



## Maintenance Manual

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# 2" & 3" PFA Lined Top Discharge Ball Valves for AAR Tank Cars

Part Number: 370/P5XX, 370/P59XX  
360/P5XX, 360/P59XX







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## PFA Lined Ball Valves - AAR Specification

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## Important Safety Notice

**WARNING:** Vessels and systems operate under pressure and can contain dangerous cargo (liquid and vapour) that can cause death or serious injury to personnel.

### Precautions

Before you remove a valve from the vessel/system, you must:

- do a Hazard Identification and Risk Assessment.
- make sure the vessel/system is empty (liquid and vapour).
- make sure the vessel and valves have been cleaned correctly.
- make sure the vessel has been certified safe for human entry.
- make sure that the vessel/system pressure is at zero. When all the vessel/system pressure is released, use an approved method to release all residual pressure before you loosen the fasteners.
- read the SDS (Safety Data Sheet) for the last cargo and obey the recommended precautions.
- use the applicable PPE (Personal Protection Equipment) for the cargo and operating conditions.

### Approved Person

You must be an “approved person” to do valve maintenance and testing. An approved person:

- knows the function of the valve.
- knows how the valve is assembled, installed and operated.
- knows the operation limits of the valve.
- has experience and qualifications related to valve maintenance and testing.
- knows and obeys all the related in-company and regional/national regulations.

### After maintenance

When you have completed the maintenance, you must do an approved leak test to the valve before you install it onto the vessel.





## Introduction

### Maintenance Manual - PFA Lined Ball Valves: AAR Specification

## IMPORTANT

Read all the information and instructions before you start the procedure. Keep this manual.

## Overview

This maintenance manual contains instructions to do a seal replacement procedure to a 2" or 3" ASA 150 PFA lined ball valve with a Zirconium ball and spindle or with a PFA coated ball and spindle.

This manual is applicable to these valves:

Size	Ball/Spindle Material	Handle	Part No.	Data Sheet
2"	Zirconium	Without	370/P500	Appendix A
2"	Zirconium	With	370/P540X	
2"	PFA coated	Without	370/P595	
2"	PFA coated	With	370/P590X	Appendix B
3"	Zirconium	Without	360/P500	Appendix C
3"	Zirconium	With	360/P540X	
3"	PFA coated	Without	360/P595	
3"	PFA coated	With	360/P590X	Appendix D

Please refer to the data sheet in the Appendix for more information about these valves.

## Special Maintenance Precautions

**WARNING:** Zirconium powder, dust and granule is highly flammable. Do not remove any Zirconium material using a file or finishing machine. Do not make a change to a component unless it is approved by Fort Vale. Do a material risk assessment and obey all the recommended health and safety procedures.

To prevent injury to personnel and damage to the valve:

- obey all cautions and warnings.
- use the recommended tools.
- obey the recommended Bolting Sequence and Step Loading Procedure (See Appendix G).
- use the applicable PPE.
- read Client Responsibilities (see Appendix F).
- use genuine Fort Vale spare parts.

**CAUTION:** It is important not to cause damage to the PFA lining of the valve components. Put a clean cover on the work bench during maintenance to prevent damage. Do not use a damaged part, contact Fort Vale for a replacement.

## Replacement Parts

Identify your valve. The part number is marked on the edge of the body flange. Please contact Fort Vale to order new seal kits and replacement parts if necessary. Install only genuine spare parts. Use the spare parts dedicated for your valve type. Do not mix parts between Zirconium valves and PFA valves, the tolerances are different.

**WARNING:** If you install a replacement part that is not a genuine Fort Vale part, there is a risk of:

- injury to personnel.
- valve malfunction.
- permanent damage to the valve or tank.

## Tools & Equipment

You will need general workshop tools and a special tool to do maintenance on this type of ball valve. You can buy the special tool from Fort Vale. Please refer to Appendix E: Tools & Equipment.



## **Introduction**

### **Maintenance Manual - PFA Lined Ball Valves: AAR Specification**

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#### **Technical Support**

If you have a problem that you cannot solve using this manual, please contact us.

#### **Disclaimer**

Fort Vale reserves all rights to make technical modifications and improvements at any time. Fort Vale accepts no responsibility for any consequences arising from the use of the valve/ancillary and these instructions. Errors and omissions excepted.



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# CHAPTER 1

## Valve Disassembly

### 2" & 3" PFA Lined Ball Valves: AAR Specification

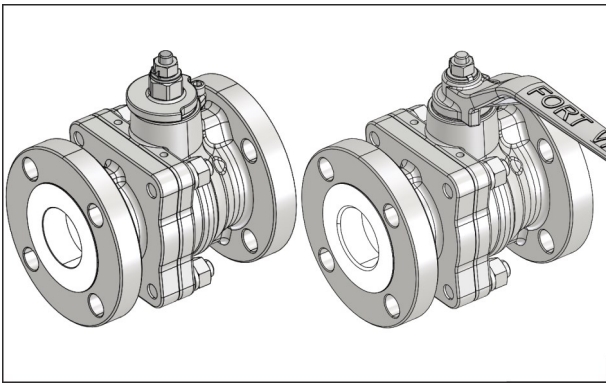
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This chapter contains instructions to fully disassemble the valve.

The illustrations show a 2" valve with a Zirconium ball and spindle, without a handle.

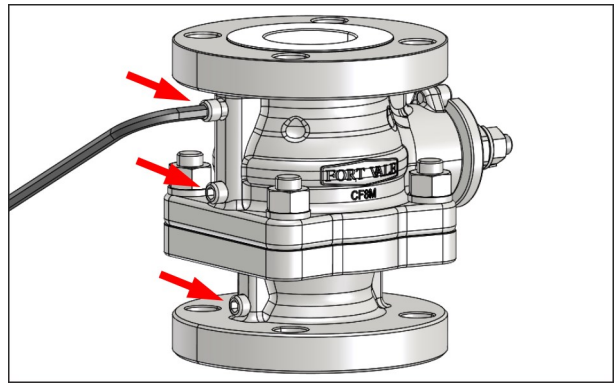
You can use this procedure for 2" and 3" valves, with Zirconium or PFA ball and spindle, with and without a handle.





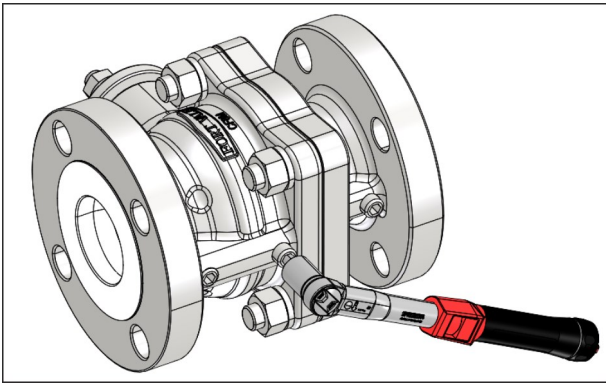
**Step 1.** Use this procedure to disassemble the ball valve to replace the main seals and the spindle seals. You can use this procedure for 2" or 3" valves, Zirconium or PFA ball, with or without handle.

**CAUTION:** Make sure that the valve has been cleaned correctly. Use the recommended PPE during this procedure. Protect the PFA lining from damage.

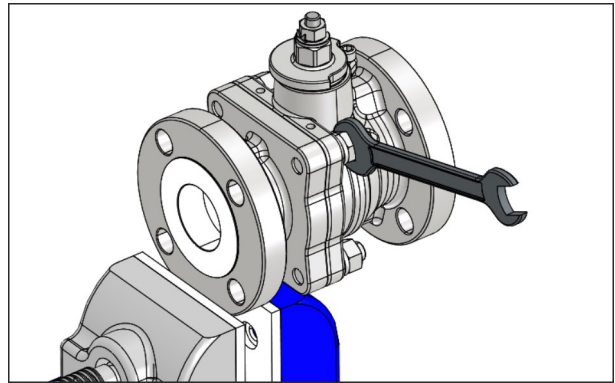


**Step 2.** Before you start to disassemble the valve, make sure there has been no leakage of product through the PFA body lining.

Use a 7/32" hex key to remove the 3x 5/16" UNC capscrews in the bottom of the body. Examine the threaded holes in the body for signs of product. If there are signs of product leakage, please contact Fort Vale.



**Step 3.** If there is no sign of leakage, install the 3x 5/16" UNC capscrews again. Use a 7/32" A/F socket to tighten the screws to a torque of 11.5 lbf.ft (15.5 Nm), unlubricated.

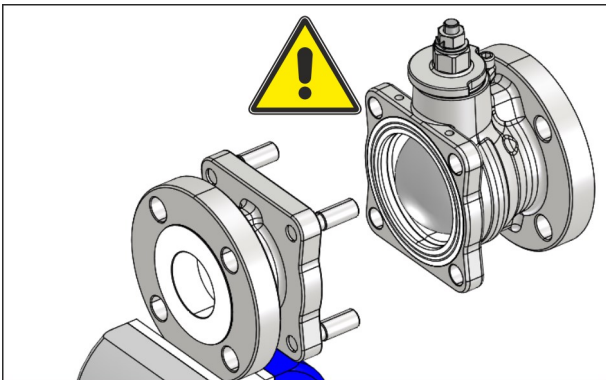


**Step 4.** Put the ball valve into the closed position. Hold the valve inlet flange in a soft jaws vice.

2" VALVE: Use a 7/8" A/F spanner

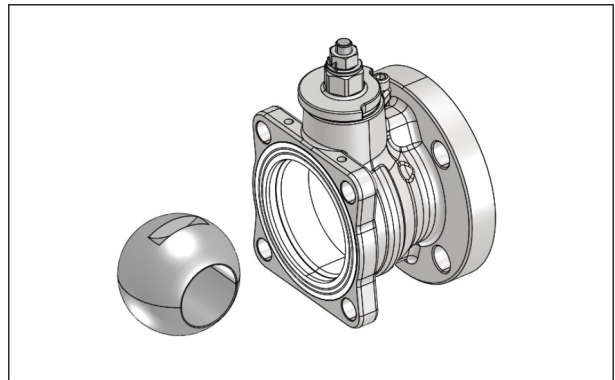
3" VALVE: Use a 3/4" A/F spanner

Remove the 4x 9/16" (2") or 6x 1/2" (3") nuts and washers.

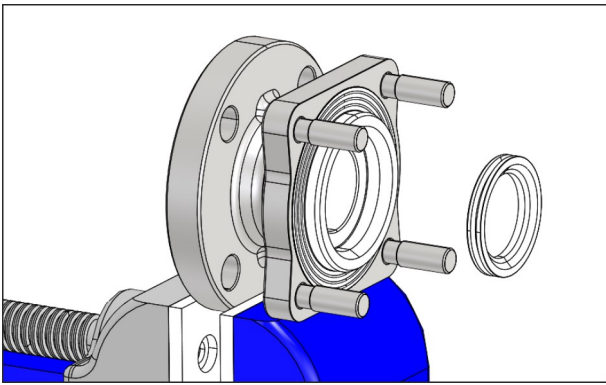


**Step 5.** Remove the valve body and ball.

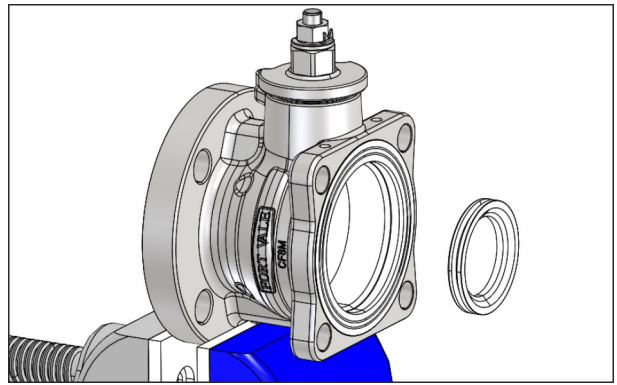
**CAUTION:** The ball is loose. Make sure it does not fall out of the body.



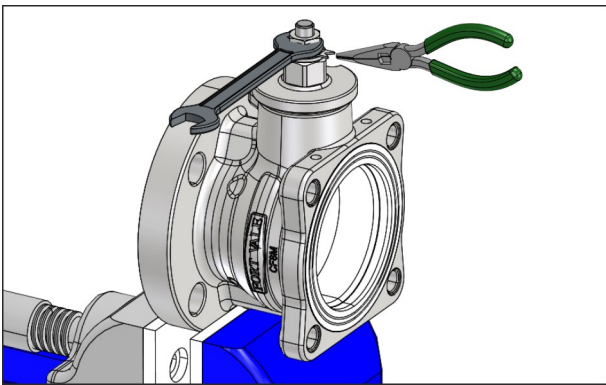
**Step 6.** Remove the ball and put it in a clean area.



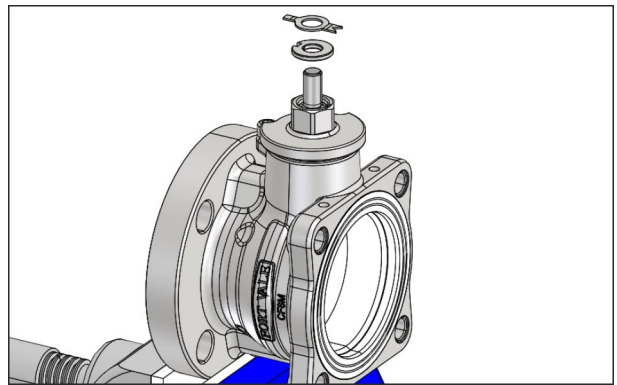
**Step 7.** Remove the main seal from the body inlet and discard it.  
Remove the body inlet from the vice.



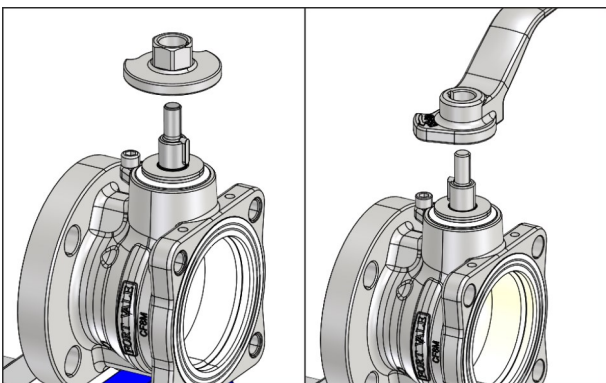
**Step 8.** Hold the valve body outlet flange in the soft-jaws vice.  
Remove the main seal and discard it.



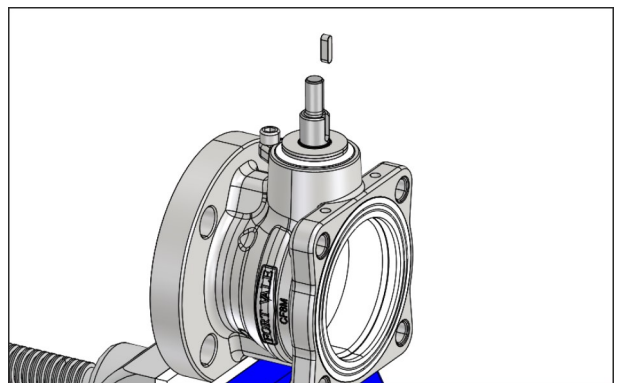
**Step 9.** Use pliers to straighten the tabs on the tab washer.  
Use a 11/16" A/F spanner to remove the 7/16" UNF full nut.



**Step 10.** Remove the tab washer. Remove the retaining washer.

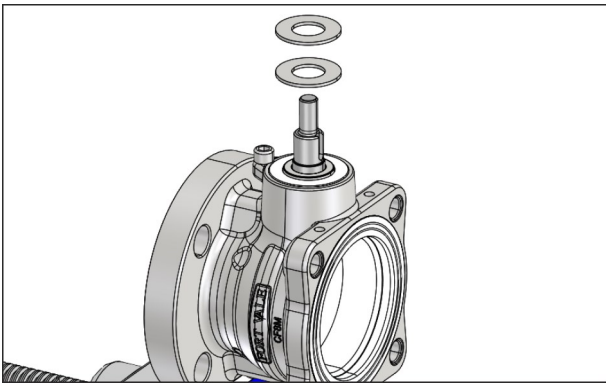


**Step 11.** Remove the stop plate or handle.

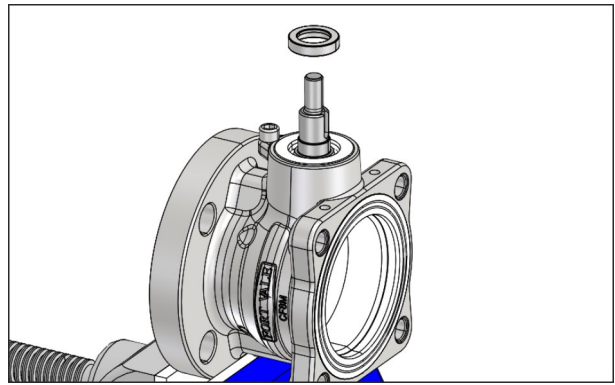


**Step 12.** Remove the keyway.

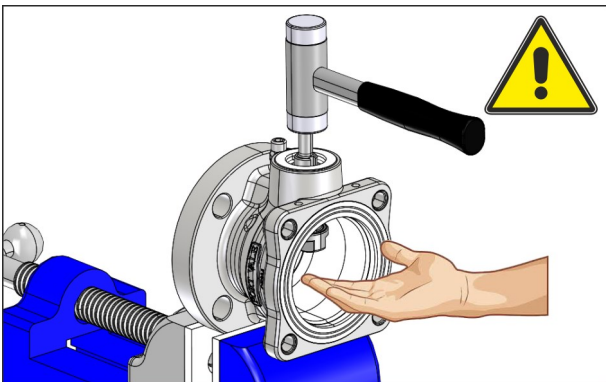




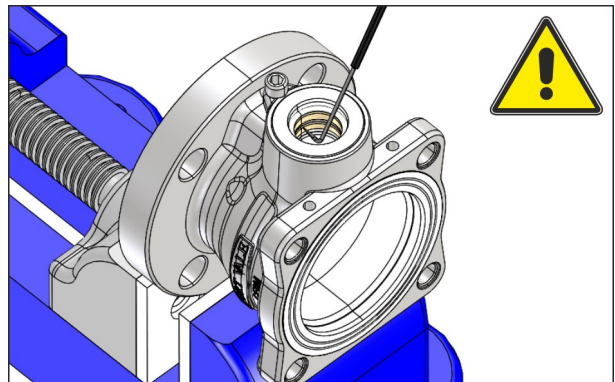
**Step 13.** Remove the 2x Belleville washers.



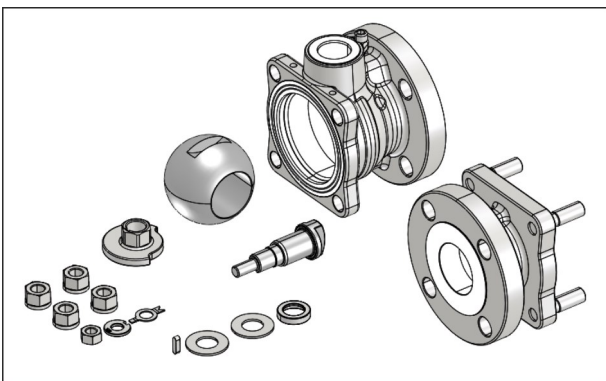
**Step 14.** Remove the stainless steel top stuffing collar.



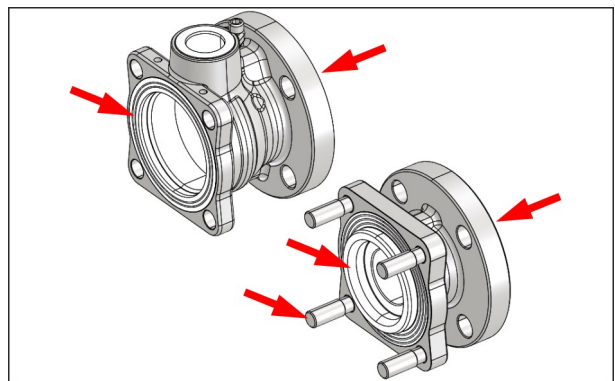
**Step 15.** Use a plastic mallet to tap the top of the spindle to disassemble it from the bore. Remove the spindle and put it in a clean area.  
**CAUTION:** Put your hand inside the valve body to hold the spindle and prevent damage to the PFA lining.



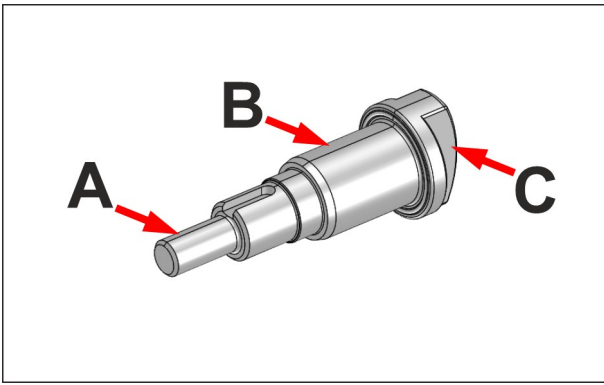
**Step 16.** Use a small pick to remove the 3x O rings and the 2x Peek stuffing collars. Discard the 3x O rings and 2x collars.  
**CAUTION:** Be careful not to cause damage to the PFA lining of the spindle housing bore.



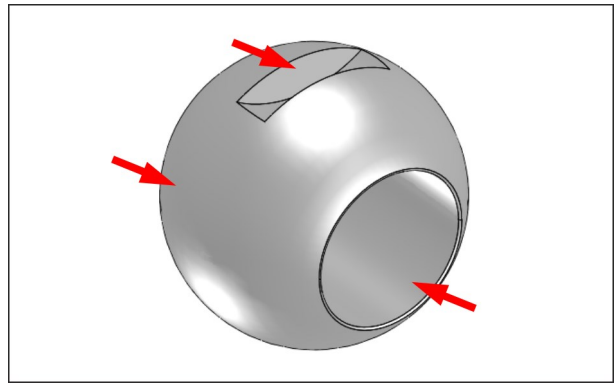
**Step 17.** Examine all the parts. Make sure they are clean and that there is no damage or corrosion. If there is damage, please contact Fort Vale. Do not use a damaged part, it will cause the valve to malfunction.



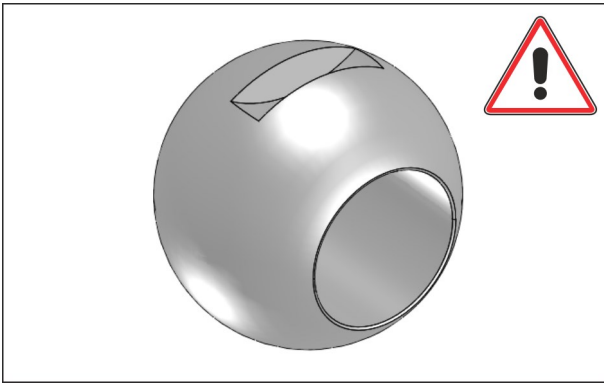
**Step 18.** BODY INLET & OUTLET: Look carefully at all the lined areas.  
STUDS: Examine the threads. Make sure all studs are installed tightly.  
If a stud is damaged, use the double-nut method to remove and replace the stud.



**Step 19. SPINDLE:** Look carefully at these areas:  
A. Thread  
B. Seal diameter  
C. Tang  
Make sure there is no distortion.  
If the spindle is PFA lined, make sure there is no damage to the PFA. If there is damage, install a new spindle.



**Step 20. BALL:** Look carefully at these areas:  
SLOT: Check for wear  
SURFACE & BORE: Make sure there are no deep scratches or pitting.  
If the ball is PFA lined, make sure there is no damage to the PFA. If there is damage, install a new ball.  
If the ball is Zirconium, read the next step for more information.



**Step 21. Zirconium ball:** It is usual to see light marks on the ball surface, caused during normal operation. If necessary, use an approved method to polish the surface of the ball. If there are deep scratches or pitting, install a new ball.

**WARNING:** Zirconium powder, dust or granule is highly flammable. Do a material risk assessment and obey all the recommended health and safety precautions.



**Step 22.** This procedure is complete.  
Go to Chapter 2 - Seal Replacement and Valve Assembly.





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# CHAPTER 2

## Seal Replacement & Valve Assembly

### 2" & 3" PFA Lined Ball Valves: AAR Specification

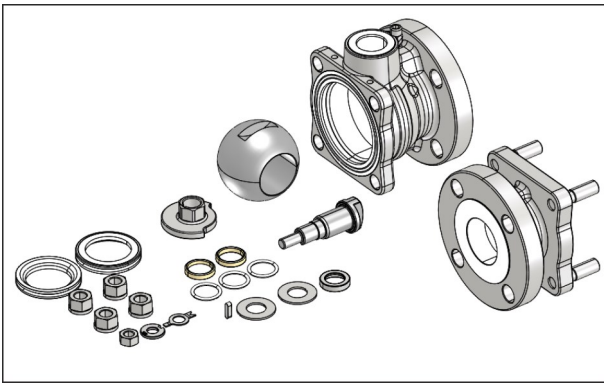
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This chapter contains instructions to replace the spindle seals and main seals and to assemble the valve.

The illustrations show a 2" valve with a Zirconium ball and spindle, without a handle.

You can use this procedure for 2" and 3" valves, with Zirconium or PFA ball and spindle, with and without a handle.



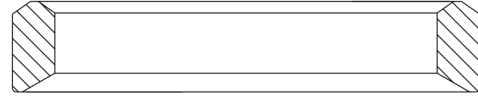


**TOP & BOTTOM STUFFING COLLAR**

**TOP COLLAR: PART NO. 370/P512**



**BOTTOM COLLAR: PART NO. 370/P513**



**Step 23.** Use this procedure to replace the seals and assemble the valve.

You can use this procedure for 2" or 3" valves, Zirconium or PFA ball, with or without handle.

**CAUTION:** Make sure that all the parts have been examined and that there is no damage.

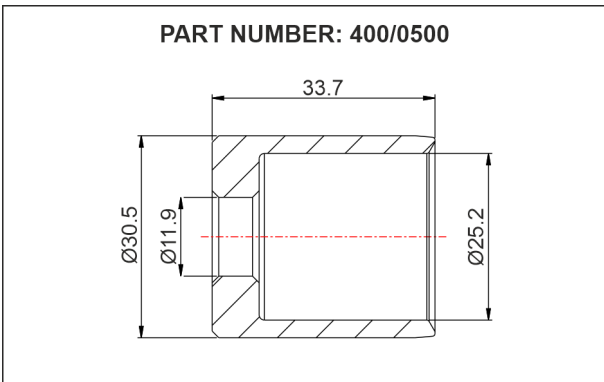
**Step 24.** Select the applicable seal kit:

2" valve: PFA or Zirconium ball, part no. 370/P5SK

3" valve with PFA ball, part no. 360/P59SK

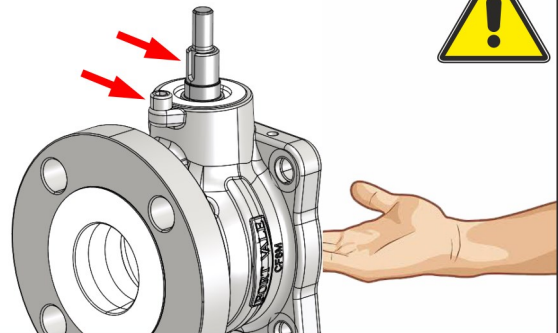
3" valve with Zirconium ball, part no. 360/P5SK

**NOTE:** The top and bottom stuffing collar are almost the same. Identify each part and orient them correctly. Examine the seals to make sure there is no damage.



**PART NUMBER: 400/0500**

**VALVE WITH HANDLE**



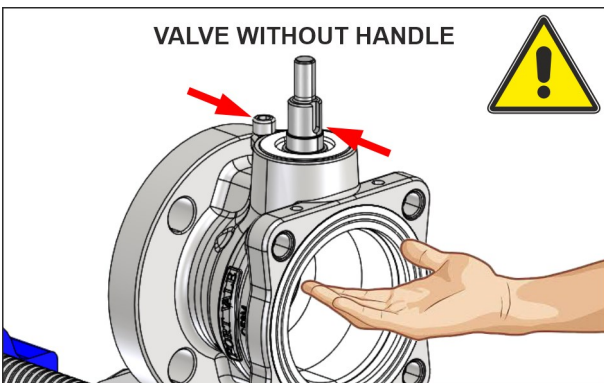
**Step 25.** You will need a special spindle stuffing tool, part no. 400/0500 to install the spindle O rings and stuffing collars.

You can buy the tool from Fort Vale.

**Step 26. VALVE WITH HANDLE:** Hold the valve body in a soft-jaws vice.

Install the spindle with the keyway at the same side as the stop bolt. If necessary, hold the spindle inside the valve until the tool is installed.

**CAUTION:** Be careful not to cause damage to the PFA lined surfaces, i.e. body, spindle bore, spindle (if lined). Do not let the spindle fall into the body.

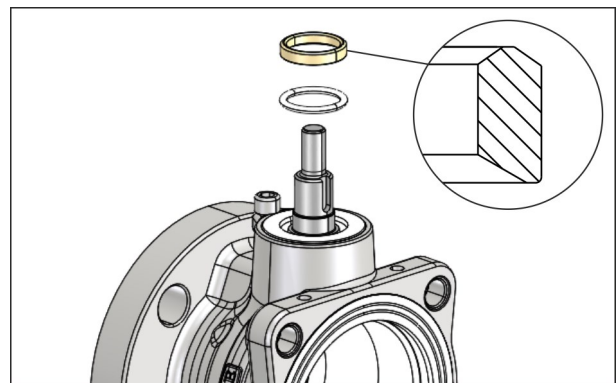


**VALVE WITHOUT HANDLE**

**Step 27. VALVE WITHOUT HANDLE:** Hold the valve body in a soft-jaws vice.

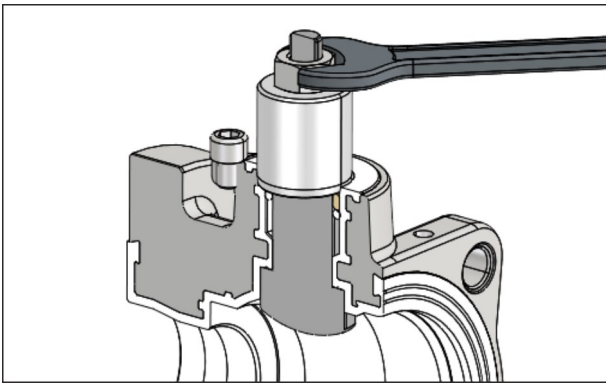
Install the spindle with the keyway at the opposite side to the stop bolt. If necessary, hold the spindle inside the valve until the tool is installed.

**CAUTION:** Be careful not to cause damage to the PFA lined surfaces, i.e. body, spindle bore, spindle (if lined). Do not let the spindle fall into the body.

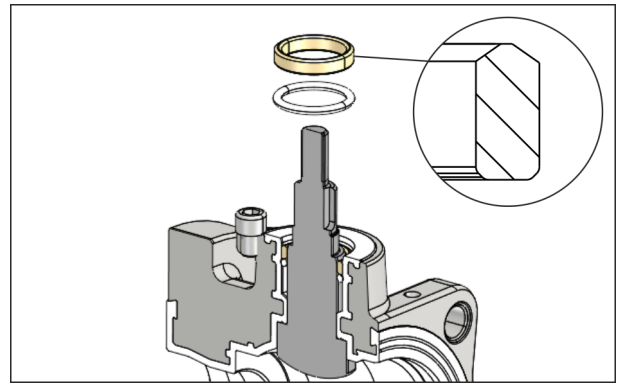


**Step 28.** Install 1x PTFE O ring and the bottom stuffing collar onto the spindle.

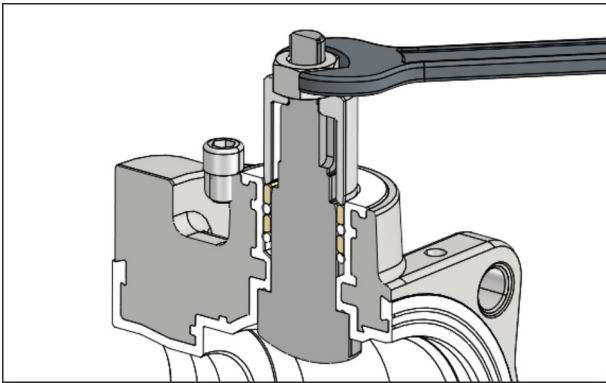
**CAUTION:** Make sure you orient the stuffing collar correctly.



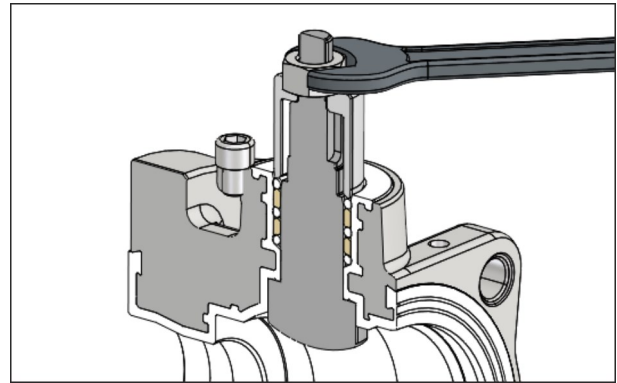
**Step 29.** Install the stuffing tool and the 7/16" UNF full nut.  
Use an 11/16" A/F spanner to tighten the nut and push the O ring and collar into the correct position.



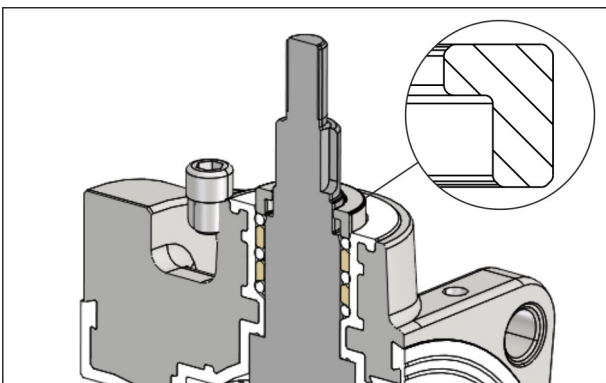
**Step 30.** Remove the nut and tool.  
Install 1x PTFE O ring and the top stuffing collar.  
**CAUTION:** Make sure you orient the stuffing collar correctly.



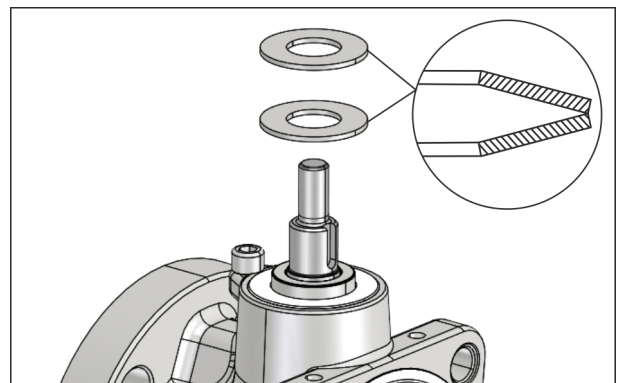
**Step 31.** Install the stuffing tool and the 7/16" UNF full nut.  
Use an 11/16" A/F spanner to tighten the nut and push the O ring and collar into the correct position.



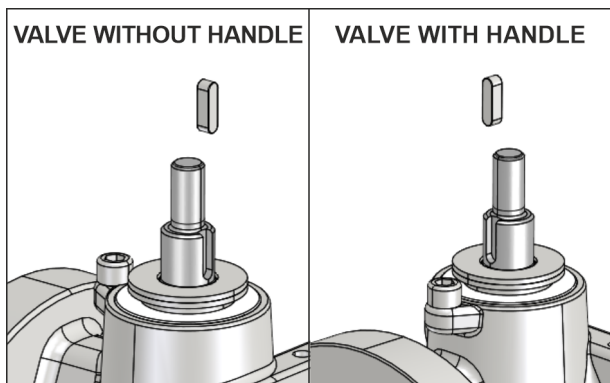
**Step 32.** Remove the nut and tool.  
Install 1x PTFE O ring.  
Install the stuffing tool and the 7/16" UNF full nut.  
Use an 11/16" A/F spanner to tighten the nut and push the O ring into the correct position.



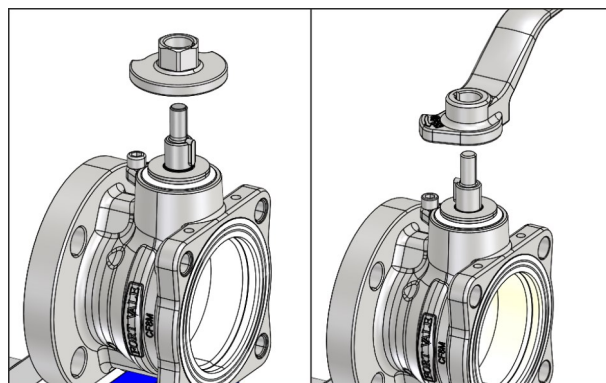
**Step 33.** Remove the nut and tool.  
Install the stainless steel top collar.  
**CAUTION:** Make sure you orient the top collar correctly.



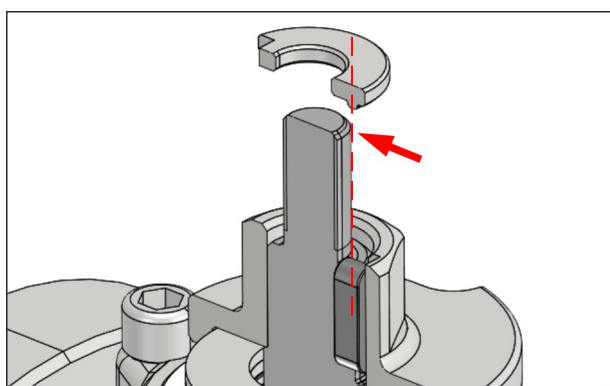
**Step 34.** Install the 2x Belleville washers with the concave faces touching.



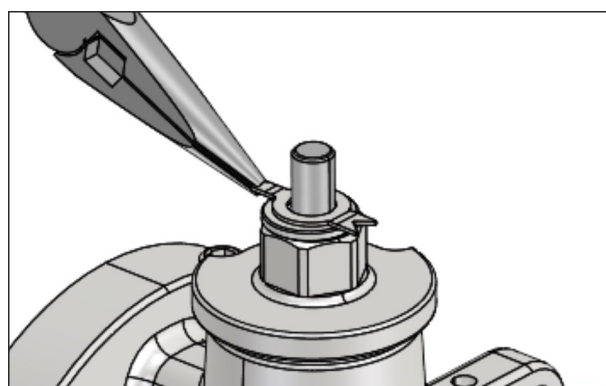
**Step 35.** Install the keyway.



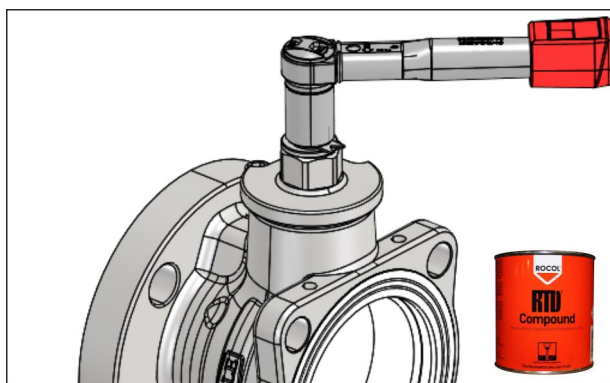
**Step 36.** Install the stop plate or handle. Note that the handle is dedicated left-handed or right-handed. If you need to change to the opposite opening, contact Fort Vale for a replacement handle.



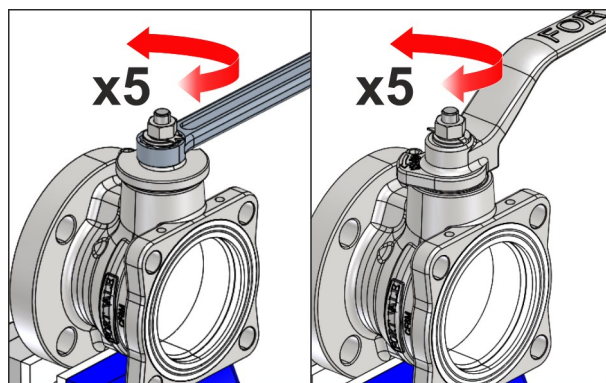
**Step 37.** Install the retaining washer with the tang face down. Engage the tang into the slot on the handle/stop plate.



**Step 38.** Install the tab washer with the tang into the slot on the retaining washer and handle/stop plate. If necessary, bend the tang on the tab washer down.



**Step 39.** Apply a small amount of anti-galling paste e.g. Rocol ® Anti-Seize Stainless to the spindle thread. Install the 7/16" UNF full nut. Use a 11/16" A/F spanner to tighten the nut to a torque of 30 lbf.ft (40 Nm)



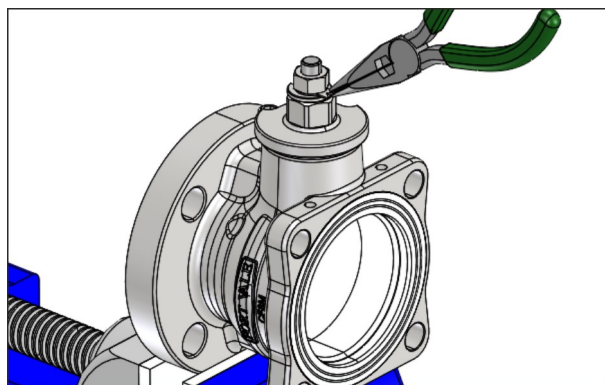
**Step 40.** Use an 11/16" box-end spanner/operate the handle to put the valve in the open and closed position x5. Check for smooth operation.



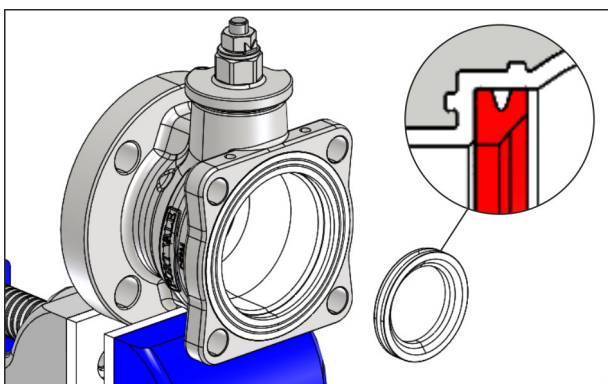


## Troubleshooting

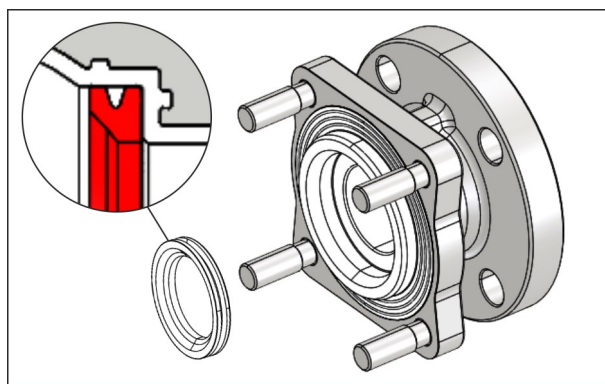
**Step 41.** If the operation is not smooth, find the cause of the problem before you continue with the procedure.



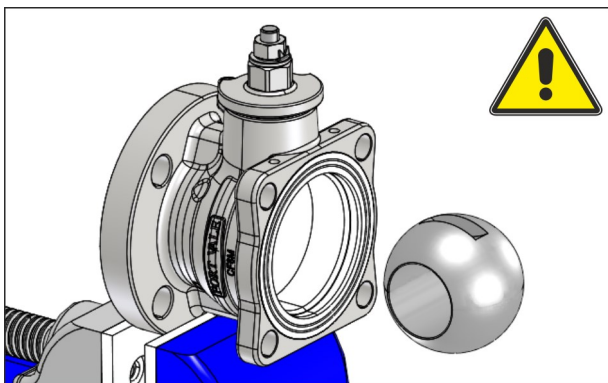
**Step 42.** If the operation is smooth, bend the washer tabs up to safety the 7/16" UNF nut.



**Step 43.** Select the main seals. Orient the seal correctly and install 1x seal into the valve body.

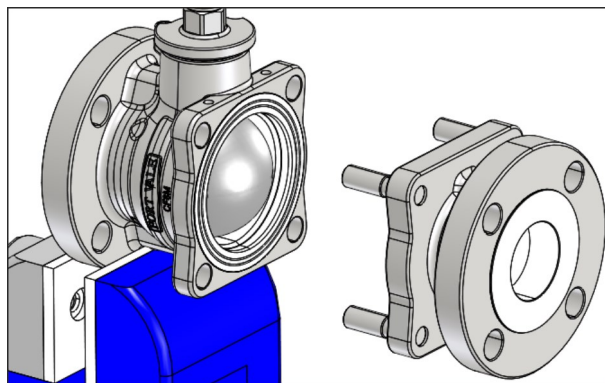


**Step 44.** Orient the seal correctly and install 1x seal into the body inlet flange.

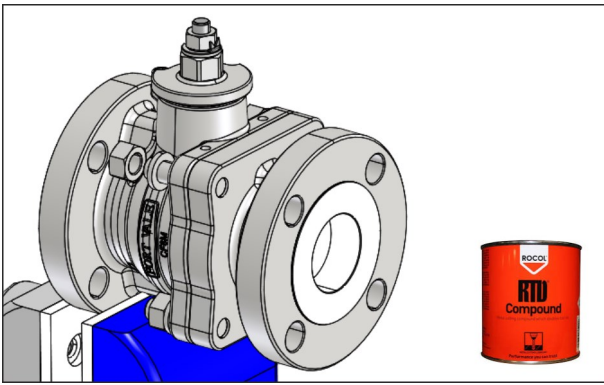


**Step 45.** Install the ball. Be careful not to cause damage to the ball.

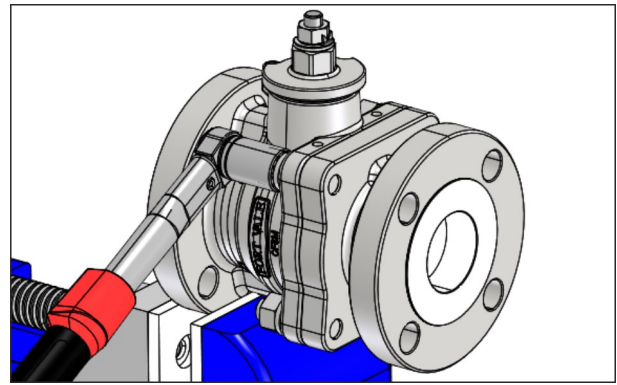
**CAUTION:** Do not let the ball fall out of the valve body.



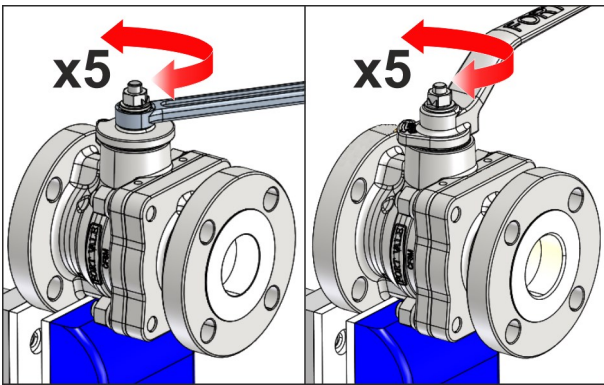
**Step 46.** Orient the body inlet flange with the test plug capscrew at the bottom. Install the body inlet flange onto the valve body. Do not install a gasket.



**Step 47.** Apply a small amount of anti-galling paste e.g. Rocol® Anti-Seize Stainless to the studs.  
 2" VALVE: Install the 4x 9/16" spring washers and nuts.  
 3" VALVE: Install the 6x 1/2" spring washers and nuts.  
**CAUTION:** Make sure the valve is in the closed position before you tighten the nuts.



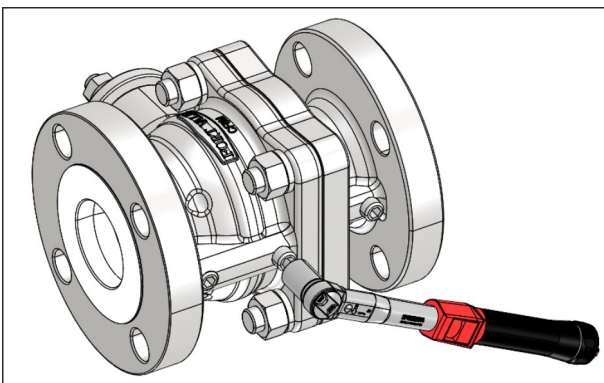
**Step 48.** 2" VALVE: Use a 7/8" A/F spanner to tighten the nuts in a diametrically opposite sequence to a torque of 55 lbf.ft (74 Nm).  
 3" VALVE: Use a 3/4" A/F spanner to tighten the nuts in a diametrically opposite sequence to a torque of 40 lbf.ft (54 Nm).



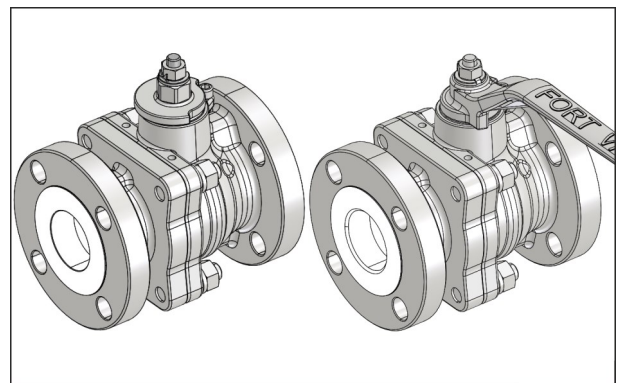
**Step 49.** Use an 11/16" box-end spanner/operate the handle to put the valve in the open and closed position x5. Check for smooth operation. Make sure the stop plate touches the stop bolt when the valve is in the open and closed position. Look inside the bore of the valve to make sure the valve is fully open and fully closed.



**Step 50.** If the operation is not satisfactory, find the cause of the problem. Check that there is no wear to the ball slot or the spindle.



**Step 51.** If the operation is satisfactory, remove the valve from the vice. Use a 7/32" A/F socket to check the torque of the 3x test plug cap screws. Target torque: 11.5 lbf.ft (15.5 Nm) unlubricated.



**Step 52.** This procedure is complete. Do an AAR approved leak test before you install the valve onto the vessel. Keep the valve in a clean plastic bag in a clean area until you install the valve onto the vessel.







# APPENDIX

## PFA Lined Ball Valves - AAR Specification

### Maintenance Manual

A	Data Sheet: USBALL043 2" PFA Lined Ball Valve - Zirconium ball & spindle, no handle	21
B	Data Sheet: USBALL049 2" PFA Lined Ball Valve - PFA lined ball & spindle, with handle	23
C	Data Sheet: USBALL044 3" PFA Lined Ball Valve - Zirconium ball & spindle, no handle	25
D	Data Sheet: USBALL050 3" PFA Lined Ball Valve - PFA lined ball & spindle, with handle	27
E	Tools & Equipment	29
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G	Bolt Torque Guide & Step Loading Procedure	31





# 2" ASA 150 PFA Lined Ball Valve: AAR Specification

Part No: 370/P500 - Zirconium Ball & Spindle



## Specification

### Nominal size

2" (50mm)

### Tank connection

Flanged: 4 x 0.75" holes on a 4.75" PCD - 2" ASA 150

### Outlet/Process connection

Flanged: 4 x 0.75" holes on a 4.75" PCD - 2" ASA 150

### Properties

No operating handle supplied

### Materials

Valve body: 316 stainless steel with PFA lining

Ball & spindle: zirconium

Main seal: RTFE

### Options

Refer to Range

## Design Conditions

Weight:	28.7 Lb (13.0 Kg)
Cold Working Pressure (CWP):	275.5 PSI (19.0 Bar)
Test Pressure:	413.3 PSI (28.5 Bar)
Design Temperature Min:	-20°F (-29°C)
Design Temperature Max:	266°F (130°C)

**NOTE:** The Design Conditions and Section View dimensions are for the specified part number only.

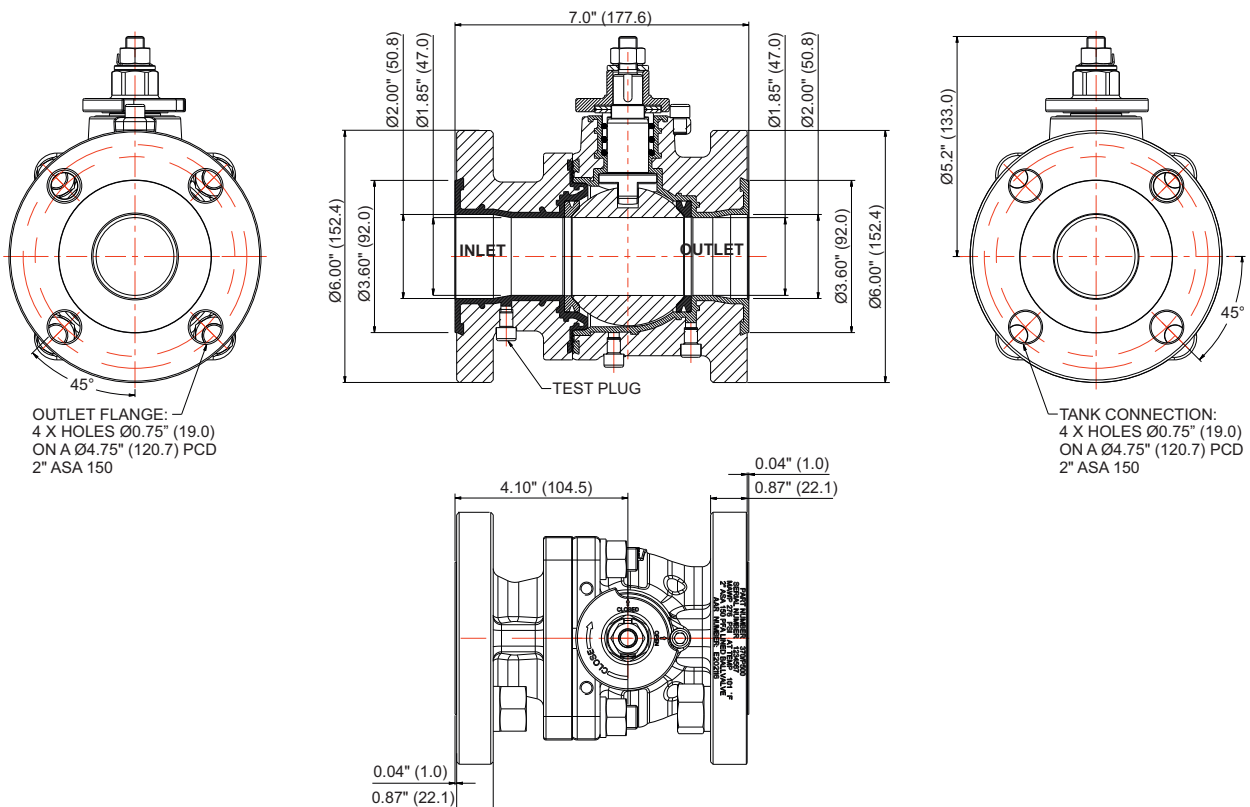
## Approvals

AAR Approval Number: E202116

## Range

Description	Part No.
No operating handle	370/P500
With operating handle	370/P540

## Section View

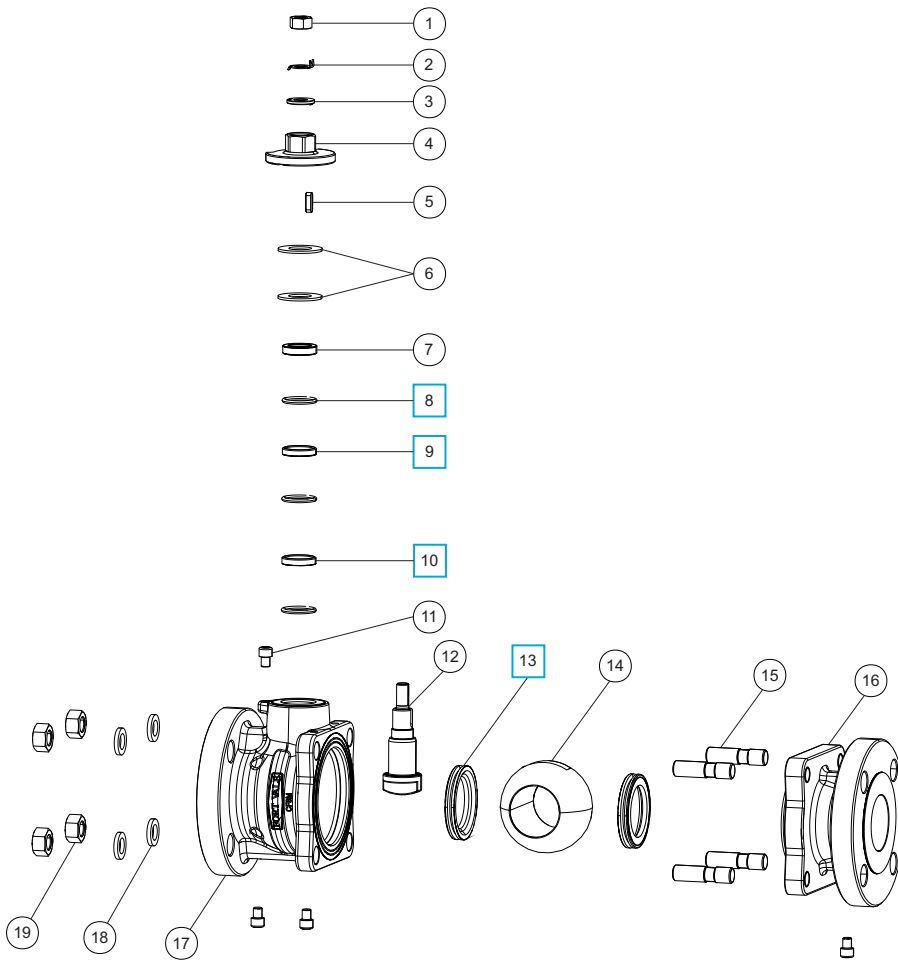




# 2" ASA 150 PFA Lined Ball Valve: AAR Specification

## Part No: 370/P500 - Zirconium Ball & Spindle

### Parts Drawing



### Parts List

Item	Description	Part No.
1	7/16" full nut	5122-178
2	Tab washer	370/P553
3	Retaining washer	370/P554
4	Handle boss & stop plate	370/P558
5	5mm keyway key	370/P511
6	20mm Belleville washer (2)	5113-041
7	St/steel top stuffing collar	370/P514
8	PTFE O ring (3)	5005-654 <span style="border: 1px solid blue; padding: 0 2px;"> </span>
9	PEEK top stuffing collar	370/P512 <span style="border: 1px solid blue; padding: 0 2px;"> </span>
10	PEEK bottom stuffing collar	370/P513 <span style="border: 1px solid blue; padding: 0 2px;"> </span>
11	5/16" UNC capscrew (4)	5121-241
12	Keyway spindle	370/P507S
13	RTFE main seal (2)	370/P505/1 <span style="border: 1px solid blue; padding: 0 2px;"> </span>
14	2" solid ball	370/P508S
15	9/16" stud (4)	312/1036
16	PFA lined body inlet	370/P504
17	PFA lined body	370/P501
18	9/16" spring washer (4)	5123-013
19	9/16" full nut (4)	251/0086

### Seal Kit

Description	Part No.
All parts marked <span style="border: 1px solid blue; padding: 0 2px;"> </span> in the Parts List	370/P5SK



# 2" ASA 150 PFA Lined Ball Valve: AAR Specification

Part No: 370/P590X - PFA Lined Ball & Spindle



## Specification

### Nominal size

2" (DN50)

### Tank connection

Flanged: 4 x 0.75" holes on a 4.75" PCD - 2" ASA 150

### Outlet/Process connection

Flanged: 4 x 0.75" holes on a 4.75" PCD - 2" ASA 150

### Materials

Valve body: 316 stainless steel with PFA lining

Ball & spindle: PFA lined

Main seal: RTFE

### Options

Refer to Range

## Design Conditions

Weight:	27.7 Lb (12.6 Kg)
Cold Working Pressure (CWP):	100.1 PSI (6.9 Bar)
Test Pressure:	159.5 PSI (11.0 Bar)
MAWP at Max. Design Temp:	79.9 PSI (5.51 Bar)
Design Temperature Min:	-40°F (-40°C)
Design Temperature Max:	266°F (130°C)

**NOTE:** The Design Conditions and Section View dimensions are for the specified part number only.

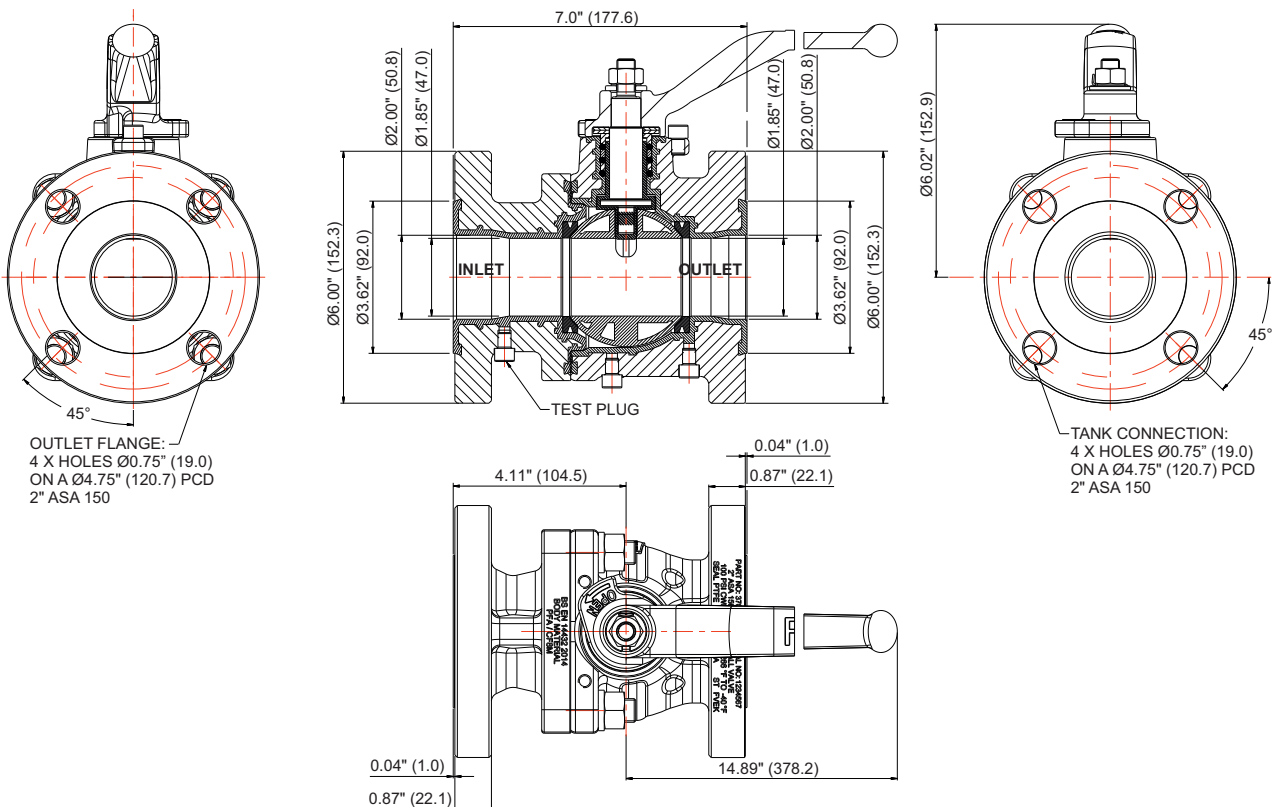
## Approvals

AAR Approval Number: E222122

## Range

Description	Part No.
Left hand operated	370/P590L
Right hand operated	370/P590R
No operating handle	370/P595

## Section View

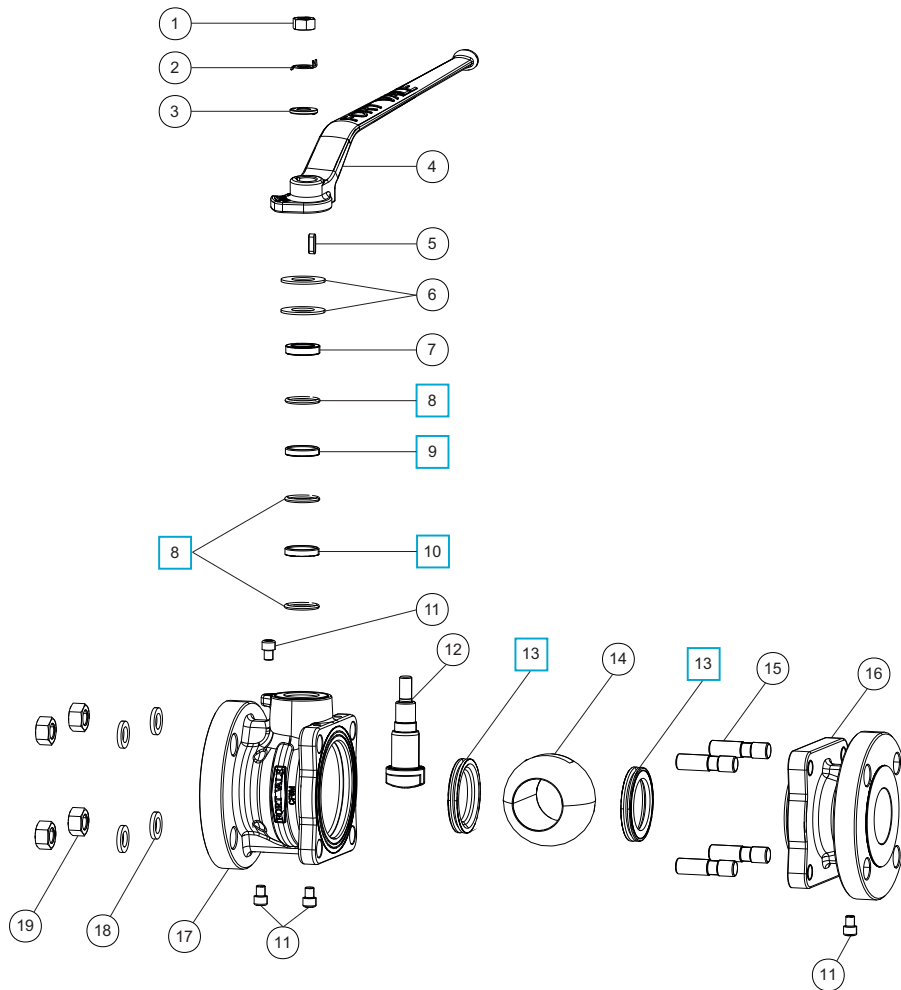




# 2" ASA 150 PFA Lined Ball Valve: AAR Specification

Part No: 370/P590X - PFA Lined Ball & Spindle

## Parts Drawing



## Parts List

Item	Description	Part No.
1	7/16" full nut	5122-178
2	Tab washer	370/P553
3	Retaining washer	370/P554
4	Handle - left-handed (shown) Handle - right-handed	370/P544 370/P545
5	5mm keyway key	370/P511
6	20mm Belleville washer (2)	5113-041
7	St/steel top stuffing collar	370/P514
8	PTFE O ring (3)	5005-654 <input type="checkbox"/>
9	PEEK top stuffing collar	370/P512 <input type="checkbox"/>
10	PEEK bottom stuffing collar	370/P513 <input type="checkbox"/>
11	5/16" UNC capscrew (4)	5121-241
12	PFA lined keyway spindle	370/P506
13	RTFE main seal (2)	370/P505/1 <input type="checkbox"/>
14	2" PFA lined ball	370/P508
15	9/16" stud (4)	312/1036
16	PFA lined body inlet	370/P504
17	PFA lined body	370/P501
18	9/16" spring washer (4)	5123-013
19	9/16" full nut (4)	251/0086

## Seal Kit

Description	Part No.
All parts marked <input type="checkbox"/> in the Parts List	370/P5SK



# 3" ASA 150 PFA Lined Ball Valve: AAR Specification

Part No: 360/P500 - Zirconium Ball & Spindle



## Specification

### Nominal size

3" (80mm)

### Tank connection

Flanged: 4 x 0.75" holes on a 6.0" PCD - 3" ASA 150

### Outlet/Process connection

Flanged: 4 x 0.75" holes on a 6.0" PCD - 3" ASA 150

### Properties

No operating handle supplied

### Materials

Valve body: 316 stainless steel with PFA lining

Ball & spindle: zirconium

Main seal: RTFE

### Options

Refer to Range

## Design Conditions

Weight:	46.5 Lb (21.1 Kg)
Cold Working Pressure (CWP):	275.5 PSI (19.0 Bar)
Test Pressure:	413.3 PSI (28.5 Bar)
Design Temperature Min:	-20°F (-29°C)
Design Temperature Max:	266°F (130°C)

**NOTE:** The Design Conditions and Section View dimensions are for the specified part number only.

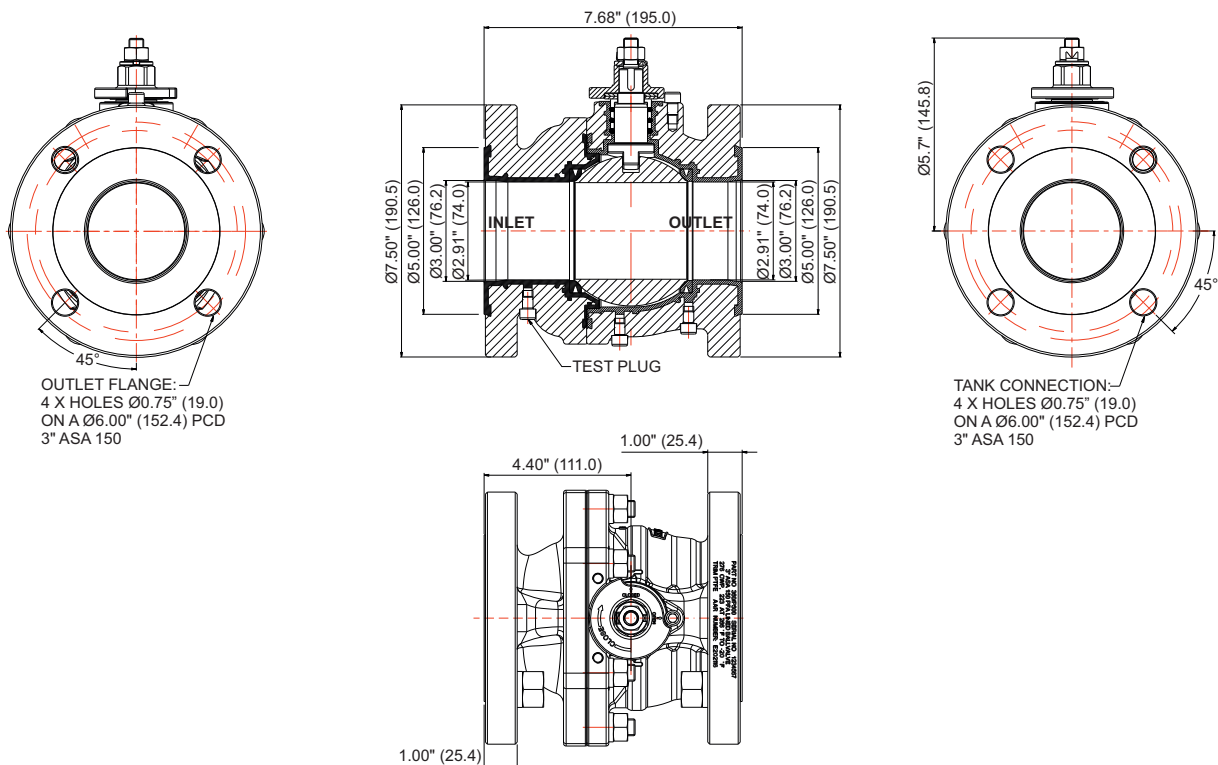
## Approvals

AAR Approval Number: E202117

## Range

Description	Part No.
No operating handle	360/P500
With operating handle	360/P540

## Section View

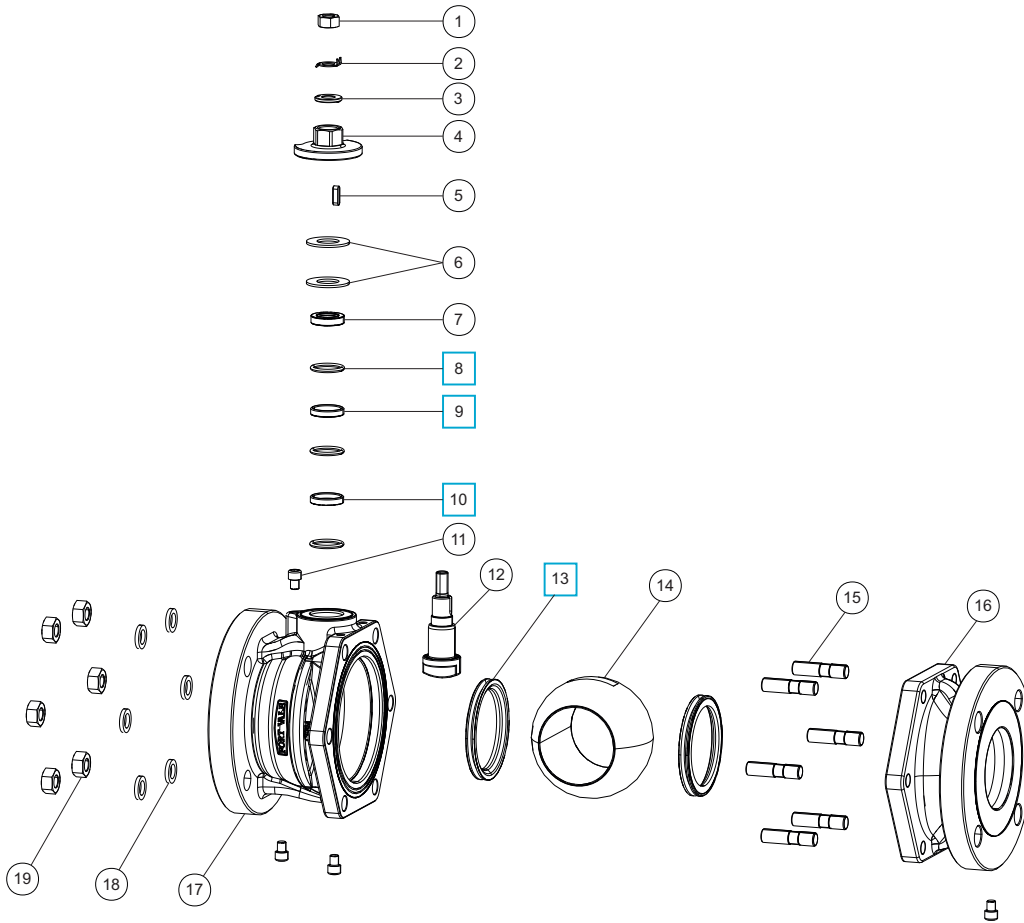




# 3" ASA 150 PFA Lined Ball Valve: AAR Specification

## Part No: 360/P500 - Zirconium Ball & Spindle

### Parts Drawing



### Parts List

Item	Description	Part No.
1	7/16" full nut	5122-178
2	Tab washer	370/P553
3	Retaining washer	370/P554
4	Handle boss & stop plate	370/P558
5	5mm keyway key	370/P511
6	20mm Belleville washer (2)	5113-041
7	St/steel top stuffing collar	370/P514
8	PTFE O ring (3)	5005-654 <input type="checkbox"/>
9	PEEK top stuffing collar	370/P512 <input type="checkbox"/>
10	PEEK bottom stuffing collar	370/P513 <input type="checkbox"/>
11	5/16" UNC capscrew (4)	5121-241
12	Keyway spindle	360/P507S
13	RTFE main seal (2)	360/P505/1 <input type="checkbox"/>
14	3" solid ball	360/P508S
15	1/2" stud (6)	312/1037
16	PFA lined body inlet	360/P504
17	PFA lined body	360/P501
18	1/2" spring washer (6)	5213-034
19	1/2" full nut (6)	5112-177

### Seal Kit

Description	Part No.
All parts marked <input type="checkbox"/> in the Parts List	360/P5SK





# 3" ASA 150 PFA Lined Ball Valve: AAR Specification

Part No: 360/P590X - PFA Lined Ball & Spindle



## Specification

### Nominal size

3" (DN80)

### Tank connection

Flanged: 4 x 0.75" holes on a 6.0" PCD - 3" ASA 150

### Outlet/Process connection

Flanged: 4 x 0.75" holes on a 6.0" PCD - 3" ASA 150

### Materials

Valve body: 316 stainless steel with PFA lining

Ball & spindle: PFA lined

Main seal: RTFE

### Options

Refer to Range

## Design Conditions

Weight:	45.6 Lb (20.7 Kg)
Cold Working Pressure (CWP):	100.1 PSI (6.9 Bar)
Test Pressure:	159.5 PSI (11.0 Bar)
MAWP at Max. Design Temp:	79.9 PSI (5.51 Bar)
Design Temperature Min:	-40°F (-40°C)
Design Temperature Max:	266°F (130°C)

**NOTE:** The Design Conditions and Section View dimensions are for the specified part number only.

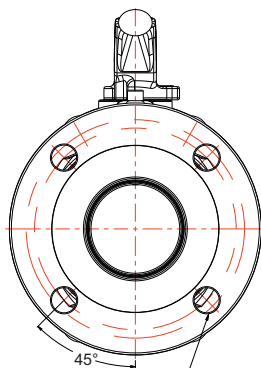
## Approvals

AAR Approval Number: E222123

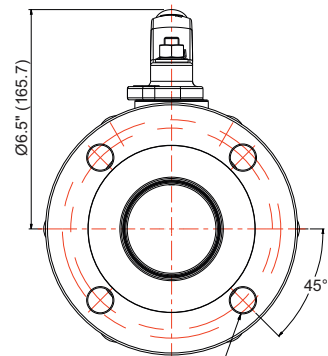
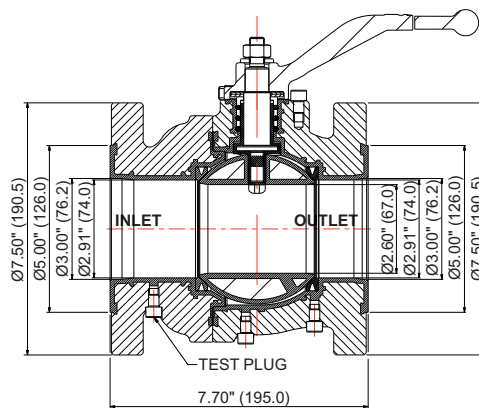
## Range

Description	Part No.
Left hand operated	360/P590L
Right hand operated	360/P590R
No operating handle	360/P595

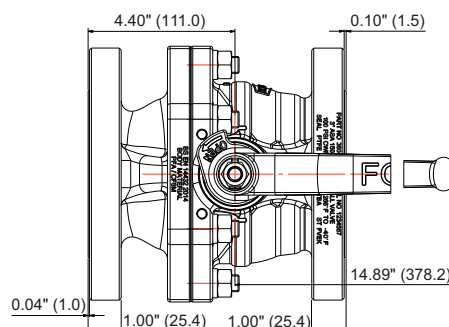
## Section View



OUTLET FLANGE:-  
4 X HOLES Ø0.75" (19.0)  
ON A Ø6.00" (152.4) PCD  
3" ASA 150



TANK CONNECTION:-  
4 X HOLES Ø0.75" (19.0)  
ON A Ø6.00" (152.4) PCD  
3" ASA 150

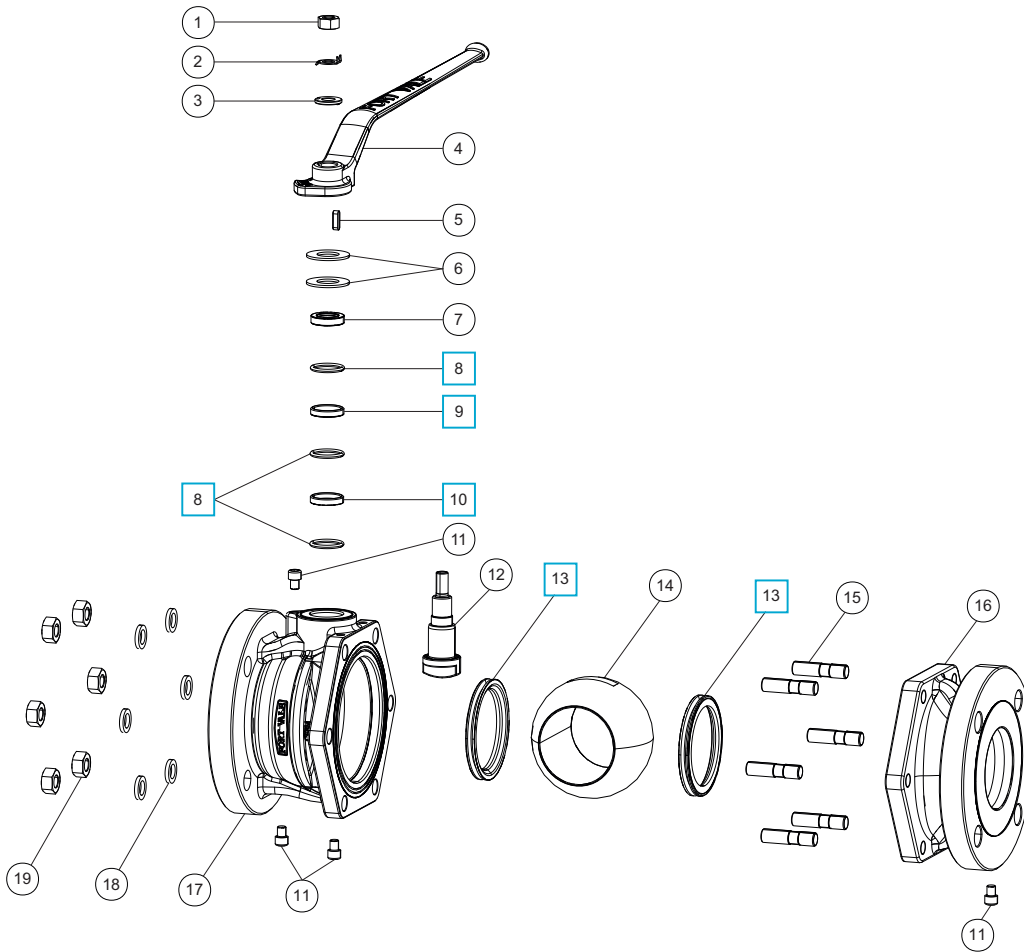




# 3" ASA 150 PFA Lined Ball Valve: AAR Specification

Part No: 360/P590X - PFA Lined Ball & Spindle

## Parts Drawing



## Parts List

Item	Description	Part No.	
1	7/16" full nut	5122-178	
2	Tab washer	370/P553	
3	Retaining washer	370/P554	
4	Handle - left-handed (shown) Handle - right-handed	370/P544 370/P545	
5	5mm keyway key	370/P511	
6	20mm Belleville washer (2)	5113-041	
7	St/steel top stuffing collar	370/P514	
8	PTFE O ring (3)	5005-654	☐
9	PEEK top stuffing collar	370/P512	☐
10	PEEK bottom stuffing collar	370/P513	☐
11	5/16" UNC capscrew (4)	5121-241	
12	PFA lined keyway spindle	360/P506	
13	RTFE main seal (2)	360/P505/3	☐
14	3" PFA lined ball	360/P508	
15	1/2" stud (6)	312/1037	
16	PFA lined body inlet	360/P504	
17	PFA lined body	360/P501	
18	1/2" spring washer (6)	5213-034	
19	1/2" full nut (6)	5112-177	

## Seal Kit

Description	Part No.
All parts marked ☐ in the Parts List	360/P59SK



## Tools & Equipment

### Maintenance Manual - PFA Lined Ball Valves - AAR Specification

## General Tools & Equipment

You will need the tools shown in Table 1 to do maintenance on 2" and 3" PFA lined ball valves.

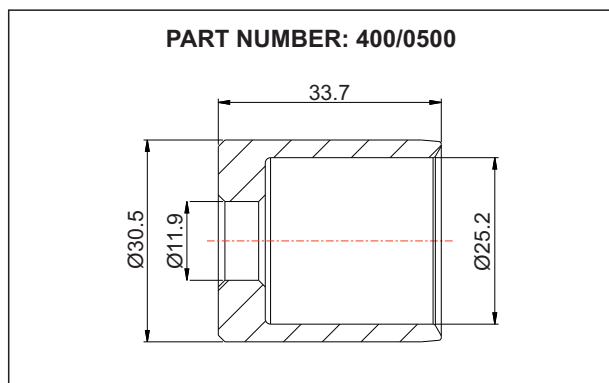
**Table 1**

#### Tools

Small screwdriver or pick
Hex key: 7/32"
Spanner: 3/4" A/F, 7/8" A/F, 11/16" A/F
Torque spanner/socket: 3/4" A/F, 7/8" A/F, 7/32" A/F, 11/16" A/F
Plastic mallet
Pliers
Soft-jaws vice
Anti-galling paste, e.g. Rocol ® Anti-Seize Stainless

## Special Tool

You will need a special tool to install the spindle O rings and stuffing collars, part no. 400/0500. The tool is compatible with a 2" and a 3" valve. You can buy the tool from Fort Vale.





## Client Responsibilities - Valves & Accessories for AAR

### Installation, Operation & Maintenance Instructions

---

### Compatibility

Make sure that the function and technical specification of the valve/accessory is compatible with the vessel service conditions and the cargo. This includes, but is not limited to:

- dimensions
- pressure/vacuum setting
- air/vapor/liquid flow capacity
- maximum allowable working pressure
- test pressure
- minimum/maximum design temperatures
- materials of construction.

### Maintenance

Fort Vale valves and accessories have a long life if you use them correctly in compatible service conditions. It is not necessary to lubricate the parts, but we recommend that you do the checks that follow:

#### Visual checks at regular intervals:

1. Examine the valve to make sure there is no damage, wear or corrosion.
2. Examine the valve and adjacent area to make sure there is no leakage of cargo.
3. Examine the fasteners to make sure they are not loose.
4. Make sure the valve operates correctly.

**CAUTION:** If you operate the valve with very corrosive cargo, or near its temperature and/or pressure limit (very high or very low temperature and/or pressure), do the visual checks more frequently.

Also, schedule maintenance at intervals that obey AAR's specification.

### Replacement Parts

Do not adapt or change the valve. If you install a replacement part, it must be a genuine Fort Vale part.

**WARNING:** If you install a part that is not genuine, there is a risk of:

- injury to personnel
- permanent damage to the valve
- permanent damage to the vessel
- valve malfunction.

### External Fire

If you install the valve in an area where there is a risk of external fire, you must install compatible accessories to prevent damage to the valve.

### Compatibility of Accessories

Accessory components must cause no interference with the valve's function. Accessories must be made from compatible materials that will cause no damage to the valve materials. Do not install an accessory that will cause an increased load on the valve, such as mechanical, static, dynamic or thermal load.

### Mis-use

Obey the instructions and recommended procedures in the installation and operating instructions. Obey the pressure and temperature markings on the valve and on the drawing. Use the valve/accessory for its correct function only. Fort Vale accept no liability or responsibility for incorrect use of the valve/accessory.



# Bolt Torque Guide & Step Loading Procedure (US)

## Installation & Operating Instructions

### Flange Bolting

**CAUTION:** Weld-distortion and too much tightening force will cause damage to a flange.

It is important not to cause damage to weld-in flanges and mating flanges. If a flange is damaged it will not give a satisfactory seal when a gasket and secondary mating flange is installed.

Bolt-stress can decrease after initial tightening. The cause can be deformation of the gasket material, particularly with soft materials such as a CNAF/PTFE envelope gasket.

Best procedure recommends that, after initial bolting, the flange joint is tightened again after a period of time. Most gasket manufacturers advise a period of 24 hours. ASME PCC-1-2000 GUIDELINES FOR PRESSURE BOUNDARY BOLTED FLANGE JOINT ASSEMBLY advises a minimum period of 4 hours.

Bolt torque calculations are based on a flat flange to within 0.006".

Recommended bolt torque values will be reduced if a lubrication is used.

### Bolt Torque

#### Bolt Torque Values

Fort Vale bolt torque values are given as a reference guide only and are based on:

- The use of a CNAF/PTFE gasket.
- Unlubricated fasteners.
- A flange flat to within 0.006".

**CAUTION:** If you use a different gasket material, a lubricant, a flange with distortion, you must re-calculate the torque value.

#### Bolt Torque Procedure

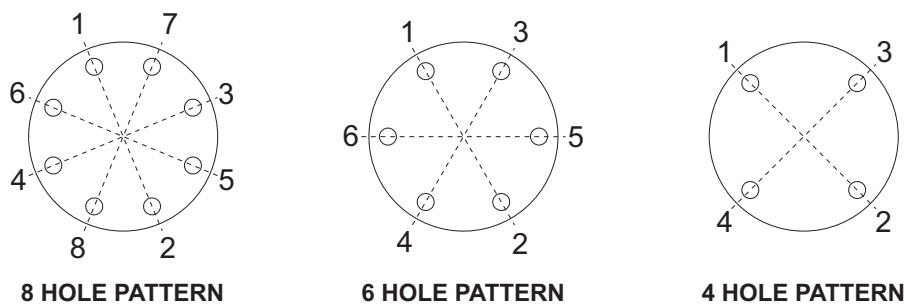
To install flanged parts correctly:

- Examine the mating flange of the part.
- If the flange is marked with a torque value, obey that torque value.
- If there is no torque value marked on the mating flange, obey the bolt torque values given in Table BT1.
- Tighten the bolts evenly in sequence. See Figure BT1.
- Obey the Step Loading Procedure (ASME PCC-1-2000). See next page.

Table BT1

Thread	Torque Value
3/8"	22 lbf.ft
1/2"	48 lbf.ft
5/8"	60 lbf.ft

Figure BT1





## **Bolt Torque Guide & Step Loading Procedure (US)**

### **Installation & Operating Instructions**

---

### **Step Loading Procedure**

To install flanged parts correctly, obey the Step Loading Procedure extract from ASME PCC-1-2000:

#### **Install**

Hand tighten, then “snug up” to 10 lbf.ft to 20 lbf.ft (not to exceed 20% of Target Torque).

Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### **Round 1**

Tighten to 20% to 30% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### **Round 2**

Tighten to 50% to 70% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### **Round 3**

Tighten to 100% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### **Round 4**

Continue tightening the bolts, but on a rotational clockwise pattern until no further nut rotation occurs at the Round 3 Target Torque value. For indicator bolting, tighten bolts until the indicator rod retraction readings for all bolts are within the specified range.

#### **Round 5**

Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/embedment losses. If the flange is subjected to a subsequent test pressure higher than its rating, it may be desirable to repeat this round after the test is completed.



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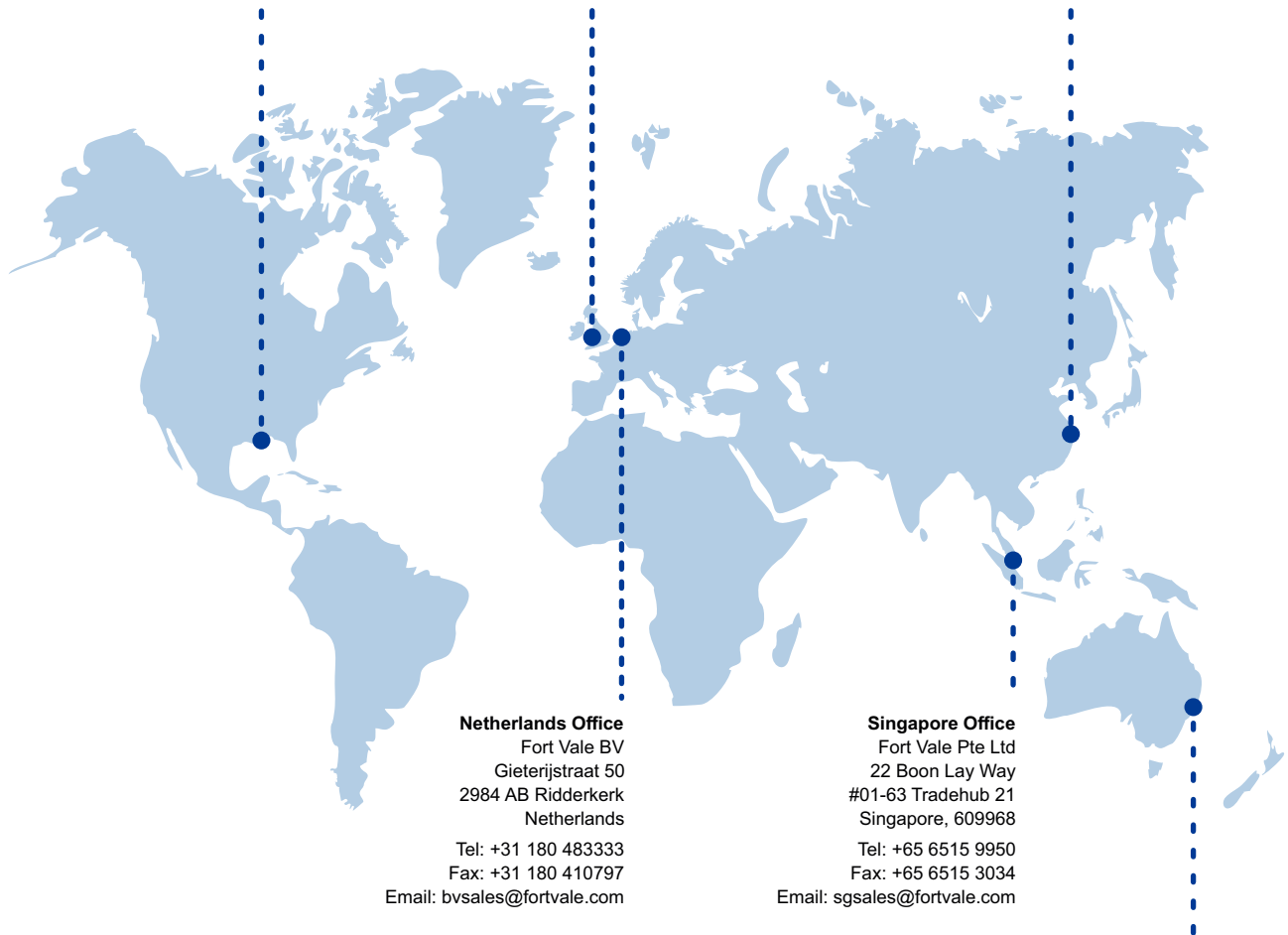
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