



# ITT

## Industrial Process

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# Installation, Operation, and Maintenance Manual

### Series PBV Plastic Lined Ball Valve



*Engineered for life*



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# Introduction and Safety

## Safety message levels

### Definitions

Safety message level	Indication
 <p><b>DANGER:</b></p>	A hazardous situation which, if not avoided, will result in death or serious injury
 <p><b>WARNING:</b></p>	A hazardous situation which, if not avoided, could result in death or serious injury
 <p><b>CAUTION:</b></p>	A hazardous situation which, if not avoided, could result in minor or moderate injury
 <p><b>Electrical Hazard:</b></p>	The possibility of electrical risks if instructions are not followed in a proper manner
<b>NOTICE:</b>	<ul style="list-style-type: none"> <li>• A potential situation which, if not avoided, could result in an undesirable result or state</li> <li>• A practice not related to personal injury</li> </ul>

## 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 IIT 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.
- You must use the appropriate lock-out procedures to isolate the valve from all power sources before performing maintenance on externally actuated valves.

**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

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**CAUTION:**

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

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### 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.
- The flange caps provide protection during transport and should not be removed.

### 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 Series PBV plastic lined ball valve is an on/off valve used to shut off media in pipelines. The housing of the valve consists of two body halves. The valves comply with the general delivery conditions for valves as per EN 12266, MSS SP-72 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 universal corrosion-resistant fluoroplastic lining of the valve makes it ideally suited for aggressive media.
- The one-piece ball and stem design prevents any ball and stem hysteresis. This is of particular importance for plastic-lined components.
- 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. 015-1212-BS1-ST1-ET1-EX1)
- Customer details (where requested)

### Connecting dimensions

Face to face:

- 1/2": DIN 3202/F1
- 1"-6": NSI B 16.10 Series 8

Flanges: ANSI B 16.5 Class 150

Actuator:

- 1/2": ISO 5211 F03
- 3/4"-1": ISO 5211 F05
- 1 1/2"-2": ISO 5211 F07
- 3"-6": ISO 5211 F10

## Valve actuation

### Stem and actuator interface

The ball and stem has machined flats to attach a lever operator or an actuator coupling. 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.

### Actuation options

Type of actuation	Construction	Comments
Lever actuation	The lever is attached to the flats of the stem and fixed with a bolt.	<ul style="list-style-type: none"> <li>• A lever stopper limits the rotation of the valve disc.</li> </ul>

Type of actuation	Construction	Comments
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 ball valve

1. Remove the flange caps.
2. Place a toothed lock washer under the nut of each valve flange to ground the valve.
3. Grease the pipeline bolts.
4. If you have metal or glass mating flanges, then use PTFE-lined seals with a metal inlay.
5. 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
15	1/2	4 x 1/2 in.	15	133
25	1	4 x 1/2 in.	20	178
40	1 1/2	4 x 1/2 in.	35	312
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

6. 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 $\Delta p = 10\text{bar}$

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

Size (in.)	Size (DN)	Operating torque (in-lb)	Operating torque (Nm)	Maximum permitted torque (in-lb)	Maximum permitted torque (Nm)
1/2	15	53	6	89	10
1	25	106	12	159	18
1 1/2	40	212	24	443	50
2	50	319	36	708	80
3	80	708	80	1416	160
4	100	1859	210	2832	320
6	150	2655	300	4425	500

## 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	<ul style="list-style-type: none"> <li>• Replace the affected parts</li> <li>• Contact ITT to obtain replacement parts or for specific instructions</li> </ul>
Seat rings or ball and stem	Damage to the seat rings or ball and stem	Replace the ball and seat rings
Packing bolts, body bolts, and pipeline bolts	Torque that is too low or too high	Tighten the bolts crosswise according to torque charts specified in this manual

## Replace the ball and seat rings

1. Place the valve in a partially open position.
2. Clean the valve exterior and flush the interior.
3. Disassemble the valve.

Type of operator	Parts to remove
Lever	Operating lever, lever retaining washer, and grounding spring washer
Actuator	Actuator, coupling, and bracket

- a) Disassemble the packing gland cover.
  - b) Disassemble the body halves.
  - c) Disassemble the disc springs, pusher and packing rings.
  - d) Remove the ball and seat rings.
4. Replace the ball and seat rings.
  5. Reassemble the valve.
    - a) Position the seat rings in the body halves.
    - b) Assemble the body halves.
    - c) Grease the body bolts.

- d) Tighten the body bolts in a criss-cross pattern to the torque value below.

**Table 2: Body bolt torque**

Size (DN)	Size (in)	Number x size	Nm	in-lbs
15	1/2	4 x M8	25	223
25	1	4 x M10	35	312
40	1 1/2	4 x M12	45	400
50	2	4 x M12	50	445
80	3	4 x M16	90	801
100	4	8 x M16	80	712
150	6	8 x M20	110	979

- e) Press in the packing rings with the pusher.  
 f) Insert the disc springs.  
 g) Assemble the packing gland cover.
6. Replace the lever or actuator.

Type of operator	Parts to replace
Lever	<ol style="list-style-type: none"> <li>1. Assemble the lever stop.</li> <li>2. Close the tapped holes with sealing caps.</li> <li>3. Mount the operating lever.</li> </ol>
Actuator	<ol style="list-style-type: none"> <li>1. Assemble the bracket.</li> <li>2. Assemble the coupling and actuator.</li> <li>3. Position the actuator in accordance with the operating instructions of the actuator.</li> </ol>
Conversion from lever to actuator	<ol style="list-style-type: none"> <li>1. Remove the lever stop and sealing caps.</li> <li>2. Ensure the actuator fits the coupling and bracket.</li> <li>3. Mount the bracket.</li> <li>4. Mount the coupling and actuator.</li> <li>5. Position the actuator in accordance with the operating instructions of the actuator.</li> </ol>

7. Measure the operating torque to ensure it does not exceed the values in the body bolt torque table above.
8. 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 (bar)	Pressure (psig)
High pressure body test	Water	26	400
High pressure seat test	Water	18	265
Low pressure seat test	Air	6	87

# Troubleshooting

## Ball valve operation troubleshooting

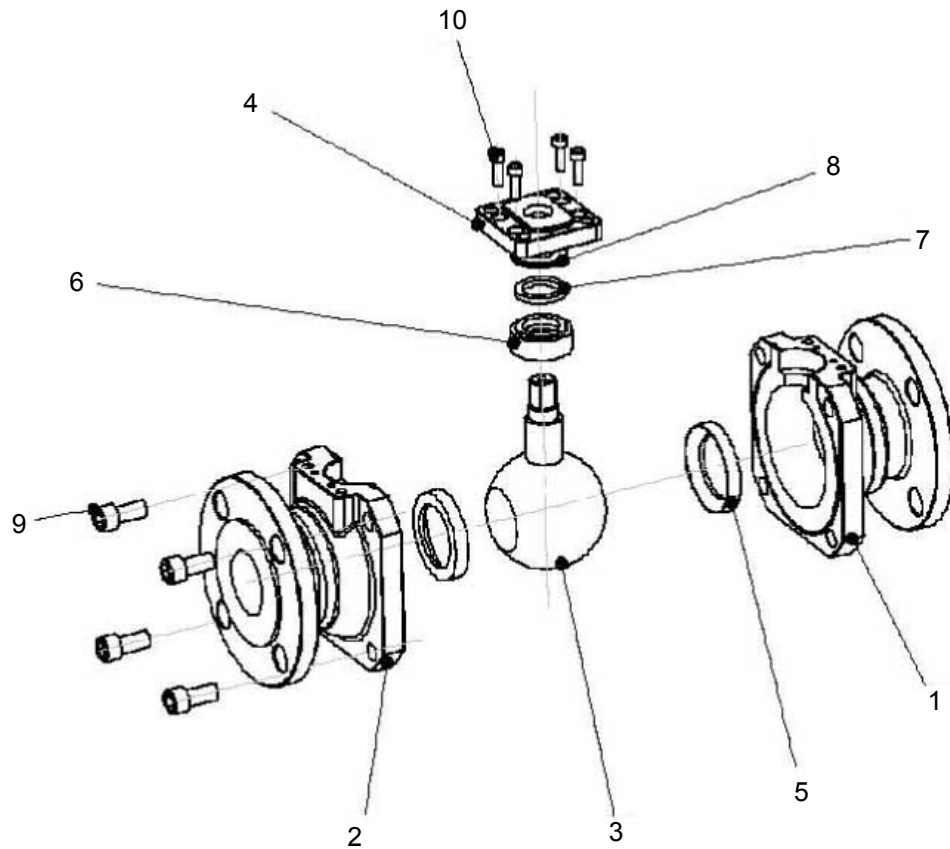
Symptom	Cause	Remedy
The ball is locked or the seat rings or ball and stem are damaged	Media crystallization	Heat trace the valve
The flange connection between the valve flanges and pipeline or body halves are leaking	Connection is too loose	Tighten the screw connections If the connection continues to leak, then you may exceed the recommended torque by 10%. If the connection continues to leak, then disassemble and inspect the ball valve.
Packing is leaking	Packing is too loose	Tighten the cover bolts
Actuated valve does not operate	The actuator does not have any power	Supply power to the actuator
	If the valve is pneumatically actuated, then the solenoid is not connected	Connect the solenoid
Valve does not operate	A foreign matter is in the ball valve	Remove the foreign matter from the ball valve
Ball will not fully close	The ball and stem are deformed	Replace the ball and seat rings
	The actuator's coupling is worn	Replace the actuator's coupling

# Parts Listings and Cross-Sectional Drawings

## Drawing and parts list

Exploded view

Lever and lever stop not shown.



### Parts list

Item	Description	Material	Quantity
1	Lined body A	Ductile iron	1
2	Lined body B	Ductile iron	1
3	Lined ball	304 stainless steel core, PFA lining	1
4	Packing gland cover	304 stainless steel	1
5	Seat ring	PTFE	2
6	Packing rings	PTFE	1
7	Pusher	PTFE	1
8	Disc springs	Stainless steel	1
9	Body bolts	Stainless steel	4

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<b>Item</b>	<b>Description</b>	<b>Material</b>	<b>Quantity</b>
10	Cover bolts	Stainless steel	4









# ITT

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