

FE Series Butterfly Valves

Product Data Sheet



introduction

< STANDARDS >



ASTM D1784



ANSI B16.5

IPEX FE Series Butterfly Valves incorporate many features of our industrial FK valve, yet the all PVC construction and EPDM liner make this valve the perfect choice for water and light industrial applications. The special trapezoid shape of the liner and serrated body cavity guarantee a bubble tight seal while keeping break-away torque at an absolute minimum. This versatile valve features double self-lubricating seals, direct actuator mount capability, and the option of either a lever handle or mounted gear box. Inserting stainless steel lugs into special molded features in the body allows for end of line installation. FE Series Butterfly Valves are part of our complete systems of pipe, valves, and fittings, engineered and manufactured to our strict quality, performance, and dimensional standards.

Valve Availability

Body Material:	PVC
Disc Material:	PVC
Size Range:	1-1/2" through 12"
Pressure:	232 psi (1-1/2" to 2"), 150 psi (2-1/2" to 8") 75 psi (10" to 12")
Seats:	EPDM
Seals:	EPDM
Body Style:	Wafer
Control Style:	Lever Handle or Mounted Gear Box
End Connections:	Flanged (ANSI 150)



FE Series Butterfly Valves

Sample Specification



1.0 Butterfly Valves - FE

1.1 Material

- The valve body and disc shall be made of PVC compound which shall meet or exceed the requirements of cell classification 12454 according to ASTM D1784.
- These compounds shall comply with standards that are equivalent to NSF Standard 61 for potable water.
- The valve shaft shall be made of zinc plated steel (sizes 1-1/2" to 8").
- or The valve shaft shall be made of 420 stainless steel (sizes 10" and 12").

1.2 Seats

- The disc liner shall be made of EPDM which shall comply with standards that are equivalent to NSF Standard 61 for potable water.

1.3 Seals

- The o-ring seals shall be made of EPDM which shall comply with standards that are equivalent to NSF Standard 61 for potable water.

- 1.4 All other wetted and non-wetted parts of the valves shall comply with standards that are equivalent to NSF Standard 61 for potable water.

2.0 Connections

2.1 Flanged style

- The ANSI 150 flanged connections shall conform to the dimensional standard ANSI B16.5.

3.0 Design Features

- The valve shall be of wafer design.
- Manual control of the valve shall be achieved through the use of either a lever handle or mounted gear box (specifier must select one).
- The shaft shall have standard ISO square dimensions for direct mounting of actuators.
- The disc seat shall be a trapezoidal elastomeric liner and provide a bubble tight seal.
- The liner shall completely isolate the valve body from the process flow.
- The liner shall function as a flange gasket on both sides of the valve.



FE Series Butterfly Valves

Sample Specification (cont'd)



- The body cavity shall feature special channeling to prevent liner slippage and compression.
- The disc, seats, and seals shall be the only wetted parts.
- The disc, seats, and seals shall be the only wetted parts.
- Teflon® seated o-ring seals shall prevent the shaft from becoming wetted.

3.1 Pressure Rating

- All valves sizes 1-1/2" through 2" shall be rated at 232 psi at 73°F.
- All valves sizes 2-1/2" through 8" shall be rated at 150 psi at 73°F.
- All valves sizes 10" through 12" shall be rated at 75 psi at 73°F.

3.2 Markings

- All valves shall be marked to indicate size, material designation, and manufacturers name or trade mark.

3.3 Color Coding

- All valves shall be color-coded dark gray.

4.0 All valves shall be Xirtec® 140 by IPEX or approved equal.

FE Series Butterfly Valves

Valve Selection

Size (inches)	Disc Material	Body Style	O-ring Material	IPEX Part Number	Pressure Rating @ 73°F
1-1/2	PVC	Handle	EPDM	053202	232 psi
2		Handle		053203	
2-1/2		Handle		053842	150 psi
		Gearbox		253842	
3		Handle		053081	
		Gearbox		253081	
4		Handle		053082	
		Gearbox		253082	
5		Handle		053843	
		Gearbox		253843	
6		Handle		053083	
		Gearbox		253083	
8		Handle		053084	
		Gearbox		253084	
10	Gearbox	052264	75 psi		
12	Gearbox	052265			

Note: Size 14" through 24" valves are available upon request.

Size (inches):

- 1-1/2
- 2
- 2-1/2
- 3
- 4
- 5
- 6
- 8
- 10
- 12

Control Style:

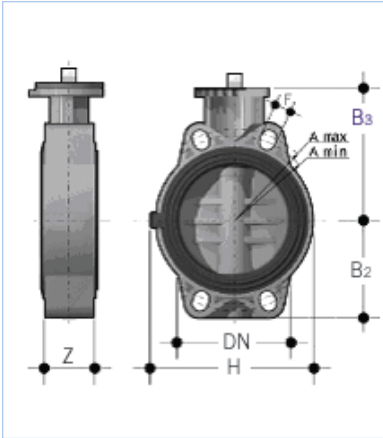
- Lever Handle
- Mounted Gear Box

IPEX Part Number:

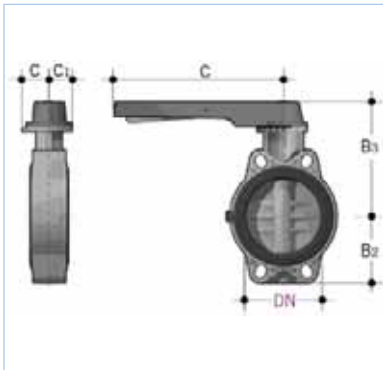
FE Series Butterfly Valves

Technical Data

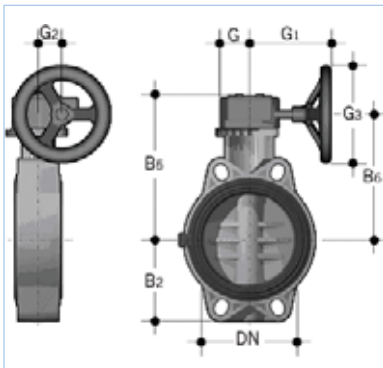
dimensions



Size	DN	Dimension (inches)								# holes	Pattern
		Z	B ₂	B ₃	H	A _{min}	A _{max}	f			
1-1/2	1.57	1.30	2.36	4.17	5.20	3.68	4.29	0.75	4	square	
2	1.97	1.69	2.76	4.45	5.79	4.25	4.88	0.75	4	square	
2-1/2	2.56	1.81	3.15	4.84	6.50	5.04	5.67	0.75	4	square	
3	3.15	1.93	3.54	5.59	5.12	5.71	6.26	0.75	4	rectangular	
4	3.94	2.20	4.13	5.98	5.91	6.50	7.48	0.75	4	rectangular	
5	4.92	2.52	4.76	6.93	7.28	8.03	8.46	0.91	4	rectangular	
6	5.91	2.76	5.20	7.44	8.27	9.06	9.53	0.91	4	rectangular	
8	7.87	2.80	6.34	8.46	12.80	11.02	11.73	0.91	8	square	
10	9.84	4.49	8.27	9.76	15.94	14.25	14.25	1.00	12	square	
12	11.81	4.49	9.65	12.01	18.70	17.00	17.00	1.00	12	square	



Size	DN	Lever Handle - Dimension (inches)						# holes	Pattern
		C ₁	C ₂	C	B ₂	B ₃			
1-1/2	1.57	1.77	1.65	6.89	2.36	5.35	4	square	
2	1.97	1.77	1.65	6.89	2.76	5.63	4	square	
2-1/2	2.56	1.77	2.09	9.84	3.15	6.61	4	square	
3	3.15	1.77	2.09	9.84	3.54	7.17	4	rectangular	
4	3.94	1.77	2.09	9.84	4.13	7.72	4	rectangular	
5	4.92	1.77	2.09	13.19	4.76	8.46	4	rectangular	
6	5.91	1.77	2.09	13.19	5.20	9.02	4	rectangular	
8	7.87	2.56	3.23	16.73	6.34	12.17	8	square	

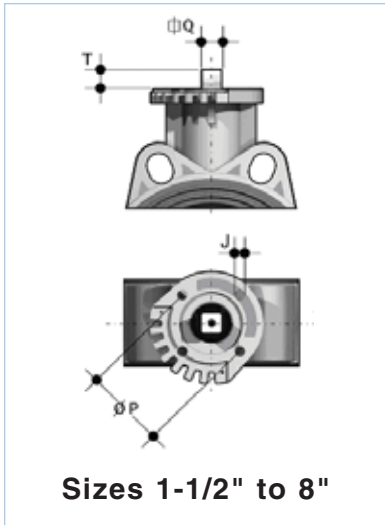


Size	DN	Mounted Gear Box - Dimension (inches)								# holes	Pattern
		G ₂	G	G ₁	G ₃	B ₂	B ₅	B ₆			
2-1/2	2.56	1.54	1.89	5.31	4.92	3.15	6.81	5.71	4	square	
3	3.15	1.54	1.89	5.31	4.92	3.54	7.36	6.26	4	rectangular	
4	3.94	1.54	1.89	5.31	4.92	4.13	7.91	6.81	4	rectangular	
5	4.92	1.54	1.89	5.67	7.87	4.76	8.66	7.56	4	rectangular	
6	5.91	1.54	1.89	5.67	7.87	5.20	9.25	8.15	4	rectangular	
8	7.87	2.36	2.56	6.89	7.87	6.34	11.34	10.12	8	square	
10	9.84	2.99	3.46	9.29	9.84	8.27	12.48	11.06	12	square	
12	11.81	2.99	3.46	9.29	9.84	9.65	14.72	13.31	12	square	

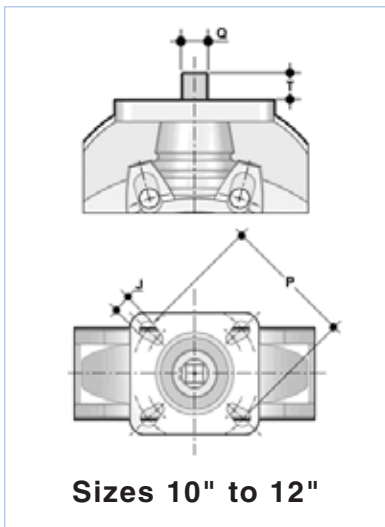
FE Series Butterfly Valves

Technical Data (cont'd)

dimensions cont'd



Mounting Pad for Actuation - Dimension (inches)					
Size	ISO	J	P	T	Q
1-1/2	F05	0.28	1.97	0.47	0.43
2	F05	0.28	1.97	0.47	0.43
2-1/2	F05 / F07	0.28 / 0.35	1.97 / 2.76	0.47	0.43
3	F07	0.35	2.76	0.63	0.55
4	F07	0.35	2.76	0.63	0.55
5	F07	0.35	2.76	0.75	0.67
6	F07	0.35	2.76	0.75	0.67
8	F10	0.43	4.02	0.94	0.87
10	F10 / F12 / F14	0.43 / 0.51 / 0.67	4.02 / 4.92 / 5.51	0.94	0.87
12	F10 / F12 / F14	0.43 / 0.51 / 0.67	4.02 / 4.92 / 5.51	0.94	0.87



FE Series Butterfly Valves

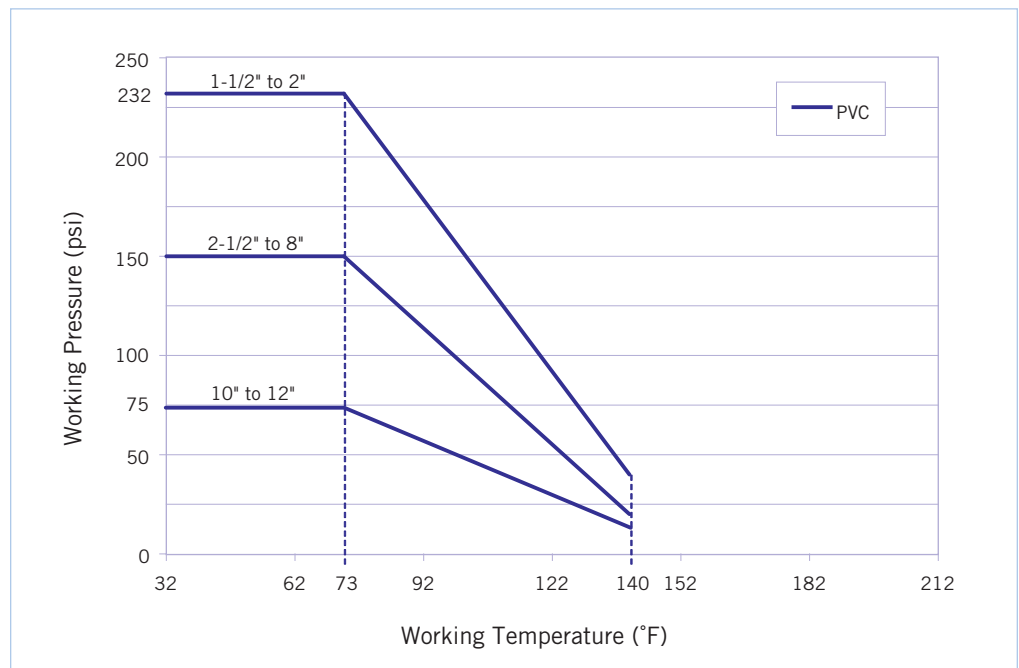
Technical Data (cont'd)



weights

Size	Approximate Weight (lbs)		
	Valve	w/ Handle	w/ Gear Box
1-1/2	1.27	1.82	-
2	1.66	2.23	-
2-1/2	2.20	3.13	5.25
3	3.09	3.62	5.73
4	3.86	4.39	6.50
5	5.62	6.68	9.70
6	7.28	8.22	11.24
8	13.23	18.17	20.41
10	26.46	-	41.01
12	41.89	-	56.44

pressure – temperature ratings



FE Series Butterfly Valves

Technical Data (cont'd)

flow coefficients

The flow coefficient (C_V) represents the flow rate in gallons per minute (GPM) at 68°F for which there is a 1 psi pressure drop across the valve in the fully open position. These values are determined from an industry standard testing procedure which uses water as the flowing media (specific gravity of 1.0). To determine specific flow rate and pressure loss scenarios, one can use the following formula:

$$f = sg \times \left(\frac{Q}{C_V} \right)^2$$

Where,

f is the pressure drop (friction loss) in psi,

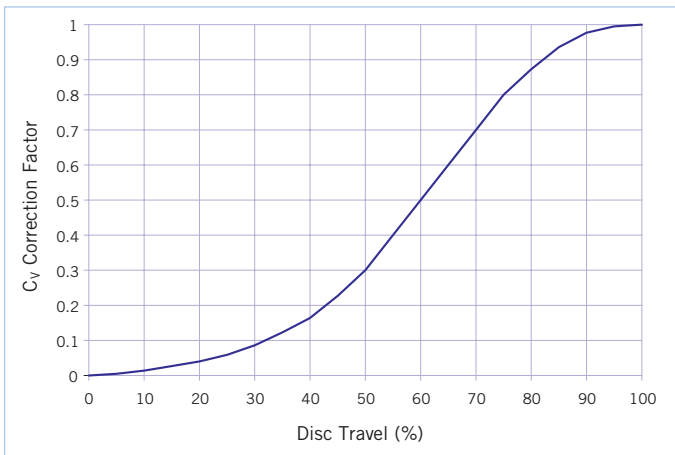
sg is the specific gravity of the fluid,

Q is the flow rate in GPM,

C_V is the flow coefficient.

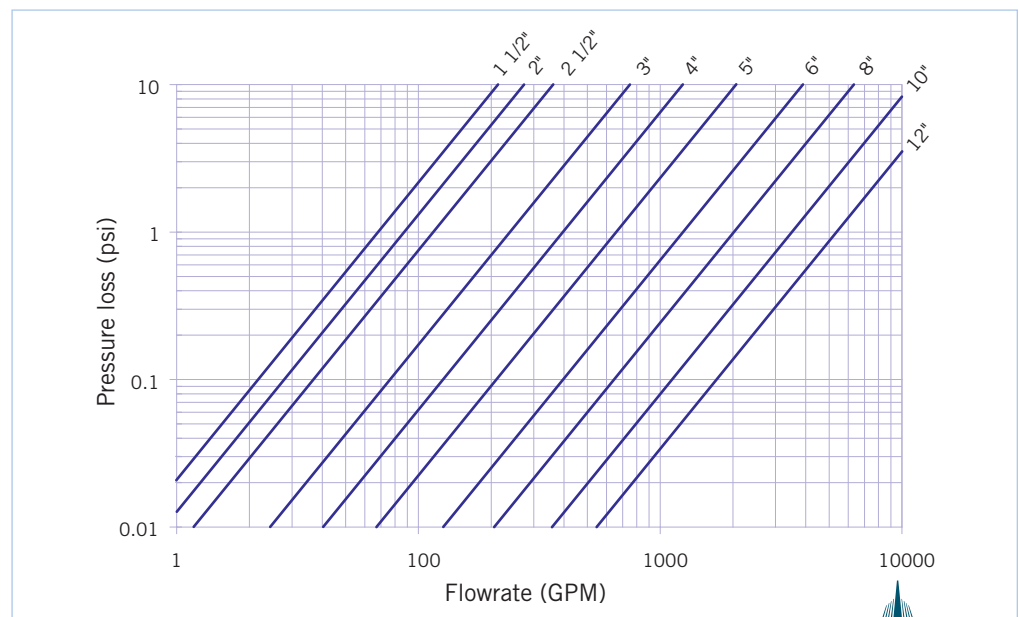
Flow Coefficient Correction Factor

Use this chart to determine the appropriate flow coefficient correction factor depending on the amount of disc travel. As the valve cycles from fully open (100% travel) to fully closed (0% travel), the corresponding C_V value will decrease in accordance with the adjacent graph.



Size	C_V
1-1/2	70
2	90
2-1/2	119
3	249
4	413
5	690
6	1309
8	2135
10	3724
12	5712

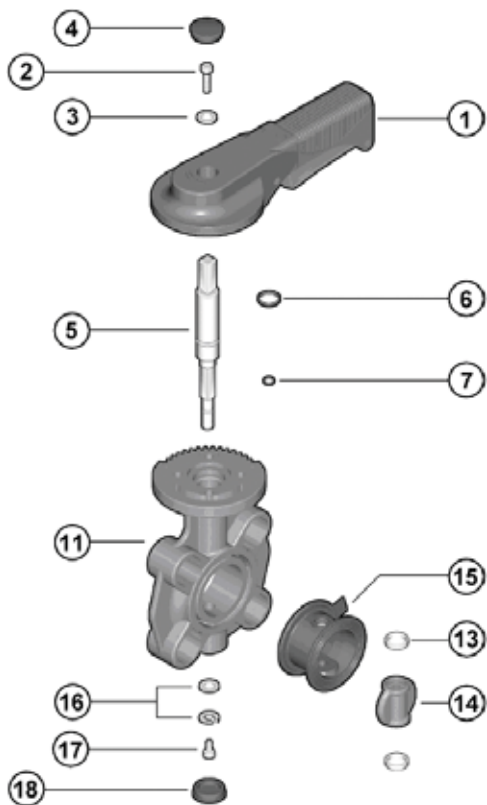
pressure loss chart



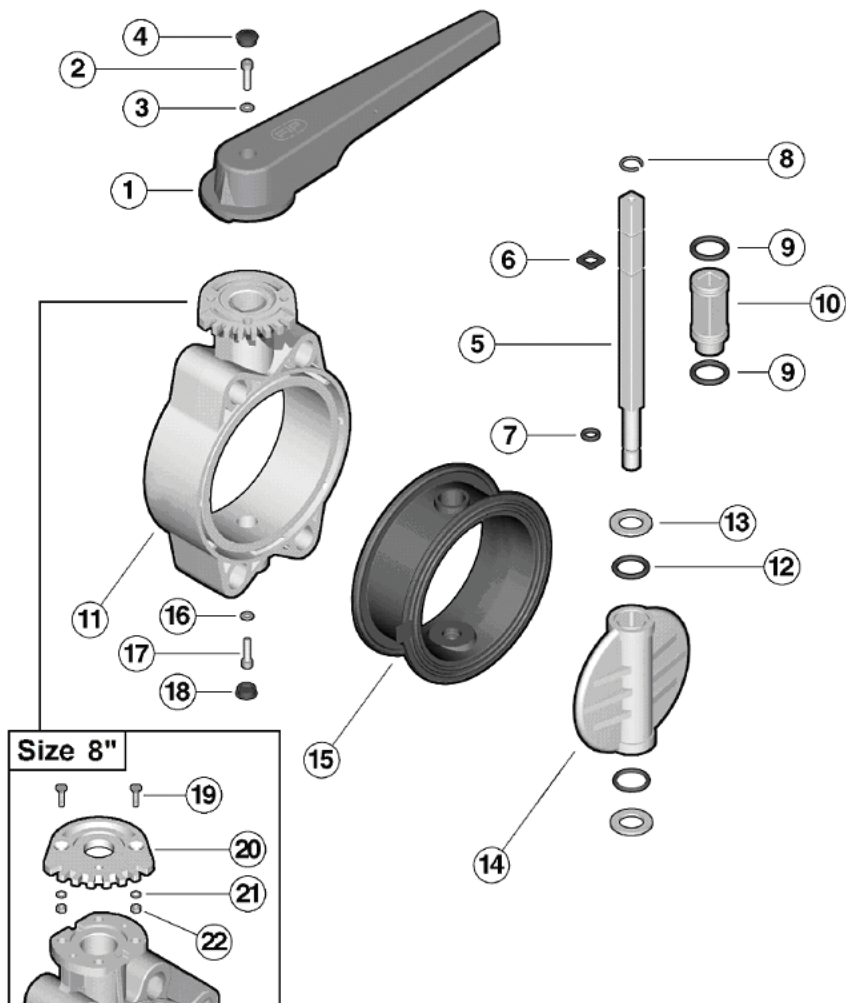
FE Series Butterfly Valves

Components

sizes 1-1/2" to 2"



sizes 2-1/2" to 8"



#	Component	Material	Qty
1*	handle	PVC	1
2	screw	SS	1
3	washer	SS	1
4	cap	PE	1
5*	shaft	zinc plated steel	1
6*	shaft o-ring	EPDM or Viton®	1
7*	shaft o-ring	EPDM or Viton®	1
11	body	PVC	1

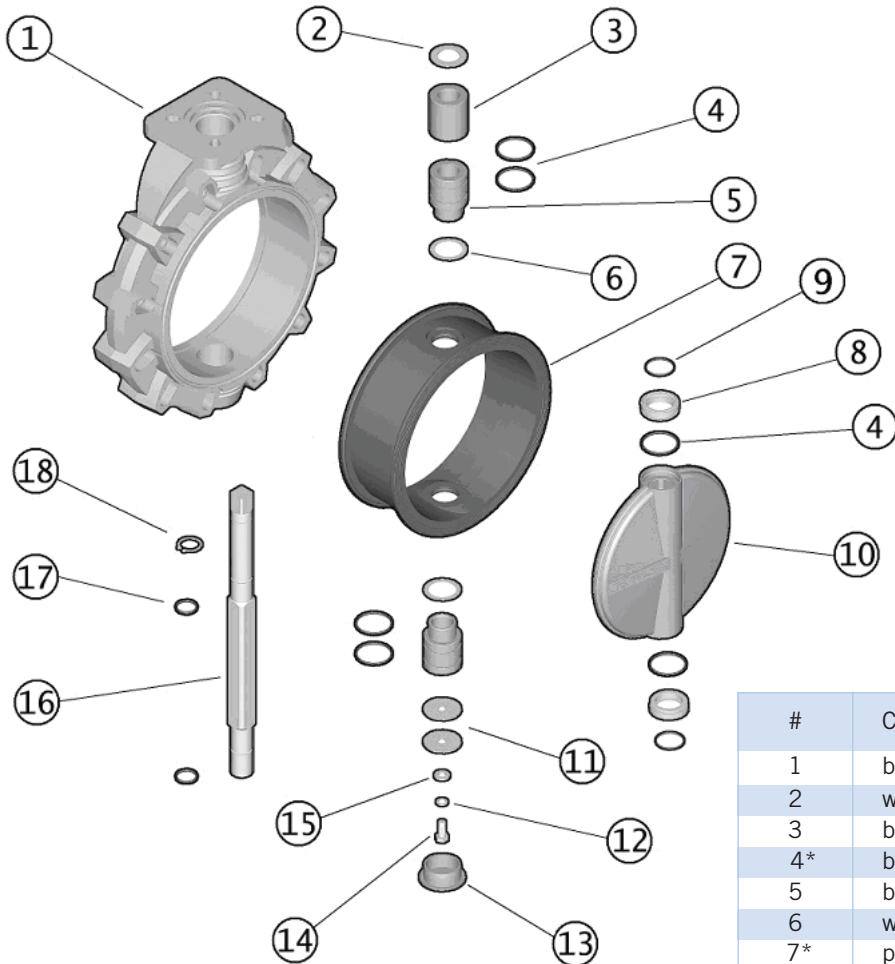
#	Component	Material	Qty
12*	disc o-ring	EPDM or Viton®	2
13*	anti-friction ring	PTFE	2
14*	disc	PVC	1
15*	primary liner	EPDM or Viton®	1
16	washer	SS	1
17	screw	SS	1
18	cap	PE	1
19	screw	SS	2
20	pad	PVC	1
21	washer	SS	2
22	nut	SS	2

* Spare parts available.

FE Series Butterfly Valves

Components (cont'd)

sizes 10" to 12"

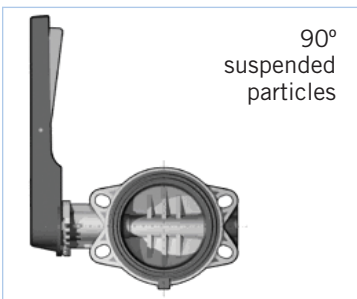
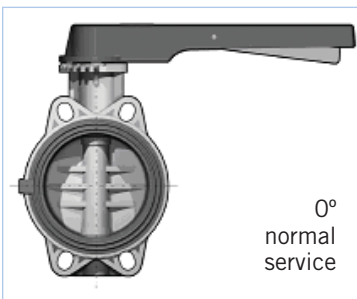
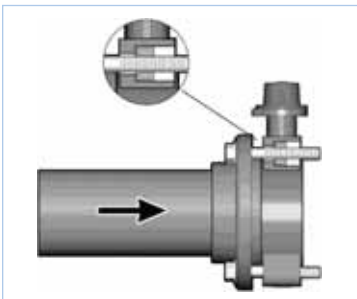


#	Component	Material	Qty
1	body	PVC	1
2	washer	SS	1
3	bushing	PP	1
4*	bushing o-ring	EPDM	4
5	bushing for o-ring	PP	2
6	washer	PTFE	2
7*	primary liner	EPDM	1
8*	anti-friction ring	PTFE	2
9*	disc o-ring	EPDM	2
10*	disc	PVC	1
11	washer	SS	2
12	washer	SS	1
13	cap	PE	1
14	screw	SS	1
15	washer	SS	1
16*	shaft	420 SS	1
17*	shaft o-ring	EPDM	2
18	retaining ring	SS	1

* Spare parts available.

FE Series Butterfly Valves

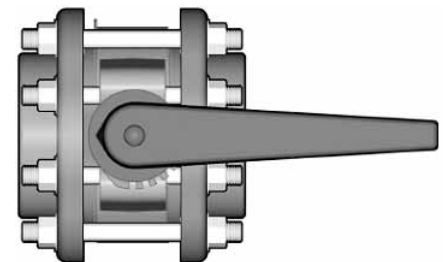
Installation Procedures



1. For the lever handle style, attach the handle (part #1 on previous pages) to the valve body (11) using the supplied bolt (2) and washer (3). Affix the cap (4) over the bolt.
2. **Ensure that the length of the bolts is sufficient for the size of valve being installed. Due to the varying designs of plastic flanges, there is no recommended minimum length. However, a length that results in at least 5 exposed threads on each side should be sufficient.**
3. Please refer to the appropriate application sub-section:
 - a. For typical inline installation, ensure that the disc is in the partially closed position then carefully insert the valve into the piping system between the two flanges. Insert the bolts, washers, and nuts (if necessary), then hand tighten. **Take care to properly line up the valve and flanges as any misalignment may cause leakage.**
 - b. For lugged version end of line installation, insert the necessary steel lugs into the valve body. Ensure that the disc is in the partially closed position then carefully position the valve on the flange. Insert the bolts, and washers, then hand tighten. **Take care to properly line up the valve and flange as any misalignment may cause leakage.**
4. To avoid damage to the primary gasket, cycle the valve to the open position before tightening the bolts. For correct joining procedure, please refer to the section entitled, “*Joining Methods – Flanging*” in the IPEX Industrial Technical Manual Series, “*Volume 1: Vinyl Process Piping Systems*”. **The bolts should be tightened in an even pattern to the nominal torque in the table below. These torque ratings are sufficient to maintain a watertight seal at the maximum rated operating pressure.**

Note: End of line installation will cause the maximum rated pressure to be reduced to the values listed in the table below. If the process media is dirty or contains suspended particles, it is advisable to install the valve in an orientation in which the shaft is not vertical (see diagrams). Over time, particles may collect at the bottom of the valve posing a threat to the seal between the disc, liner, and shaft.

Size	Nominal Bolt Torque ((ft-lbs)	Lugged P _{max} (psi)
1-1/2	7	90
2	9	90
2-1/2	11	90
3	13	90
4	15	90
5	26	90
6	30	60
8	41	60
10	52	-
12	52	-



FE Series Butterfly Valves

Valve Maintenance



disassembly

1. If removing the valve from an operating system, isolate the valve from the rest of the system. **Be sure to depressurize and drain the isolated branch before continuing.**
2. Cycle the valve to a partially open position then loosen each bolt holding the valve to the pipe flange(s). Please refer to the section entitled, "Joining Methods – Flanging" in the IPEX Industrial Technical Manual Series, "Volume 1: Vinyl Process Piping Systems" for a recommended bolt tightening pattern diagram. Follow the same pattern when disassembling the flanged joint(s) then carefully remove the valve from the line.

Sizes 1-1/2" to 8"

3. For the lever handle style, remove the cap (4) then loosen the screw (2) and washer (3) to remove the handle (1).
4. For the mounted gear box style, loosen and remove the bolts and washers fixed to the gear box. Carefully remove the gear box from the valve taking care not to damage the stem.
5. For 8" sizes, loosen and remove the bolts (19), washers (21), and nuts (22) then remove the spacer pad (20) from the valve body.
6. Remove the cap (18) then loosen and remove the screw (17) and washer(s) (16) from the base of the valve body.
7. Carefully pull the shaft (5) out of the valve body then remove the disc (14).
8. Remove the primary liner (15) from the valve body.
9. Remove the nylon bushing (10) and o-rings (9) from the valve body (sizes 2-1/2" to 8").
10. Remove the disc anti-friction rings (13), and o-rings (12, sizes 2-1/2" to 8").
11. Remove the retaining ring (8, sizes 2-1/2" to 8") and o-rings (6, 7) from the shaft.
12. The valve components can now be checked for problems and/or replaced.

Sizes 10" to 12"

3. Loosen and remove the bolts and washers fixed to the gear box. Carefully remove the gear box from the valve taking care not to damage the stem.
4. Remove the cap (13) then loosen and remove the screw (14) and washers (11, 12, and 15) from the base of the valve body (1).
5. Carefully pull the shaft (16) out of the valve body then remove the disc (10).
6. Remove the primary liner (7) from the valve body
7. Remove the upper and lower bushings (3, 5), washers (2, 6), and o-rings (4) from the valve body.
8. Remove the disc anti-friction rings (8) and o-rings (4, 9).
9. Remove the retaining ring (18) and o-rings (17) from the shaft.
10. The valve components can now be checked for problems and/or replaced.



FE Series Butterfly Valves

Valve Maintenance (cont'd)



assembly

Note: Before assembling the valve components, it is advisable to lubricate the o-rings with a water soluble lubricant. **Be sure to consult the "IPEX Chemical Resistance Guide" and/or other trusted resources to determine specific lubricant-rubber compatibilities.**

Sizes 1-1/2" to 8"

1. Insert the primary liner (15) into the valve body (11). **Ensure that the proper holes line up with those on the body.**
2. Properly fit the o-rings (9) on the nylon bushing (10) (sizes 2-1/2" to 8") then insert into the valve body from above.
3. Properly fit the disc o-rings (12, sizes 2-1/2" to 8") and anti-friction rings (13) on the disc (14), then insert into the valve liner taking care to center the holes.
4. Properly fit the o-rings (6, 7) and retaining ring (8, sizes 2-1/2" to 8") in their grooves on the shaft (6), then carefully insert into the valve body from above.
5. Fasten the shaft at the base of the valve body using the screw (17) and washer (16). Affix the cap (18) over the bolt.
6. For 8" sizes, affix the spacer pad (20) to the valve body using the screws (19), washers (21), and nuts (22).
7. For the lever handle style, affix the handle (1) using the screw (2), washer (3), and cap (4).
8. For the mounted gear box style, carefully place the gear box on the stem, lining up the holes. Fasten using the necessary bolts and washers.

Sizes 10" to 12"

1. Insert the primary liner (7) into the valve body (1). **Ensure that the proper holes line up with those on the body.**
2. Properly fit the o-rings (4) on the upper and lower bushings (3, 5) then insert into the valve body from above and below along with the washers (2, 6).
3. Properly fit the disc o-rings (4, 9) and anti-friction rings (8) on the disc (10), then insert into the valve liner taking care to center the holes.
4. Properly fit the o-rings (17) and retaining ring (18) in their grooves on the shaft (16), then carefully insert into the valve body from above.
5. Fasten the shaft at the base of the valve body using the screw (14) and washers (11, 12, and 15). Affix the cap (13) over the bolt.
6. Carefully place the gear box on the stem, lining up the holes. Fasten using the necessary bolts and washers.



FE Series Butterfly Valves

Testing and Operating



The purpose of system testing is to assess the quality of all joints and fittings to ensure that they will withstand the design working pressure, plus a safety margin, without loss of pressure or fluid. Typically, the system will be tested and assessed in sub-sections as this allows for improved isolation and remediation of potential problems. With this in mind, the testing of a specific installed valve is achieved while carrying out a test of the overall system.

An onsite pressure test procedure is outlined in the IPEX Industrial Technical Manual Series, *“Volume I: Vinyl Process Piping Systems”* under the section entitled, *“Testing”*. The use of this procedure should be sufficient to assess the quality of a valve installation. **In any test or operating condition, it is important to never exceed the pressure rating of the lowest rated appurtenance in the system.**

Important points:

- Never test thermoplastic piping systems with compressed air or other gases including air-over-water boosters.
- When testing, do not exceed the rated maximum operating pressure of the valve.
- Avoid the rapid closure of valves to eliminate the possibility of water hammer which may cause damage to the pipeline or the valve.

The FE handle incorporates a locking mechanism that prevents unintentional rotation. The spring-loaded handle must be depressed to cycle the valve. A padlock can be installed through this portion of the handle as an additional safety precaution.

Please contact IPEX customer service and technical support with regard to any concern not addressed in this data sheet or the technical manual.

FE Series Butterfly Valves

About IPEX

IPEX is a leading supplier of thermoplastic piping systems. We provide our customers with one of the world's largest and most comprehensive product lines. All IPEX products are backed by over 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, the IPEX name is synonymous with quality and performance.

Our products and systems have been designed for a broad range of customers and markets. Contact us for information on:

- PVC, CPVC, PP, FR-PVDF, ABS, PEX and PE pipe and fittings ($\frac{1}{4}$ " to 48")
- Industrial process piping systems
- Double containment systems
- Acid waste systems
- High purity systems
- Industrial, plumbing and electrical cements
- Municipal pressure and gravity piping systems
- Plumbing and mechanical pipe systems
- Electrical systems
- Telecommunications systems
- Irrigation systems
- PE Electrofusion systems for gas and water
- Radiant heating systems

WARRANTY: All IPEX products are guaranteed against defects resulting from faulty workmanship or materials. If any such product is found to be defective by reason of faulty workmanship or materials, upon written notice and return of the product, the defective product will be replaced by IPEX free of charge, including shipping charges for the replacement product. Claims for labour costs and other expenses required to replace such defective product or to repair any damage resulting from the use thereof will not be allowed by IPEX. Our liability is limited to the price paid for the defective product. IPEX will not be bound by any warranty, other than the above set forth, unless such warranty is in writing.

This literature is published in good faith and is believed to be reliable. However, IPEX does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience.

IPEX maintains a policy of ongoing product improvement. This may result in modification of features and/or specifications without notice.

