



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 1 of 12

First Issue : 07/07/2011

Prepared By : X.Zhuang

Approved By : E. Gulgun

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Rev. No: 2

1. INTRODUCTION

1.1. **WARNING**

Do not install, maintain or operate valves before having carefully read this IMO in order to avoid prospective damages to people and property. Always use the valves within the limit of the working conditions as described in International Standard Valve (ISV) technical documents, and/or nameplate.

For your safety and protection, follow essential and best safety practices prior to removing the valve from service and before any disassembly of the valve

- 1.2. Applicable safety regulations should be followed at all times.
- 1.3. Never loosen or remove any bolting or fittings while valve is under pressure.
- 1.4. Keep hands and objects out of the valve if there is a possibility of unexpected valve actuation in order to prevent serious damage or injury.
- 1.5. For proper handling and disposition, obtain a Material Safety Data Sheet (MSDS) of the media that the valve is exposed to and follow the material handling precautions associated with the media. Immediately contact the proper authority if there is any additional concern.
- 1.6. Wear protective clothing or equipment regularly required when working with the media involved.
- 1.7. Depressurize the line and valve as follows prior to removal of the valve or valve parts:
 - 1.7.1. Drain the line while the valve is in the open position.
 - 1.7.2. Close and open the valve to relieve any pressure that may be trapped in the valve body cavity prior to removal from service. Leave the valve in the open position.
 - 1.7.3. Remove the valve from the line carefully.
 - 1.7.4. Carefully open and close the valve several times while the valve bore is in vertical position to drain any remaining media before disassembly.
- 1.8. ISV assumes no liability for damages, failures, or any other occurrences resulting from unauthorized modification, misuse, or use of non-original manufactured equipment parts.
- 1.9. Any unauthorized repair or modification may void the product warranty; refer to ISV warranty information for details.
- 1.10. ISV withholds the right to revise the valve design. This IMO may not exactly represent your valve's construction. If there are any concerns, please contact the ISV Engineering department.

2. STORAGE

- 2.1. ISV valves are shipped in the full open position with the exception of valves that are equipped with fail-closed actuators. A corrosion inhibitor is applied to all end connections, flanged sealing surfaces and bores (non-stainless steel valves). End protectors are installed to prevent foreign material from entering the body cavity and from scratching and damaging the sealing surfaces of the end connections. This will provide adequate protection for indoor storage.
- 2.2. Do not remove the end protectors except for inspection or installation.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
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IMO

002

Page : 2 of 12

First Issue : 07/07/2011

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Rev. Date : 03/26/2013

Rev. No: 2

- 2.3. If valves require outdoor storage, ISV recommends a clean, dry, covered area off of the ground. Special packaging and additional lubrication may be required.
- 2.4. Never store the valve in a partially open position. If the valve is left in a partially open position for an extended period of time, the soft seat can be damaged.

3. INSTALLATION

- 3.1. Use proper handling equipment based on the weight of the valve. To avoid damage to the valve or personnel while handling, use a rig or sling if the weight is over 50lbs.
- 3.2. Valve can be installed in line bi-directionally.
- 3.3. With valves that have fittings or extensions, check and tighten before valve is put into service.
- 3.4. Stem or seat grease fittings are for EMERGENCY USE ONLY.
- 3.5. When the valve is ready for installation, remove the end protectors from both ends.
- 3.6. Inspect the valve internals, valve pipe connections and adjoining pipe to make sure they are free of damage, dirt and debris.
- 3.7. Install the valve in open position.
- 3.8. Flanged End Valves:
 - 3.8.1. After confirmation of bolting and gasket material, size and length, align the bolt holes of valve and pipe flanges.
 - 3.8.2. Insert gasket and bolts.
 - 3.8.2.1. To prevent unbalanced tightening and excessive stress on the bolting, the valve-to-pipeline alignment must be accurate.
 - 3.8.3. Follow standard piping practice regarding the bolting of the valve by tightening the bolting uniformly in a crosswise pattern.
 - 3.8.3.1. Uneven compression of the gasket/o-ring can occur if standard tightening sequences are not followed.
 - 3.8.3.2. Deformation of the gasket/o-ring can cause the valve to leak if the bolting is over-torqued.
 - 3.8.4. After installation, check and retighten bolting if necessary.
- 3.9. Weld End Valves:
 - 3.9.1. Verify that the weld area is clean. The weld area should be free of oil, dust, rust, paint or any other contaminants that could inhibit the welding process.
 - 3.9.2. Proper valve to pipe alignment should be verified. If necessary, make corrective adjustments.
 - 3.9.3. Any welding should be done by qualified personnel while using properly certified and approved welding procedures in accordance with all related regional codes and regulations
 - 3.9.4. Any weld process related heat applied to the valve body could damage the seat and seals.
 - 3.9.5. Minimize heat generated by welding to prevent damage to seat and seal.
 - 3.9.6. Perform localized post weld-heat treatment (PWHT) if necessary.
 - 3.9.7. Clean and inspect the weld
 - 3.9.8. After the weld is completed, the pipeline and valves should be flushed to remove any foreign contaminants.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 3 of 12

First Issue : 07/07/2011

Prepared By : X.Zhuang

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Rev. Date : 03/26/2013

Rev. No: 2

3.9.8.1. Use Caution during flushing to avoid trapping debris in the valve cavities that could damage or scratch the sealing surfaces.

- 3.10. Check with a piping engineer to assure that the pipeline stress is not concentrated on the valve.
- 3.11. For new construction, valve and line should be flushed to eliminate contaminants and debris prior to cycling the valve.

4. OPERATION

WARNING: To prolong the life of the seats, ensure that the ball valve is either fully OPEN or fully CLOSED. If the ball is left in the half-open position, damage could be caused to the soft seats.

- 4.1. Make sure the pipeline is clean.
- 4.2. Verify that the valve bolting is tightened to proper torque.
- 4.3. Make sure that the vent and drain lines are closed ⁽¹⁾.
- 4.4. Confirm that the ball is in the OPEN position when doing a pipeline pressure test.
- 4.5. Maximum permitted shell pressure test is 1.5 times working pressure of the valve.
- 4.6. Maximum permitted pipeline shell pressure test is 1.1 times working pressure of the valve while the valve is in closed position.
- 4.7. Directional closing is clockwise for both the lever and gear operated valves.
- 4.8. In the event a new operator such as lever, gear or actuator is installed, the open and close stops of the new operator shall be properly adjusted if needed and as minimum air seat test shall be performed prior to service.

5. MAINTENANCE

- 5.1. Maintenance intervals should be established and performed by the operational personnel according to service conditions.
- 5.2. Routine maintenance consists of tightening the valve bolting and checking for leakage.
- 5.3. Performance observations should be done periodically to ensure safety and function.
 - 5.3.1. More frequent observation is recommended for valves under extreme conditions.
- 5.4. It is highly recommended to operate the valve at least once a month and generally as often as possible, to avoid torque increase and prevent deposit formations.

6. OVERHAUL MAINTENANCE

- 6.1. Overhaul maintenance consists of replacing the seats and all seals. Replacement of ball and stem may be required. See Warning, Disassembly and Assembly section for part replacement.

7. DISASSEMBLY

NOTE: If complete disassembly becomes necessary, replacement of all soft goods such as o-rings, gaskets, and packings is recommended. Prior to disassembly, read the complete IMO including the Warning section.

7.1. BT3E/B(U) (Two Piece)

- 7.1.1. Verify the valve has been fully drained and depressurized per section 1, and close the valve for disassembly.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 4 of 12

First Issue : 07/07/2011

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Rev. Date : 03/26/2013

Rev. No : 2

- 7.1.2. Remove the lever or gear and the related hardware.
- 7.1.3. Stand the valve on the body (1) side flange. Use caution to not damage the flange sealing surface.
- 7.1.4. Mark the body-end cap connection, the trunnion-body connection, and the gland-body connection with a line of reference for reassembly.
- 7.1.5. For Lever Operated Valves:
- 7.1.5.1. Remove the lock plate (37), locking pin (40), and key (22).
 - 7.1.5.2. Remove the top plate-gland cap-screws (13.2), and top plate (10).
 - 7.1.5.3. Remove the gland-body cap-screws (13.1).
- Note:** Some models are only equipped with top plate-gland cap screw (13.2)
- 7.1.6. For Gear Operated Valves.
- 7.1.6.1. Remove the key (22).
 - 7.1.6.2. Remove the top plate-gland cap-screws (13.2) and top plate (10).
 - 7.1.6.3. Remove the gland-body cap-screws (13.1).
- Note:** Some models are only equipped with top plate-gland cap screw (13.2)
- 7.1.7. Pull the stem sub-assembly outward.
- 7.1.7.1. Stem sub-assembly consists of stem (4), packing (17), gland (8), gland o-ring (15.4), gland gasket (16.3), thrust washer (18), stem o-ring (15.3), anti-static devices (28, 29), and ball-upper bearing (21.2).
 - 7.1.7.1.1. To disassemble the stem sub-assembly, push the stem down through the gland. Separation of the remaining parts will complete this task.
- 7.1.8. Remove the trunnion-body cap-screws (13.3).
- 7.1.9. Remove the trunnion sub-assembly.
- 7.1.9.1. Trunnion sub-assembly consists of the trunnion (9), trunnion o-ring (15.5), and trunnion gasket (16.4).
- 7.1.10. Remove body-end cap bolting (11.1, 12).
- 7.1.11. Carefully lift and remove the end cap (2).
- 7.1.12. Stand the end cap (2) on the flanged end connection. Use caution to not damage the flange sealing surface.
- 7.1.13. Remove the ball sub-assembly and set it on a clean surface.
- 7.1.13.1. Ball sub-assembly consists of the ball (3), ball spacer (19.1), and ball-lower bearing (21.3).
- 7.1.14. Remove the seat sub-assemblies from the end cap (2) and body (1) seat pockets.
- 7.1.14.1. Seat sub-assembly consists of the seat (5), seat insert (7), and the seat o-ring (15.2).
- 7.1.15. Remove the seat springs (27).
- 7.1.16. Clean all metallic parts with industrial cleaner.
- 7.1.17. Inspect all parts for scratches and damages on critical surfaces.
- 7.1.18. Only use OEM replacement parts as needed.

7.2. BT3E(U) (Three Piece)



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
ISO0, ISO5, ISO7 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 5 of 12

First Issue : 07/07/2011

Prepared By : X.Zhuang

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Rev. Date : 03/26/2013

Rev. No: 2

- 7.2.1. Verify the valve has been fully drained and depressurized per section 1, and close the valve for disassembly.
- 7.2.2. Remove the lever or gear and related hardware.
- 7.2.3. Mark the body-end cap connection, the trunnion-body connection, and the gland-body connection with a line of reference for reassembly.
- 7.2.4. For Lever Operated Valves:
- 7.2.4.1. Remove the lock plate (37), key (22), and set screw (34).
 - 7.2.4.2. Remove the top plate-gland cap-screws (13.2), and top plate (10).
- 7.2.5. For Gear Operated Valves:
- 7.2.5.1. Remove the key (22) and pin (32) or set screw (32).
 - 7.2.5.2. Remove the top plate-gland cap-screws (13.2) and top plate (10).
- 7.2.6. Remove the gland-body cap-screws (13.1).
- Note:** Some models are only equipped with top plate-gland cap screw (13.2)
- 7.2.7. Pull the stem sub-assembly outward.
- 7.2.7.1. Stem sub-assembly parts consist of stem (4), packing (17), gland (8), gland o-ring (15.4), gland gasket (16.3), thrust washer (18), stem o-ring (15.3), anti-static devices (28, 29), and stem bearing (21.1).
 - 7.2.7.1.1. To disassemble the stem sub-assembly, push the stem down through the gland. Separation of the remaining parts will complete this task.
- 7.2.8. Stand the valve on the flanged end of one of the end caps (2). Use caution to not damage the flange sealing surface.
- 7.2.9. Remove the trunnion-body cap-screws (13.3).
- 7.2.10. Remove the trunnion sub-assembly.
- 7.2.10.1. Trunnion sub-assembly parts consist of the trunnion (9), trunnion o-ring (15.5), and trunnion gasket (16.4).
- 7.2.11. Remove the body-end cap bolting (11.1, 11.2⁽¹⁾, 12) from the upper end cap (2).
- 7.2.12. Carefully lift and remove the upper end cap (2).
- 7.2.13. Stand the end cap (2) on the flanged end connection. Use caution to not damage the flange sealing surface.
- 7.2.14. Remove the ball sub-assembly and set it on a clean surface.
- 7.2.14.1. Ball sub-assembly consists of the ball (3), ball spacer (19.1), and ball-lower bearing (21.3).
- 7.2.15. Remove the body-end cap bolting (11.1, 11.2⁽¹⁾, 12) from the lower end cap (2).
- 7.2.16. Using standard safety practices, remove the body (1) from the lower end cap (2).
- 7.2.17. Remove the seat and seat pusher sub-assemblies from the end cap (2) seat pockets.
- 7.2.17.1. Seat sub-assembly consists of the seat (5), seat insert (7), and the seat o-ring (15.2).
 - 7.2.17.2. Seat pusher sub-assembly consists of the seat pusher (6), seat springs (27), and seat gasket (16.2).
- 7.2.18. Clean all metallic parts with industrial cleaner.
- 7.2.19. Inspect all parts for scratches and damages on critical surfaces.
- 7.2.20. Only use OEM replacement parts as needed.



7.3. BT3E(U) with TRUNNION PLATES (Three Piece)

7.3.1. Verify the valve has been fully drained and depressurized per section 1, and close the valve for disassembly.

7.3.2. Remove the gear and related hardware.

7.3.3. Mark the body-end cap connection, the trunnion-body connection, and the gland-body connection with a line of reference for reassembly.

7.3.4. Remove the key (33) and the set screw (32).

7.3.5. Remove the top plate-body cap-screws (13.2) and top plate (10).

7.3.6. Remove the gland-body cap-screws (13.1).

Note: Some models are only equipped with top plate-gland cap screw (13.2)

7.3.7. Pull the stem and stem sub-assembly outward.

7.3.7.1. Stem sub-assembly parts consist of stem (4), packing (17), gland (8), gland o-ring (15.4), gland gasket (16.3), thrust washer (18), stem o-ring (15.3), anti-static devices (28, 29), and stem bearing (21.1).

7.3.7.2. To disassemble the stem sub-assembly, push the stem down through the gland. Separation of the remaining parts will complete this task.

7.3.8. Stand the valve on the flanged end of one of the end caps (2). Use caution to not damage the flange sealing surface.

7.3.9. Remove the body-end cap bolting (11.1, 11.2⁽¹⁾, 12) from the upper end cap (2).

7.3.10. Carefully lift and remove the end cap (2).

7.3.11. Stand the end cap (2) on the flanged end connection. Use caution to not damage the flange sealing surface.

7.3.12. Remove the ball and trunnion plate sub-assembly. Use caution to not scratch or damage any sealing surface.

7.3.12.1. Ball and trunnion plate sub-assembly consists of ball (3), trunnion plate (9), ball spacer (19.1), ball-upper bearing (21.2), ball-lower bearing (21.3), and pin (41).

7.3.13. Remove the trunnion plates (9) from the ball (3) and set all parts on a clean surface.

7.3.14. Remove the body-end cap bolting (11.1, 11.2⁽¹⁾, 12) from the lower end cap (2).

7.3.15. Using standard safety practices, remove the body (1) from the lower end cap (2).

7.3.16. Remove the seat and seat pusher sub-assemblies from the end cap (2) seat pockets.

7.3.16.1. Seat sub-assembly consists of the seat (5) seat insert (7), and the seat o-ring (15.2).

7.3.16.2. Seat pusher sub-assembly consists of the seat pusher (6), seat springs (27), and seat gasket (16.2).

7.3.17. Clean all metallic parts with industrial cleaner.

7.3.18. Inspect all parts for scratches and damages on critical surfaces.

7.3.19. Only use OEM replacement parts as needed.

8. ASSEMBLY

8.1. BT3E/B(U) (Two Piece)

8.1.1. Prior to assembly, verify all parts are free of scratches, damages, dirt and debris.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 7 of 12

First Issue : 07/07/2011

Prepared By : X.Zhuang

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Rev. Date : 03/26/2013

Rev. No : 2

- 8.1.2. Lubricate all moving parts and threaded connections. PTFE tape should be used on all NPT connections.
- 8.1.3. Assemble the seat sub-assemblies.
- 8.1.4. Assemble the stem and trunnion sub-assemblies.
- 8.1.5. Assemble the ball sub-assembly.
- 8.1.6. Stand the body (1) and end cap (2) onto their end flanges. Do not damage the flange sealing surface.
- 8.1.7. Install the seat springs (27) and seat sub-assemblies (with the seat insert (7) facing up) into the body and end cap seat pockets.
- 8.1.8. Place the ball sub-assembly onto the seat (5) in the body (1).
- 8.1.9. Rotate the ball (3) to the open position.
- 8.1.10. Center the ball (3) in the valve body (1).
- 8.1.11. Install the stem and trunnion sub-assembly through the body (1) into the ball (3).
- 8.1.12. Install body studs (11.1).
- 8.1.13. Place the end cap gasket (16.1) onto the end cap (2).
- 8.1.14. Install end cap o-ring (15.1) onto the end cap (2).
- 8.1.15. Place the end cap (2) on top of the body (1), and align the bolt holes according to the line of reference.
- 8.1.16. Install nuts (12).
- 8.1.17. Install top plate (10).
- 8.1.18. Install lock plate (37), locking pin (40), key (22), and lever adapter (32).
- 8.1.19. Install lever or gear and related hardware.
- 8.1.20. Verify the fully open and closed stops are set correctly.
- 8.1.21. After assembly, valve needs to be pressure tested per owner's specifications.
- 8.1.22. After testing, it is recommended to drain and dry the valve completely. Apply corrosive inhibitors to the machined surfaces, use protective end covers, and make sure the valve is in the fully open position.
- 8.1.23. Valve shall be marked as "repaired".

8.2. BT3E(U) (Three Piece)

- 8.2.1. Prior to assembly, verify all parts are free of scratches, damages, dirt and debris.
- 8.2.2. Lubricate all moving parts and threaded connections. PTFE tape should be used on all NPT connections.
- 8.2.3. Assemble the seat and seat pusher sub-assemblies.
- 8.2.4. Assemble the stem and trunnion sub-assemblies.
- 8.2.5. Assemble the ball sub-assembly.
- 8.2.6. With the end caps (2) sitting on their flanged ends, install the end cap gaskets (16.1) and the end cap o-rings (15.1).
- 8.2.7. Install the seat pusher sub-assemblies into the end cap (2) seat pockets with the seat springs (27) facing down.
- 8.2.8. Install the seat sub-assemblies into the end cap (2) seat pockets with the seat insert (7) facing up.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 8 of 12

First Issue : 07/07/2011

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Rev. No : 2

- 8.2.9. Install studs (11.1, 11.2⁽¹⁾) into the body.
- 8.2.10. Place the body (1) on top of one of the end caps (2) using your line of reference for alignment.
- 8.2.11. Center the ball (3) in the valve body (1).
- 8.2.12. Install the stem and trunnion sub-assembly through the body (1) into the ball (3).
- 8.2.13. Install nuts (12).
- 8.2.14. Place the end cap (2) on top of the body (1), and align the bolt holes according to the line of reference.
- 8.2.15. Install nuts (12).
- 8.2.16. Install top plate (10).
- 8.2.17. For lever operated valves, install lock plate (37), key (22), set screw (34), and lever adapter (32).
- 8.2.18. Install lever or gear and related hardware.
- 8.2.19. Verify the fully open and closed stops are set correctly.
- 8.2.20. After assembly, valve needs to be pressure tested per owner's specifications.
- 8.2.21. After testing, it is recommended to drain and dry the valve completely. Apply corrosive inhibitors to the machined surfaces, use protective end covers, and make sure the valve is in the fully open position.
- 8.2.22. Valve shall be marked as "repaired".

8.3. BT3E(U) with TRUNNION PLATES (Three Piece)

- 8.3.1. Prior to assembly, verify all parts are free of scratches, damages, dirt and debris.
- 8.3.2. Lubricate all moving parts and threaded connections. PTFE tape should be used on all NPT connections.
- 8.3.3. Assemble seat and seat pusher sub-assemblies.
- 8.3.4. Assemble stem and the ball-trunnion sub-assemblies.
- 8.3.5. With the end caps (2) sitting on their flanged ends, install the end cap gaskets (16.1) and the end cap o-rings (15.1).
- 8.3.6. Install the seat pusher sub-assemblies into the end cap (2) seat pockets with the seat springs (27) facing down.
- 8.3.7. Install the seat sub-assemblies into the end cap (2) seat pockets with the seat insert (7) facing up.
- 8.3.8. Align the pins (41) in the trunnion plate (9) to the pin holes in the end cap (2). Use caution while lowering the ball-trunnion plate sub-assembly to not scratch or damage any sealing surfaces.
- 8.3.9. Place the ball-trunnion sub-assembly into the end cap (2).
- 8.3.10. Install studs (11.2, 11.2⁽¹⁾) into the body.
- 8.3.11. Place the body (1) on top of the end cap (2) using your line of reference for alignment.
- 8.3.12. Install the stem sub-assembly through the body (1) into the ball (3).
- 8.3.13. Install nuts (12) onto the lower end cap-body connection.
- 8.3.14. Place the other end cap (2) on top of the body (1), and align the bolt holes according to the line of reference.
- 8.3.15. Install nuts (12) onto the upper end cap-body connection torque all nuts.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve
IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 9 of 12

First Issue : 07/07/2011

Prepared By : X.Zhuang

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Rev. No: 2

- 8.3.16. Install the top plate (10), gear, and related hardware.
- 8.3.17. Verify the fully open or closed stops are set correctly.
- 8.3.18. After assembly, valve needs to be pressure tested per owner's specifications.
- 8.3.19. After testing, it is recommended to drain and dry the valve completely. Apply corrosive inhibitors to the machined surfaces, use protective end covers, and make sure the valve is in the fully open position.
- 8.3.20. Valve shall be marked as "repaired".

9. DISPOSAL

- 9.1. If disposal of the valve is necessary, check with local environment authorities for disposal regulations.
- 9.2. Remove ISV nameplate, logo and markings before disposal to prevent improper usage.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve

IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO
002

Page : 10 of 12

First Issue : 07/07/2011

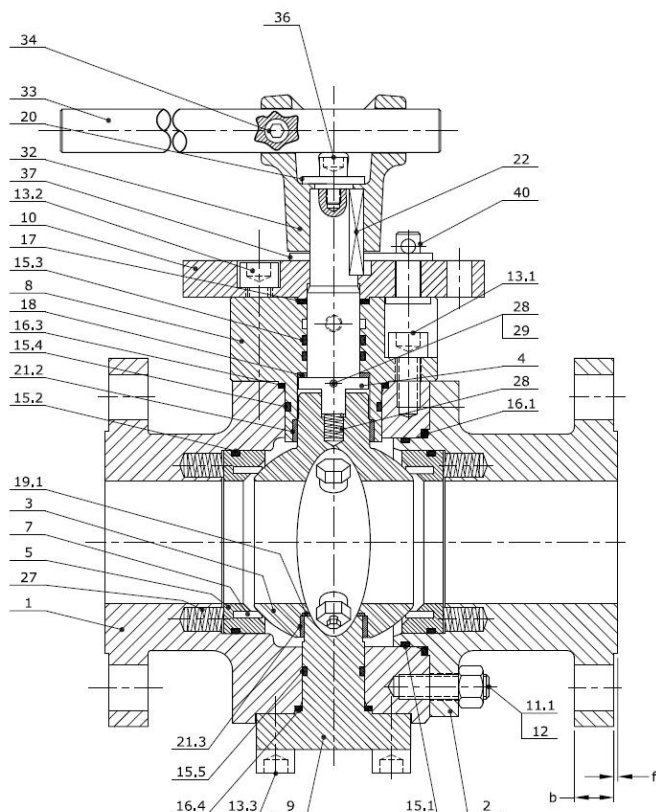
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Rev. No: 2

FIGURE 1 – LEVER OPERATED ISV BT3E/B(U) SERIES VALVE (TWO PIECE)



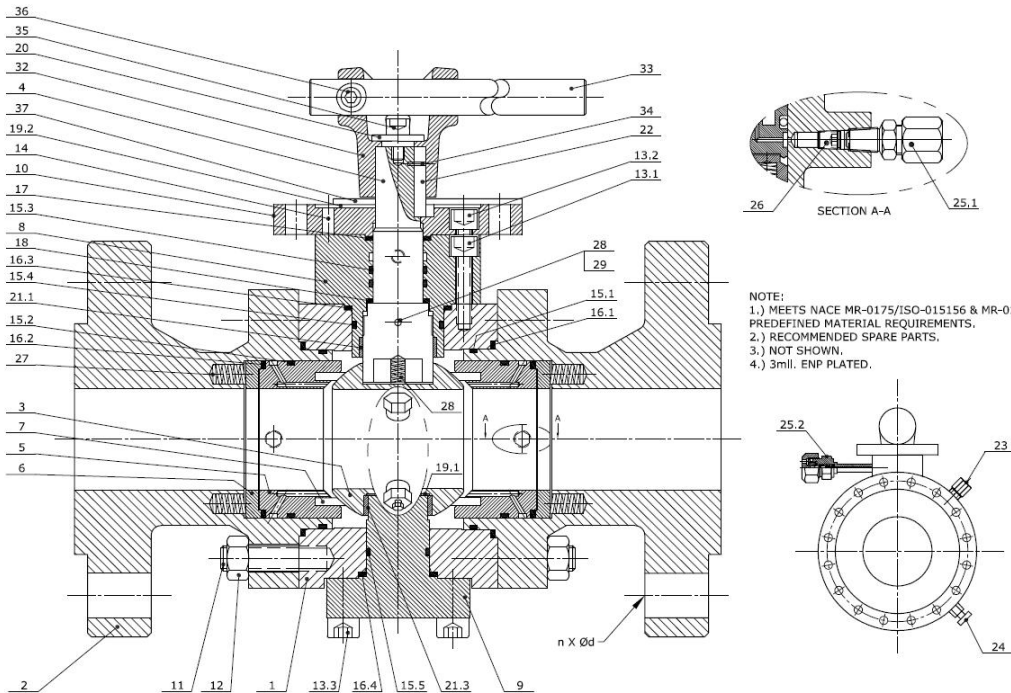
NOTE:
1.) MEETS NACE MR-0175/ISO-015156 & MR-0103 PREDEFINED MATERIAL REQUIREMENTS.
2.) RECOMMENDED SPARE PARTS.
3.) NOT SHOWN
4.) 3mil. ENP PLATED.
5.) ALTERNATE MAT'L: 4140+ENP

1	BODY	1
2	END CAP	1
3	BALL	1,4
4	STEM	1,4,5
5	SEAT	1,4
6		
7	SEAT INSERT	2
8	GLAND	1,4
9	TRUNNION	1,4,5
10	TOP PLATE	1
11.1	STUD; END CAP-BODY	1
11.2		
12	NUT; END CAP-BODY	1
13.1	CAP SCREW; GLAND-BODY	1
13.2	CAP SCREW; TOP PLATE-GLAND	1
13.3	CAP SCREW; TRUNNION-BODY	1
14	ALIGNMENT PIN	3.
15.1	O-RING; END CAP	2
15.2	O-RING; SEAT	2
15.3	O-RING; STEM	2
15.4	O-RING; GLAND	2
15.5	O-RING; TRUNNION	2
16.1	GASKET; END CAP	2
16.2		
16.3	GASKET; GLAND	2
16.4	GASKET; TRUNNION	2
17	STEM PACKING	2
18	STEM THRUST WASHER	2
19.1	SPACER; BALL	
19.2		
20	WASHER; STEM SCREW	1
21.1		
21.2	BEARING; BALL-UPPER	
21.3	BEARING; BALL-LOWER	
22	KEY	
23	VENT PLUG	
24	DRAIN VALVE	
25.1		
25.2	INJECTION FITTING; STEM	
26		
27	SEAT SPRING	
28	ANTISTATIC SPRING	
29	ANTISTATIC BALL	
30	RIVET	3
31	NAME PLATE	3
32	LEVER ADAPTER	
33	SEAMLESS PIPE	
34	SCREW	1
35		
36	LEVER BOLT	1
37	LOCK PLATE	
38		
39		
40	LOCKING PIN	

*This sketch is provided for reference only. For detailed information contact ISV.



FIGURE 2 – LEVER OPERATED ISV BT3E(U) SERIES VALVE (THREE PIECE)



NOTE:
 1.) MEETS NACE MR-0175/ISO-015156 & MR-0103
 PREDEFINED MATERIAL REQUIREMENTS.
 2.) RECOMMENDED SPARE PARTS.
 3.) NOT SHOWN.
 4.) 3ml. ENP PLATED.

1	BODY	
2	END CAP	
3	BALL	
4	STEM	
5	SEAT	
6	SEAT PUSHER	
7	SEAT INSERT	
8	GLAND	
9	TRUNNION	
10	TOP PLATE	
11.1	STUD; END CAP-BODY	
11.2		
12	NUT; END CAP-BODY	
13.1	CAP SCREW; GLAND-BODY	
13.2	CAP SCREW; TOP PLATE-GLAND	
13.3	CAP SCREW; TRUNNION-BODY	
14	ALIGNMENT PIN	
15.1	O-RING; END CAP	
15.2	O-RING; SEAT	
15.3	O-RING; STEM	
15.4	O-RING; GLAND	
15.5	O-RING; TRUNNION	
16.1	GASKET; END CAP	
16.2	GASKET; SEAT	
16.3	GASKET; GLAND	
16.4	GASKET; TRUNNION	
17	STEM PACKING	
18	STEM THRUST WASHER	
19.1	SPACER; BALL	
19.2	STOP PLATE SPACER	
20	WASHER; STEM SCREW	
21.1	BEARING; STEM	
21.2		
21.3	BEARING; BALL-LOWER	
22	KEY	
23	VENT PLUG	
24	DRAIN VALVE	
25.1	INJECTION FITTING; SEAT	
25.2	INJECTION FITTING; STEM	
26	INTERNAL CHECK VALVE	
27	SEAT SPRING	
28	ANTISTATIC SPRING	
29	ANTISTATIC BALL	
30	RIVET	
31	NAME PLATE	
32	LEVER ADAPTER	
33	SEAMLESS PIPE	
34	SET SCREW	
35	STEM SCREW	
36	LEVER BOLT	
37	LOCK PLATE	
38		
39		
40		

*This sketch is provided for reference only. For detailed information contact ISV.



ISV Installation, Maintenance and Operation Manual

API-6D Three Piece Trunnion Ball Valve

IS00, IS05, IS07 – BT3E(U), BT3E/B(U) Series

IMO

002

Page : 12 of 12

First Issue : 07/07/2011

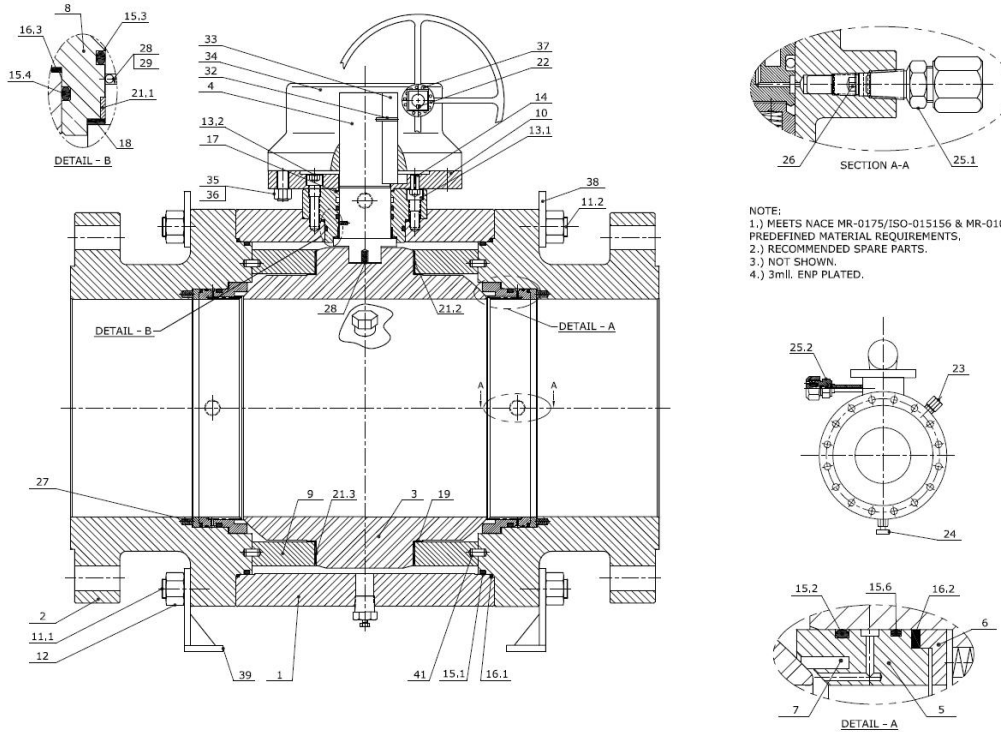
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FIGURE 3 – GEAR OPERATED ISV BT3E(U) SERIES VALVE (THREE PIECE)



NOTE:
 1.) MEETS NACE MR-0175/ISO-015156 & MR-0103
 PREDEFINED MATERIAL REQUIREMENTS,
 2.) RECOMMENDED SPARE PARTS.
 3.) NOT SHOWN.
 4.) 3mil. ENP PLATED.

1	BODY	1
2	END CAP	1
3	BALL	1,4
4	STEM	1,4
5	SEAT	1,4
6	SEAT PUSHER	1,4
7	SEAT INSERT	2
8	GLAND	1,4
9	TRUNNION	1,4
10	TOP PLATE	
11.1	STUD; END CAP-BODY	1
11.2	STUD; LIFTING EYE/SUPPORT LEG	
12	NUT; END CAP-BODY	1
13.1	CAP SCREW; GLAND-BODY	1
13.2	CAP SCREW; TOP PLATE-GLAND	1
13.3		
14	ALIGNMENT PIN	
15.1	O-RING; END CAP	2
15.2	O-RING; SEAT	2
15.3	O-RING; STEM	2
15.4	O-RING; GLAND	2
15.5		
15.6	O-RING; SEAT (SECONDARY)	2
16.1	GASKET; END CAP	2
16.2	GASKET; SEAT	2
16.3	GASKET; GLAND	2
16.4		
17	STEM PACKING	2
18	STEM THRUST WASHER	2
19.1	SPACER; BALL	2
19.2		
20		
21.1	BEARING; STEM	
21.2	BEARING; BALL-UPPER	
21.3	BEARING; BALL-LOWER	
22	KEY	
23	VENT PLUG	
24	DRAIN VALVE	
25.1	INJECTION FITTING; SEAT	
25.2	INJECTION FITTING; STEM	
26	INTERNAL CHECK VALVE	
27	SEAT SPRING	
28	ANTISTATIC SPRING	
29	ANTISTATIC BALL	
30	RIVET	3
31	NAME PLATE	3
32	SET SCREW	
33	KEY	
34	GEAR BOX	
35	GEAR STUD	1
36	GEAR NUT	1
37	LOCKING DEVICE	
38	LIFTING EYE	
39	SUPPORT LEG	
40		
41	PIN	

NOTES:

(1) – If the valve is equipped with item.