



USER INSTRUCTIONS

Durco® BX2001 High-Performance Butterfly Valves

FCD DVENIM0390-03-AQ – 5/16



HOW TO SPECIFY BX2001 VALVES

Valve Size		Size	Type	Body Class	Materials	Seal	Seat	Operator	Options
Selection	Code	Selection	Code	Selection	Code	Selection	Code	Selection	Code
2 in (50 mm)	2	14 in (350 mm)	14						
3 in (80 mm)	3	16 in (400 mm)	16						
4 in (100 mm)	4	18 in (450 mm)	18						
5 in (125 mm)	5	20 in (500 mm)	20						
6 in (150 mm)	6	24 in (600 mm)	24						
8 in (200 mm)	8	30 in (750 mm)	30						
10 in (250 mm)	10	36 in (900 mm)	36						
12 in (300 mm)	12								
Type									
Selection	Code								
Big Max 2001	BX2								
Body									
Lug	L								
Wafer	W								
Class									
ASME 150 Bidirectional	1								
DIN PN10	2								
ASME 300 End of Line Lug	9								
ASME 150 End of Line Lug	4								
DIN PN16	5								
DIN PN20	7								
ASME 300 Bidirectional	3								
DIN PN25	0								
DIN PN40	8								
Body Material									
Selection	Code	Selection	Code						
D4*■	1	DC3	6						
DS*■	8	Ti	7						
D4L	L	D2	9						
D20	2	DINC	N						
DMM	3	CK3M	K						
DNI	4	CD4MCu	0						
DC2	5								
Disc Material									
Selection	Code	Selection	Code						
D4*■	1	DC3	6						
D4L	L	Ti	7						
D20	2	D2	9						
DMM	3	DINC	N						
DNI	4	CK3M	K						
DC2	5	CD4MCu	0						
Shaft Material									
Selection	Code	Selection	Code						
17-4SS*	1	Ti	7						
316SS	S	N50A	R						
C20H	2	▲ N50 TriFlex +601°F	T						
K Monel 500	3	Ferralium 255	F						
Nickel	4	254 SMO	K						
Hastelloy B	5								
Hastelloy C276	6								
Bearing Material									
Selection	Code	Selection	Code						
PTFE/Fiberglass	A	Inconel/PTFE	N						
Hastelloy B/PTFE	B	316SS/PTFE ■	S						
C20/PTFE	C	Monel/PTFE	M						
Hastelloy C/PTFE	H	Nickel/PTFE	4						
Inconel X750, APEX or TriFlex +400°F	I	316 HCP (TriFlex* or APEX +400°F)	T						
Titanium/PTFE	L								

Code	Options
T	TriFlex/Apex to 400°F
H	TriFlex/Apex 401°F to 600°F
R	TriFlex 601°F to 800°F
Y	TriFlex 801°F to 1000°F
B	Single 1/8" NPT Bleed/Inj. Port ¹
P	Two 1/8" NPT Purge Ports ¹
L	Bearing Lube (1/8" NPT Port)
C	CL2 Cleaned
O	O2 Cleaned★
S	Special Cleaning★
N	N.A.C.E. Trim (includes R shaft)
J	Steam Jacket
D	Steam Traced Disc
F	Special Fasteners
I	Inconel 718 Bellevilles ●▼
Z	None
X	Special Non-Standard

Code	Operator
0	Locking Lever 2-8 in
1	Enclosed Gear
2	Pad Lockable Gear
9	Bare Stem

Code	Seat
V	PFA/Viton Energizer*
R	PFA/Silicone Energizer
M	PFA/Inconel Energizer
Z	Fire Seal PFA/Inconel
N	Inconel TriFlex ◆
S	316/Inconel TriFlex
A	Inconel APEX Class IV
C	Copper/Inconel TriFlex
K	Monel TriFlex
U	UHMWPE (2" - 12")
4	Nickel/Inconel TriFlex

Code	Shaft Seal
1	Single PTFE Cup & Cone*
2	Double PTFE Cup & Cone
3	Live Loaded Single Cup & Cone*
4	Live Loaded Double Cup & Cone**
7	Triple Seal Single PTFE Cup & Cone (Self-Adjusting)
8	Triple Seal Double PTFE Cup & Cone (Self-Adjusting)
9	Single Grafoil ■▼
0	Double Grafoil ▼

* = Standard PFA Seat - All other materials considered optional.
 ◆ = Standard TriFlex Seat - All other materials considered optional.
 ** = 17-7 S.S. Belleville Washers included.
 ▼ = Grafoil Packing is NOT recommended with Belleville Washers.
 ★ = Customer specification must be given.
 ▲ = ASTM A479 Xn19 Standard Triflex +601°F (315°C)
 ● = For use with Shaft Seals 3 & 4 only (17-7 Bellevilles Standard).
 ■ = Standard Fire Sealed.
¹ = Per Packing Gland

INTRODUCTION

The Big Max® BX2001 is a superior quality ASME Class 150 and 300 valve available in standard PFA, fire sealed and two metal seated versions. Offered in 2 in through 36 in sizes and in both wafer and lug body designs, all are available with a wide variety of packing options to meet your routine or most rigid service requirements.

BX2001 effectively contains fugitive process media emissions regulated by the federal Clean Air Act, including chlorine, hydrofluoric acid and anhydrous HCl. This valve is an ideal choice for precise throttling control or on-off service with lighter weight piping systems and less expensive, energy efficient actuators.

Materials Selection Chart

DS = ASTM A216 Gr. WCB (CAST STEEL)
DSNI = NICKEL COATED CAST STEEL
D2 = ASTM A351 Gr. CF8 (304 SS)
D4 = ASTM A351 Gr. CF8M (316 SS)
D20 = ASTM A351 Gr. CN-7M (DURIMET 20)
CK3M = ASTM A351 Gr. CK-3MCuN (254 SMO)*
DINC = ASTM A494 Gr. CY-40 (INCONEL 600)**
DMM = ASTM A494 Gr. M35-1 (MONEL 400)**
DNI = ASTM A494 Gr. CA-100 (NICKEL 200)
DC2 = ASTM A494 Gr. N-7M (CHLORIMET 2)
DC3 = ASTM A494 Gr. CW-6M (CHLORIMET 3)
D44 = ASTM A351 Gr. CF8M with controlled ferrite
D4L = ASTM A351 Gr. CF3M

*Registered trademark of Avesta AB

**Registered trademark of International Nickel Co. Inc.

PRESSURE-CONTAINING FASTENERS

Material Selection

Selecting the proper fastener material is the ultimate responsibility of the customer because the supplier does not typically know in what service the valves will be used or what elements may be present in the environment. Flowserve normally supplies B7 (carbon steel) for ductile cast iron and carbon steel valves. For stainless steel and high alloy valves, B8 (stainless steel) fasteners are supplied as standard. All fasteners used must have a minimum yield strength of 40,000 PSI, a minimum elongation of 12% and be compatible with the process fluid. Determining compatibility to the process fluid goes beyond a material being resistant to general corrosion because the more important consideration is a material's resistance to stress corrosion cracking. Depending on the service, it may make sense to use B7 fasteners on high alloy valves. One such service would be marine environments because of stainless steel's susceptibility to stress corrosion cracking in chloride environments. Another key aspect of fasteners is frequent visual inspection. Because of the common practice of using steel fasteners rather than stainless steel to avoid chloride stress corrosion cracking, visual inspection is recommended to monitor the general corrosion of these fasteners. If jacketing or insulation is used on a valve, it must be periodically removed for visual inspection of the fasteners. If you wish assistance in determining the proper fasteners to use, please refer to the "Fasteners" chart (next page), or contact the Flowserve Material Engineering Group at (937) 226-4475.

Design & Type

Flowserve valve design standards adopt ASME B18.2.1 (1981) as the standard for fastener type and design. This national standard requires that finished hex "head" cap screws be used when the head of the fastener is turned. A finished hex "head" cap screw and a heavy hex cap screw have a bearing surface under the head to minimize frictional resistance during tightening. They also comply to qualified body dimensions and fully formed head dimensions. Cookeville Flow Control Division's policy is to use finished hex "head" and heavy hex "head" cap screws for all pressure retaining fasteners. This includes top caps, packing adjusters, bottom caps, body halves or other pressure retaining components. Compliance is made with ASME B18.2.2 (1987), *Square and Hex Nuts*, when studs and heavy hex nuts are required. Additional information on these items may be obtained from Flowserve Corporation, Cookeville Flow Control Division, Cookeville, Tennessee.

PRESSURE CONTAINING FASTENERS (continued)

FASTENERS

TABLE 1

Cap Screws-Studs
HHCS - Finished Heavy Hex Head Cap Screw HCS - Finished Hex Head Cap Screw SCS - Socket Head Cap Screw STUD - Stud Dimensions per ASME B18.2.1 Alloy identification stamp required on each piece. Certification required. Alloy Specification (40 KSI Minimum Yield Strength, 12% Min. El.)
ASTM Material Specifications
B840 - 316 Stainless Steel per ASTM A193, Grade B8M2 or Grade B8M3, 40 KSI Min. Yield Strength, 12% Min. El. B7 - Chromium - Molybdenum Alloy Steel per ASTM A193, Grade B7 B7M - Chromium - Molybdenum Alloy Steel per ASTM A193, Grade B7M, 100% hardness tested B7MT - Chromium - Molybdenum Alloy Steel per ASTM A193, Grade B7M, 100% hardness tested, PTFE coated, DuPont SP11C, type B - Color blue or green B8M - 316 Stainless Steel per ASTM A193, Grade B8M, Class 1, 40 KSI Min. Yield Strength, 12% Min. El. B8C2 - 304 Stainless Steel per ASTM A193, Grade B8, Class 2 C20 - Carpenter C20, CB-3 (UNS N08020), ASTM B473, 40 KSI Min. Yield Strength, 12% Min. El. HC - Hastelloy C276 (UNS N10276), ASTM B574 I625 - Inconel 625 (UNS N006625), ASTM B446 I825 - Incoloy 825 (UNS N08825), ASTM B425, 40 KSI Min. Yield Strength, 12% Min. El. IN - Inconel 600 (UNS N0660), ASTM B166, 40 KSI Min. Yield Strength, 12% Min. El. M - Monel (UNS N04400), ASTM B164, Class A or B, 40 KSI Min. Yield Strength, 12% Min. El. HB - Hastelloy B (UNS 10665), ASTM B335 I718 - Incoloy 718, AMS 5596B MKH - Monel K-500, Cold drawn and aged hardened, QQN-286 and ASTM F468 L7 - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7 L7M - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7M, 100% hardness tested L7T - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7, PTFE coated, DuPont SP11C, Type B - Color blue or green L7MT - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7M, 100% hardness tested, Teflon coated, DuPont SP11C, Type B - Color blue or green N - Nickel per ASTM B160 (UNS N0220), 40 KSI Min. Yield Strength, 12% Min. El. B7YC - Chromium-Molybdenum Steel per A193, Grade B-7, Yellow Zinc Dichromate Plated

TABLE 2

Nuts
HN - Finished Heavy Hex Nut XN - Finished Hex Nut HXN - Regular Heavy Hex Nut Dimensions per ASME B18.2.2 Alloy identification stamp is required on each piece. Certification required.
ASTM Material Specifications
8 - 304 Stainless Steel per ASTM A194, Grade 8 8M - 316 Stainless Steel per ASTM A194, Grade 8M 2H - ASTM A194, Grade 2H 2HM - ASTM A194, Grade 2HM 7M - ASTM A194, Grade 7M, 100% hardness tested 7MT - ASTM A194, Grade 7M, 100% hardness tested, PTFE coated, DuPont SP11C, Type B - Color blue or green M - Monel (UNS N04400), ASTM B164, Class A or B, or QQN-281, Class B HB - Hastelloy B (UNS N10665), ASTM B335 HC - Hastelloy C276 (UNS N10276), ASTM B574 I625 - Inconel 625 (UNS N06625), ASTM B446 I718 - Incoloy 718, AMS 5596B I825 - Incoloy 825 (UNS N08825), ASTM B425 L7 - Chromium-Molybdenum Alloy Steel per ASTM A194, Grade 7 L7M - Chromium-Molybdenum Alloy Steel per ASTM A194, Grade 7M, 235 BHN Max, ASTM A320, Section 9 MKH - Monel K-500, Cold drawn and aged hardened, QQN-286 and ASTM F467 8F - 303 Stainless Steel per ASTM A194, Grade 8F 2HYC - ASTM A194, Grade 2H, Yellow Zinc Dichromate Plated

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SECTION I

SAFETY PRECAUTIONS

To avoid possible injury to personnel or damage to valve parts, WARNING and CAUTION notes must be strictly adhered to. Modifying this product, substituting nonfactory parts, or using maintenance procedures other than outlined could drastically affect performance, be hazardous to personnel and equipment, and may void existing warranties.

1. WARNING: Standard industry safety practices must be adhered to when working on this, or any other, process control product. Specifically, personal protective and lifting devices must be used as warranted.

- 2.** Always completely remove the valve from service before attempting any maintenance on the valve.
- 3.** Depressurize and bleed the line on both sides of the valve before removing the valve.
- 4.** Check nameplate before installation to ensure that the valve is not installed in systems where service conditions exceed those for which the valve was designed.
- 5.** Install or remove the valve with the disc in the closed position.

SECTION I

SAFETY PRECAUTIONS (continued)

IMPORTANT NOTES ABOUT YOUR WARRANTY AND SAFETY

Replacement Parts

The use of parts and components other than those supplied by **Flowserve Corporation** could severely restrict the operation and performance of this valve. Unauthorized modifications or substitution of components can lead to valve **failure** due to corrosion and/or **premature failure** of the substituted parts.

Selection, Installation, Operation and Maintenance

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, each product is designed to perform its intended function safely during its useful service life. However, it is necessary that Flowserve's customers be fully aware of their responsibilities when using these products.

Each Flowserve product may be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can, and often does, provide general guidelines, it is obviously not possible to provide application specific data and warnings for all

conceivable applications. The purchaser/end user must therefore assume the ultimate responsibility for the proper selection, installation, operation and maintenance of the products. Read the appropriate IOM before installing, operating or repairing any valve. The purchaser/end user should train its employees and/or contractors in the safe use of the Flowserve products in connection with the purchaser's manufacturing processes.

Flowserve will continue to provide its customers with the best possible products and service available. We do not recommend substituting surplus or remanufactured valves over new Flowserve valves or those repaired in an authorized service center. Should you have any questions about these provisions or about Flowserve products in general, please contact your local Flowserve representative, who will be happy to help.

Paying close attention to safety is always extremely important. However, there are often situations that require special attention. These situations are indicated throughout this book by the following symbols:



DANGER – Immediate hazards which WILL result in severe personal injury or death.



WARNING – Hazards or unsafe practices which COULD result in severe personal injury or death.



CAUTION – Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

NOTE: ALWAYS COORDINATE REPAIR ACTIVITY WITH OPERATIONS PERSONNEL, AND FOLLOW ALL PLANT SAFETY REQUIREMENTS AND OSHA REGULATIONS.

SECTION II

INSTALLATION (Please refer to and follow all recommendations of MSS SP-92)

1. Check valve nameplate before installation to ensure that the valve's pressure rating and materials of construction are compatible with the intended service conditions. If lug style, check for end of line service tag.
2. Inspect adjoining pipelines and remove any material that could damage the seat. Check clearance of the disc projection into the pipeline shown in **TABLE B** and **FIGURE 1**.
3. Check actuator stops before valve is installed and the line is pressurized. Make certain position indicator reads "shut" and the disc position is in agreement.
4. The valve must be installed with the disc in the closed position and centered on the seat.
5. The valve must be properly aligned and centered between the pipe flanges.
6. The BX2001 is designed for bi-directional shut off when installed between metallic ANSI B16.5 flanges. Flow direction should agree with the flow arrow on the body to assure lower opening torque and longer service life. With non-metallic flanges, the BX2L4 series valve should be used.
7. The use of rubber or other similar "soft" gaskets is NOT recommended, and should be avoided.
8. When standard lug style valves are installed for end-of-line (dead-end) service, the retainer ring must be supported by a mating pipe flange. For true end-of-line service with retainer ring unsupported, a BX2L4 series valve must be used.
9. When BX2L4 valves are used, torque down retainer ring fasteners to 120 in-lb in a criss-cross manner.

⚠ CAUTION

BX2L4 end of line valves are derated to 150 PSI maximum when installed without a mating flange supporting the retainer ring.

10. When BX2L4 valves are used, check for compatibility before using API 601 spiral wound metallic gaskets.
11. Flange fasteners should be tightened and torqued in a sequential criss-cross pattern as recommended by the MSS SP-92 standard.
12. For recommended fastener sizes see the tables at the end of this publication on page 34 and 35.

FIGURE 1
Mating Flange
Clearance Dimensions

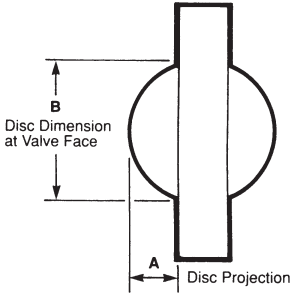


TABLE B – Disc Projection

Size	in (mm)	2 (50)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
ASME Class 150	A in (mm)	3/8 (10)	11/16 (17)	1 1/8 (29)	1 1/2 (38)	2 1/16 (52)	2 5/8 (67)	3 5/8 (92)	4 1/2 (114)	5 (127)	5 25/32 (147)	6 3/8 (162)	7 3/32 (180)	8 5/16 (211)	11 (279)	13 41/64 (346)
	B in (mm)	1 1/4 (32)	2 7/16 (62)	3 5/8 (92)	4 1/2 (114)	5 9/16 (141)	7 (178)	9 5/16 (237)	11 3/8 (289)	12 45/64 (323)	14 45/64 (373)	16 9/16 (420)	18 15/32 (469)	22 23/32 (561)	28 3/8 (721)	34 3/8 (873)
ASME Class 300	A in (mm)	3/8 (10)	11/16 (17)	1 1/8 (29)	—	2 1/16 (52)	2 5/8 (67)	3 5/8 (92)	4 1/2 (114)	4 1/8 (105)	4 51/64 (121)	5 3/8 (137)	6 1/4 (159)	—	—	—
	B in (mm)	1 1/4 (32)	2 7/16 (62)	3 5/8 (92)	—	5 9/16 (141)	7 (178)	9 5/16 (237)	10 3/4 (273)	12 7/32 (310)	14 3/32 (358)	15 7/8 (402)	17 1/4 (438)	—	—	—

SECTION III

VALVE REMOVAL

! DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death.

1. Refer to Safety Precautions Instructions on page 5 of this manual.
2. Open the valve and bleed the line.
3. Close the valve.
4. Remove the valve from the line.

SECTION IV

SEAT REPLACEMENT

DISASSEMBLY

1. For repairs that require seat replacement only, it is not necessary to remove manual operators.
2. Place the valve seat side up on a work table.
3. For valves that have retainer ring fasteners, remove the fasteners and lift the retainer ring and seat package out of the valve body.
4. For metal seated valves that use a wire retainer locking ring, cut the wire where it is attached to the valve body. Use pliers to pull the wire while also rotating the retainer ring until the wire is pulled free. Lift the retainer ring and seat out of the valve body.
5. For soft seated valves that use an O-ring retainer locking ring, insert the flat blade of a screwdriver into the gap between the back of the retainer ring and the valve body. Twist the blade to pry the retainer ring out of the valve body, then remove the seat package.

CLEAN UP AND PREPARATION

1. Remove the PFA seat and seat energizer from the seat ring. Remove any gasket material from the seat ring and clean thoroughly.
2. Remove any seat gasket material from the retainer ring and the seat pocket of the valve body. Clean all surfaces thoroughly. Discard retainer ring fasteners, wire or O-ring retainer lock rings.
3. Carefully clean and inspect the sealing surface of the valve disc. Small scratches, scale or minor corrosion can be removed by polishing using 600 grit or finer emery paper. DO NOT SAND OR BEAD BLAST DISC.
4. Metal seated valves use hard surface plating on the valve disc to improve seal life. If the plating is damaged, scratched or heavily worn, the disc should be replaced.
5. Under no circumstances should worn, corroded or scratched valve discs be repaired by welding or re-machining.

PFA SEAT PACKAGE PRE-ASSEMBLY

1. Spread open the seat and insert the seat energizer into the seat. Press the energizer firmly into the inside of the seat.
2. Spread open the seat again and slip it over the seat ring, working it around the circumference of the ring until the seat ring is totally encapsulated by the seat.

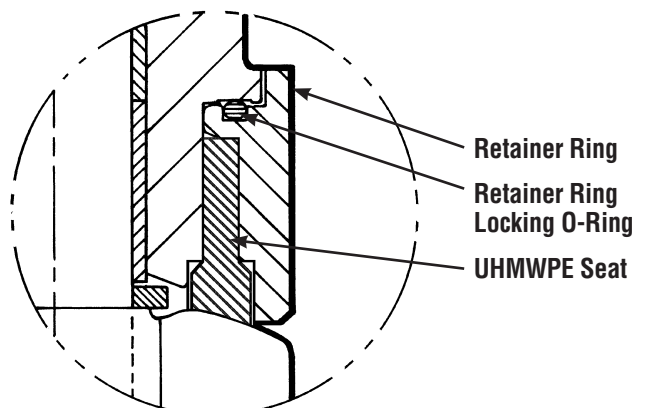
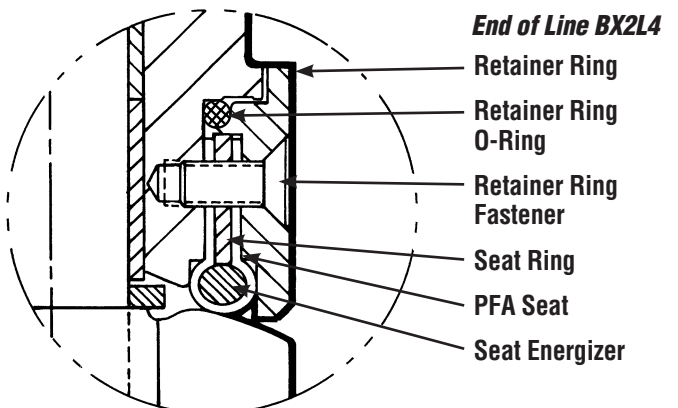
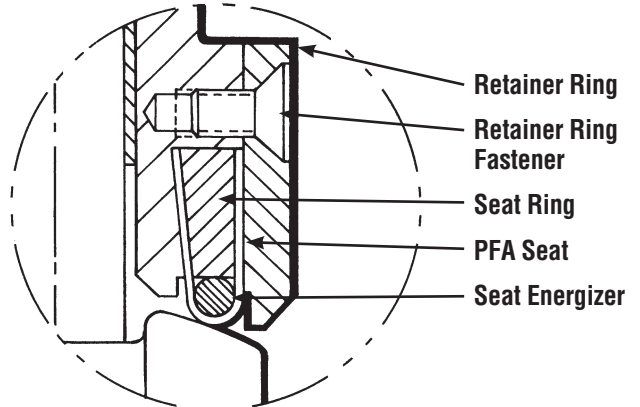
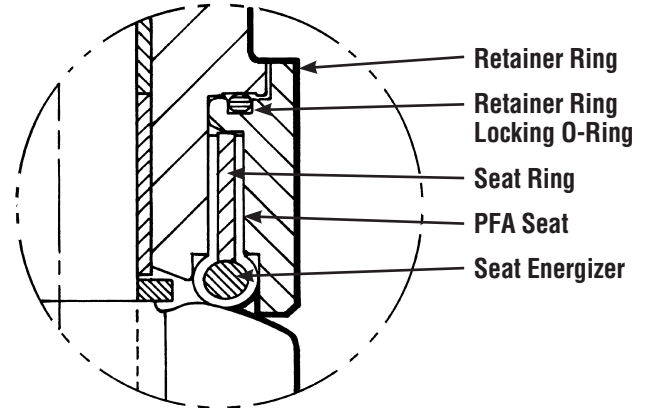
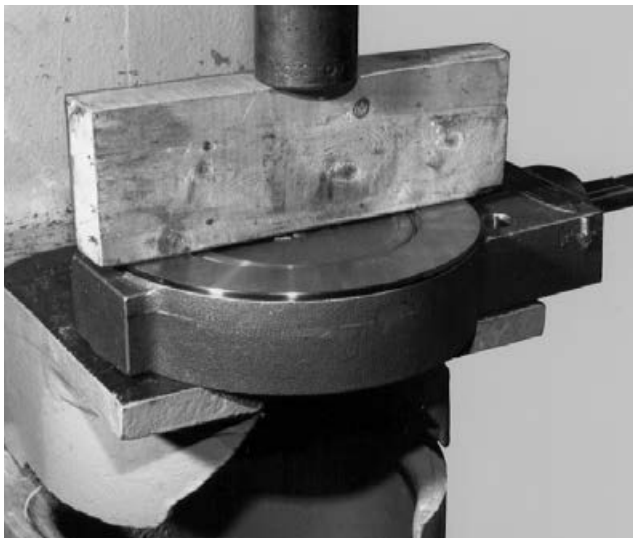


SECTION IV

SEAT REPLACEMENT (continued)

SEAT PACKAGE INSTALLATION – STANDARD VALVE

1. Make certain the valve disc is fully closed and place the seat package in the valve body seat pocket. For valves with seat rings with an angled face, place the angled face side of the seat down against the seat pocket in the valve body.
2. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or “C” clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm). **Note:** For end-of-line BX2L4 lug valves, tighten fasteners to 120 in-lbs (14 Nm).
3. For valves that use an O-ring retainer locking ring, place the new O-ring into the outside groove of the retainer ring. Apply a light coat of lubricant on the O-ring and place the retainer ring on the body. Using a press or “C” clamps, firmly press the retainer ring into the valve body.

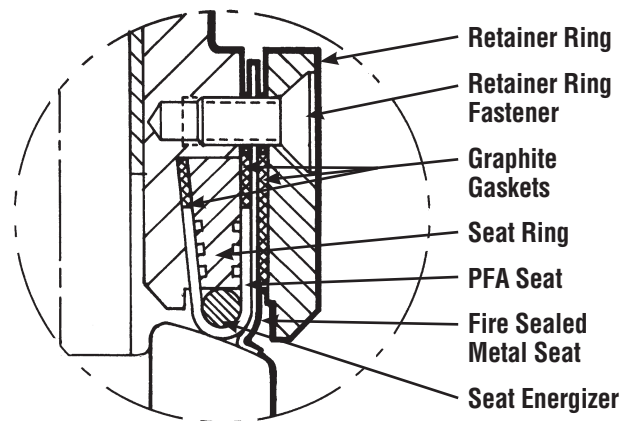
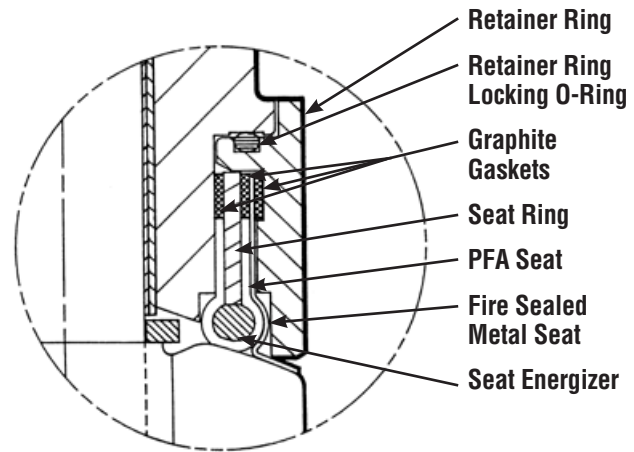


SECTION IV

SEAT REPLACEMENT (continued)

SEAT PACKAGE INSTALLATION – FIRE SEALED VALVE

1. Make certain the valve disc is fully closed and place one of the 3 graphite gaskets into the seat pocket of the valve body. **Note:** If the repair kit contains one wide and 2 narrow gaskets, use the narrow gaskets first and use the wide gaskets for Step 5.
2. Place the seat package in the valve body seat pocket. For valves with seat rings with an angled face, place the angled face side of the seat down against the seat pocket in the valve body.
3. Place a second graphite gasket on the top of the seat package, making certain it is centered so that it fits around the outside diameter of the PFA seat.
4. Place the fire sealed metal seat on the package, orientated so that the inside metal lip is facing away from the valve disc. Make certain that the inside lip is centered to the valve disc.
5. Some styles of retainer rings have a machined groove for this gasket. For these styles, use a small amount of adhesive and glue the gasket into the groove of the retainer ring. For styles without the machined gasket groove, place the third graphite gasket on top of the fire sealed metal seat, making certain that it is centered to the diameter of the seat.
6. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or “C” clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm).
7. For valves that use an O-ring retainer locking ring, place the new O-ring into the outside groove of the retainer ring. Apply a light coat of lubricant on the O-ring and place the retainer ring on the body. Using a press or “C” clamps, firmly press the retainer ring into the valve body.

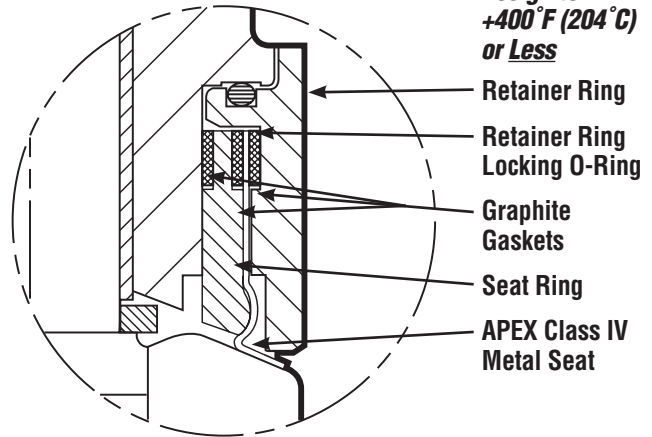


SECTION IV

SEAT REPLACEMENT (continued)

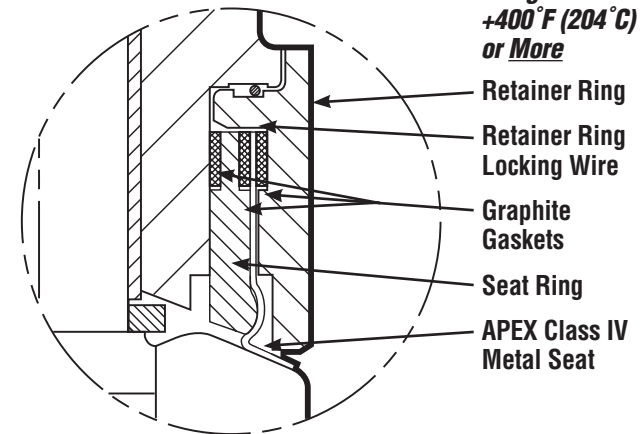
SEAT PACKAGE INSTALLATION – APEX CLASS IV METAL SEATED VALVE

1. Make certain the valve disc is fully closed and place one of the 3 graphite gaskets into the seat pocket of the valve body. **Note:** If the repair kit contains one wide and 2 narrow gaskets, use the narrow gaskets first and use the wide gaskets for Step 5.
2. Place the seat ring in the valve body seat pocket. For valves with seat rings with an angled face, place the angled face side of the seat down against the seat pocket in the valve body.
3. Place a second graphite gasket on the top of the seat package, making certain it is centered so that it fits into the groove around the outside diameter of the seat ring.
4. Place the APEX metal seat on the seat package, orientated so that the inside metal lip is facing away from the valve disc. Make certain that the inside lip is centered to the valve disc.
5. Some styles of retainer rings have a machined groove for this gasket. For these styles, use a small amount of adhesive and glue the gasket into the groove of the retainer ring. For styles without the machined gasket groove, place the third graphite gasket on top of the APEX metal seat, making certain that it is centered to the diameter of the seat.
6. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or “C” clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm).
7. For valves that use an O-ring retainer locking ring, place the new O-ring into the outside groove of the retainer ring. Apply a light coat of lubricant on the O-ring and place the retainer ring on the body. Using a press or “C” clamps, firmly press the retainer ring into the valve body.
8. For valves that use a wire retainer locking ring, place the retainer ring into the valve body seat pocket. Thread the wire through the slot in the valve body and rotate the retainer ring to pull the wire through the valve body until both ends of the wire extend through the slot. Bend each end of the wire back to lock the wire in place. Trim off extra wire length and tack weld each to the valve body.



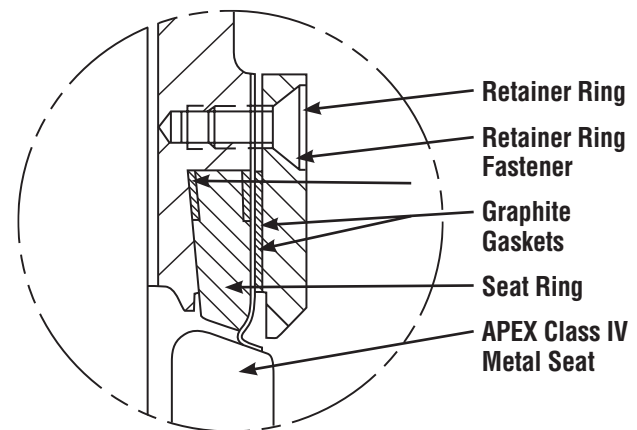
*Design to
+400°F (204°C)
or Less*

Retainer Ring
Retainer Ring
Locking O-Ring
Graphite
Gaskets
Seat Ring
APEX Class IV
Metal Seat



*Design from
+400°F (204°C)
or More*

Retainer Ring
Retainer Ring
Locking Wire
Graphite
Gaskets
Seat Ring
APEX Class IV
Metal Seat



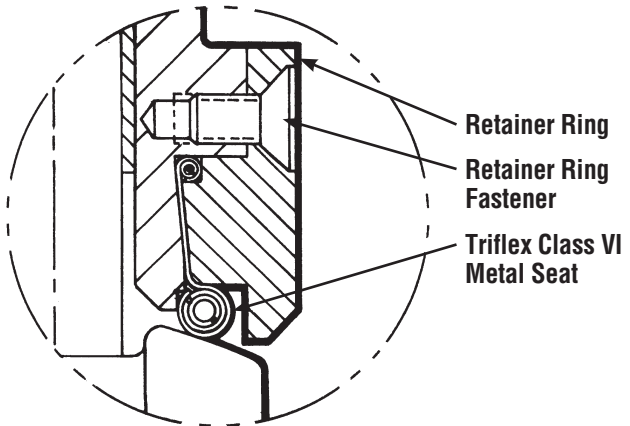
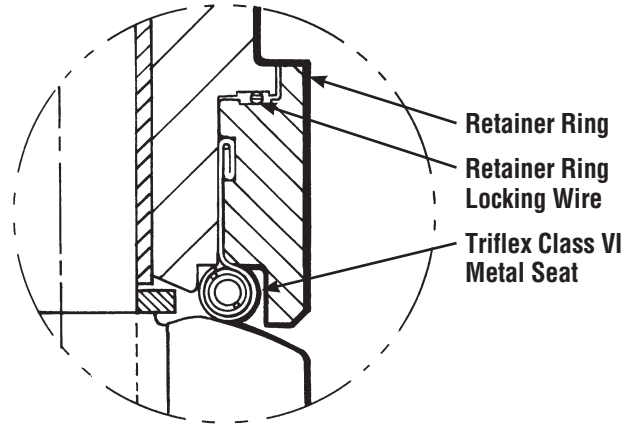
Retainer Ring
Retainer Ring
Fastener
Graphite
Gaskets
Seat Ring
APEX Class IV
Metal Seat

SECTION IV

SEAT REPLACEMENT (continued)

SEAT PACKAGE INSTALLATION – TRIFLEX CLASS IV METAL SEATED VALVE

1. Make certain the valve disc is fully closed and place the seat into the valve body with the rolled seal on the outside of the seat facing up, away from the valve body seat pocket.
2. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or “C” clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm).
3. For valves that use a wire retainer locking ring, place the retainer ring into the valve body seat pocket. Thread the wire through the slot in the valve body and rotate the retainer ring to pull the wire through the valve body until both ends of the wire extend through the slot. Bend each end of the wire back to lock the wire in place. Trim off extra wire length and tack weld each to the valve body.



FINAL PREPARATION FOR INSTALLATION – SEAT REPLACEMENT REPAIR

1. Stem packing fasteners should be re-tightened to the torque specifications listed on page 25 of this manual. Make certain to identify the style of packing used in the valve in order to select the proper fastener torque. Packing styles are illustrated on page 25 of this manual.
2. If manual operators were removed, re-install them using the procedures in Section VIII for gears or Section X for levers.
3. Operate the valves a few times to insure that the valve disc turns freely into and out of the seat. Seat testing of repaired valves is recommended.

SECTION V

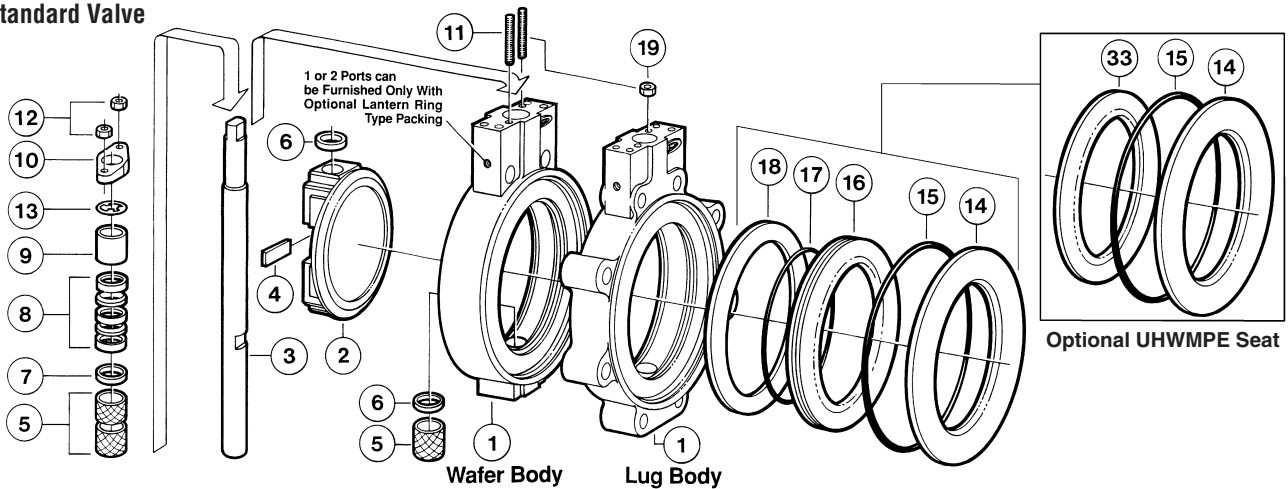
PARTS LIST 2" thru 12" – Standard, Fire Sealed and BX2L4 End of Line Valve

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
3	Shaft	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
4	Pin	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
5	Bearing	*	PTFE/Fiberglass (■ PTFE/316 SS)	PTFE/Fiberglass (■ PTFE/316 SS)
6	Thrust Bearing	2	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
7	Thrust Washer	1	1018 Steel	316 SS
•8	Packing Set	1	PTFE Cup and Cone (■ Grafoil)	PTFE Cup and Cone (■ Grafoil)
9	Gland	1	304 SS	304 SS
10	Adjuster	1	ASTM A351 Gr. CD4MCu	ASTM A351 Gr. CD4MCu
11	Stud-Adjuster	2	B8-M3 (■ Gr. B-7)	B8-M3 (■ Gr. B-7)
12	Nut-Adjuster	2	Gr. 8 (■ Gr. 24)	Gr. 8 (■ Gr. 24)
13	Ground Spring	1	302 SS	302 SS
14	Retainer Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
•15	Lock Ring	1	Viton A**	Viton A
•16	Seat	1	PFA	PFA
•17	Seat Energizer	1	Viton A**	Viton A
18	Seat Ring	1	1020 Steel	ASTM A240 Type 316 SS
19	Jamb Nut	1	300 Series SS	300 Series SS
•20	Gasket-Fire Seal	3	■ Grafoil***	■ Grafoil
•21	Seat-Fire Seal	1	■ Inconel X750	■ Inconel X750
22	Capscrew	As Req'd	Chrome Steel	Chrome Steel
•33	Seat	1	UHMWPE	UHMWPE

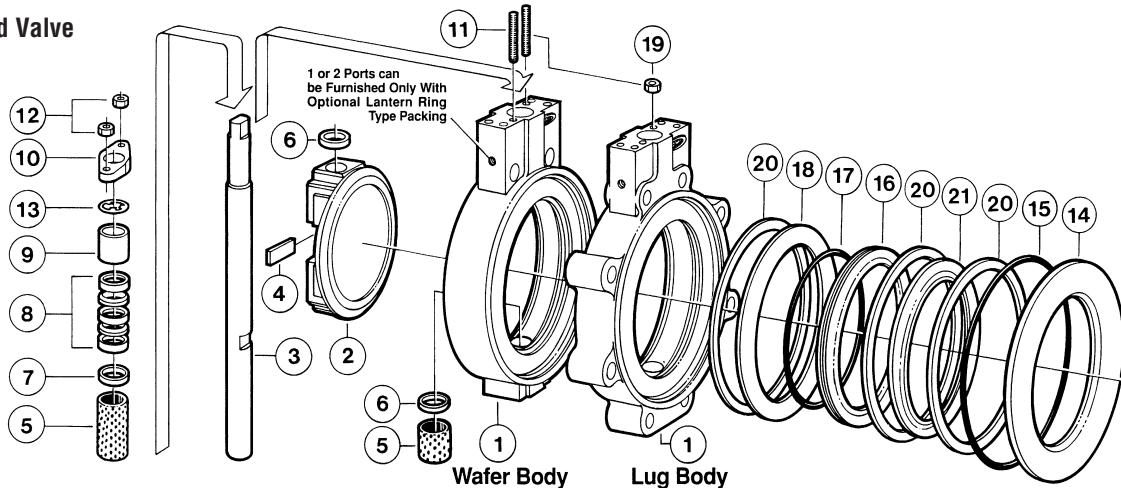
* For quantities of PTFE/Fiberglass bearings, see **Table D** on page 22. All Fire Sealed have 1 upper and 1 lower bearing.

** Registered trademark of the DuPont Company. *** Registered trademark of Union Carbide. ■ Materials for Fire Sealed valves only. • Recommended spare parts.

Standard Valve

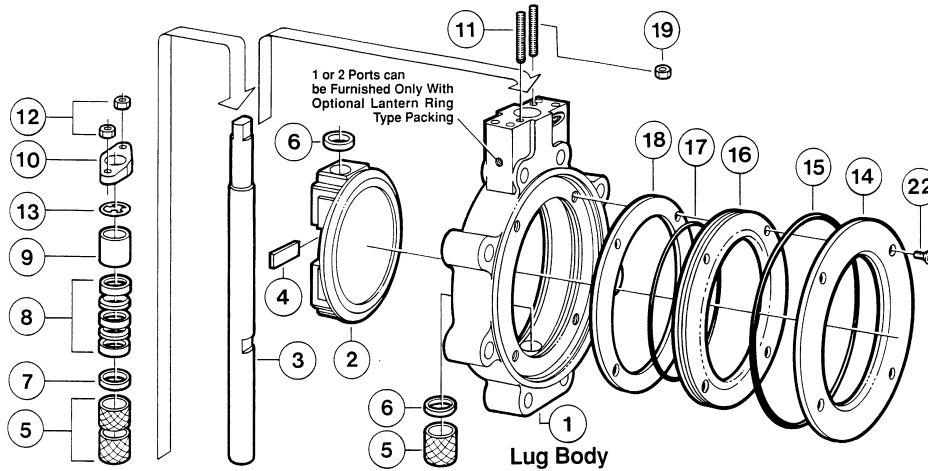


Fire Sealed Valve



SECTION V

BX2L4/BX2L9 End Of Line Lug Valve

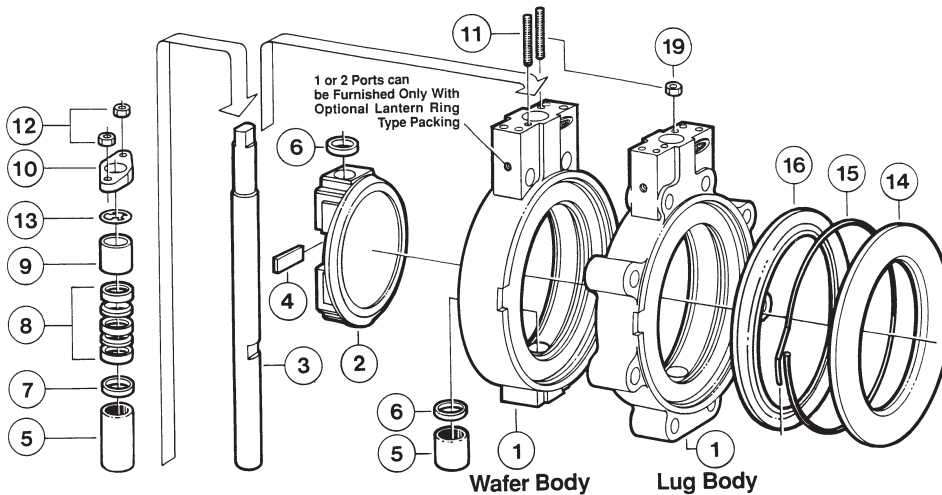


PARTS LIST 2" thru 12" – TriFlex L Class IV Metal Seat

Item No.	Description	Qty.	Material Options	
			Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M (ENC)	ASTM A351 Gr. CF8M (ENC)
3	Shaft	1	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F
4	Pin	1	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F
5	Bearing	*	PTFE/Fiberglass - to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass - to 400°F 316 SS Chrome Plated above 400°F
6	Thrust Bearing	2	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
7	Thrust Washer	1	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
8	Packing Set	1	PTFE Cup and Cone to 400°F Grafoil above 400°F	PTFE Cup and Cone to 400°F Grafoil above 400°F
9	Gland	1	304 SS	304 SS
10	Adjuster	1	ASTM A351 Gr. CD4MCu	ASTM A351 Gr. CD4MCu
11	Stud-Adjuster	2	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
12	Nut-Adjuster	2	Gr.8 to 400°F — Gr. 2H above 400°F	Gr.8 to 400°F — Gr. 2H above 400°F
13	Ground Spring	1	302 SS	302 SS
14	Retainer Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
15	Lock Ring	1	Inconel	Inconel
16	Seat	1	Inconel X750 Std. - Others as specified	Inconel X750 Std. - Others as specified
19	Jamb Nut	1	300 Series SS	300 Series SS

*For quantities of PTFE/Fiberglass bearings, see Table D on page 22.

TriFlex Valve



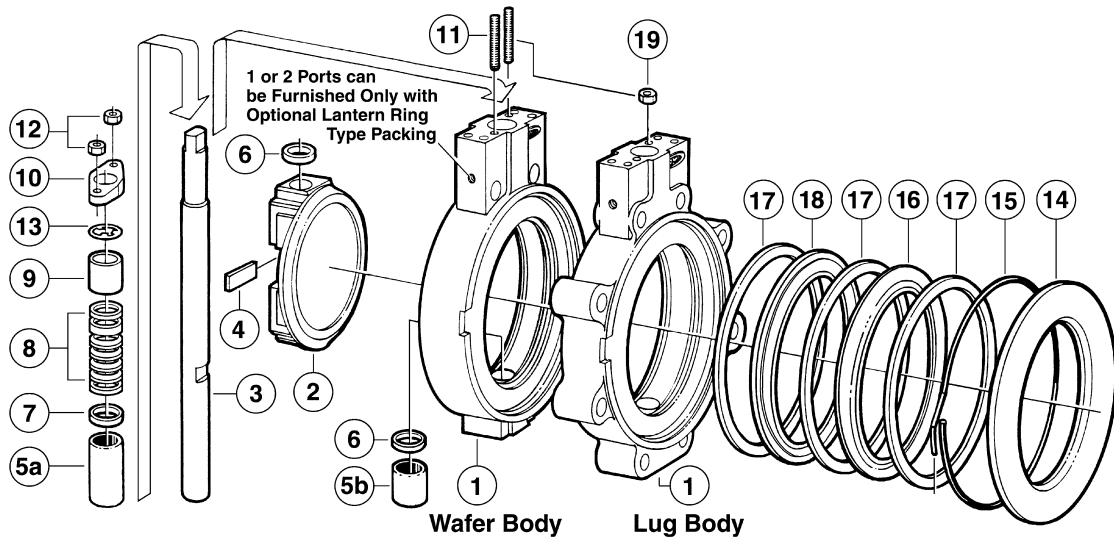
SECTION V

PARTS LIST 2" thru 12" – APEX Class IV Metal Seat

Apex				
Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M (ENC)	ASTM A351 Gr. CF8M (ENC)
3	Shaft	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
4	Pin	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
5	Bearing	*	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F
6	Thrust Bearing	2	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
7	Thrust Washer	1	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
8	Packing Set	1	PTFE Cup and Cone to 400 Deg. F Grafoil*** above 400°F	PTFE Cup and Cone to 400 Deg. F Grafoil*** above 400°F
9	Gland	1	304 SS	304 SS
10	Adjuster	1	ASTM A351 Gr. CD4MCu	ASTM A351 Gr. CD4MCu
11	Stud-Adjuster	2	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
12	Nut-Adjuster	2	Gr.8 to 400°F — Gr. 2H above 400°F	Gr.8 to 400°F — Gr. 2H above 400°F
13	Ground Spring	1	302 SS	302 SS
14	Retainer Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
•15	Lock Ring	1	Viton A** to 400°F — Inconel above 400°F	Viton A** to 400°F — Inconel above 400°F
•16	Seat	1	Inconel X750 - Others as specified	Inconel X750 - Others as specified
•17	Gasket	3	Grafoil***	Grafoil***
18	Seat Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
19	Jamb Nut	1	300 Series SS	300 Series SS

* For quantities of PTFE/Fiberglass bearings, see **Table D** on page 22. ** Registered trademark of the DuPont Company.
 *** Registered trademark of Union Carbide. • Recommended spare parts.

APEX Valve



SECTION V

PARTS LIST 14" thru 36" – Standard and Fire Sealed

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
2A	Taper Pin	As Req.	ASTM A276 Type 316 Condition B	ASTM A276 Type 316 Condition B
2B	Shaft	1	ASTM A564 UNS S17400 Type 630	ASTM A564 UNS S17400 Type 630
•3	Packing Set	As Req.	PTFE (■Grafoil)**	PTFE (■Grafoil)**
4	Packing Gland	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
5	Thrust Washer 14", 16" & 18" only	2	PTFE	PTFE
6	Packing Washer	As Req.	Carbon Steel	316 Stainless Steel
7	Bearing	2	PTFE/Fiberglass (■PTFE/316 SS)	PTFE/Fiberglass (■PTFE/316 SS)
8	Adjuster Fastener	As Req.	B8M3 (■Gr. B-7)	B8M3 (■Gr. B-7)
9	Adjuster	As Req.	ASTM A351 Gr. CD4M-Cu	ASTM A351 Gr. CD4M-Cu
10	Grounding Spring	1	300 Series Stainless Steel	300 Series Stainless Steel
11	Retainer Ring	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
12	Seat Ring	1	Carbon Steel	ASTM A240 UNS S31600 Type 316
•13	Seat Energizer	1	Viton A*	Viton A*
•14	Seat	1	PFA	PFA
•15	Retainer Fastener	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
•16	Fire-Sealed Seat	1	Inconel X750	Inconel X750
•17	Retainer Gasket	1	■Grafoil**	■Grafoil**
•18	Seat Gasket	2	■Grafoil**	■Grafoil**
19	Jamb Nut	4	300 Series Stainless Steel	300 Series Stainless Steel
20	Thrust Bearing	2	PTFE	PTFE
21	Thrust Washer	2	300 Series Stainless Steel	300 Series Stainless Steel
22	Adjustment Stud	1	Carbon Steel - Zinc Plated	304 Stainless Steel
23	Support Stud	4	Carbon Steel - Zinc Plated	304 Stainless Steel
24	Lock Washer	4	Carbon Steel	300 Series Stainless Steel
25	Nut	4	Carbon Steel	300 Series Stainless Steel
26	Thrust Plate	1	Carbon Steel - Zinc Plated	304 Stainless Steel
31	Bottom Cap	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
32	Bottom Cap Gasket	1	TFM 1600 (■Grafoil**)	TFM 1600 (■Grafoil**)
33	Bottom Cap Fastener	6	B8M3 (■Gr. B-7)	B8M3 (■Gr. B-7)
34	Bearing Cap	1	ASTM A240 UNS S31600 Type 316	ASTM A240 UNS S31600 Type 316
35	Bearing Cap Fastener	2	B8M3	B8M3
36	Thrust Bearing	2	TFM 1600	TFM 1600

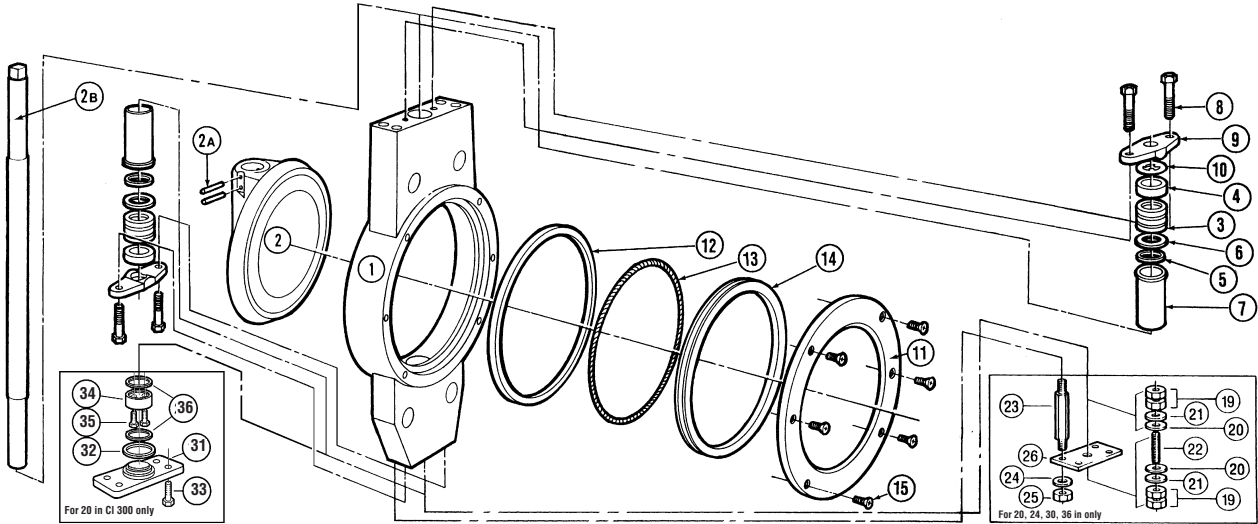
■ Materials for Fire Sealed valves only
* Registered trademark of DuPont Company

• Recommended spare parts
** Registered trademark of Union Carbide

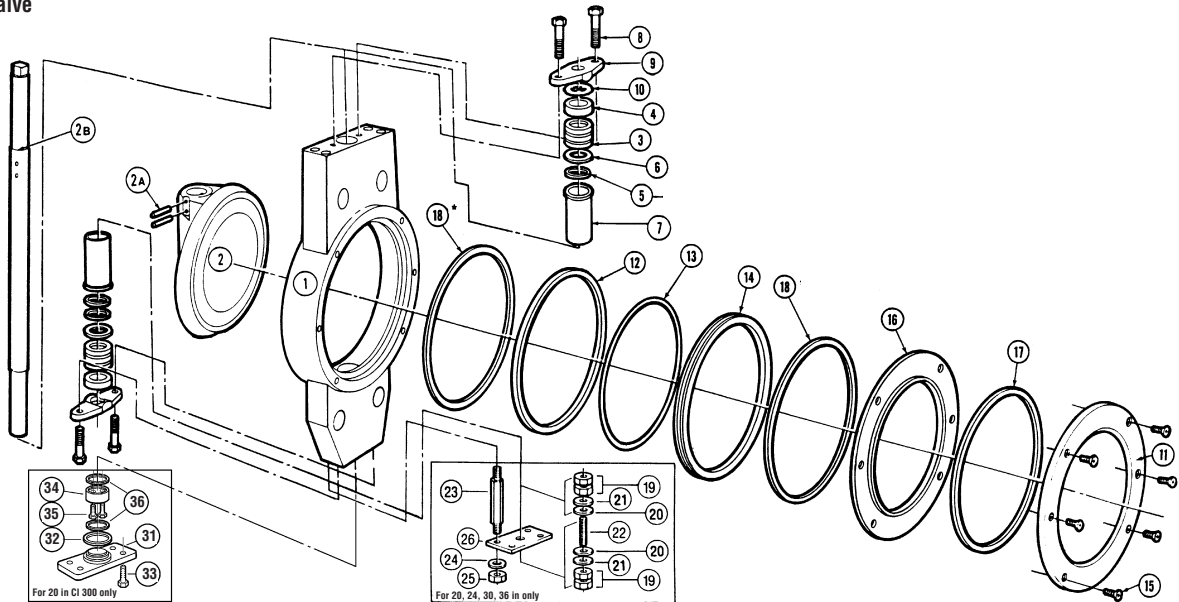
SECTION V

PARTS LIST 14" thru 36"
(See Parts List on page 16.)

Standard Valve



Fire Sealed Valve



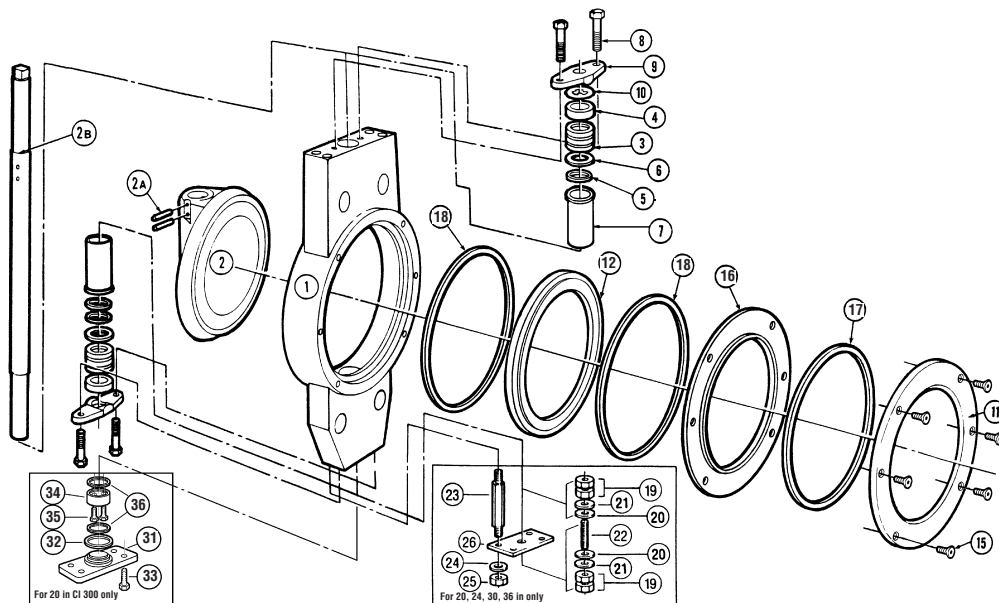
SECTION V

PARTS LIST 14" thru 36" – APEX Class IV Metal Seat

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M ENC	ASTM A351 Gr. CF8M
2A	Taper Pin	As Req.	ASTM A276 Type 316 Condition B	ASTM A276 Type 316 Condition B
2B	Shaft	1	ASTM A564 UNS S17400 Type 630	ASTM A564 UNS S17400 Type 630
*3	Packing Set	As Req.	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
4	Packing Gland	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
5	Thrust Washer 14", 16" & 18" only	2	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
6	Packing Washer	As Req.	Carbon Steel	316 Stainless Steel
7	Bearing	2	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F
8	Adjuster Fastener	As Req.	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
9	Adjuster	As Req.	ASTM A351 Gr. CD4M-Cu	ASTM A351 Gr. CD4M-Cu
10	Grounding Spring	1	300 Series Stainless Steel	300 Series Stainless Steel
11	Retainer Ring	1	ASTM A515 Gr. 70	ASTM A240 UNS S31600 Type 316
12	Seat Ring	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
*14	APEX Seat	1	Inconel X750 Std. — Others as specified	Inconel X750 Std. — Others as specified
*15	Retainer Fastener	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
*17	Retainer Gasket	1	Grafoil**	Grafoil**
*18	Seat Gasket	2	Grafoil**	Grafoil**
19	Jamb Nut	4	300 Series Stainless Steel	300 Series Stainless Steel
20	Thrust Bearing	2	PTFE	PTFE
21	Thrust Washer	2	300 Series Stainless Steel	300 Series Stainless Steel
22	Adjustment Stud	1	Carbon Steel - Zinc Plated	304 Stainless Steel
23	Support Stud	4	Carbon Steel - Zinc Plated	304 Stainless Steel
24	Lock Washer	4	Carbon Steel	300 Series Stainless Steel
25	Nut	4	Carbon Steel	300 Series Stainless Steel
26	Thrust Plate	1	Carbon Steel - Zinc Plated	304 Stainless Steel
31	Bottom Cap	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
32	Bottom Cap Gasket	1	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F
33	Bottom Cap Fastener	6	B8M3 to 400°F — B7 above 400°F	B8M3 to 400°F — B7 above 400°F
34	Bearing Cap	1	ASTM A240 UNS S31600 Type 316	ASTM A240 UNS S31600 Type 316
35	Bearing Cap Fastener	2	B8M3	B8M3
36	Thrust Bearing	2	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F

• Recommended spare parts * Registered trademark of DuPont Company ** Registered trademark of Union Carbide

APEX Valve



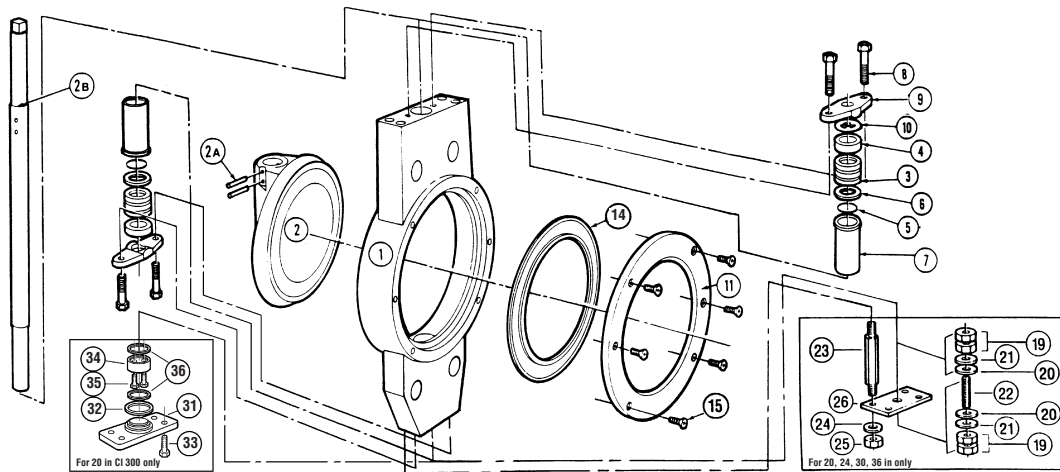
SECTION V

PARTS LIST 14" thru 36" – TriFlex Class IV Metal Seat

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M ENC	ASTM A351 Gr. CF8M ENC
2A	Taper Pin	As Req.	ASTM A276 Type 316 Condition B to 600°F Monel K-500 above 600°F	ASTM A276 Type 316 Condition B to 600°F Monel K-500 above 600°F
2B	Shaft	1	ASTM A564 UNS S17400 Type 630 to 600°F ASTM A479 Type XM-19 above 600°F	ASTM A564 UNS S17400 Type 630 to 600°F ASTM A479 Type XM-19 above 600°F
•3	Packing Set	As Req.	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
4	Packing Gland	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
5	Thrust Washer 14", 16" & 18" only	2	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
6	Packing Washer	As Req.	Carbon Steel	316 Stainless Steel
7	Bearing	2	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F
8	Adjuster Fastener	As Req.	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
9	Adjuster	As Req.	ASTM A351 Gr. CD4M-Cu	ASTM A351 Gr. CD4M-Cu
10	Grounding Spring	1	300 Series Stainless Steel	300 Series Stainless Steel
11	Retainer Ring	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
•14	Triflex Seat	1	Inconel X750 Std. — Others as specified	Inconel X750 Std. — Others as specified
•15	Retainer Fastener	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
19	Jamb Nut	4	300 Series Stainless Steel	300 Series Stainless Steel
20	Thrust Bearing	2	PTFE	PTFE
21	Thrust Washer	2	300 Series Stainless Steel	300 Series Stainless Steel
22	Adjustment Stud	1	Carbon Steel - Zinc Plated	304 Stainless Steel
23	Support Stud	4	Carbon Steel - Zinc Plated	304 Stainless Steel
24	Lock Washer	4	Carbon Steel	300 Series Stainless Steel
25	Nut	4	Carbon Steel	300 Series Stainless Steel
26	Thrust Plate	1	Carbon Steel - Zinc Plated	304 Stainless Steel
31	Bottom Cap	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
32	Bottom Cap Gasket	1	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F
33	Bottom Cap Fastener	6	B8M3 to 400°F — B7 above 400°F	B8M3 to 400°F — B7 above 400°F
34	Bearing Cap	1	ASTM A240 UNS S31600 Type 316	ASTM A240 UNS S31600 Type 316
35	Bearing Cap Fastener	2	B8M3	B8M3
36	Thrust Bearing	2	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F

• Recommended spare parts * Registered trademark of DuPont Company ** Registered trademark of Union Carbide

TriFlex Valve



SECTION VI

SERVICE KITS

Service kits are offered in **Table C**. Seat kits include all components necessary for seat replacement. Complete kits include the seat kit plus other components required for complete valve repair. When ordering, indicate size, model number, pressure class and material of construction (as detailed on valve nameplate) for the valve to be repaired.

For valves that have special material configurations, consult the factory with original valve's smart number.

IMPORTANT NOTE

The use of parts and components other than those supplied by Flowserve Corporation could severely restrict the operation and performance of this valve. Unauthorized or substitutions of components can lead to valve failure due to corrosion and/or premature failure of the substituted parts.

TABLE C – Service Kits

BX2001 ASME Class 150 Repair Kits	BX2301 ASME Class 300 Repair Kits
SX = Standard BX2001 Seat Kit	SX3 = Standard BX2301 Seat Kit
CX = Standard BX2001 Complete Kit	CX3 = Standard BX2301 Complete Kit
SL = Std. BX2 End of Line Lug Seat Kit	SL3 = Std. BX2301 End of Line Lug Seat Kit
CL = Std. BX2 End of Line Lug Complete Kit	CL3 = Std. BX2301 End of Line Lug Complete Kit
SU = UHWMPE BX2001 Seat Kit	SU3 = UHWMPE BX2301 Seat Kit
CU = UHWMPE BX2001 Complete Kit	CU3 = UHWMPE BX2301 Complete Kit
SZ = Fire Sealed BX2001 Seat Kit	SZ3 = Fire Sealed BX2301 Seat Kit
CZ = Fire Sealed BX2001 Complete Kit	CZ3 = Fire Sealed BX2301 Complete Kit
ST = TriFlex BX2001 Seat Kit (Inconel Seat)	ST3 = TriFlex BX2301 Seat Kit (Inconel Seat)
CT = TriFlex BX2001 Complete Kit (Inconel Seat)	CT3 = TriFlex BX2301 Complete Kit (Inconel Seat)
S4 = APEX BX2001 Seat Kit (Inconel Seat)	S43 = APEX BX2301 Seat Kit (Inconel Seat)
C4 = APEX BX2001 Complete Kit (Inconel Seat)	C43 = APEX BX2301 Complete Kit (Inconel Seat)

Valve Type	Seat Kit Components	Complete Kit components
Standard, End of Line Lug, UHWMPE	PFA seat, seat energizer, retainer fasteners or locking ring	Seat kit, packing, bearings, disc pins, thrust washers
Fire Sealed	PFA seat, seat energizer, retainer fasteners or locking ring, Fire Sealed seat, Grafoil retainer and seat gaskets	Seat kit, packing, bearings, disc pins, thrust washers
Triflex	TriFlex seat, retainer fasteners or locking ring	Seat kit, packing, bearings, disc pins, thrust washers
APEX	APEX seat, retainer fasteners or locking rings, Grafoil retainer and seat gaskets	Seat kit, packing, bearings, disc pins, thrust washers

SECTION VII

COMPLETE VALVE REPAIR

DISASSEMBLY

1. Place the valve seat side up on a work table and remove manual operators.
2. Remove seat package following the procedure for seat replacement in **Section IV**.
3. Remove packing bolts or nuts, adjuster and gland. Remove external disc support hardware or bottom cap.
4. Grind away weld from end of disc pin and drive out pins using a punch and hammer. Discard pins.
5. Carefully pull or push shaft through the disc and out of the valve body.
6. Remove packing and bearings from valve body and discard.

CLEANUP AND PREPARATION

1. Clean and inspect seat components and valve disc, following the procedure for seat replacement in **Section IV**.
2. Remove any gasket material from the seat pocket, packing box and shaft bore of the valve body. Clean all surfaces thoroughly. Polish the valve body packing and stem bores, the disc shaft bore and the shaft using 600 grit or finer emery paper.

CAUTION

Do not sandblast the valve body, disc or shaft.

3. Carefully inspect all machined bores and surfaces. Small scratches, scale or minor corrosion can be removed by polishing using 600 grit or finer emery paper. Under no circumstances should heavily worn, corroded or scratched valve bodies, discs or shafts be repaired by welding or re-machining.

VALVE ASSEMBLY — 2" THRU 12"

1. Clamp the valve body in a vice and insert the bearing(s) into the bottom (blind) shaft bore. For PTFE/fiberglass bearings, insert the bearing stack as shown in **Table D**. For severe service, fire sealed and metal bearings, insert the short bearing into the bottom shaft bore. **Note:** Severe service and fire sealed bearings are split. Align the split towards one side of the valve.
3. Insert the top bearing(s) into the top shaft bore of the valve body. For PTFE/fiberglass bearings, insert the bearing stack as shown in **Table D**. For severe service, fire sealed and metal bearings, insert the long bearing into the top shaft bore. **Note:** Severe service and fire sealed bearings are split. Align the split of the top bearing in the opposite direction of the bottom bearing.
4. Slide the shaft through the top bearing and disc and into the bottom shaft bore. When fully inserted, the disc pin slot of the disc and shaft will be aligned.



2. Place one disc thrust washer over the bearing and then place the disc (disc pin slot up toward the top end of the valve body) into the valve body, aligning the disc and body shaft bores. Slide the second disc thrust washer into the gap between the top of the disc and valve body.



SECTION VII

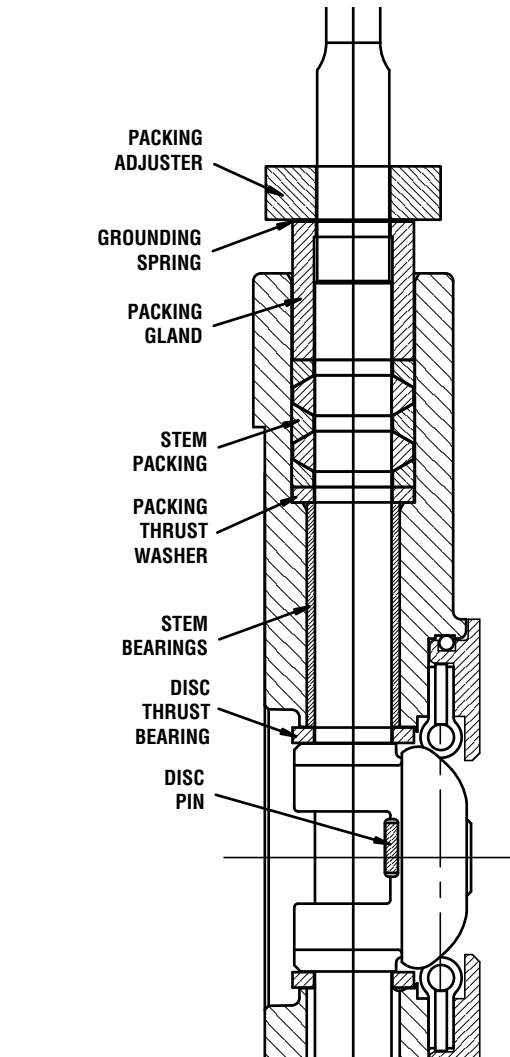
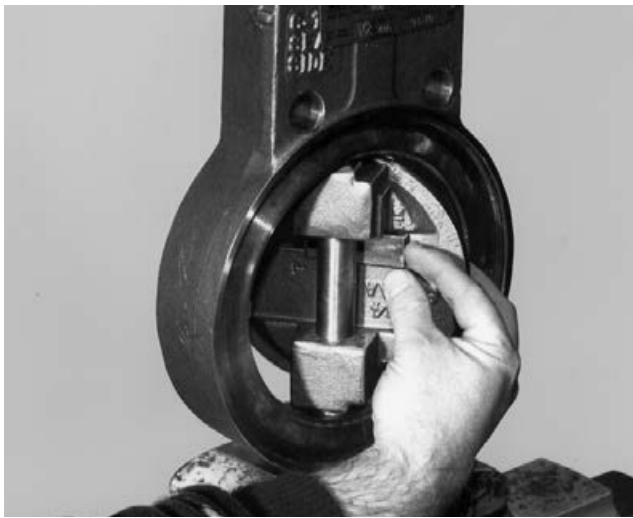
COMPLETE VALVE REPAIR (continued)

5. Insert the disc pin (thin end first) into the slot between the disc shaft. When the pin is installed in the proper orientation, the thick end of the pin will be adjacent to the small drilled hole in the slot of the disc (adjacent to the original pin weld). Also check alignment of shaft double D to the disc face. The flat of the double D should be parallel to the front face of the disc. Improper orientation of disc pin will cause the shaft flat and disc face to be off parallel by several degrees.

12. Operate the valves a few times to insure that the valve disc turns freely into and out of the seat. Seat testing of repaired valves is recommended.

TABLE D – PTFE/Fiberglass Bearings

Valve Size	Pressure Class	Bottom Bearing		Top Bearing	
		Qty.	Length (in)	Qty.	Length (in)
2	150/300	2	0.81	1	1.00
3	150/300	1	1.00	2	1.00
4	150/300	1	1.00	2	1.00
6	150/300	1	1.00	2	1.00
8	150	1	1.50	1	1.00 1.50
8	300	2	1.00	2	1.50
10	150	2	1.00	3	1.00
10	300	1	1.00 1.50	2 1	1.00 1.50
12	150	2	1.13	3	1.13
12	300	2	1.50	2 1	1.50 1.00



6. Using a punch and hammer on the thick end of the pin, firmly set the pin. Check disc and shaft connection to ensure there is no looseness.
7. Weld the thick end of the pin to the disc. Draw weld into the small drilled hole in the pin slot of the disc to act as a secondary mechanical lock. Be certain to use weld rod compatible with pin and disc materials and service environment.
8. Insert packing thrust washer, packing set and packing gland into the packing bore of the valve body. Slide the grounding spring over the shaft. Install packing adjuster and adjuster nuts.
9. Tighten adjuster nuts to the torque specifications listed on page 25 of this manual. Make certain to identify the style of packing used in the valve in order to select the proper fastener torque. **Note:** Packing styles are illustrated on page 25.
10. Install the seat package following the procedure for seat replacement in **Section IV**.
11. If manual operators were removed, re-install them using procedures in **Section VIII** for gears or **Section X** for levers.

SECTION VII

COMPLETE VALVE REPAIR (continued)

VALVE ASSEMBLY — 14" THRU 36"

1. Lay the valve body on the table with the seat pocket side down. Insert a bearing into the top and bottom shaft bore. Some designs of fire sealed bearings require a separate metal outer sleeve (included in the repair kit). Insert the PTFE/stainless bearing into the metal sleeve prior to installing the bearing into the shaft bore. **Note:** Severe service and fire sealed bearings are split. Align the splits towards opposite sides of the valve.
2. Insert packing thrust washer, packing set and packing gland into the top packing bore of the valve body. Install packing adjuster and fasteners. Finger-tighten the fasteners. These fasteners will be tightened to the required torque after the shaft is installed. Do not install the bottom packing set. It is installed after the shaft.
3. Place the disc face down into the valve body with the disc pin holes towards the top of the body. Align the shaft bores of the disc and valve body. Very close alignment of the bores is required to insert the shaft.
4. Carefully slide the shaft through the bottom shaft bore (the end without the stem packing installed) of the valve body and into the disc bore.

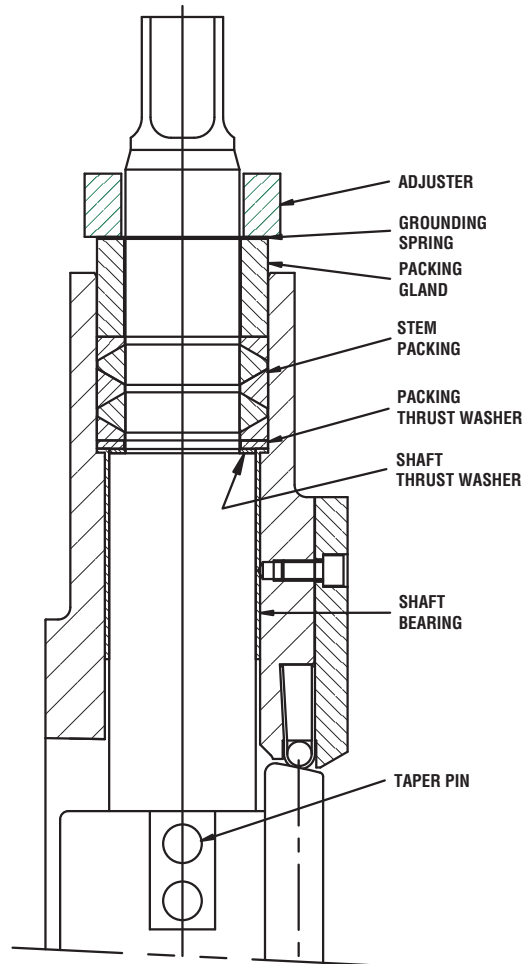
CAUTION

Do not use excessive force to push the shaft through the disc or galling may occur.

Note: For valves with a stepped shaft design, place the shaft thrust washer over the top end of the shaft before the shaft enters into the top shaft bore of the body.

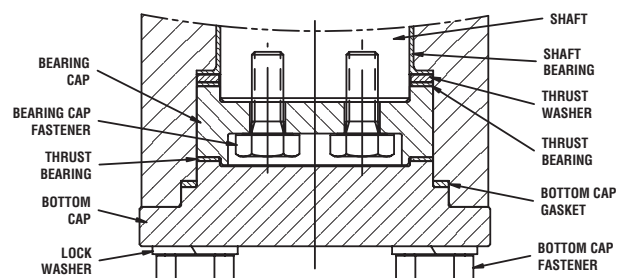
5. Push the shaft through the body until the tapered disc pin holes in the disc and shaft are aligned.
6. Verify that the orientation of the shaft is such that the taper direction of the pin holes in the shaft matches the taper direction of the pin holes in the disc. When properly orientated, the tapered holes will match perfectly and the word "DISC", stamped on the shaft below the shaft square, will be located on the same side as the front face of the disc (the seat pocket side of the valve body).
7. Insert the tapered disc pins and firmly set each pin using a punch and hammer. Check disc and shaft connection to ensure there is no looseness.
8. Weld the small end of each pin to the disc. Be certain to use weld rod compatible with pin and disc materials and service environment.
9. For valves with bottom stem packing, insert packing thrust washer, packing set and packing gland into the bottom packing bore of the valve body. Install packing adjuster and fasteners. Finger-tighten the fasteners. **Note:** For valves with a stepped shaft design, insert the shaft thrust washer into the packing bore prior to installing the packing thrust washer.

FIGURE 2
Stepped Shaft Design



10. For valves with bottom end cap design, slide one thrust bearing onto the shaft, attach the bearing cap to the end of the shaft (use thread cement and torque fasteners to 30 ft-lbs). Place the second thrust bearing on the bearing cap. Place the bottom cap gasket on the bottom cap and install the bottom cap. Torque bottom cap fasteners to 75 ft-lbs in a criss-cross pattern.

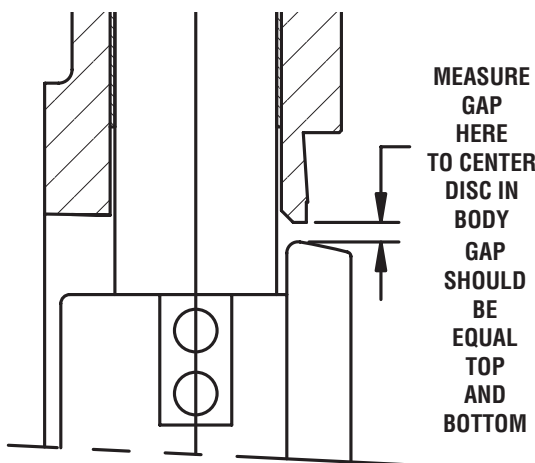
FIGURE 3
Bottom Cap Design



SECTION VII

COMPLETE VALVE REPAIR (continued)

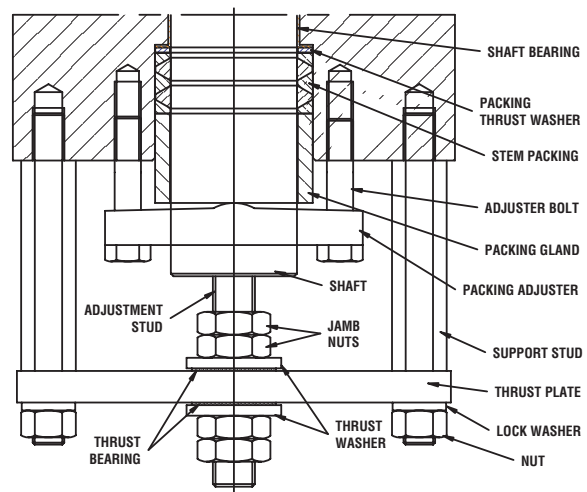
11. Turn valve over so that the valve body seat pocket is up and level the disc face to the valve body.
12. Remove the top adjuster and slide the grounding spring over the shaft. Replace the adjuster and tighten the adjuster bolts to the torque specifications listed on page 25 of this manual. For valves that have top and bottom stem packing, the tightening of adjuster fasteners can push the disc assembly off-center to the valve body seat pocket. Alternate fastener tightening between top and bottom packing to keep disc centered in the valve body. Check the gap between the disc and the valve body seat pocket. The maximum acceptable gap difference (measured at the top and bottom of the disc) is .015". Make certain to identify the style of packing used in the valve in order to select the proper fastener torque. **Note:** Packing styles are illustrated on page 25.



13. For valves with an external disc support design, assemble the disc support hardware on the bottom of the valve body. See **Figure 4**.
 - (a) Thread the four support studs into the tapped holes on the end of the body.
 - (b) Apply thread cement and thread the adjustment stud into the shaft until it bottoms in the tapped hole and torque to 100 ft-lbs.
 - (c) Thread two jamb nuts onto the adjustment stud and slide one metal thrust washer (cup side away from nuts) and one PTFE thrust washer over the adjustment stud.
 - (d) Fasten the thrust plate to the support studs with four lock washers and nuts.

- (e) Slide the remaining PTFE washer followed by the metal washer (cup side facing the PTFE washer) over the adjustment stud and thread the two jamb nuts onto the stud.
- (f) Finger tighten the jamb nut adjacent to the metal thrust washer on each side of the thrust plate and check for acceptable centering of the disc in the valve body by measuring the gap as explained in Step 12. If the disc is off center, then adjust the position by turning either nut to pull or push the disc into position.
- (g) Once the disc is centered, simultaneously tighten the two inside jamb nuts to 40 ft-lbs.
- (h) Tighten the outside jamb nuts to 200 ft-lbs. Make certain that the inside jamb nuts do not turn while tightening the outside nuts. Check for acceptable disc centering.
- (i) Tack weld the adjustment stud to the valve shaft and outside jamb nuts to the adjustment stud.

FIGURE 4
External Disc Support Design

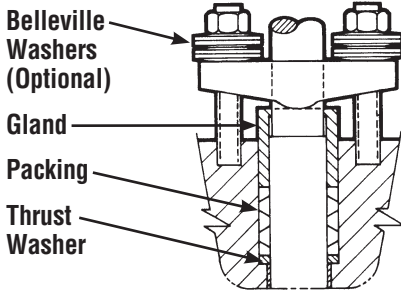


14. Install the seat package following the procedure for seat replacement in **Section IV**.
15. If manual operators were removed, re-install them using the procedures in **Section VIII** for gears or **Section X** for levers.
16. Operate the valves a few times to insure that the valve disc turns freely into and out of the seat. Seat testing of repaired valves is recommended.

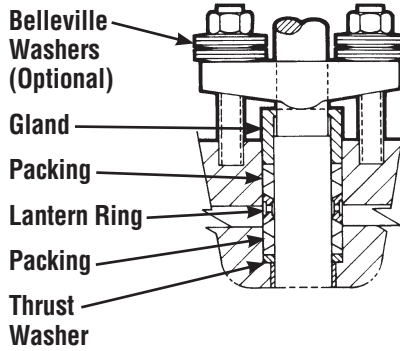
SECTION VII

COMPLETE VALVE REPAIR (continued)

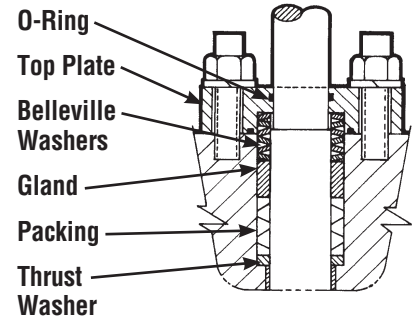
Single PTFE Cup and Cone



Double PTFE Cup and Cone



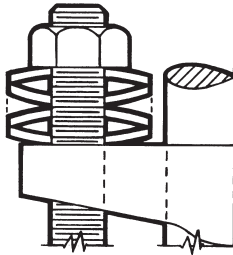
Triple Seal PTFE Cup and Cone



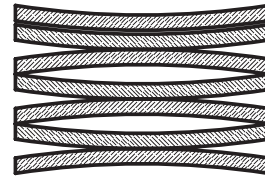
Adjuster Fastener Torque — PTFE Cup and Cone Packing

Valve Size		2	3	4	5	6	8	10	12	14	16	18	20	24	30	36
Fastener Torque – 150	Ft-lbs.	13	13	15	23	23	35	41	45	35	40	45	35	40	45	65
	(Nm)	(17)	(17)	(20)	(31)	(31)	(47)	(55)	(61)	(47)	(54)	(61)	(47)	(54)	(61)	(87)
Fastener Torque – 300	Ft-lbs.	13	13	15	—	23	35	45	50	35	40	45	40	—	—	—
	(Nm)	(17)	(17)	(20)	—	(31)	(47)	(61)	(68)	(47)	(54)	(61)	(54)	—	—	—

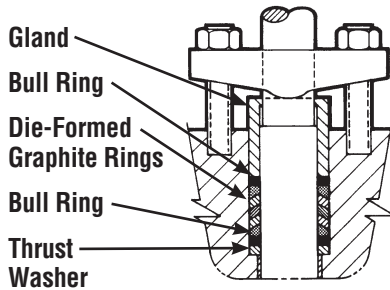
**Adjuster Bolts
Belleville Washer
Arrangement**



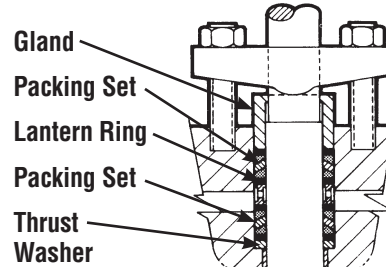
**Triple Seal Belleville
Washer Arrangement**



Single Fire Sealed Grafoil



Double Fire Sealed Grafoil



Adjuster Fastener Torque — Fire Sealed Grafoil Packing

Valve Size		2	3	4	5	6	8	10	12	14	16	18	20	24	30	36
Fastener Torque – 150	Ft-lbs.	8	8	8	14	14	20	28	31	30	35	40	30	35	40	60
	(Nm)	(11)	(11)	(11)	(19)	(19)	(27)	(37)	(41)	(40)	(47)	(54)	(40)	(47)	(54)	(80)
Fastener Torque – 300	Ft-lbs.	8	8	8	—	14	20	31	40	30	35	40	35	—	—	—
	(Nm)	(11)	(11)	(11)	—	(19)	(27)	(41)	(54)	(40)	(47)	(54)	(47)	—	—	—

SECTION VIII

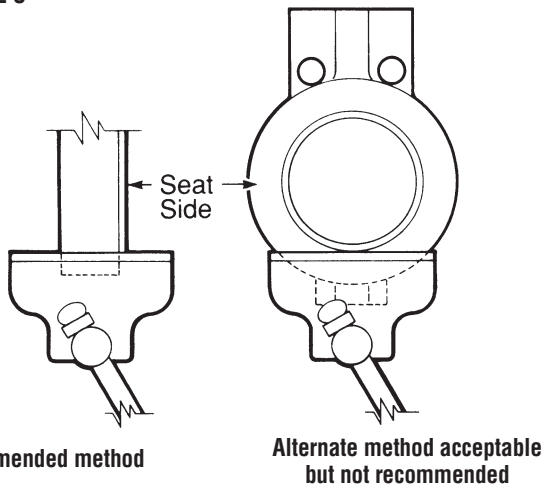
MANUAL GEAR OPERATOR INSTALLATION (See FIGURE 5 and FIGURE 6 below.)

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. (Refer to **FIGURE 6**.) **Note:** At this time, adjustments should be made to ensure that the body's machined flanged surface (6) is parallel with the disc. To accomplish this, place the valve body's machined flange surface (6) on a level plate. Position a bubble level on the upper side of the shaft flat and adjust the shaft until completely level.

WARNING

When placing the valve into the vice, grip the bottom of the valve only. Do not grip the bottom edge of the retainer ring, this can damage the retainer ring/gasket sealing surface. Refer to **FIGURE 5**. **Note:** Vice should have soft jaws.

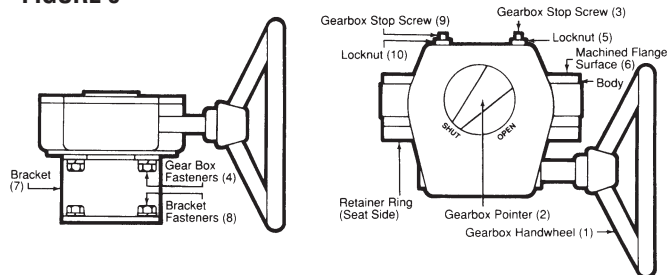
FIGURE 5



2. Place bracket (7) on the valve body as shown in **FIGURE 6**. Attach using the brackets fasteners (8), lock washers and hex nuts, making the fasteners finger-tight.

3. Rotate the gearbox handwheel (1) clockwise until the gearbox pointer (2) indicates the "shut" position.
4. Place the gearbox on the bracket (7) as shown in **FIGURE 6**.
5. Loosen the gearbox stopping screws (3) and (9).
6. Install the gearbox fasteners (4) and lock washers and tighten. Bracket fasteners (8) must also be tightened.
7. Turn the gearbox closing stop screw (9) clockwise until it stops, then tighten the locknut (10).
8. Turn the gearbox handwheel (1) counterclockwise to open the valve until the disc face is perpendicular to the valve body flange face.
9. Turn the gearbox opening stop screw (3) clockwise until it stops, then tighten the locknut (5).
10. Cycle the valve from closed to open to closed again using the gear operator. Recheck to make sure the disc is centered on the seat by measuring the distance from the machined surface on the disc to the machine flanged surface (6) on the body. This should be done at two points, one above or below the disc over travel stop and the other 180 degrees from the first. Both measurements should be equal.

FIGURE 6



SECTION IX

CHANGING MANUAL GEAR OPERATOR QUADRANTS

CAUTION

Do not attempt to change the manual gear operator quadrant while the valve is in service.

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. Depressurize system

if valve is installed as valve could open when the manual gear operator is removed.

2. Remove manual gear operator.
3. Remount gear operator 180 degrees from the position shown in **FIGURE 6**.
4. Follow Steps 5 through 9 of the Manual Gear Operator Installation instructions above.

SECTION X

LOCKING LEVER HANDLE AND INDICATOR PLATE INSTALLATION (See FIGURE 7 below.)

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. (Refer to **FIGURE 7**.)
Note: At this time, adjustments should be made to ensure that the valve body's machined flanged surface (5) is parallel with the disc. To accomplish this, place the valve body's machined flanged surface (5) on a level plate. Position a bubble level on the upper side of the shaft flat and adjust the shaft until completely level.
2. Place bracket (6) on the valve body as shown in **FIGURE 7**. Attach using the bracket fasteners (7), lock washers and hex fasteners. Secure hex fasteners finger-tight.
3. Mount the indicator plate (1) to the bracket (6) as shown in **FIGURE 7** with the shakeproof washers placed between the indicator plate (1) and the bracket (6). The indicator plate fasteners (4) should be finger-tight at this time.
4. Place the locking lever handle (2) on the valve stem as shown in **FIGURE 7** and tighten the pinch fastener (3) provided.
5. Position the indicator plate (1) so that the locking lever fits in the "closed" position of the indicator plate (1). Tighten the indicator plate fasteners (4) and the bracket fasteners (7). (Be sure that the lever cannot be moved with a $\frac{5}{16}$ padlock installed in locking hole.)
6. Cycle the valve from closed to open, to closed again, using the locking lever handle. Recheck to make sure the disc is centered on the seat by measuring the distance from the machined surface on the disc to the machined flanged surface (6) on the body. This should be done at two points, one above or below the disc over travel stop and the other 180 degrees from the first. Both measurements should be equal.

SECTION XI

CHANGING LOCKING LEVER HANDLE QUADRANTS

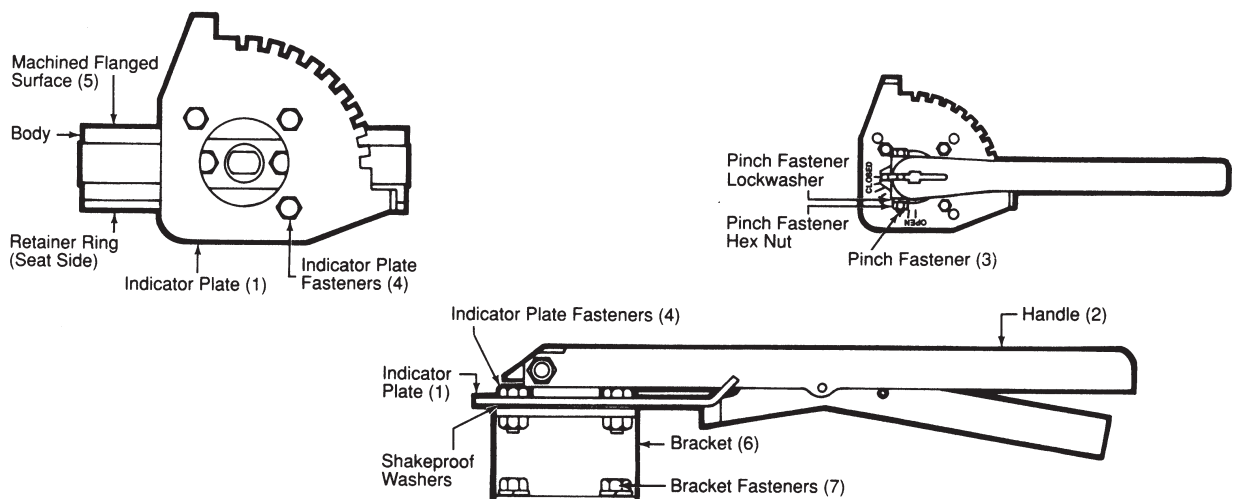
CAUTION

Do not attempt to change locking lever handle quadrants while the valve is in service.

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. Depressurize system if valve is installed as valve could open when the locking lever handle is removed.

2. Remove the locking lever handle (2) and indicator plate (1).
3. Mount the indicator plate (1) 180 degrees from the position shown in **FIGURE 7**. Do not tighten the indicator plate fasteners (4) at this time.
4. Follow Steps 4 and 5 in the Locking Lever Handle and Indicator Plate Installation Instructions above.

FIGURE 7



SECTION XII

BX2001 FLANGE DRILLING SPECIFICATIONS — Fastener Thread Sizes

Due to the hydrodynamic torque encountered with butterfly valves, safe operating practices dictate that manual gear operators, pneumatic actuators or electric actuators be used when these differential pressures are exceeded.

Wafer Style – Class 150 and 300 Drilling				Lug Style – Class 150 and 300 Drilling			
Size in (mm)	No. of Holes	Hole Size Inch	B.C. in (mm)	No. of Fasteners	Thread Size Inch	B.C. in (mm)	B1 in (mm)
2 (50)	4	3/4	43/4 (121)	4	5/8-11	43/4 (121)	6 (152)
2 (50)	2	3/4	5 (127)	8	5/8-11	5 (127)	6 1/4 (154)
3 (80)	2	3/4	6 (152)	4	5/8-11	6 (152)	7 1/2 (191)
3 (80)	2	7/8	6 5/8 (168)	8	3/4-10	6 5/8 (168)	8 1/8 (206)
4 (100)	2	3/4	7 1/2 (191)	8	5/8-11	7 1/2 (191)	9 (229)
4 (100)	2	7/8	7 7/8 (200)	8	3/4-10	7 7/8 (200)	9 3/8 (238)
6 (150)	2	7/8	9 1/2 (241)	8	3/4-10	9 1/2 (241)	11 (279)
6 (150)	2	7/8	10 5/8 (270)	12	3/4-10	10 5/8 (270)	12 1/8 (308)
8 (200)	2	7/8	11 3/4 (298)	8	3/4-10	11 3/4 (298)	13 1/2 (343)
8 (200)	2	1	13 (330)	12	7/8-9	13 (330)	14 3/4 (315)
10 (250)	2	1	14 1/4 (362)	12	7/8-9	14 1/4 (362)	16 (406)
10 (250)	4***	1	15 1/4 (387)	16	1-8	15 1/4 (387)	17 1/4 (438)
12 (300)	2	1	17 (432)	12	7/8-9	17 (432)	19 (483)
12 (300)	4***	1 1/8	17 3/4 (451)	16	1 1/8-8	17 3/4 (451)	20 1/4 (514)
14 (350)	4	1 1/16	18 3/4 (476)	12	1-8	18 3/4 (476)	21 (533)
14 (350)	8*	1 1/8	20 1/4 (514)	20*	1 1/8-8	20 1/4 (514)	23 (584)
16 (400)	4	1 1/16	21 1/4 (540)	16	1-8	21 1/4 (540)	23 1/2 (597)
16 (400)	8*	1 1/4	22 1/2 (572)	20*	1 1/4-8	22 1/2 (572)	25 1/2 (648)
18 (450)	4	1 3/16	22 3/4 (578)	16	1 1/8-8	22 3/4 (578)	25 (635)
18 (450)	8*	1 1/4	24 3/4 (628)	24*	1 1/4-8	24 3/4 (628)	28 (711)
20 (500)	8*	1 1/8	25 (635)	20*	1 1/8-8	25 (635)	27 1/2 (699)
20 (500)	10*	1 1/4	27 (686)	24*	1 1/4-8	27 (686)	30 (762)
24 (600)	8*	1 1/4	29 1/2 (749)	20*	1 1/4-8	29 1/2 (749)	32 (813)
30 (750)	16*	1 1/4	36 (914)	28**	1 1/4-8	36 (914)	38 3/4 (984)
36 (900)	16**	1 1/2	42 3/4 (1086)	32**	1 1/2-8	42 3/4 (1086)	46 (1168)

ASME Class 150 ASME Class 300

All dimensions are approximate and for illustration purposes only. For exact dimensions request certified dimensional prints.

* The two fastener holes on either side of the shaft, top and bottom, are tapped blind holes (both sides).

** Four fastener holes, two on either side of the shaft top and bottom, are tapped blind holes, both sides.

*** The two fastener holes on either side of the shaft, top and bottom, are tapped through.

Maximum Differential Pressures	
Valve Size in (mm)	Max ΔP – Valve 90° open†
3 (80)	34 PSIG (2.3 bar)
4 (100)	16 PSIG (1.1 bar)
6 (150)	7 PSIG (.5 bar)
8 (200)	5 PSIG (.3 bar)

†Based on a 120 pound maximum force on wrench. See MSS SP91 for further clarification.

Big Max high performance butterfly valves meet the following flange specifications:

ASME B16.5	2 in (50 mm) - 24 in (600 mm)
MSS SP44	30 in (750 mm) & 36 in (900 mm)
ASME B16.47 (Series A)	30 in (750 mm) & 36 in (900 mm)

SECTION XIII

BX2001 VALVE AND OPERATOR WEIGHTS

BX Manual Operator Weights		
Valve Size in (mm)	Locking Lever	Gear
2 (50)	6 lbs (2.7 kg)	11 lbs (5 kg)
2 (50)	6 lbs (2.7 kg)	11 lbs (5 kg)
3 (80)	6 lbs (2.7 kg)	11 lbs (5 kg)
3 (80)	6 lbs (2.7 kg)	11 lbs (5 kg)
4 (100)	6 lbs (2.7 kg)	11 lbs (5 kg)
4 (100)	6 lbs (2.7 kg)	11 lbs (5 kg)
6 (150)	6 lbs (2.7 kg)	11 lbs (5 kg)
6 (150)	6 lbs (2.7 kg)	11 lbs (5 kg)
8 (200)	20 lbs (9.1 kg)	28 lbs (12.7 kg)
8 (200)	20 lbs (9.1 kg)	28 lbs (12.7 kg)
10 (250)	N/A	28 lbs (12.7 kg)
10 (250)	N/A	28 lbs (12.7 kg)
12 (300)	N/A	31 lbs (14 kg)
12 (300)	N/A	31 lbs (14 kg)
14 (350)	N/A	64 lbs (29.0 kg)
14 (350)	N/A	94 lbs (42.6 kg)
16 (400)	N/A	76 lbs (34.5 kg)
16 (400)	N/A	108 lbs (49.0 kg)
18 (450)	N/A	76 lbs (34.5 kg)
18 (450)	N/A	125 lbs (56.7 kg)
20 (500)	N/A	76 lbs (34.5 kg)
20 (500)	N/A	101 lbs (45.8 kg)
24 (600)	N/A	101 lbs (45.8 kg)
30 (750)	N/A	156 lbs (70.8 kg)
36 (900)	N/A	HFM GF/S5 156 lbs (70.8 kg) HFM GF/D9 224 lbs (101.6 kg)

ASME Class 150 ASME Class 300

All dimensions are approximate and for illustration purposes only. For exact dimensions request certified dimensional prints.

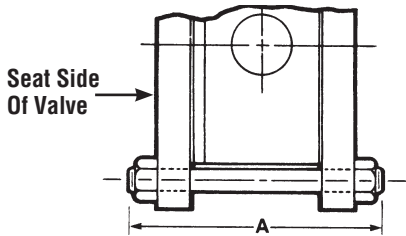
BX Valve Weights* in Pounds (Kilograms)		
Valve Size in (mm)	BX2W	BX2L
2 (50)	12 lbs (5.4 kg)	12 lbs (5.4 kg)
2 (50)	10 lbs (4.5 kg)	14 lbs (6.4 kg)
3 (80)	16 lbs (7.3 kg)	18 lbs (8.2 kg)
3 (80)	15 lbs (6.8 kg)	21 lbs (9.5 kg)
4 (100)	20 lbs (9.1 kg)	26 lbs (11.8 kg)
4 (100)	20 lbs (9.1 kg)	27 lbs (12.2 kg)
5 (125)	30 lbs (13.5 kg)	35 lbs (15.8 kg)
6 (150)	35 lbs (15.9 kg)	40 lbs (18.1 kg)
6 (150)	36 lbs (16.3 kg)	52 lbs (23.6 kg)
8 (200)	58 lbs (26.3 kg)	68 lbs (30.8 kg)
8 (200)	63 lbs (28.6 kg)	90 lbs (40.8 kg)
10 (250)	86 lbs (39 kg)	104 lbs (47.1 kg)
10 (250)	106 lbs (48 kg)	146 lbs (66 kg)
12 (300)	125 lbs (56.7 kg)	160 lbs (72.6 kg)
12 (300)	161 lbs (73 kg)	230 lbs (104 kg)
14 (350)	250 lbs (113.4 kg)	300 lbs (136 kg)
14 (350)	345 lbs (157 kg)	636 lbs (289 kg)
16 (400)	325 lbs (147.4 kg)	400 lbs (181.4 kg)
16 (400)	480 lbs (218 kg)	900 lbs (408 kg)
18 (450)	400 lbs (181.4 kg)	500 lbs (226.8 kg)
18 (450)	685 lbs (311 kg)	1170 lbs (530.7 kg)
20 (500)	467 lbs (211.8 kg)	624 lbs (283 kg)
20 (500)	650 lbs (295 kg)	950 lbs (432 kg)
24 (600)	665 lbs (301.6 kg)	880 lbs (399 kg)
30 (750)	1050 lbs (476.3 kg)	1425 lbs (646.4 kg)
36 (900)	2162 lbs (980.7 kg)	2748 lbs (1246.5 kg)

SECTION XIV

DIMENSIONS OF FASTENERS REQUIRED FOR INSTALLATION — CLASS 150

STUD FASTENERS

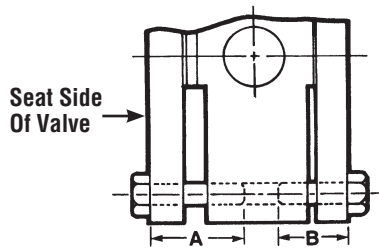
BX2-Valves
Wafer Style
Class-150
2" Thru 12"
ASME B16.5 Flange
Thickness
1/8" Thick Composite
Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)
Size - Dia. & Thread	in	5/8 - 11			3/4 - 10			7/8 - 9	
No. of Stud Fasteners		4	4	8	8	8	8	12	12
"A" Length of Stud Fasteners	in (mm)	5 (127)	5 1/2 (140)	5 3/4 (146)	6 1/4 (159)	6 1/4 (159)	6 3/4 (171)	7 1/4 (184)	8 (203)

CAP SCREW FASTENERS

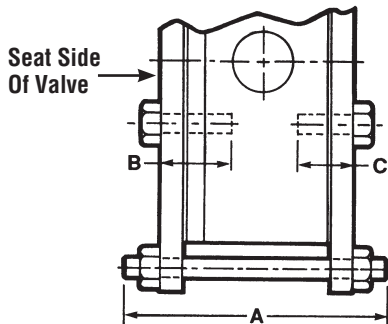
BX2-Valves
Lug Style
Class-150
3" Thru 12"
ASME B16.5 Flange
Thickness
1/8" Thick Composite
Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)
Size - Dia. & Thread	in	5/8 - 11			3/4 - 10			7/8 - 9	
No. of "A" Fasteners		4	4	8	8	8	8	12	12
"A" Length of Fasteners	in (mm)	2 (50)	2 (50)	2 1/4 (57)	2 1/4 (57)	2 1/4 (57)	2 1/2 (63)	2 3/4 (70)	2 3/4 (70)
No. of "B" Fasteners		4	4	8	8	8	8	12	12
"B" Length of Fasteners	in (mm)	1 3/4 (44)	1 3/4 (44)	1 3/4 (44)	2 (50)	2 (50)	2 (50)	2 1/4 (57)	2 1/4 (57)

STUD FASTENERS

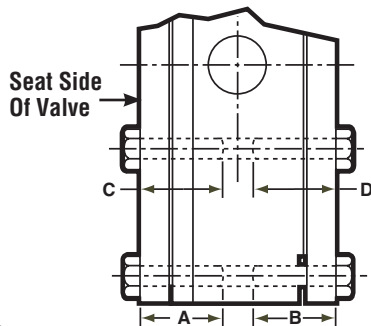
BX2-Valves
Wafer Style
Class-150
14" Thru 24"
ASME B16.5
Flange Thickness
30" and 36"
MSS SP44
and B16.47
(Series A)
Flange Thickness
1/8" Thick Composite
Gasket



Valve Size	in (mm)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
Size - Dia. & Thread	in	1 - 8		1 1/8 - 8		1 1/4 - 8		1 1/2 - 8
No. of Stud Fasteners		12	16	16	16	16	24	24
"A" Length of Stud Fasteners	in (mm)	9 (230)	9 1/2 (240)	10 1/2 (270)	11 1/4 (290)	13 (330)	16 1/2 (420)	19 (480)
No. of "B" Fasteners		—	—	—	4	4	4	8
"B" Length of Fasteners	in (mm)	—	—	—	3 1/2 (90)	3 1/4 (85)	4 1/4 (110)	5 1/2 (140)
No. of "C" Fasteners		—	—	—	4	4	4	8
"C" Length of Fasteners	in (mm)	—	—	—	3 (75)	3 1/2 (90)	4 1/2 (115)	5 1/4 (135)

CAP SCREW FASTENERS

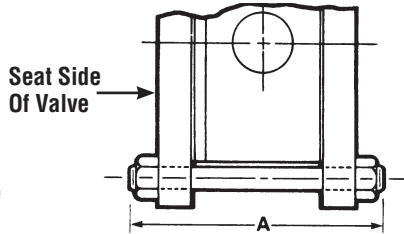
BX2-Valves
Lug Style
Class-150
14" Thru 24"
ASME B16.5
Flange Thickness
30" and 36"
MSS SP44
and B16.47
(Series A)
Flange Thickness
1/8" Thick Composite
Gasket



Valve Size	in (mm)	14" (350)	16" (400)	18" (450)	20" (500)	24" (600)	30" (750)	36" (900)
Size - Dia. & Thread	in	1 - 8		1 1/8 - 8		1 1/4 - 8		1 1/2 - 8
No. of Stud Fasteners		12	16	16	16	16	24	24
"A" Length of Stud Fasteners	in (mm)	3 1/4 (85)	3 1/4 (85)	3 1/4 (85)	3 3/4 (95)	4 1/4 (110)	5 (130)	7 1/2 (190)
No. of "B" Fasteners		12	16	16	16	16	24	24
"B" Length of Fasteners	in (mm)	2 3/4 (70)	3 (75)	3 1/4 (85)	3 1/2 (90)	4 1/4 (110)	5 (130)	7 (180)
No. of "C" Fasteners		—	—	—	4	4	4	8
"C" Length of Fasteners	in (mm)	—	—	—	3 1/2 (90)	4 (100)	4 3/4 (120)	5 1/2 (140)
No. of "D" Fasteners		—	—	—	4	4	4	8
"D" Length of Fasteners	in (mm)	—	—	—	3 (75)	3 1/2 (90)	4 1/2 (115)	5 1/4 (135)

SECTION XV
DIMENSIONS OF FASTENERS REQUIRED FOR INSTALLATION — CLASS 300
STUD FASTENERS

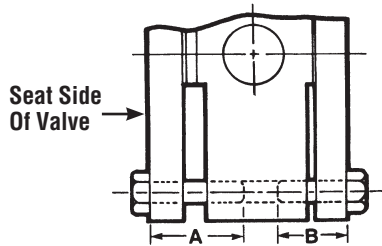
BX2-Valves
 Wafer Style
 Class-300
 2" Thru 12"
 ASME B16.5 Flange
 Thickness
 1/8" Thick Composite
 Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)
Size - Dia. & Thread	in	5/8 - 11	3/4 - 10			7/8 - 9
No. of Stud Fasteners		8	8	8	12	12
"A" Length of Stud Fasteners	in (mm)	5 1/2 (140)	6 1/2 (165)	7 (178)	7 1/2 (190)	8 1/2 (215)

CAP SCREW FASTENERS

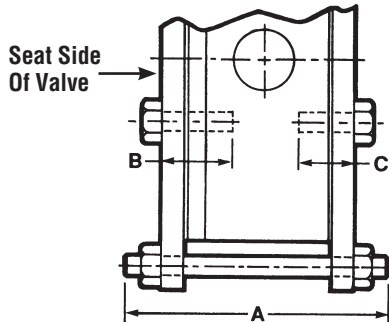
BX2-Valves
 Lug Style
 Class-300
 3" Thru 12"
 ASME B16.5 Flange
 Thickness
 1/8" Thick Composite
 Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)
Size - Dia. & Thread	in	5/8 - 11	3/4 - 10			7/8 - 9
No. of "A" Fasteners		8	8	8	12	12
"A" Length of Fasteners	in (mm)	1 3/4 (44)	2 1/4 (57)	2 1/2 (64)	2 3/4 (70)	3 (75)
No. of "B" Fasteners		8	8	8	12	12
"B" Length of Fasteners	in (mm)	1 3/4 (44)	2 (50)	2 1/4 (57)	2 1/2 (64)	3 (75)

STUD FASTENERS

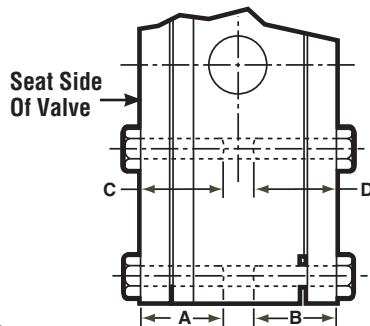
BX2-Valves
 Wafer Style
 Class-300
 14" Thru 24"
 ASME B16.5
 Flange Thickness
 30" and 36"
 MSS SP44
 and B16.47
 (Series A)
 Flange Thickness
 1/8" Thick Composite
 Gasket



Valve Size	in (mm)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)
Size - Dia. & Thread	in	1 - 8	1 1/8 - 8		1 1/4 - 8		
No. of Stud Fasteners		12	12	16	16	20	20
"A" Length of Stud Fasteners	in (mm)	10 (254)	10 3/4 (275)	12 1/4 (310)	13 1/4 (340)	14 1/2 (370)	15 (380)
No. of "B" Fasteners		4	4	4	4	4	4
"B" Length of Fasteners	in (mm)	3 1/2 (90)	3 3/4 (95)	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)
No. of "C" Fasteners		4	4	4	4	4	4
"C" Length of Fasteners	in (mm)	3 1/4 (85)	3 1/2 (90)	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)

CAP SCREW FASTENERS

BX2-Valves
 Lug Style
 Class-300
 14" Thru 24"
 ASME B16.5
 Flange Thickness
 30" and 36"
 MSS SP44
 and B16.47
 (Series A)
 Flange Thickness
 1/8" Thick Composite
 Gasket



Valve Size	in (mm)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)
Size - Dia. & Thread	in	1 - 8	1 1/8 - 8		1 1/4 - 8		
No. of Stud Fasteners		16	16	16	16	20	20
"A" Length of Stud Fasteners	in (mm)	3 1/2 (90)	3 3/4 (95)	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	5 1/2 (140)
No. of "B" Fasteners		16	16	16	16	20	20
"B" Length of Fasteners	in (mm)	3 1/4 (85)	3 1/2 (90)	4 (100)	4 1/2 (115)	5 (130)	5 1/2 (140)
No. of "C" Fasteners		—	—	4	4	4	4
"C" Length of Fasteners	in (mm)	—	—	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)
No. of "D" Fasteners		—	—	4	4	4	4
"D" Length of Fasteners	in (mm)	—	—	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)



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