

XOMOX®

**brands you trust.**

Maintenance & Repair Instructions  
For 1 & 2 Piece Flanged Ball Valves

CRANE ChemPharma, Tuflin®  
Process Ball Valves

**CRANE**®

ChemPharma Flow Solutions

[www.cranechempharma.com](http://www.cranechempharma.com)

### Trouble-free operation.

Tufline Figure 500 Process Ball Valves have proven themselves with long-term, trouble-free service in a wide variety of applications.

Applied within their pressure and temperature limitations, properly installed, adjusted, and operated, these valves should require minimum attention.

### Read carefully.

The following procedures and illustrations have been prepared to assist you in the maintenance and repair of your Tufline Process Ball Valves. Please read these instructions carefully.

### ⚠ WARNING

READ AND UNDERSTAND INSTRUCTIONS BEFORE SERVICING VALVE. Failure to follow instructions could result in death or serious injury. If you have any questions, contact the factory at 513-745-6000.

Standard stem nut packing adjustment arrangement

### ⚠ CAUTION

These instructions have been prepared for valves as they are currently manufactured. If you have an older design valve that needs repair, contact either the factory or your nearest Service Center to make sure that you have the correct repair parts and instructions.

### Maintenance.

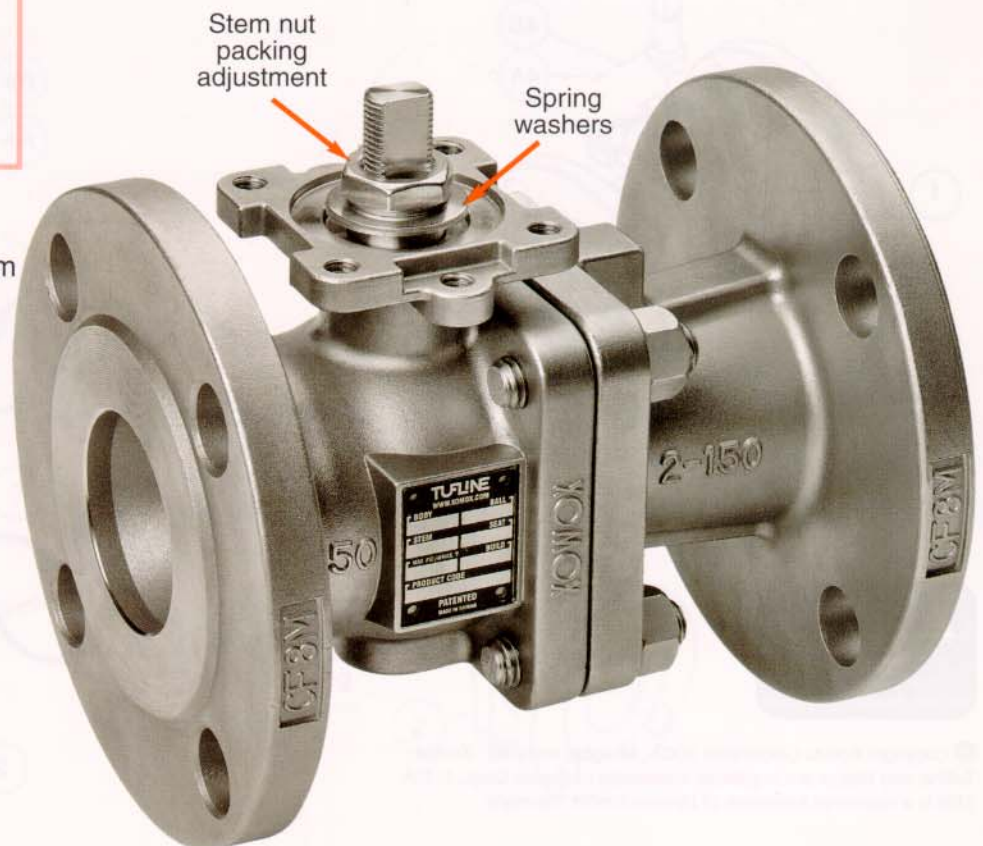
All Tufline Process Ball Valves are factory tested for tight shutoff. Standard valves with a stem packing adjustment nut are live loaded and normally no further adjustment is necessary.

If leakage should occur along the stem, follow the simple adjustment instructions at the right.

### Stem seal adjustment.

#### Stem nut arrangement (standard)

To adjust for leakage along the valve stem, bend the tab on the locking washer down. Turn the stem nut clockwise in approximately 1/3-turn increments to compress the spring washers. Do not over-tighten, flattening the spring washers. Bend the tab on the locking washer to hold the position of the stem nut. If a tight seal cannot be obtained, continue with the instructions for valve repair.



**Figure 1.**  
**1-Piece Ball Valves**

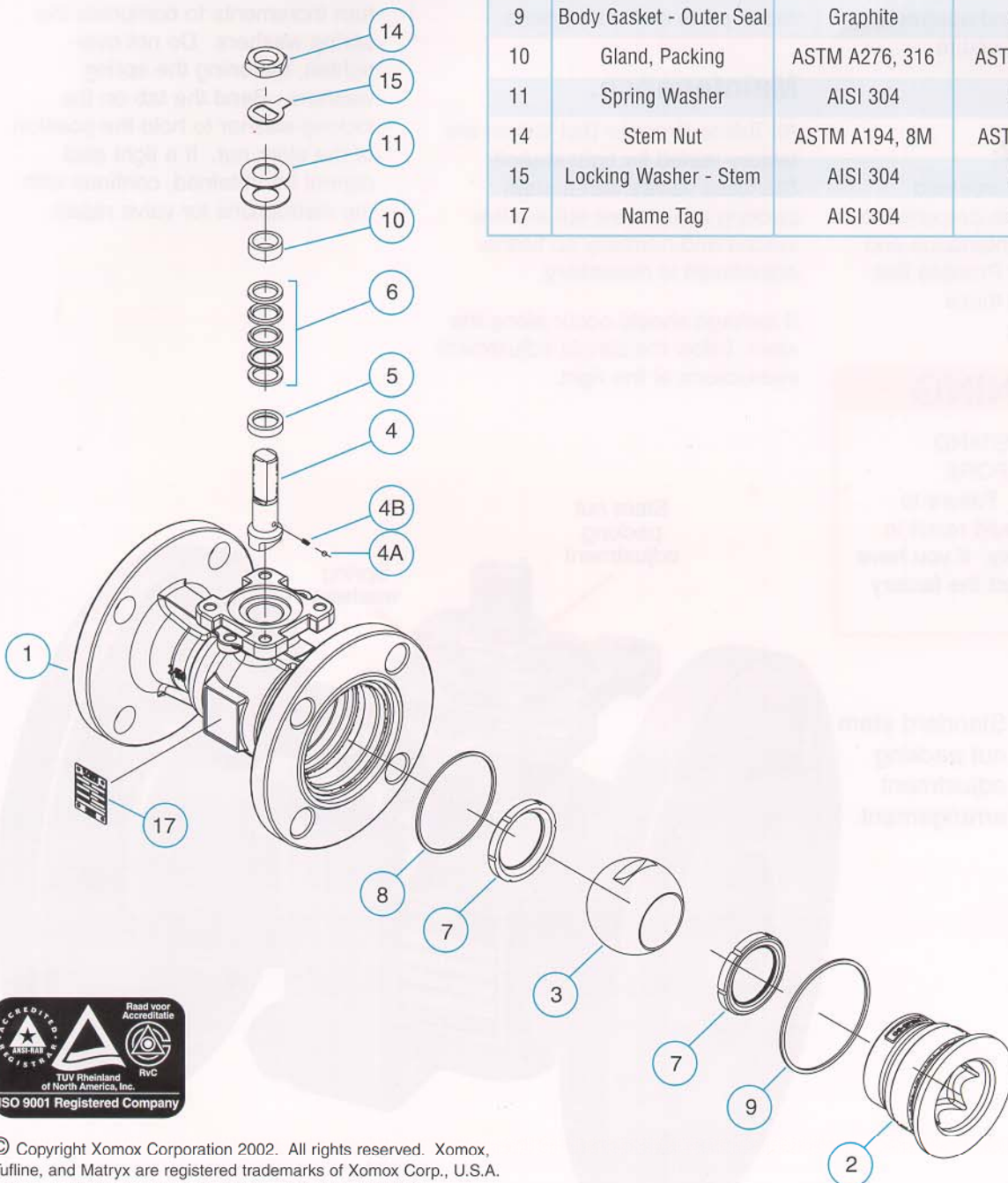
Tufline 511R, 513R  
Size: 3/4" - 4"  
Reduced Port

Raised Face  
Flanged Ends

Class 150 & 300

Less Operator

Component numbers 5, 6, 7, 8, and 9 are recommended replacement parts. They are available in the appropriate seal kit.



Part No.	Component	Carbon Material	Stainless Material	Qty.
1	Body	ASTM A216, WCB	ASTM A351, CF8M	1
2	Insert	ASTM A216, WCB	ASTM A351, CF8M	1
3	Ball	ASTM A351, CF8M	ASTM A351, CF8M	1
4	Stem	ASTM A276, 316	ASTM A276, 316	1
4A	Anti-Static Ball	AISI 316	AISI 316	1 - 2
4B	Anti-Static Spring	AISI 316	AISI 316	1 - 2
5	<b>S2</b> Stem Seal Ring		PTFE	1
6	Packing	PTFE/Graphite	PTFE/Graphite	1 Set
7	Soft Seat	TFM® 1600	TFM® 1600	2
8	Body Gasket - Inner Seal	PTFE	PTFE	1
9	Body Gasket - Outer Seal	Graphite	Graphite	1
10	Gland, Packing	ASTM A276, 316	ASTM A276, 316	1
11	Spring Washer	AISI 304	AISI 304	2
14	Stem Nut	ASTM A194, 8M	ASTM A194, 8M	2
15	Locking Washer - Stem	AISI 304	AISI 304	1
17	Name Tag	AISI 304	AISI 304	1



## Repair.

It is important that leakage be attended to promptly. If leakage is allowed to persist, the valve top works could be damaged by corrosive media.

### **⚠ WARNING**

The procedures below must be followed carefully. Failure to do so could result in equipment damage, serious injury, or death.

## Before disassembly.

1. Open the valve to the 45-degree position. This will allow any trapped pressure within the valve to escape.
2. Remove the valve from the pipeline.
3. If the valve has been used with hazardous fluids, make certain the valve is thoroughly cleaned and decontaminated before disassembly.

## Disassembly.

**1. 1-Piece Valve:** Remove the "insert" by turning it counter-clockwise.

**2-Piece Valve:** Separate the body halves by unscrewing the body stud nuts or bolts.

**2. 1-Piece Valve:** Remove the insert inner and outer seals body gaskets.

**2-Piece Valve:** Remove the body joint inner and outer seals gaskets.

### **3. Standard Stem Nut Arrangement:**

Bend the tab on the locking washer down and remove the stem nut by turning it counter-clockwise.

**4.** Rotate the ball to the closed position and remove it from the valve body.

**5.** Remove the locking washer, gland, and spring washers from the stem.

**6.** Remove the stem by pressing it down into the body cavity.

**7.** Remove the stem packing, **S2** stem seal ring, and soft seats from the body.

## Inspection.

Inspect the valve components for wear or damage.

Be sure to carefully inspect the following components for nicks, cracks, breaks, or other defects:

- Valve soft seats
- Ball
- Stem
- Packing rings (see drawing)
- Spherical stem seal

The parts listed above, along with the body gaskets, are the only components that should require replacement.

In addition, carefully inspect the **1-Piece Valve** body and insert or **2-Piece Valve** body and tail.

Inspect both the seat pockets and body joint gasket areas. Clean all areas thoroughly to remove all signs of corrosion and media build-up.

## Reassembly.

When reassembling valves, it is recommended that new seal components be used to minimize the chance of internal and external leakage. Seal kits are available containing new seals for repairing Tuffline Process Ball Valves. The components included in each kit are indicated in Figures 1 and 2.

**1.** Place the spherical stem seal over the stem with the conical surface facing the spherical stem shoulder.

**2.** Insert the stem through the valve body cavity. Make sure the anti-static spring and ball are located properly in the stem.

**3.** Install the packing rings over the stem with the concave side down, pushing the rings into the body packing chamber.

For the **PTFE packing**, orientation is important. For the **graphite packing**, it is important to firmly compress each graphite ring independently as it is installed.

**4.** Place the packing gland over the valve stem.

**5.** Install the two (2) spring washers over the stem with the concave surfaces face to face.

**6.** Place the locking washer over the stem. Thread the stem nut over the stem. Do not tighten at this time.

**7.** Insert the replacement seats with the conical surface facing the ball.

**8.** Insert the ball into the body cavity with the port opening in the closed position. With the stem drive tab positioned in the ball drive slot, turn the ball to the open position.

**9. 1-Piece Valve:** Install inner and outer gaskets in the body.

**2-Piece Valve:** Install inner and outer gaskets in the body.

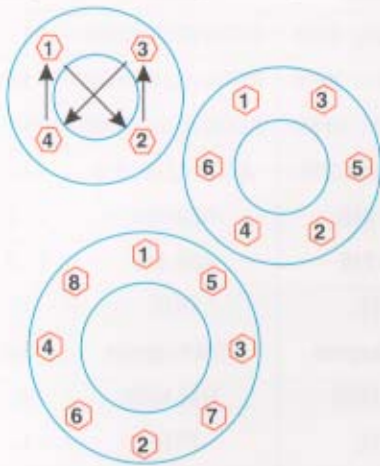
**10. 1-Piece Valve:** Install the insert, turning the insert clockwise.

For valve sizes  $\frac{3}{4}$ " and 1", after the insert is in position, it will remain raised above the flange from .03 to .09. It is important to be sure there is firm metal-to-metal contact between the insert and the body.

For valve sizes  $1\frac{1}{2}$ " to 4", after the insert is in position, it should be flush to no more than .010" below the flange. It is important to be sure there is firm metal-to-metal contact between the insert and the body.

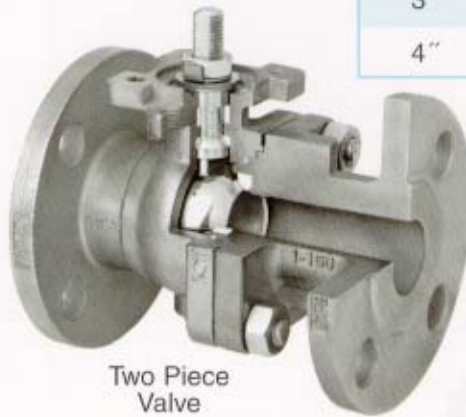
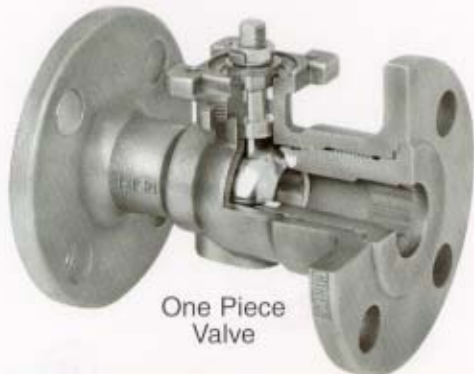
**2-Piece Valve:** Join the body halves, making sure the lettering on the halves face the same direction. Install and tighten the body stud nuts in the crossing pattern shown in Figure 3. Tighten the nuts to the torque values listed in Table 1. When tightening in the crossing pattern, cycle through the pattern at least three (3) times to assure proper and uniform torque. When the 2-piece valve is reassembled, be sure the studs protrude through the nut a minimum of one (1) thread.

**Figure 3.**  
**Body Joint Nut Tightening Pattern**



11. Tighten the stem nut clockwise to compress the spring washers. See "Stem Nut Torque Values" listed in Table 2. (Do not over-tighten, flattening the spring washers). Bend the tab up on the locking washer to hold the position of the jam nut.

12. Open and close the valve two (2) or three (3) times to be sure the valve operates properly.



**Table 1. 2-Piece Body Joint Bolting Torque Values**

Class 150	Class 300	Body Stud Size	Torque ft. lbs.
1/2", 3/4", 1" FP	1/2" FP	3/8-16UNC	15-20
1 1/2", 2", 3" FP 2", 3", 4" RP	3/4", 1", 1 1/2" FP 2 RP	1/2-13UNC	40-50
4" FP	2", 3", 4" FP 3", 4" RP	5/8-11UNC	90-100

**Table 2. Stem Nut Torque Values, ft-lbs**

1-Piece Valve		2-Piece Valve		
Reduced Port	Torque ft-lbs	Full Port	Reduced Port	Torque ft-lbs
3/4"	6	1/2"	—	6
1"	6	3/4"	—	6
1 1/2"	8	1"	—	8
2"	12	1 1/2"	2"	12
3"	17	2"	—	12
4"	17	—	3"	17
		3"	4"	17
		4"	—	25

### Service Center Repair.

Before attempting field repair, you may wish to consider sending the valve to a Xomox Service Center for repair.

Specialized equipment and experienced personnel at Xomox Service Centers can often provide repairs more economically than repairs performed in the field.

### New valve warranty.

Valves repaired at Xomox Service Centers are tested to the same specifications as new valves, and carry the standard new valve warranty.

Xomox Service Center locations are listed on the back page.

### Shipping precautions.

When shipping valves to a service center, I.C.C. regulations require that all valves be thoroughly decontaminated and depressurized prior to shipment.

The customer must provide certification that these regulations have been adhered to, and that valves shipped to Xomox Service Centers are completely free of hazardous liquids or gases.

Shipments to Xomox Service Centers must be prepaid. Return shipments will be f.o.b. Xomox Service Center. Xomox Service Center locations are listed on the back page.

**Figure 2.**  
**2-Piece Ball Valves**

Tufline 521F, 523F  
Size: 1/2" - 4"  
Full Port

Tufline 521R, 523R  
Size: 2" - 4"  
Reduced Port

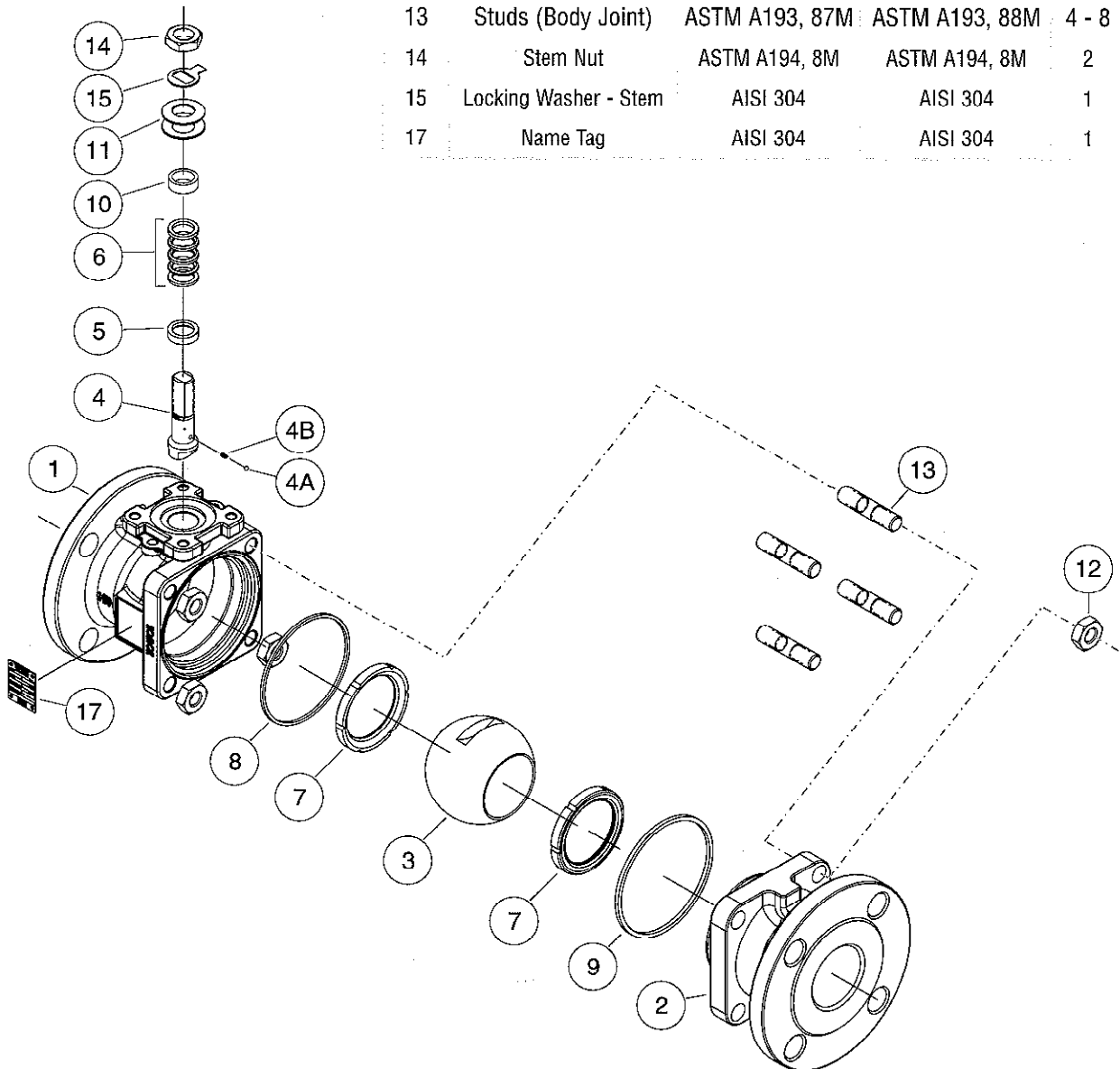
Reduced Port  
Raised Face  
Flanged Ends

Class 150 & 300

Less Operator

Component numbers 5, 6, 7, 8, and 9 are recommended replacement parts. They are available in the appropriate seal kit.

Part No.	Component	Carbon Material	Stainless Material	Qty.
1	Body	ASTM A216, WCB	ASTM A351, CF8M	1
2	Tail	ASTM A216, WCB	ASTM A351, CF8M	1
3	Ball	ASTM A351, CF8M	ASTM A351, CF8M	1
4	Stem	ASTM A276, 316	ASTM A276, 316	1
4A	Anti-Static Ball	AISI 316	AISI 316	1 - 2
4B	Anti-Static Spring	AISI 316	AISI 316	1 - 2
5	<b>S2</b> Stem Seal Ring	PTFE	PTFE	1
6	Packing	PTFE/Graphite	PTFE/Graphite	1 Set
7	Soft Seat	TFM 1600	TFM 1600	2
8	Body Gasket - Inner Seal	PTFE	PTFE	1
9	Body Gasket - Outer Seal	Graphite	Graphite	1
10	Gland, Packing	ASTM A276, 316	ASTM A276, 316	1
11	Spring Washer	AISI 304	AISI 304	2
12	Nut (Body Joint)	ASTM A194 2HM	ASTM A194 8M	4 - 8
13	Studs (Body Joint)	ASTM A193, 87M	ASTM A193, 88M	4 - 8
14	Stem Nut	ASTM A194, 8M	ASTM A194, 8M	2
15	Locking Washer - Stem	AISI 304	AISI 304	1
17	Name Tag	AISI 304	AISI 304	1



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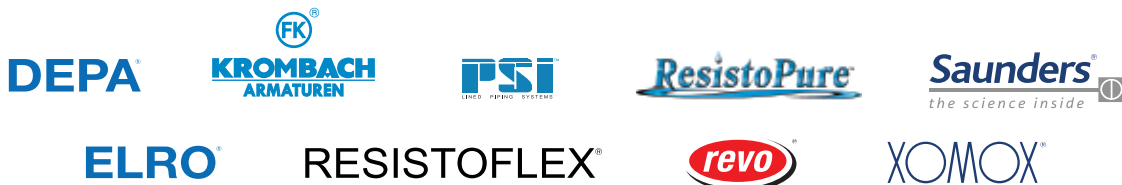
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CRANE ChemPharma Flow Solutions Include: Pipe - Valves - Fitting - Actuators - Pumps



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