ITT

Industrial Process

Installation, Operation, and Maintenance Manual

Series PBFV Plastic Lined Butterfly Valve - Lug and Wafer Style

Engineered for life

Table of Contents

Introduction and Safety

Safety message levels

Definitions

Safety message level	Indication
 **DANGER:**	A hazardous situation which, if not avoided, will result in death or serious injury
 **WARNING:**	A hazardous situation which, if not avoided, could result in death or serious injury
 **CAUTION:**	A hazardous situation which, if not avoided, could result in minor or moderate injury
 **Electrical Hazard:**	The possibility of electrical risks if instructions are not followed in a proper manner
NOTICE:	• A potential situation which, if not avoided, could result in an undesirable result or state • A practice not related to personal injury

User health and safety

General precautions

This product is designed and manufactured using good workmanship and materials, and meets all applicable industry standards. This product should be used only as recommended by an ITT engineer.

WARNING:

- Misapplication of the valve can result in injury or property damage. Select valves and valve components of the proper materials and make sure that they are consistent with your specific performance requirements. Incorrect application of this product includes but is not limited to:
  - Exceeding the pressure or temperature rating
  - Failing to maintain this product according to the recommendations
  - Using this product to handle caustic or hazardous substances that it is not designed to handle

Qualifications and training

The personnel responsible for the assembly, operation, inspection, and maintenance of the valve must be appropriately qualified. The operating company must do the following tasks:

- Define the responsibilities and competency of all personnel handling this equipment.
- Provide instruction and training.
- Ensure that the contents of the operating instructions have been fully understood by the personnel.

Instruction and training can be carried out by either ITT or the reseller of the valve by order of the operating company.

Non-compliance risks

Failure to comply with all safety precautions can result in the following conditions:

- Death or serious injury due to electrical, mechanical, and chemical influences
- Environmental damage due to the leakage of dangerous materials
- Product damage
- Property damage
- Loss of all claims for damages

Operational safety precautions

Be aware of these safety precautions when operating this product:

- Do not leave hot or cold components of the product unsecured against contact if they are a source of danger.
- Do not remove the contact guard for moving parts when the product is in operation. Never operate the product without the contact guard installed.
- Do not hang items from the product. Any accessories must be firmly or permanently attached.
- Do not use the product as a step or hand hold.
- Do not paint over the identification tag, warnings, notices, or other identification marks associated with the product.

Maintenance safety precautions

Be aware of these safety precautions when performing maintenance on this product:

- You must decontaminate the product if it has been exposed to harmful substances such as caustic chemicals.
- You must immediately fit or reactivate all safety and protective equipment upon completion of work.

Use of unauthorized parts

Reconstruction or modification of the product is only permissible after consultation with ITT. Genuine spare parts and accessories authorized by ITT serve to maintain safety. Use of non-genuine ITT parts can annul liability of the manufacturer for the consequences. ITT parts are not to be used in conjunction with products not supplied by ITT as this improper use can annul all liability for the consequences.

Unacceptable modes of operation

The operational reliability of this product is only guaranteed when it is used as designated. The operating limits given on the identification tag and in the data sheet may not be exceeded under any circumstances. If the identification tag is missing or worn, contact ITT for specific instructions.

Transportation and Storage

Handling and unpacking guidelines

CAUTION:

Always observe the applicable standards and regulations regarding the prevention of accidents when handling the product.

Handling guidelines

Follow these guidelines when handling the product to prevent damage:

- Use care when handling the product.
- Leave protective caps and covers on the product until installation.

Unpacking guidelines

Follow these guidelines when unpacking the product:

1. Inspect the package for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. If anything is out of order, file a claim with the shipping company.

Storage, disposal, and return requirements

Storage

If you are not immediately installing the product after delivery, store it as follows:

- Store the product in a dry room that maintains a constant temperature.
- Make sure that the products are not stacked on top of one another.

Disposal

Dispose of this product and associated components in compliance with federal, state, and local regulations.

Return

Ensure these requirements are met before you return a product to ITT:

- Contact ITT for specific instructions on how to return the product.
- Clean the valve of all hazardous material.
- Complete a Material Safety Data Sheet or Process Data Sheet for any process fluid that could remain on the valve.
- Obtain a Return Material Authorization from the factory.

Product Description

General description

Design overview

The butterfly valve is an on/off valve used to shut off media in pipelines. It may also be used to restrict the flow rate of pipeline fluids. The universal corrosion-resistant fluoroplastic lining of the valve makes it ideally suited for aggressive media. The valves comply with the general delivery conditions for valves as per EN 12266 and ASME B16.34. As per MSS SP-25 & EN 19:2002, the body carries the following data:

- Nominal diameter
- Nominal pressure
- Manufacturer's mark
- Casting heat number

Features

- The disc and stem are generally a two piece construction with a socket joint for 2–16 in. sizes. However an alternate design with an integrated disc and stem can be provided for 3–8 in. sizes.
- The springs under the packing gland exert an even pre-loading on the packing rings.

Valve identification

An identification plate is permanently attached to the valve body and contains the following information:

- Valve series, nominal pressure, and lining material
- Allowable operating pressure at allowable temperatures
- Figure number (ex. 050–1532–DS1–DL1–ET1–BK1–EX1)
- Customer details (where requested)

Connecting dimensions

Face to face: 2–16 in. ANSI B 16.10 Narrow

Connection: ANSI B 16.5 Class 150

Actuator mounting ISO 5211:

- 2–3": F05
- 4": F07
- 6–8": F10
- 10–12": F12
- 14–16": F14

Valve actuation

Stem and actuator or lever interface as per ISO 5211

This table shows how the stem connects to the actuator per size.

Size	Stem connection
2–6 in.	• The stem has machined flats (Double 'D') to attach a lever operator or an actuator.[1] • If required, a key way slot connection may also be provided.

[1] When the valve is open, the stem flats are parallel to the axis of the pipeline. When the valve is closed, the stem flats are at right angles to the axis of the pipeline.

Size	Stem connection
8 in. and above	• The stem is connected to the actuator with a key way slot. • Levers are not provided. • Operation is by manual geared or automated actuators.

Actuation options

Type of actuation	Construction	Comments
Lever actuation	The lever is attached to the flats of the stem and fixed with a bolt.	• The valve opens and closes with a quarter turn rotation of the disc. • A lever stopper limits the rotation of the valve disc. • Intermediate positions can be achieved by using the notched plate.
Worm gear actuation	By means of any commercially available worm gear equipped with an F-connection as per ISO 5211.	Couplings and brackets are available as accessories.
Remote actuation	By means of pneumatic, hydraulic, or electric quarter-turn actuators with an F-connection as per ISO 5211.	

Installation

Install the butterfly valve

1. Remove the flange caps.
2. If the valve is marked with an arrow, then install the valve in the direction of the arrow.
3. Connect an earthing cable to the earthing system.
4. Grease the pipeline bolts.
5. If you have metal or glass mating flanges, then use PTFE-lined seals with a metal inlay.
6. Tighten the pipe flange bolts crosswise.

   ITT recommends using a gasket.

Table 1: Pipeline bolt torque

Size (DN)	Size (in)	Number x size	Nm	in-lbs
50	2	4 x 5/8 in.	50	445
80	3	4 x 5/8 in.	70	623
100	4	8 x 5/8 in.	60	534
150	6	8 x 3/4 in.	100	890
200	8	8 x 3/4 in.	140	1239
250	10	12 x 7/8 in.	130	1151
300	12	12 x 7/8 in.	160	1416
350	14	12 x 1 in.	210	1859
400	16	16 x 1 in.	190	1682

7. After the valve is at operating pressure and temperature, check the torques on all the connecting bolts.

Operation

Operating pressures

Guidelines

- **NOTICE:**

  Admissible factors of safety lie in the range of 20 - 50% of the operating torque. To prevent damage to the valve, particular attention must be paid to the maximum permitted operating torque.

- The operating torque of the actuator must be at least 20-30% higher than the operating torque of the valve.
- Media of higher viscosity and media with solids may require an increased factor of safety when calculating the size of the actuator. This is particularly true for non-Newtonian liquids such as high polymer substances, suspensions, pastes, lubricants, resins, lacquers etc.

Operating torque at Δp = 10bar

Test medium is water at 30ºC. For other media, higher operating torques can occur.

Table 2

Size (in.)	Size (DN)	Operating torque (in-lb)	Operating torque (Nm)	Maximum permitted torque (in-lb)	Maximum permitted torque (Nm)
2	50	35	4	62	7
3	80	53	6	97	11
4	100	89	10	159	18
6	150	124	14	221	25
8	200	221	25	389	44
10	250	336	38	593	67
12	300	531	60	929	105
14	350	885	100	1549	175
16	400	1505	170	2638	298

Shut down

1. Position the valve in a partially open position.
2. Ensure the system is free of operating pressure.
3. Flush out the media.
4. Loosen the piping flange bolts.
5. Remove the valve from service.
6. Replace the flange caps on the valve flanges.

Maintenance

Precautions

WARNING:

- All procedures must be performed by qualified personnel.
- When the process fluid is hazardous, thermal (hot or cold), or corrosive, take extra precautions. Employ the appropriate safety devices and be prepared to control a process media leak.
- Always wear protective clothing and equipment to safeguard the eyes, face, hands, skin, and lungs from the particular fluid in the line.

Inspection

Inspection area	What to look for	Action if problem is found
External valve parts	Excessive wear or corrosion	• Replace the affected parts • Contact ITT to obtain replacement parts or for specific instructions

Replace the disc and stem

1. Set the disc in the semi-open position.
2. Clean the valve.
3. Disassemble the valve.

Options	Description
Valve actuation type	Action
Actuated valve	If installed, remove the actuator with bracket and coupling.
Lever actuated valve	1. Remove the operating lever and lever retaining washer. 2. Disassemble the lever notch plate.

   a) Position the valve upside down.
   b) Remove the body bolts and then the bottom body half.
   c) Remove the elastomeric backing.
   d) Remove the bottom stem, bearings, disc springs, pusher and o-ring.
   e) Remove the body liner and lined disc assembly.

   NOTICE:

   Be careful when removing the body lining and disc so as not to damage the lining.

   f) Remove the top bearings, disc springs, pusher and o-ring.
4. Replace the disc and stem.
5. Reassemble the valve.
   a) Position the top body of the valve upside down.
   b) Apply high temperature lubricating grease on the bearings and put them on the top and bottom stems.
   c) If you have a two-piece disc and stem, then insert the top stem into the top square socket in the disc.
   d) Insert the bottom stem into the bottom circular socket in the disc.
   e) Assemble the O-ring, pusher and disc springs over the top and bottom stems into the cavity in the body liner. Pay attention so as not to damage the bearings or lining.

f) Insert the assembly into the top body half with the top stem going into the neck of the top body half.

g) Insert the elastomeric backing into the gap between the body and body liner.

h) Install the bottom body half.

i) Place the disc in a partially open position.

j) Assemble the body halves.

k) Tighten the greased body nuts equally.

Maintain a gap between the body halves using the following guidelines. The gap may be adjusted per the sealing requirements. Use the minimum gap for high pressure sealing, which also requires a higher operating torque.

Size (in)	Size (DN)	Minimum gap (in)	Minimum gap (mm)	Maximum gap (in)	Maximum gap (mm)
2	50	.04	1	.08	2
3	80	.04	1	.08	2
4	100	.04	1	.08	2
6	150	.08	2	.12	3
8	200	.08	2	.12	3
10	250	.08	2	.12	3
12	300	.12	3	.16	4
14	350	.12	3	.16	4
16	400	.12	3	.16	4

6. If you have a lever operated valve, then assemble the lever notched plate and mount the operating lever.
7. If you have a direct mounting actuator, then assemble the actuator on the top flange using screws. Position the actuator in accordance with the operating instructions of the actuator.
8. If you have an actuator requiring brackets, then insert the coupling on the stem, assemble the bracket, and mount the actuator on the bracket.
9. Test the pressure tightness of the packing and seat rings.

   Test at 15–35°C, (59–95°F) for 15 seconds for valves DN15–50 (1/2–2 in.) or 60 seconds for valves DN80–150 (3–6 in.). Tightness is verified according to EN 12266-1, MSS-SP-72 or API 598.

Type of test	Test medium	Pressure (barg)	Pressure (psig)
High pressure body test	Water	26	400
High pressure seat test	Water	18	265
Low pressure seat test	Air	6	87

Troubleshooting

Operation troubleshooting

Sympton	Cause	Remedy
The disc is locked or the disc and lining are damaged	Crystallization	Heat tracing
The flange connection between the valve and pipeline or between the valve and end piece are leaking	Connection is too loose	Tighten the screw connections If the connection continues to leak, then you may exceed the recommended torque by 10%. If the connection continues to leak, then disassemble and inspect the ball valve.
Valve does not operate	The actuator does not have any power	Supply power to the actuator
	Directional control valve is not connected	Connect the directional control valve
	A foreign matter is in the ball valve	Remove the foreign matter from the valve

Parts Listings and Cross-Sectional Drawings

Drawing and parts list

Section view

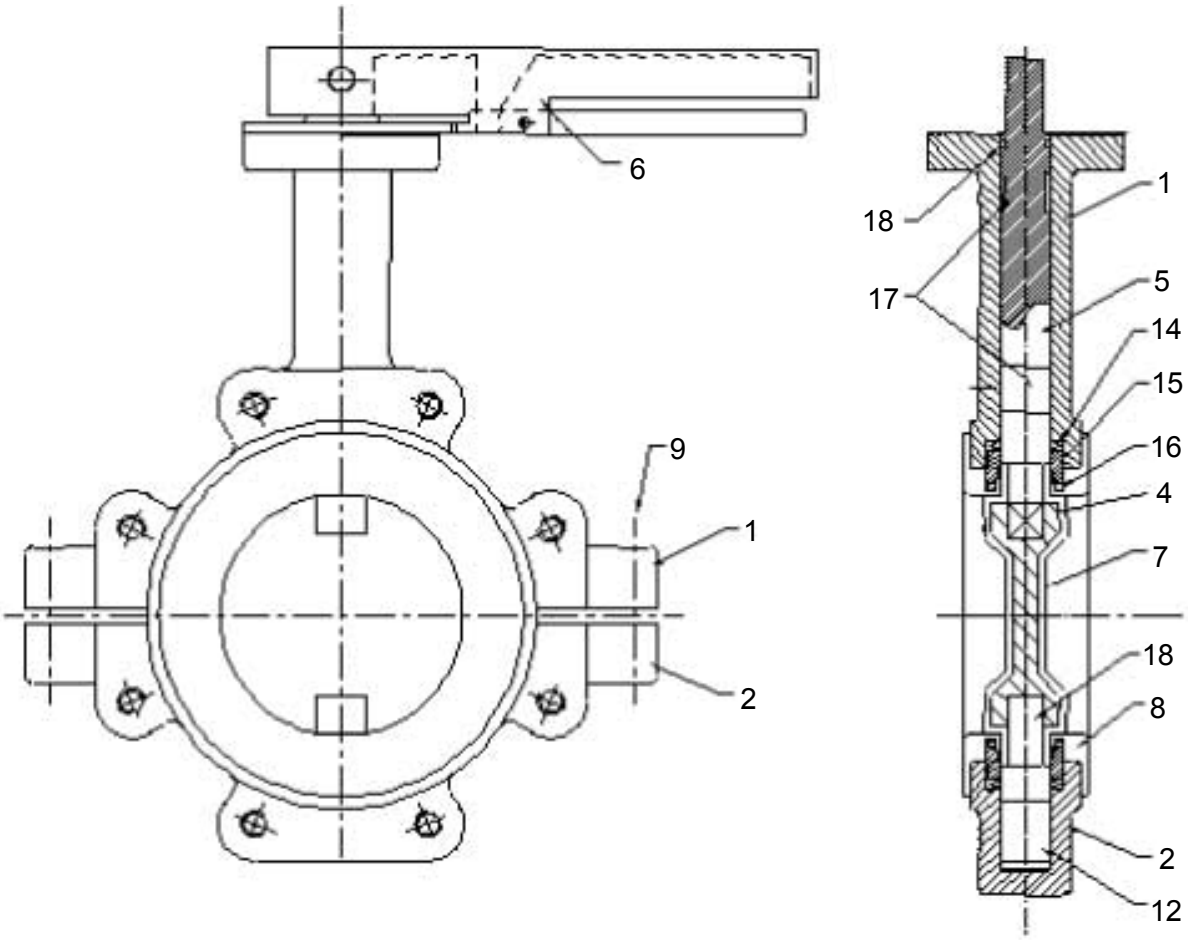

Figure 1: Lug type butterfly valve

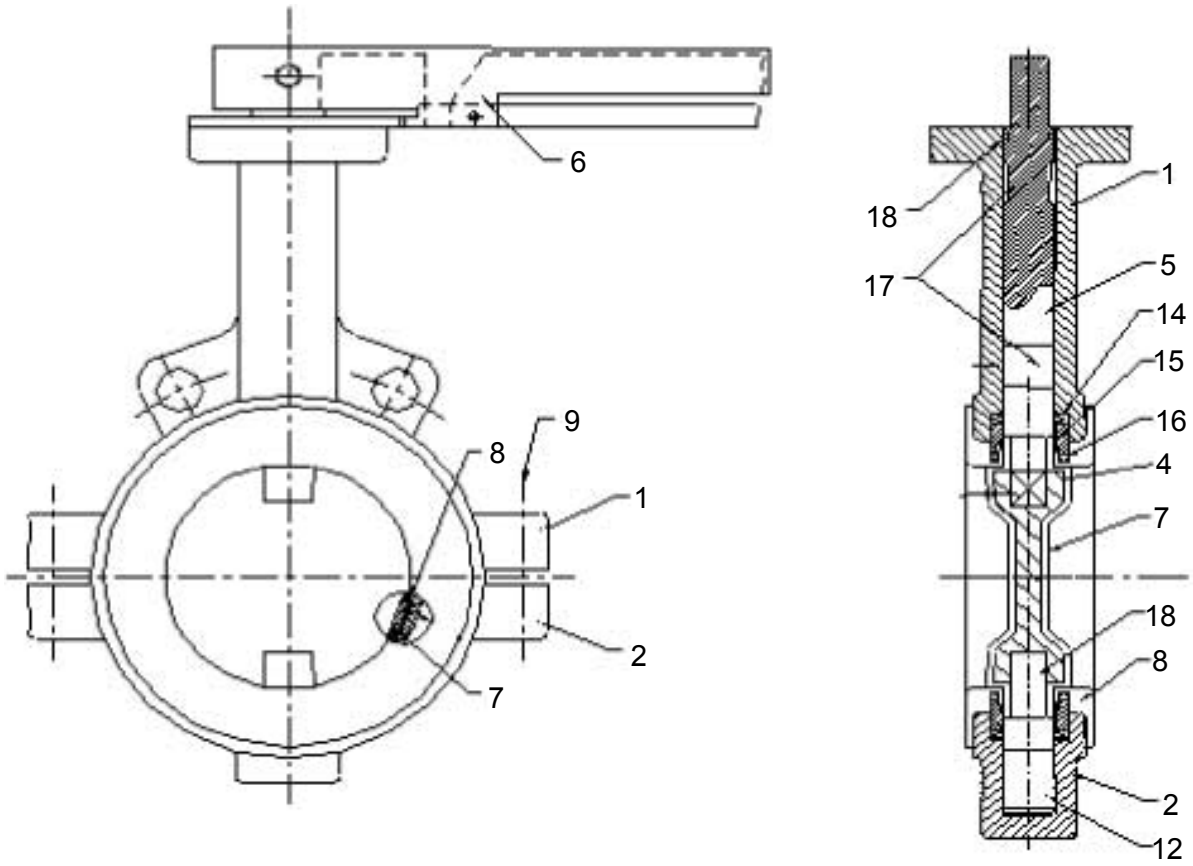

Figure 2: Wafer type butterfly valve

Parts list

Item	Description	Material	Quantity
1	Body A	ASTM A395/EN-GJS-400-18-RT	1
2	Body B	ASTM A395/EN-GJS-400-18-RT	1
4	Disc	ASTM A351 CF8	1
5, 18	Stem	ASTM A240 Gr.304	1
6	Lever assembly	ASTM A395/EN-GJS-400-18-RT	1
7	Disc lining	PFA	1
8	Body liner	PTFE	1
9	Fasteners	High tensile alloy steel	2
12, 17	Bearing	PTFE	2
14	Disc spring	Stainless steel	1
15	Pusher	AISI 304	1
16	O-ring	Viton	1

Visit our Web site for the latest version of this document and more information
www.engvalves.com

ITT Regional HQ & S.E.A. Sales
10 Jalan Kilang #06-01
159410
Singapore
Tel. +65 62763693
Fax +65 62763685
E-mail: ipgsin@itt.com