the stem housing, fit the studs and tighten the nuts. Place the gear operator on the coupling & the bracket, fit the studs & tighten the nuts.
- z) Where applicable, fit sealant injection fittings and the drain/vent plugs.
- aa) Rotate the ball slowly back and forth to a full quarter turn. This will allow the seat to assume its permanent position and shape against ball and body. A fast turning motion may damage the seat before it has a chance to form a proper seal.

### 6.3 Disassembly – Floating Ball Valves

- a) Valve shall be positioned vertically by resting body side flanges on clean ground surface (preferably covered with rubber sheet).
- b) Remove the handle, lever or gear box.
- c) Open the body adapter joint by loosening the Nuts in crisscross pattern
- d) Remove the body seal from the body adapter and body gasket from the body.
- e) Remove the ball from the body & the seats from body & body adapter.
- f) Remove the stem by removing stem holding devices as applicable.
- g) Push stem into Body cavity & take it out.
- h) Remove all stem seals.
- i) All the components should be stored in a clean place.

### 6.4 Reassembly – Floating Ball Valves

*Before reassembly, inspect the valve for any damage on body-adapter and null internals. Damaged internals to be replaced by genuine & with recommended parts only.*

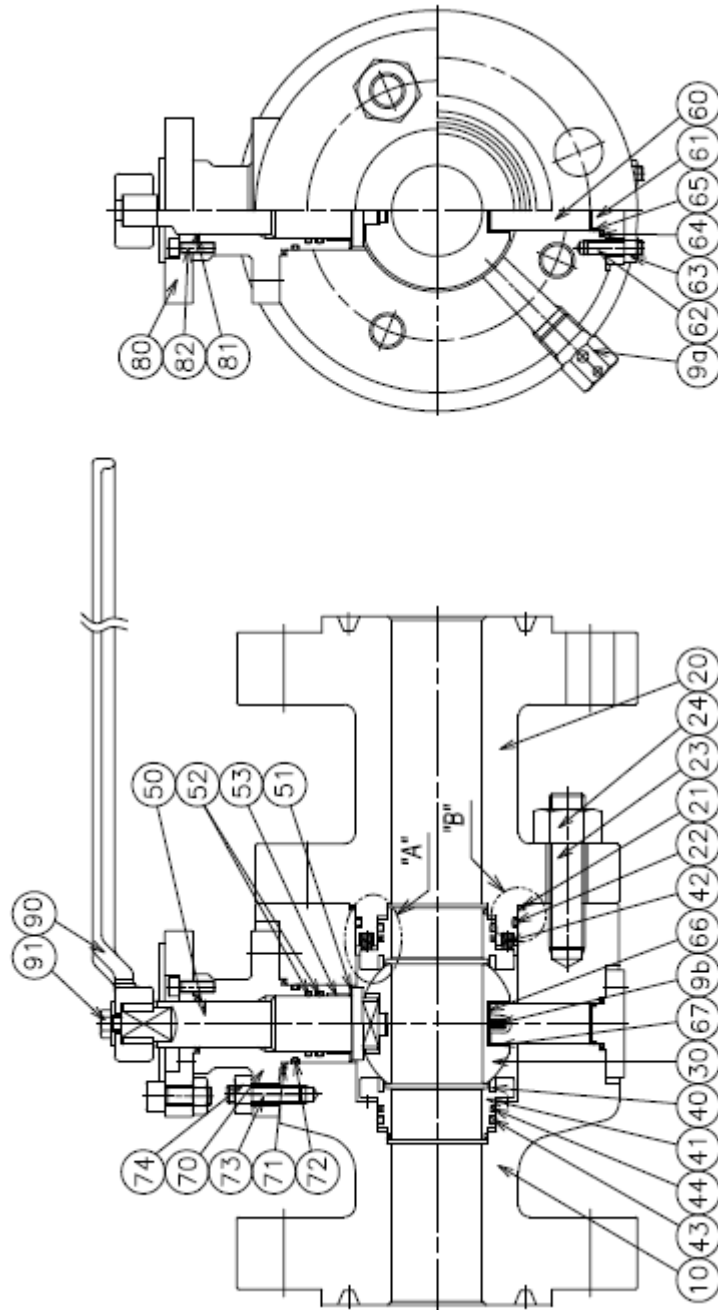
- a) Follow the same step as mentioned in 6.3-a.
- b) Apply suitable coat to bolting to prevent from corrosion.
- c) Insert body seats in position.
- d) Insert the stem seal bottom and the stem o-rings on the stem & install the stem from inside the body.

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- e) Insert the top stem seal, the spacer, the disc springs or stem bush into the stem as applicable.
- f) Ensure proper locking of stem with lock nut, washer or mounting plate as applicable.
- g) Align stem A/F parallel with the body bore.
- h) Gently slide the ball over the stem A/F.
- i) Place seal and seat in body adaptor.
- j) Position the gasket with the body & position studs.
- k) Assemble the valve by putting adapter on the body & tighten the body nuts in a crisscross pattern.
- l) Put the operating member i.e. lever/ handle or G.O. in position into body and tighten them.
- m) Ensure smooth operation of valve during opening and closing.

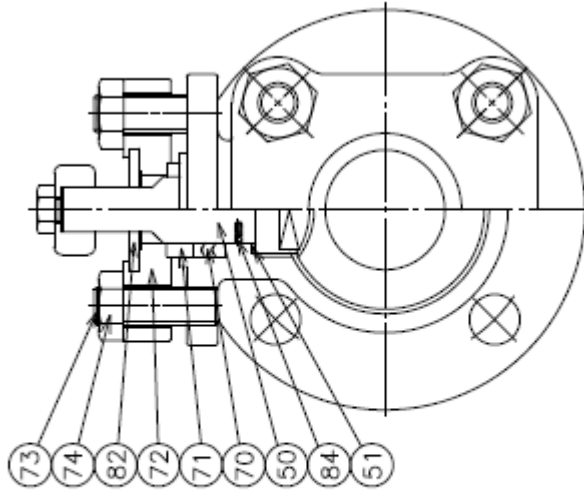


6.5 Parts List – Trunnion Ball Valve

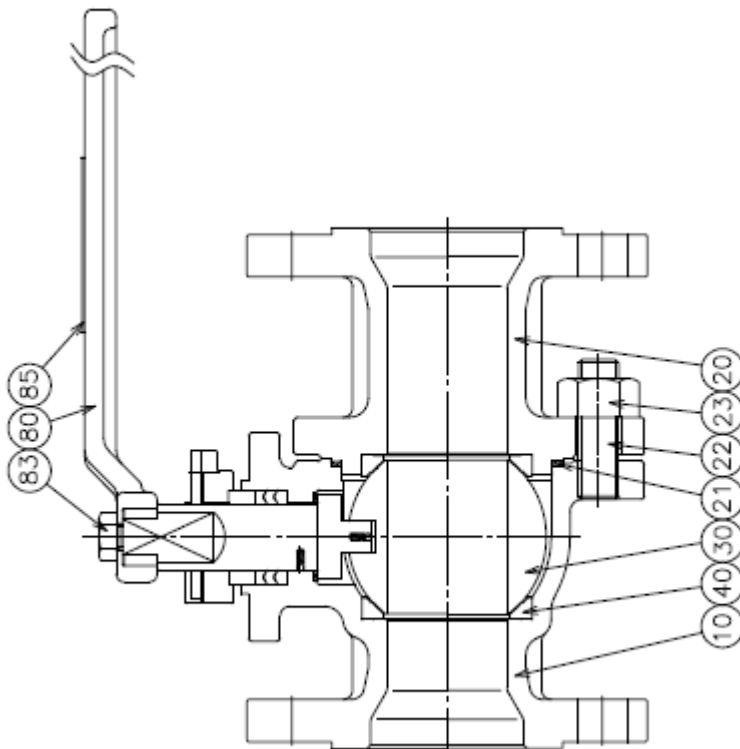


- 10 BODY
- 20 CAP
- 21 CAP FIRE SAFE GASKET
- 22 CAP O-RING
- 23 CAP BOLT
- 24 CAP NUT
- 30 BALL
- 40 SEAT
- 41 SEAT HOLDER
- 42 SEAT SPRING
- 43 SEAT O-RING
- 44 SEAT FIRE SAFE RING
- 50 STEM
- 51 THRUST SEAL
- 52 STEM O-RING
- 53 STEM BEARING
- 60 TRUNNION
- 61 TR. COVER
- 62 TR. COVER BOLT
- 63 TR. COVER NUT
- 64 TR. FIRE SAFE GAKET
- 65 TR. O-RING
- 66 TR. THRUST
- 67 TR. BEARING
- 70 GLAND
- 71 GLAND FIRE SAFE SEAL
- 72 GLAND O-RING
- 73 GLAND BOLT
- 74 GLAND NUT
- 80 MOUNTING PLATE
- 81 STEM FIRE SAFE GASKET
- 82 MOUNTING PLATE BOLT
- 90 LEVER
- 91 LEVER SET BOLT
- 92 STOPPER BOLT
- 93 STOPPER
- 9a DRAIN PLUG
- 9b ANTI STATIC DEVICE

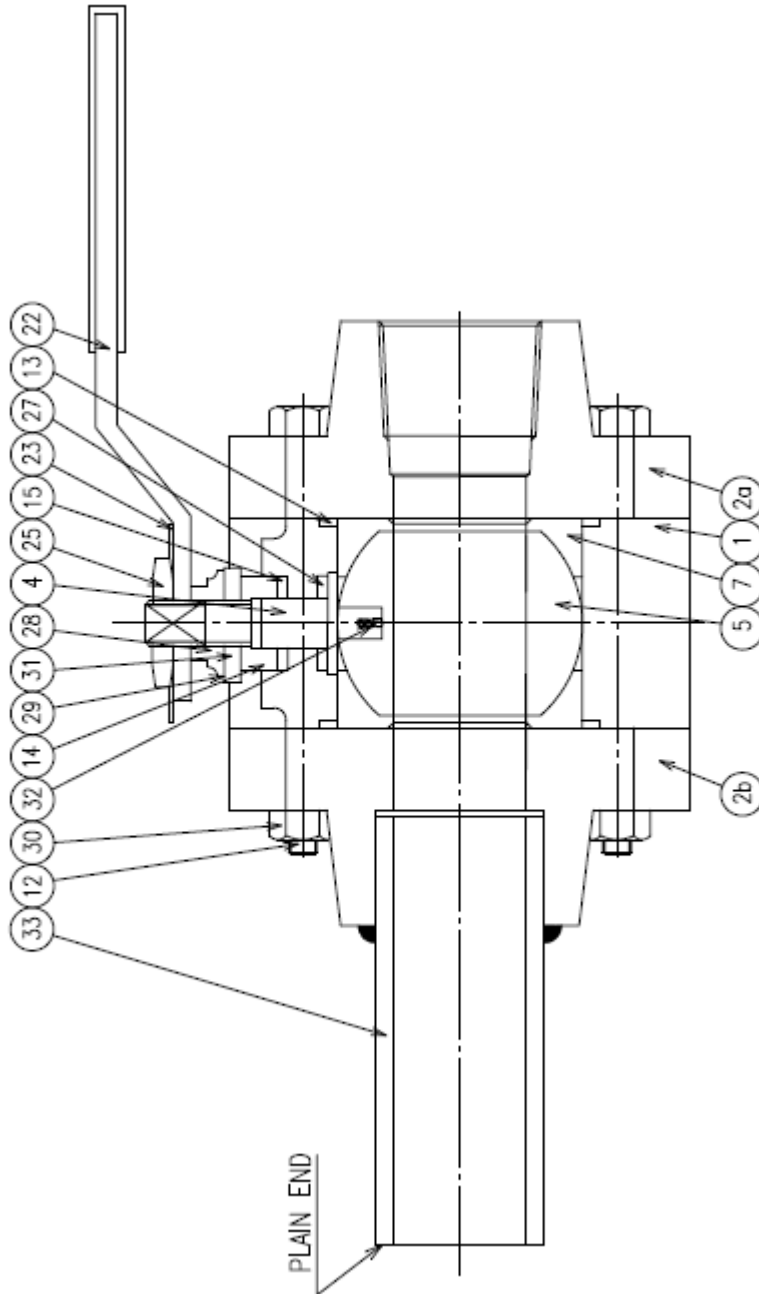
6.6 Parts List – Floating Ball Valve (Two Piece Design)



- 10 BODY
- 20 CAP
- 21 CAP GASKET
- 22 CAP BOLT
- 23 CAP NUT
- 30 BALL
- 40 SEAT
- 50 STEM
- 51 THRUST SEAL
- 70 PACKING
- 71 GLAND RING
- 72 GLAND FLANGE
- 73 GLAND BOLT
- 74 GLAND NUT
- 80 LEVER
- 82 STOPPER
- 83 LEVER BOLT
- 84 ANTI STATIC DEVICE
- 85 NAME PLATE



6.7 Parts List – Floating Ball Valve (Three Piece Design)



- 1 BODY
- 2a NPT CAP
- 2b SW CAP
- 4 STEM
- 5 BALL
- 7 SEAT
- 12 CAP BOLT
- 13 GASKET
- 14 GLAND
- 15 GLAND PACKING
- 22 HANDLE
- 23 NAME PLATE
- 25 HANDLE NUT
- 27 THRUST BEARING
- 28 STEM NUT
- 29 TAP WASHER
- 30 CAP NUT
- 31 CONICAL SPRING
- 32 ANTI STATIC DEVICE
- 33 PUP PIECE