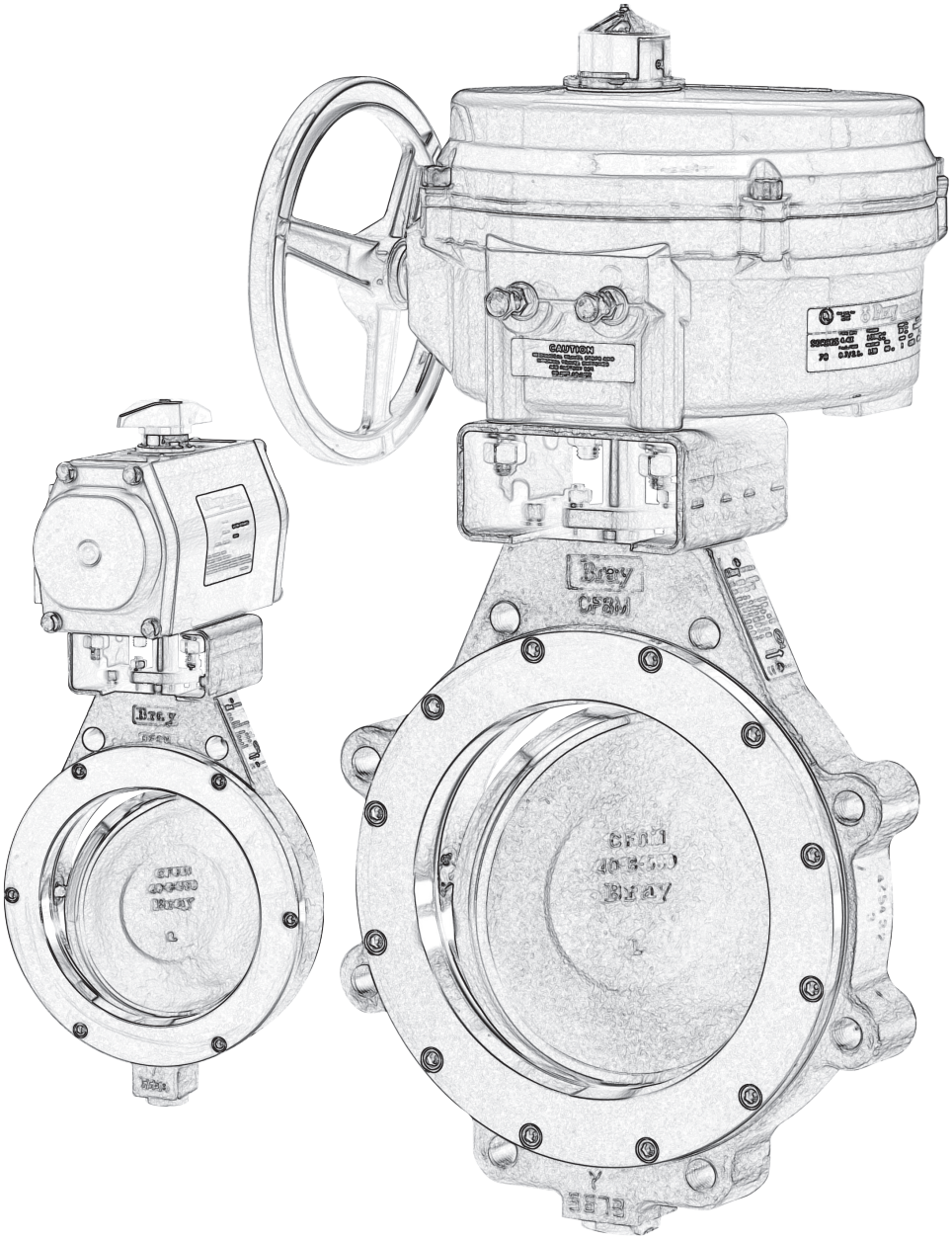
Bray®

Your Global Flow Control Partner

Bray/McCannalok
High Performance Butterfly Valve
Operation and Maintenance Manual



ABS TYPE APPROVED PRODUCT

LLOYD'S REGISTER · LRQA ISO 9001

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Read and Follow These Instructions
Save These Instructions

DEFINITION OF TERMS

WARNING	indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

INTRODUCTION

The Bray/McCannalok high-performance butterfly valve combines the advantages of trunnion-type ball valves with the easy operation, light weight, and low cost of butterfly valves. One basic design is suitable for a wide range of services, including oxygen, chlorine, sour gas, vacuum, and steam applications.

Features Include:

- Bubble tight shutoff provided throughout a wide range of operating conditions.
- Suitable for both modulating and on/off services, the Bray/McCannalok butterfly valve is easily automated with your choice of manual operators, electric and pneumatic actuators, positioners, and controls.
- The Bray/McCannalok is available in a Fire Safe model qualified to API 607 5th Edition and BS 6755 Part 2.
- The Bray/McCannalok is also available in a Metal Seated only model providing IEC 60534-4 Class IV bi-directional leakage rates through full pressure range.

Additional information about Bray/McCannalok butterfly valves – including application data, engineering specifications, and actuator selection is available from your Bray distributor or sales representative.

INSTALLATION

Special instructions for Fire Safe and Metal Seated valves appear on page 10.

1. The Bray/McCannalok valve is designed to be mounted between ANSI flanges. When the valve is open, the disc will extend into the pipe on both sides of the valve – further on the body side than the seat retainer side of the valve. Piping must be large enough to allow the disc to clear the pipe. Tables 1 and 2 on page 3 show the minimum pipe ID allowable, and standard pipe IDs. In general, Class 150 valves will clear Schedule 40 pipe, and Class 300 valves will clear Schedule 80 pipe adequately. Class 600 will in general clear Schedule 80 sizes 3, 4, and 6; and Schedule 100 in sizes 8, 10, 12, 14, and 16.

CAUTION

2. If handle or actuator has been removed do not rotate disc beyond full open or closed position – this could cause damage to sealing surfaces.

NOTE: Bray/McCannalok valves are equipped with travel limiters to prevent over closure. The valve is opened by turning counterclockwise, closed by turning clockwise. The double "D" flats or keyway at the top of the stem is parallel to the disc edge.

NOTICE

3. For maximum service life, install the valve with the seat retainer upstream. Positive shutoff will be obtained with the valve in either position; however, installation with the seat retainer upstream will give longer service life, especially in erosive services.
4. With the disc in closed position, carefully center valve between flanges. Guide holes (wafer pattern valve) or tapped holes (lugged valves) to match ANSI Pipe flanges and assist in positive alignment.
5. Use standard torques when bolting valve into the line. The seat is sufficiently compressed by the seat retainer, and additional force from flange bolting is not required.
6. Gaskets should conform to the requirements of API Standard 601, Edition 3 for ASME/ANSI B16.5 class flanges. Spiral wound gaskets, such as Flexitallic CG or CGI series, conforming to ASME/ANSI B16.20 are acceptable.

MAINTENANCE

1. Reasonable precautions should be taken before beginning work on the valve. Protective clothing, as required by the specific line fluid, should be worn.

WARNING

Before removing handle or the actuator from the valve, or before removing seat retainer from a valve in dead end service, close the valve and depressurize the line.

2. The eccentric design of the Bray/McCannalok may allow line pressure to open the valve if the handle/actuator is not in place while the valve is under pressure.

WARNING

Do not pressurize the line without a handle or actuator on the valve.

3. The Bray/McCannalok valve must be in the closed position to be removed from the line.

4. Begin all work on a valve that has been removed from the line by cleaning the valve, removing any grit or scale.

CAUTION

When handling the valve, care should be taken not to scratch the disc edge or seat.

5. Replacement seats, seals and other parts are available from authorized distributors. Contact your distributor or sales representative for details of price and delivery.

NOTES:

1. Minimum ID of pipe with recommended clearances (per API 609) have been calculated by adding the minimum ID with zero clearance to a minimum recommended diametric clearance for each pipe size.
2. These charts assume that the pipe is on the body side of the valve and that the pipe is perfectly centered. The seat retainer side of the valve will always have more clearance than the body side.
3. A minimum of 1/16" thick gasket is used between the pipe flange and valve body face.
4. When using a pipe whose ID is smaller than the recommended minimum inside diameter of pipe with adequate clearance, a chamfer of 45° should be provided on the end of the pipe so that it clears the disc.

Table 1 -
NOMINAL INSIDE DIAMETER OF PIPE

Valve Size In. (mm)	Pipe Schedule		
	40	80	100
2.5 (65)	2.469 (62.7)	2.323 (59.0)	
3 (80)	3.068 (77.9)	2.900 (73.7)	
4 (100)	4.026 (102.3)	3.826 (97.2)	
5 (125)	5.047 (128.2)	4.813 (122.3)	
6 (150)	6.065 (154.1)	5.761 (146.3)	
8 (200)	7.981 (202.7)	7.625 (193.7)	7.439 (189.0)
10 (250)	10.020 (254.5)	9.564 (242.9)	9.314 (236.6)
12 (300)	11.938 (303.2)	11.376 (289.0)	11.064 (281.0)
14 (350)	13.124 (333.4)	12.500 (317.5)	12.126 (308.0)
16 (400)	15.000 (381.0)	14.314 (363.6)	13.938 (354.0)
18 (450)	16.876 (428.7)	16.126 (409.6)	
20 (500)	18.814 (477.9)	17.938 (455.6)	
24 (600)	22.626 (574.7)	21.564 (547.7)	

Table 2 -
MINIMUM INSIDE DIAMETER OF PIPE WITH THE RECOMMENDED CLEARANCE

Valve Size In. (mm)	Class		
	150	300	600
2.5 (65)	2.28 (57.9)	2.28 (57.9)	
3 (80)	2.86 (72.6)	2.86 (72.6)	2.75 (69.9)
4 (100)	3.72 (94.5)	3.72 (94.5)	3.56 (90.4)
5 (125)	4.80 (121.9)	4.80 (121.9)	
6 (150)	5.88 (149.4)	5.75 (146.1)	5.38 (136.7)
8 (200)	7.80 (198.1)	7.56 (192.0)	6.88 (174.8)
10 (250)	9.78 (248.4)	9.44 (239.8)	8.50 (215.9)
12 (300)	11.74 (298.2)	11.31 (287.3)	10.12 (257.1)
14 (350)	12.90 (327.7)	11.38 (289.1)	10.88 (276.4)
16 (400)	14.68 (372.9)	14.31 (363.5)	12.62 (320.6)
18 (450)			14.40 (365.8)
20 (500)			15.86 (402.8)
24 (600)	22.50 (571.5)	20.68 (525.3)	
30 (750)	28.55 (725.2)	27.06 (687.3)	
32 (800)	30.69 (779.5)		
36 (900)	34.50 (876.3)	33.63 (854.2)	
40 (1000)	37.55 (953.8)	36.59 (929.4)	
42 (1050)	39.55 (1004.6)	38.67 (982.2)	
44 (1100)		38.67 (982.2)	
48 (1200)	51.09 (1297.7)	45.13 (1146.3)	
54 (1350)	52.95 (1344.9)		
60 (1500)	58.25 (1479.6)		

STEM SEAL REPLACEMENT

Refer to drawing on page 7 for parts identification.

1. If required, remove handle assembly. Remove socket head cap screws (21) and lock washers (22). Remove mounting bracket (20). For actuated valves, unbolt mounting bracket from body and lift actuator assembly off stem.

NOTICE

Note assembly positions before removal.

2. Remove gland retainer nuts (14) and lock washers (13). Remove gland retainer (11) anti-blowout retaining ring or split ring (10) (depending on size), and gland ring (7).
3. Hook out stem seals (8).

CAUTION

When handling stem seals, care should be taken not to scratch stem or stuffing box bore.

Do not remove thrust washer (9), unless further valve disassembly is required.

4. Examine stuffing box bore and stem, clean as necessary to remove any corrosion or foreign matter before installing new seals.
5. Install new seals in stuffing box one at a time, TFE (white) seals first, with the carbon fiber ring at the top. Stagger seal ring joints 180° apart when installing. Tamp each ring to bottom before installing next ring.

Table 3 - TOTAL NUMBER OF STEM SEALS

Valve Size		Class 150	Material CF/TFE	Class 300	Material CF/TFE	Class 600	Material CF/TFE
In.	(mm)						
2.5	(65)	4	1 / 3	4	1 / 3		
3	(80)	4	1 / 3	4	1 / 3	12	2 / 10
4	(100)	4	1 / 3	4	1 / 3	12	2 / 10
5	(125)	4	1 / 3	4	1 / 3		
6	(150)	4	1 / 3	4	1 / 3	16	2 / 14
8	(200)	5	1 / 4	5	1 / 4	16	2 / 14
10	(250)	5	1 / 4	5	1 / 4	18	0 / 18
12	(300)	5	1 / 4	5	1 / 4	18	0 / 18
14	(350)	6	0 / 6	6	0 / 6	18	0 / 18
16	(400)	6	0 / 6	9	0 / 9	16	0 / 16
18	(450)					16	0 / 16
20	(500)					16	0 / 16
24	(600)	10	0 / 10	8	0 / 8		
30	(750)	8	0 / 8	9	0 / 9		
32	(800)	8	0 / 8				
36	(900)	8	0 / 8	9	0 / 9		
40	(1000)	9	0 / 9	9	0 / 9		
42	(1050)	9	0 / 9	9	0 / 9		
44	(1100)			9	0 / 9		
48	(1200)	9	0 / 9	9	0 / 9		
54	(1350)	9	0 / 9				
60	(1500)	9	0 / 9				

CF = Carbon Fiber

NOTICE

On the larger valves it will be necessary to compress each seal before adding the next.

6. Slide gland ring (7) over stem on top of seals (8). Install anti-blowout retaining ring or split ring (10) (depending on valve size). Slide gland retainer (11) over stem and onto gland studs (12). Place lockwashers (13) and hex nuts (14) on studs (12) and tighten finger tight. Tighten gland nuts (14) evenly and alternately to the proper torque value given in Table 4 on page 5.
7. Remount actuator, or mounting bracket (20) with lock washers (22) and cap screws (21) and handle assembly.
8. Operate valve open and closed several times to check for binding and to set the stem seals. Loosen gland nuts (14) and retighten to torque value given in Table 4 on page 5.

SEAT REPLACEMENT

Refer to drawing on page 7 for parts identification.

1. With the disc in the closed position, remove the valve from the line.
2. Lay the valve down with the disc in the closed position and the seat retainer side facing up.
3. Remove the socket head cap screws (17), the seat retainer (16), and seat (15).
4. Carefully clean the seat area in the body and seat retainer. Remove foreign material, dirt, etc. Check disc seating area for nicks or scratches.
5. With the disc in the CLOSED position, place the new seat (15) on disc (2), carefully centering it in the recess in the body.
6. Align the holes in the seat retainer (16) with matching holes in body and carefully place in position on top of seat (15).

CAUTION

Do not shift the retainer in order to align holes. It may shift the seat from its correct position.

Lightly grease cap screw (17) threads and bearing areas.

Step 6.1: Install the cap screws and tighten all cap screws finger tight.

Step 6.2: Tighten the cap screws to approximately 30% of the torque value listed in Table 2 in a crisscross pattern.

Step 6.3: Repeat Step 6.2, increasing the torque value to approximately 60% of the final torque value.

Step 6.4: Repeat Step 6.3, increasing the torque value to the final required torque value.

Step 6.5: Open the disc. Re-torque all cap screws to the final required torque value given in Table 4 on page 5.

7. A final tightening should be performed/checked prior to installation. Operate valve several times and examine seat for any damage before reinstalling the valve in the line.

Table 4 - GLAND RETAINER NUT AND SEAT RETAINER SCREW TORQUES Lb-in (N-m)

Valve Size in. (mm)	Gland Nut			Seat Retainer Screws		
	150	300	600	150	300	600
2.5 (65)	60 (7)	60 (7)		100 (11)	100 (11)	
3 (80)	60 (7)	60 (7)	80 (9)	100 (11)	100 (11)	100 (11)
4 (100)	60 (7)	60 (7)	100 (11)	175 (20)	175 (20)	175 (20)
5 (125)	80 (9)	100 (11)		100 (11)	175 (20)	
6 (150)	80 (9)	120 (14)	140 (16)	100 (11)	175 (20)	300 (34)
8 (200)	80 (9)	140 (16)	200 (23)	175 (20)	175 (20)	300 (34)
10 (250)	110 (12)	190 (21)	200 (23)	175 (20)	300 (34)	300 (34)
12 (300)	130 (15)	220 (25)	200 (23)	300 (34)	300 (34)	300 (34)
14 (350)	130 (15)	200 (23)	240 (27)	300 (34)	300 (34)	500 (56)
16 (400)	150 (17)	220 (25)	240 (27)	300 (34)	300 (34)	750 (85)
18 (450)			400 (45)			1500 (169)
20 (500)			480 (54)			1500 (169)
24 (600)	190 (21)	240 (27)		500 (56)	500 (56)	
30 (750)	210 (24)	310 (35)		500 (56)	750 (85)	
32 (800)	210 (24)			750 (85)		
36 (900)	240 (27)	360 (41)		500 (56)	1500 (169)	
40 (1000)	280 (32)	420 (47)		500 (56)	1500 (169)	
42 (1050)	280 (32)	420 (47)		500 (56)	1500 (169)	
44 (1100)		420 (47)			1500 (169)	
48 (1200)	300 (34)	600 (68)		750 (85)	1500 (169)	
54 (1350)	360 (41)				1500 (169)	
60 (1500)	500 (56)				1500 (169)	

DISC AND STEM REPLACEMENT

Refer to drawing on page 7 for parts identification.

NOTICE

Stem and disc are supplied as a matched set with taper pins and are to be replaced as a set.

1. For handle-operated valves remove handle assembly. Remove socket head cap screws (21) and lock washers (22). Remove mounting bracket (20). For actuated valves, unbolt mounting bracket from body and lift actuator assembly off stem.

NOTICE

Note assembly positions before removal.

2. Remove gland retainer nuts (14) and lock washers (13). Remove gland retainer (11), anti-blowout retaining ring or split ring (10) (depending on valve size), and gland ring (7).

3. Hook out stem seals (8).

CAUTION

Take care not to scratch stem or stuffing box bore.

4. Remove locating plug (19) and gasket (18).

5. Remove cap screws (17), seat retainer (16), and seat (15).

6. Turn disc to the full open position and drill out tack welds on large end of taper pins (4).

CAUTION

Take care to support valve so that disc surfaces are not scratched.

Drill sizes to remove tack welds as given in Table 5 on page 6. Use center-punch to dimple center of tack welds prior to drilling.

7. Place valve in flat position, with flat face of disc up. Support disc and body on wooden blocks to protect disc and body surfaces. Disc will rest in partially open position.

8. Knock out taper pins (4) using a rod or punch on small end of pin (opposite tack weld). It may be necessary to lift body and rotate disc slightly to do this. Make sure disc is resting on wood block since it will swing freely

on stem with pins removed. When pins (4) are out, lay body down so disc and body are evenly supported on flat surface.

9. Using a brass bar or drift punch, knock stem (3) loose and pull from body. After long or severe service this may take considerable force. Be careful not to damage bearings, spacers or body.

CAUTION

Be careful not to damage bearings, spacers or body.

Disc spacers (5) are used at top and bottom of disc to properly position disc in body. Proper spacers were selected at initial assembly and rarely require replacement. The location of these spacers should be noted, and the spacers marked at disassembly so that they are reinstalled in the same positions, top and bottom.

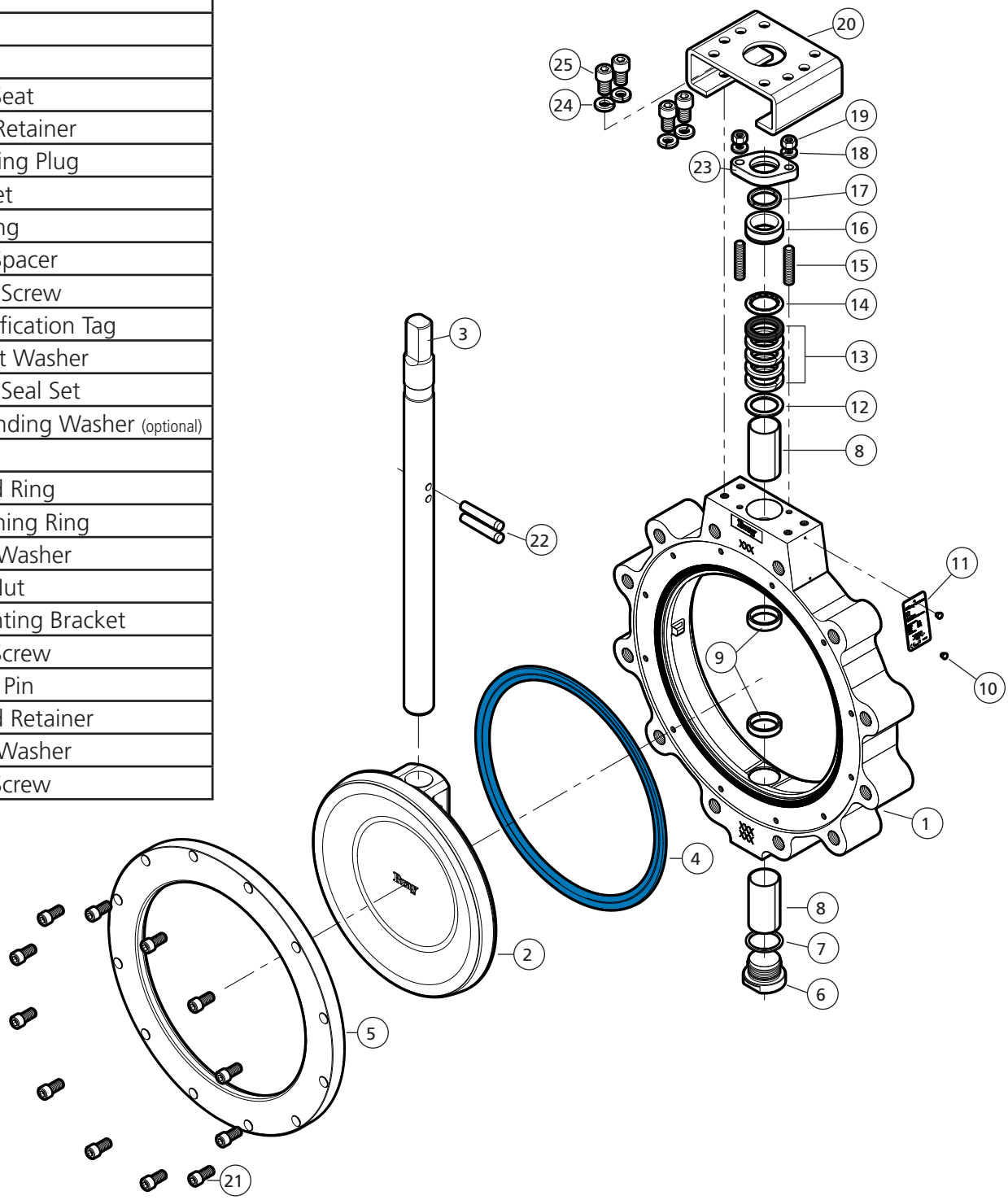
10. Separate body from disc, and remove thrust washer (9) from packing bore.
11. Examine stem bearings (6) for excessive wear. If removed from body, **note position and mark to reinstall in same location**. If bearing liner is worn through to the shell, or severe damage is evident they should be replaced. Replacement is rarely needed.
12. Clean body thoroughly to remove all dirt, foreign matter, rust, etc.
13. Place the body (1) flat, seat retainer side up, and support it on wooden blocks sufficiently above the work surface as to facilitate insertion of the disc (2) in open position. Lower the disc into position, aligning the bores in body and disc.
14. Insert new stem (3) in body (1) with large end of the taper pin holes toward the top. Assemble disc spacers (5) as stem (3) is inserted, making sure that spacers are returned to original locations as marked.
15. Align taper pin holes in disc and stem, and install taper pins (4). Drive pins in tightly with rod or punch, and tack weld each pin (4) to disc (2) at large end of pin.
16. Install new gasket (18) on locating plug (19) and install plug in body.
17. Install new stem seals, following instructions in "Stem Seal Replacement" section. (See page 4)
18. Install new seat, following instructions in "Seat Replacement" section. (See page 4)
19. Remount handle assembly or actuator, and operate valve several times to verify proper operation. Examine disc and seat for any damage before reinstalling in line.

Table 5 -
DRILL SIZE TO REMOVE TACK WELD - in (mm)

Valve Size In. (mm)	Class					
	150		300		600	
2.5 (65)	.234 (5.9)	15/64	.234 (5.9)	15/64		
3 (80)	.234 (5.9)	15/64	.234 (5.9)	15/64	.250 (6.4)	1/4
4 (100)	.234 (5.9)	15/64	.234 (5.9)	15/64	.289 (7.3)	9/32
6 (150)	.234 (5.9)	15/64	.234 (5.9)	15/64	.341 (8.7)	1 1/32
8 (200)	.234 (5.9)	15/64	.234 (5.9)	15/64	.591 (15.0)	19/32
10 (250)	.234 (5.9)	15/64	.234 (5.9)	15/64	.706 (17.9)	45/64
12 (300)	.234 (5.9)	15/64	.234 (5.9)	15/64	.706 (17.9)	45/64
14 (350)	.234 (5.9)	15/64	.234 (5.9)	15/64	.706 (17.9)	45/64
16 (400)	.591 (15.0)	19/32	.234 (5.9)	15/64	1.032 (26.2)	1 1/32
18 (450)	.706 (17.9)	45/64	.706 (17.9)	45/64	1.032 (26.2)	1 1/32
20 (500)					1.241 (31.5)	1 1/4
24 (600)	.706 (17.9)	45/64	1.032 (26.2)	1 1/32		
30 (750)	1.033 (26.2)	1 1/32	1.241 (31.5)	1 1/4		
32 (800)	1.033 (26.2)	1 1/32				
36 (900)	1.033 (26.2)	1 1/32	1.241 (31.5)	1 1/4		
40 (1000)	1.241 (31.521)	1 1/4	1.521 (38.6)	1 17/32		
42 (1050)	1.241 (31.5)	1 1/4	1.521 (38.6)	1 17/32		
44 (1100)			1.521 (38.6)	1 17/32		
48 (1200)	1.241 (31.5)	1 1/4	1.521 (38.6)	1 17/32		
54 (1350)	1.521 (38.6)	1 17/32				
60 (1500)	1.521 (38.6)	1 17/32				

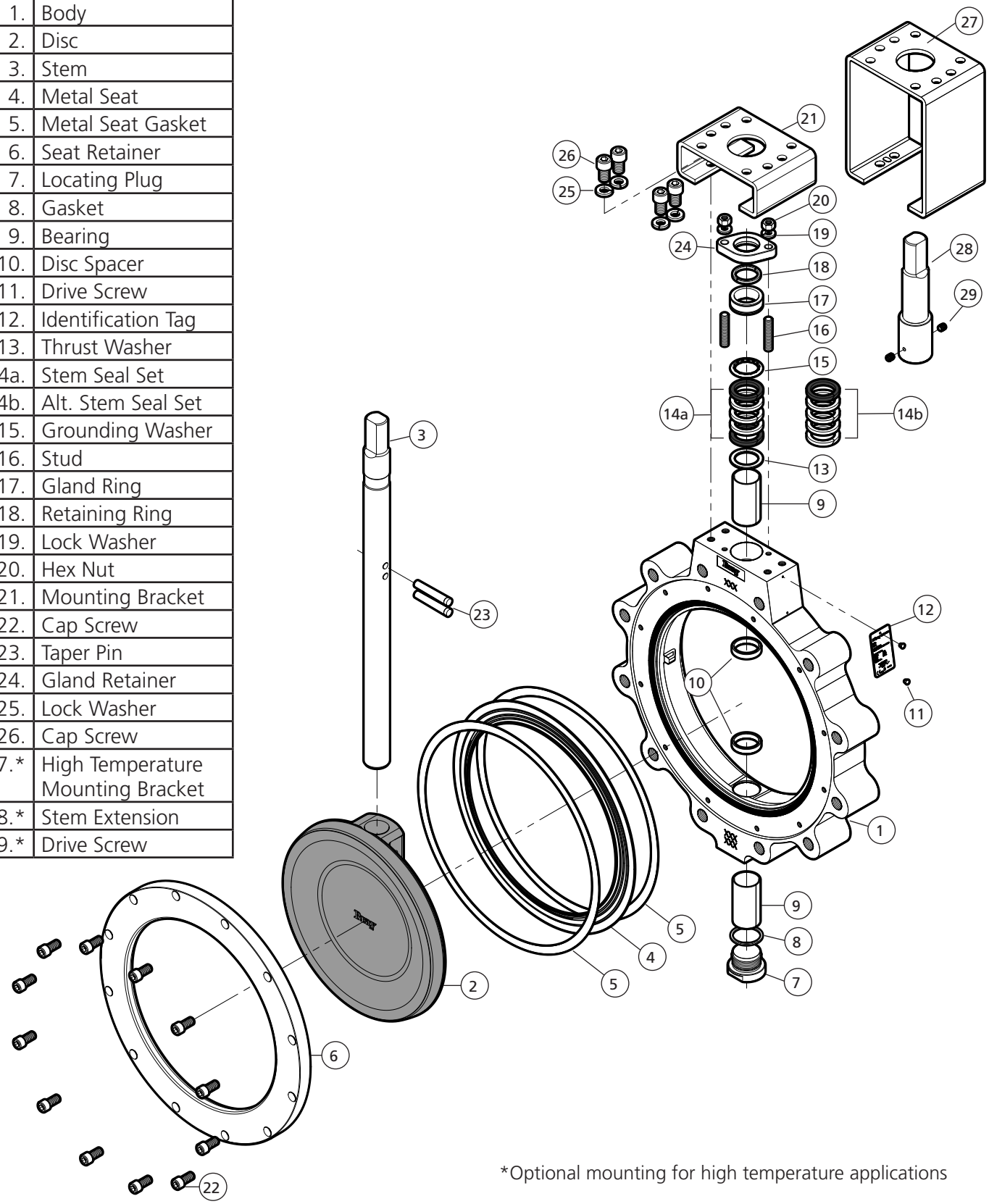
PARTS DIAGRAM - STANDARD

No.	Description
1.	Body
2.	Disc
3.	Stem
4.	Soft Seat
5.	Seat Retainer
6.	Locating Plug
7.	Gasket
8.	Bearing
9.	Disc Spacer
10.	Drive Screw
11.	Identification Tag
12.	Thrust Washer
13.	Stem Seal Set
14.	Grounding Washer (optional)
15.	Stud
16.	Gland Ring
17.	Retaining Ring
18.	Lock Washer
19.	Hex Nut
20.	Mounting Bracket
21.	Cap Screw
22.	Taper Pin
23.	Gland Retainer
24.	Lock Washer
25.	Cap Screw



PARTS DIAGRAM - METAL SEATED

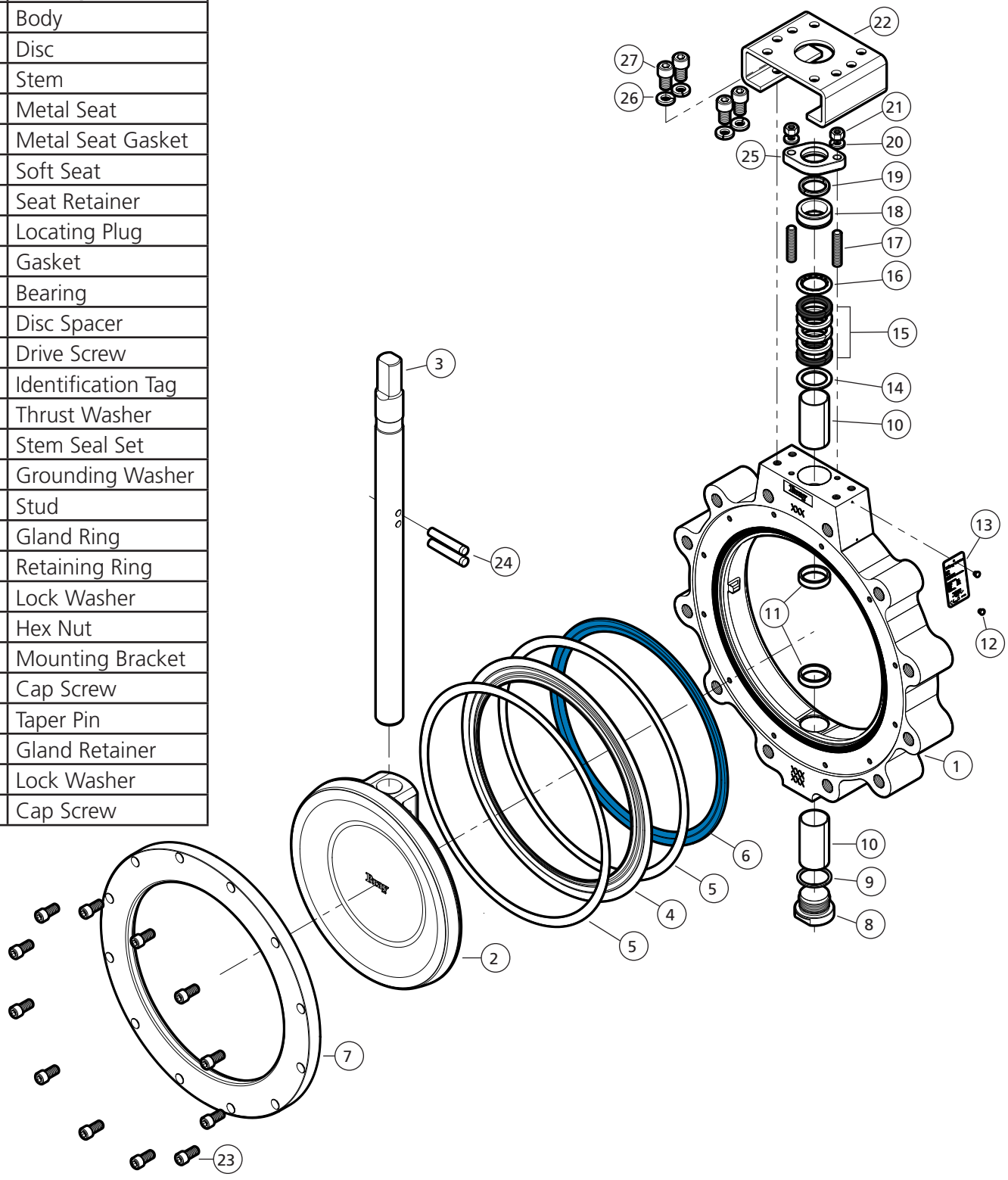
No.	Description
1.	Body
2.	Disc
3.	Stem
4.	Metal Seat
5.	Metal Seat Gasket
6.	Seat Retainer
7.	Locating Plug
8.	Gasket
9.	Bearing
10.	Disc Spacer
11.	Drive Screw
12.	Identification Tag
13.	Thrust Washer
14a.	Stem Seal Set
14b.	Alt. Stem Seal Set
15.	Grounding Washer
16.	Stud
17.	Gland Ring
18.	Retaining Ring
19.	Lock Washer
20.	Hex Nut
21.	Mounting Bracket
22.	Cap Screw
23.	Taper Pin
24.	Gland Retainer
25.	Lock Washer
26.	Cap Screw
27.*	High Temperature Mounting Bracket
28.*	Stem Extension
29.*	Drive Screw



*Optional mounting for high temperature applications

PARTS DIAGRAM - FIRE SAFE

No.	Description
1.	Body
2.	Disc
3.	Stem
4.	Metal Seat
5.	Metal Seat Gasket
6.	Soft Seat
7.	Seat Retainer
8.	Locating Plug
9.	Gasket
10.	Bearing
11.	Disc Spacer
12.	Drive Screw
13.	Identification Tag
14.	Thrust Washer
15.	Stem Seal Set
16.	Grounding Washer
17.	Stud
18.	Gland Ring
19.	Retaining Ring
20.	Lock Washer
21.	Hex Nut
22.	Mounting Bracket
23.	Cap Screw
24.	Taper Pin
25.	Gland Retainer
26.	Lock Washer
27.	Cap Screw



SPECIAL INSTRUCTIONS BRAY/MCCANNALOK FIRE SAFE AND METAL SEATED INSTALLATION

1. The **Bray/McCannalok Fire Safe** valve will provide fire safe shutoff with flow in either direction, meeting API 607 and British Standard 6755 part 2 criteria, as well as bubble-tight shutoff in either direction in normal service. However, installation with the seat retainer upstream provides maximum protection to the soft seat, and will increase seat life, especially in erosive services.

   The **Bray/McCannalok Metal Seated** valve has been extensively performance tested in our state-of-the-art technology center and test laboratory. The Inconel® 718 metal seat has been contoured to provide control, strength and flexibility in high temperature applications. The Technology Group's design validation procedure includes cycle, torque and leakage testing to ensure long service life.

2. Installation bolting information given for the standard Bray/McCannalok valves is also applicable to the Fire Safe and Metal Seated versions.

Stem Seal Replacement

The procedure for replacement on page 4 also applies to Metal Seated valves that use TFE (white) seals. For Fire Safe and Metal Seated valves that use graphite stem seals, use the following exceptions:

1. Graphite stem seals are used in the Fire Safe valves and as an option for Metal Seated valves. The arrangement of the two types of stem seals when installed is: bottom seal – carbon fiber braided ring; center seals – graphite rings; top seal – carbon fiber braided ring.
2. Table 6 on page 11 shows stem seal quantities for class 150 and 300 valves.

Seat Replacement

1. Fire Safe valves will have both a soft seat and metal seat while the Metal Seated valves have only a metal seat. Ignore soft seat instructions for Metal Seated valves.
2. With the disc in the closed position, remove the valve from the line.

WARNING

Verify line is depressurized prior to removal.

3. Lay the valve down with the disc in the closed position and the seat retainer side facing up.
4. Remove socket head cap screws, seat retainer, metal fire seat, gaskets, and soft seat.
5. Carefully remove graphite gaskets from metal seat. Do not bend or crimp metal seat. All traces of the old gaskets must be removed.
6. Clean seat retainer and body surfaces to remove any adhering gasket material, corrosion, or other foreign material. Examine disc seating surfaces for damage, and examine seating surface of metal seat and soft seat for wear or damage. Replace if damaged.
7. Place new soft seat on disc, carefully centering in body recess.
8. Place new graphite gasket on the body. Position metal seat over the disc, lip facing out, on top of the polymer seat. Place another graphite gasket on top of the metal seat. Graphite gaskets can be first attached to the metal seat to simplify the assembly. Spray a suitable adhesive, like 3M Super 77 general purpose adhesive or similar, in 3 or 4 spots on both sides of the metal seat to hold the gaskets in position.

CAUTION

Handle the gaskets carefully as they are very thin and are easily torn or scratched.

9. Align holes in seat retainer with holes in body and seat, and carefully place seat retainer in position, on top of seat.

CAUTION

Be careful that seat does not shift when retainer is installed.

   Lightly grease cap screw threads and bearing areas.

   Step 9.1: Install the cap screws and tighten all cap screws finger tight.

   Step 9.2: Tighten the cap screws to approximately 30% of the torque value listed in Table 2 in a crisscross pattern.

   Step 9.3: Repeat Step 2, increasing the torque value to approximately 60% of the final torque value.

   Step 9.4: Repeat Step 3, increasing the torque value to the final required torque value.

   Step 9.5: Open the disc. Re-torque all cap screws to the final required torque value given in Table 6 on page 11.

10. Lubricate the disc edge with molybdenum disulfide spray or similar lubricant, if available. As a minimum, lubricate the disc edge with light machine oil or light grease. Operate valve several times and examine seat for damage before reinstalling in line.

Disc and Stem Replacement

The same procedures apply to Fire Safe and Metal Seated valves as to the Standard valves, with the addition of the special requirements for stem seal and seat replacement.

FIELD ADJUSTMENTS – ALL VALVES

Stem Seal Leakage – Should leakage occur at the stem seals, it may be stopped by retightening the gland retainer nuts to the values specified in Table 4 on page 5 or Table 6 on page 11.

NOTICE

Do not overtighten gland nuts, as this may cause increased operating torque and improper valve operation or closure.

If the leakage cannot be stopped by this action, the stem seals require replacement.

Adjusting Valve Closure – Valves with gear actuators or electric/pneumatic actuators may require adjustment of the travel stops in the actuator to properly close valve for tight shut-off. The following procedure should be followed to set travel or limit stops. (It is recommended that the valve must be removed from line for this procedure and actuator mounting).

1. Using a straight-edge and vernier or depth caliper, measure the distances from the face of the seat retainer to the disc (valve closed) face at the 3 o'clock and 9 o'clock positions (stem is at 12 o'clock position). The measurements must agree within 1/16" (0.062").
2. If they do not agree, disc must be rotated in the direction of the larger dimension. If the 3 o'clock dimension is larger, the disc is not fully closed, and must be rotated in the "close" direction more. If 9 o'clock dimension is larger, disc is over-closed, and must be opened slightly.
3. The valve disc is at the full open position when the disc is perpendicular to the body. Set the "open" actuator stop for this position.

CAUTION

Do not allow the valve to over-open as this may damage the disc seating surfaces by hitting body or attached piping.

4. On gear operators, loosen and adjust the closing stop screw to permit proper disc positioning. Adjust and lock down when disc closure is within measured tolerance in Step 1. Open and close valve; recheck measurements before reinstalling in line.

NOTICE

The setting of the actuation device's close travel stop is important.

The valve has an internal travel limiter to ensure valve disc cannot be over closed.

To ensure that the valve travel limiter is not damaged, the actuator close travel stop bolt must be at a position just before valve disc contacts it's travel limiter.

5. For other power actuators, consult the manufacturer's instructions for setting travel stops, as these vary with actuator model and type.
6. If removing the valve from the line is not practical, as a crude remedy the disc can be placed into a position in the seat at which the leakage stops and travel stops are adjusted to this position.

Table 6 -
TOTAL NUMBER OF STEM SEALS

Valve Size In.	(mm)	Class 150	Material CF/G	Class 300	Material CF/G	Class 600
2.5	(65)	4	2 / 2	4	2 / 2	–
3	(80)	4	2 / 2	4	2 / 2	4 / 8
4	(100)	4	2 / 2	4	2 / 2	4 / 8
5	(125)	4	2 / 2	4	2 / 2	–
6	(150)	4	2 / 2	4	2 / 2	4 / 12
8	(200)	5	2 / 3	5	2 / 3	4 / 12
10	(250)	5	2 / 3	5	2 / 3	4 / 14
12	(300)	5	2 / 3	5	2 / 3	4 / 14
14	(350)	6	2 / 4	8	2 / 6	4 / 14
16	(400)	6	2 / 4	9	2 / 7	4 / 12
18	(450)	9	2 / 7	9	2 / 7	–
20	(500)	9	2 / 7	9	2 / 7	–
24	(600)	10	2 / 8	8	2 / 6	–

CF = Carbon Fiber G = Formed Graphite

Table 7 -
GLAND NUT TORQUE Lb-in (N-m)

Valve Size In.	(mm)	Class 150		Class 300	
2.5	(65)	35	(4)	45	(5)
3	(80)	35	(4)	45	(5)
4	(100)	35	(4)	45	(5)
5	(125)	45	(5)	65	(7)
6	(150)	45	(5)	65	(7)
8	(200)	45	(5)	80	(9)
10	(250)	65	(7)	100	(11)
12	(300)	65	(7)	100	(11)
14	(350)	80	(9)	125	(14)
16	(400)	100	(11)	150	(17)
18	(450)	100	(11)	150	(17)
20	(500)	100	(11)	150	(17)
24	(600)	150	(17)	200	(23)

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Bray Controls
Division of Bray International, Inc.
13333 Westland East Blvd.
Houston, Texas 77041
Tel: 281.894.5454 • www.bray.com