



# Installation, Operation, and Maintenance Manual

CU27 Uni-Directional and CB27 Bi-Directional Knife Gate Valve



**ITT**



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# 1 Introduction and Safety

## 1.1 Safety message levels

### Definitions

Safety message level	Indication
 <b>DANGER:</b>	A hazardous situation which, if not avoided, will result in death or serious injury
 <b>WARNING:</b>	A hazardous situation which, if not avoided, could result in death or serious injury
 <b>CAUTION:</b>	A hazardous situation which, if not avoided, could result in minor or moderate injury
 <b>ELECTRICAL HAZARD:</b>	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>

## 1.2 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 ITT.



### **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 contain or control media that is incompatible with the materials of construction

### 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 use the appropriate lock-out procedures to isolate the valve from all power sources before performing maintenance on externally actuated valves.
- Upon completion of work, all safety and protective equipment must immediately be fitted again or reactivated.

### **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 for specific instructions.

# 2 Transportation and Storage

## 2.1 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.
4. Do not lift or pull on the electrical conduit lines. Doing so may cause the POC switches to come out of calibration.

## 2.2 Storage, disposal, and return requirements

**Storage**

The package is designed to protect the valve only during shipping. If you are not installing the valve immediately after delivery, then you must store it according to these requirements.

**Table 1: Storage period**

This table describes requirements for short-term and long-term valve storage.

Storage period	Requirements
Less than 6 months	<ul style="list-style-type: none"> <li>• Do not expose the valve to direct sunlight.</li> <li>• Do not expose the valve to weather conditions.</li> <li>• Do not expose the valve to temperature extremes.</li> <li>• Do not stack the valves on top of each other.</li> <li>• Make sure the gate is in the full-open position.</li> </ul>
More than 6 months	<ul style="list-style-type: none"> <li>• Store in accordance with the short-term action items.</li> <li>• Store in accordance with ITT's Long Term Storage Procedure. Contact ITT to obtain this procedure.</li> </ul>

**Storage of rubber components**

As rubbers possess varying degrees of resistance to deteriorating influences which may be present during storage, they should be stored in a cool, dry, dark place away from sunlight, extreme weather etc. Rubber components should be supported under undue stress from loading or bending. Seals in assembled valves and actuators should be positioned to minimize compression on the seals.

The shelf life for different rubbers as mentioned in below is guideline data and is not substitute for examination of cured material at the time of intended use.

Aflas: 4 years

Natural Rubber: 2 Years

EPDM / NBR: 4 Years

### 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 :

- Contact 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.

## 2.3 Lifting the valve



### WARNING:

- When handling the products it is mandatory to observe the applicable standards and regulations regarding the prevention of accidents.
- Never tamper with the fasteners on the cylinder. Serious injury could result if the nuts on the cylinder tie rods are either tightened or loosened.
- DO NOT attach lifting gear to the valve handwheel, gear operator, or gate guards (if provided).
- DO NOT lift the valve using the seat bore area. This could cause damage to the seating surfaces and seals.
- DO NOT remove protective caps and covers on the product until installation.



### CAUTION:

- Personal injury or valve damage could occur if the valve is lifted by any part of the bevel gear assembly. The bevel gear assembly is not designed to support the weight of the valve.
- One person should not attempt to lift cylinder-operated valves larger than 15.24 cm | 6.00 in. or handwheel-operated valves larger than 30.48 cm | 12.00 in.
- Use lifting equipment rated for the weight of the valve assembly.
- Do not lift the valve by the handwheel.

1. To lift larger valves, loop a lifting strap around the body. Raise the valve into a vertical position.
2. Lifting procedure:

When using lifting gear to move the valve, it should be supported by two or more eyebolts screwed into the tapped holes in the valve body for large sizes.

Loop the lifting scrap under the support plate for handwheel operated and bevel gear operated valves by ensuring the lifting straps do not tighten against any part of the valve.

For the cylinder operated valves it is advised to lift the valves using the two opposite tie rods located above the bottom plates by using lifting eyes.

3. Slowly take up the slack in the lifting straps to ensure that the straps are clear and not binding against the valve or valve top-works.



**WARNING:**

Do not adjust or remove the cylinder nuts. Cylinder failure may result from improperly tightened fasteners.

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# 3 Product Description

## 3.1 CU27 uni-directional valve

### 3.1.1 General description

The CU27 is a uni-directional knife gate valve whereas the line pressure assists the closing of the valve by pushing the gate against the integral metal seat in the body. The valve has a range of application in Pulp and Paper, Water and Wastewater, and General Industry. These valves may be supplied with manual handwheels, bevel gear operators and pneumatic cylinder actuators. The CU27 is designed according to the MSS SP-81 standard. It is supplied with PTFE impregnated synthetic fiber packing in the body chest which can be tightened to stop a packing leak. The valve should be installed with consideration of the flow direction and seat arrow cast into the valve body.

### 3.1.2 General diagram

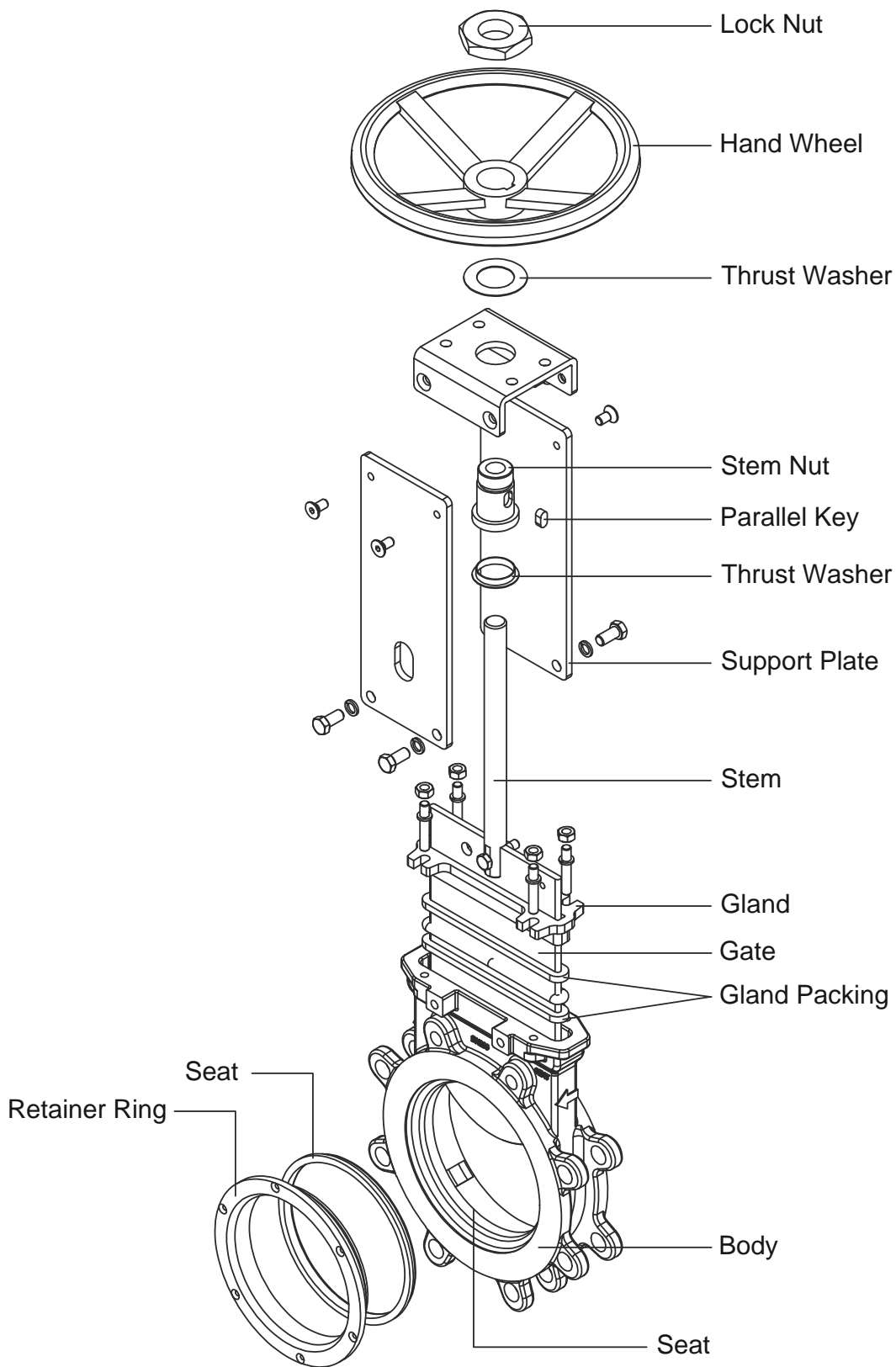


Figure 1: CU27

## 3.2 CB27 bi-directional valve

### 3.2.1 General description

The CB27 is a bi-directional knife gate valve using a perimeter seating design with single-piece design for sizes 2" to 20" (DN50 to DN500) and two-piece design for sizes above 20" (> DN500). The perimeter seat design provides bi-directional shut off regardless of line pressure. The body seals are designed to be field replaceable. These valves may be supplied with manual handwheels, bevel gear operators and pneumatic cylinder actuators. The CB27 is designed according to the MSS SP-81 standard. The CB27 is supplied with PTFE impregnated synthetic fiber packing in the body chest which can be tightened to stop a packing leak.

### 3.2.2 General diagram

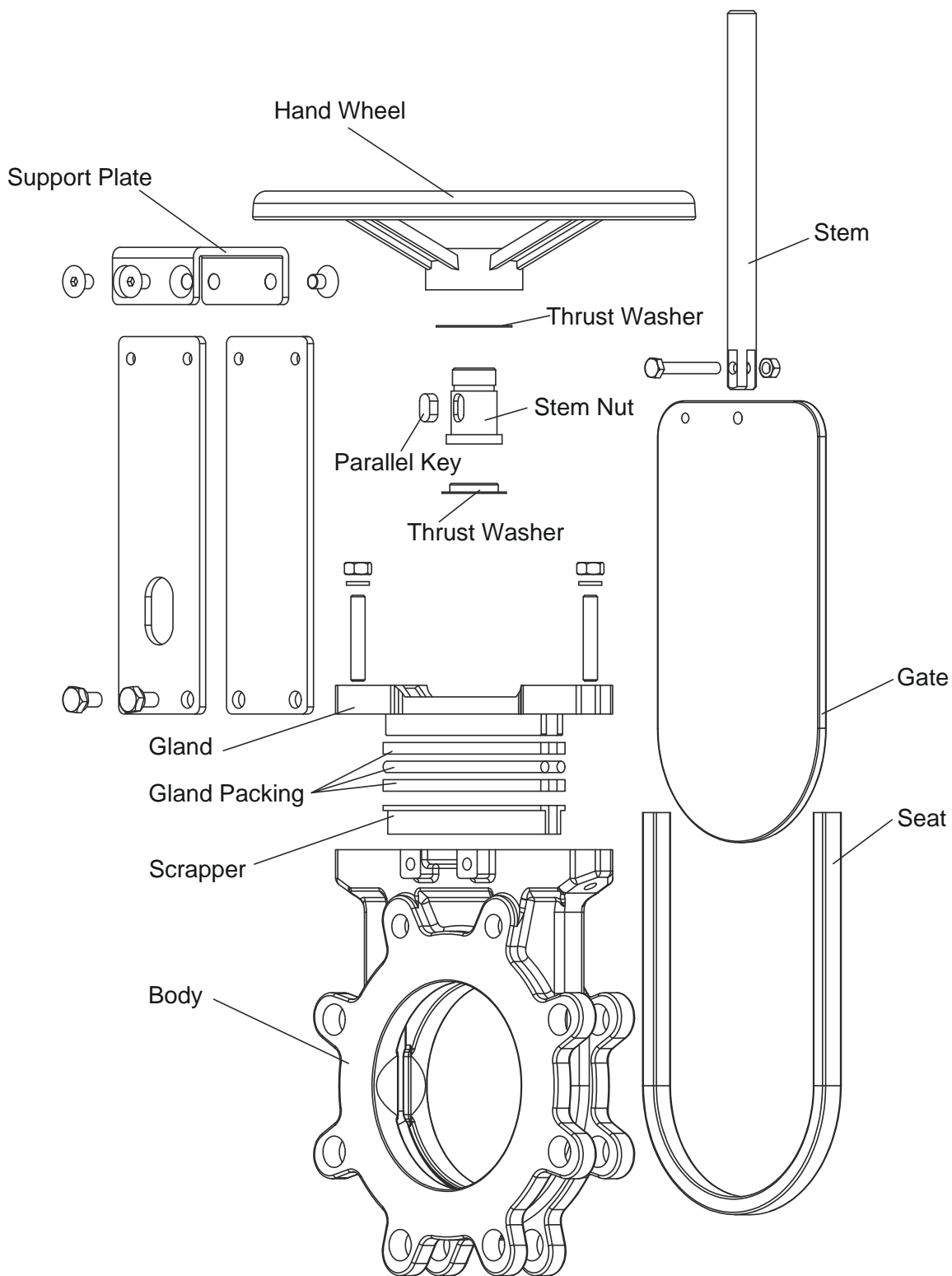


Figure 2: CB27

# 4 Installation

## 4.1 Preinstallation

### Precautions



#### WARNING:

- Air cylinders, when provided, are sized for a specified input pressure. Excessive pressure could result in serious personal injury or may cause damage to the valve and cylinder. Air regulators and air filters are available from ITT or your authorized ITT distributor.
- All procedures must be performed by qualified personnel.
- Always wear protective clothing and equipment to safeguard the eyes, face, hands, skin, and lungs from the fluid in the line.

#### NOTICE:

- Weld any flanges or pipelines before you install the valves. If this is impossible, protect the valve from excessive heat.
- Remove all weld slag, rods, debris, and tools from the pipeline before valves are installed or cycled.
- Always use studs in tapped holes to ensure full thread engagement of flange fasteners.
- Do not over-tighten a machine bolt that has bottomed out. Valve damage may result, preventing proper operation.
- Always use appropriate fasteners for the service, in compliance with applicable piping codes and standards.

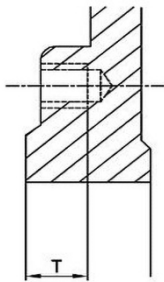
### Recommended fasteners

Table 2: Recommended fasteners and torques for CU27

Valve Size		Face to Face	Flange OD	Bolt Circle PCD	No. of Holes (each side)	Tapped Holes in valve chest	Thru Tapped Holes	Fastener Thread Size	Max Depth tapped holes in chest (Fig 1)	Max allowable fastener torque
IN	DN	A	OD	P	N	T1	T2	F1	T	(ft.lb.)
2"	50	1.89	5.91	4.74	4	2	2	5/8" - 11 UNC	0.31	43
3"	80	2.00	7.48	6.00	4	2	2	5/8" - 11 UNC	0.34	43
4"	100	2.00	9.06	7.50	8	2	6	5/8" - 11 UNC	0.34	43
6"	150	2.25	11.02	9.51	8	2	6	3/4" - 10 UNC	0.41	51
8"	200	2.75	13.58	11.75	8	2	6	3/4" - 10 UNC	0.47	51
10"	250	2.75	15.94	14.25	12	4	8	7/8" - 09 UNC	0.47	80
12"	300	3.00	19.09	17.01	12	4	8	7/8" - 09 UNC	0.47	80
14"	350	3.00	21.06	18.74	12	4	8	1" - 8 UNC	0.59	108
16"	400	3.50	23.62	21.26	16	6	10	1" - 8 UNC	0.59	108
18"	450	3.50	25.00	22.76	16	6	10	1.1/8" - 8 UN	0.59	137
20"	500	4.50	27.56	25.00	20	8	12	1.1/8" - 8 UN	0.87	137
24"	600	4.50	32.09	29.51	20	8	12	1.1/4" - 8 UN	0.87	166

**Table 3: Recommended fasteners and torques for CB27**

Valve Size		Face to Face	Flange OD	Bolt Circle PCD	No. of Holes (each side)	Tapped Holes in valve chest	Thru Tapped Holes	Fastener Thread Size	Max Depth tapped holes in chest (Fig 1)	Max allowable fastener torque
IN	DN	A	OD	P	N	T1	T2	F1	T	(ft.lb.)
2"	50	1.89	5.91	4.74	4	2	2	5/8" - 11 UNC	0.20	43
3"	80	2.00	7.48	6.00	4	2	2	5/8" - 11 UNC	0.20	43
4"	100	2.00	9.06	7.50	8	2	6	5/8" - 11 UNC	0.27	43
6"	150	2.25	11.02	9.51	8	2	6	3/4" - 10 UNC	0.39	51
8"	200	2.75	13.58	11.75	8	4	4	3/4" - 10 UNC	0.47	51
10"	250	2.75	15.94	14.25	12	4	8	7/8" - 09 UNC	0.47	80
12"	300	3.00	19.09	17.01	12	4	8	7/8" - 09 UNC	0.47	80
14"	350	3.00	21.06	18.74	12	4	8	1" - 8 UNC	0.59	108
16"	400	3.50	23.62	21.26	16	6	10	1" - 8 UNC	0.59	108
18"	450	3.50	25.00	22.76	16	6	10	1.1/8" - 8 UN	0.59	137
20"	500	4.50	27.56	25.00	20	8	12	1.1/8" - 8 UN	0.78	137
24"	600	4.50	32.09	29.51	20	8	12	1.1/4" - 8 UN	0.78	166

**Figure 3: Max depth tapped holes in chest**

## 4.2 Installing the valve

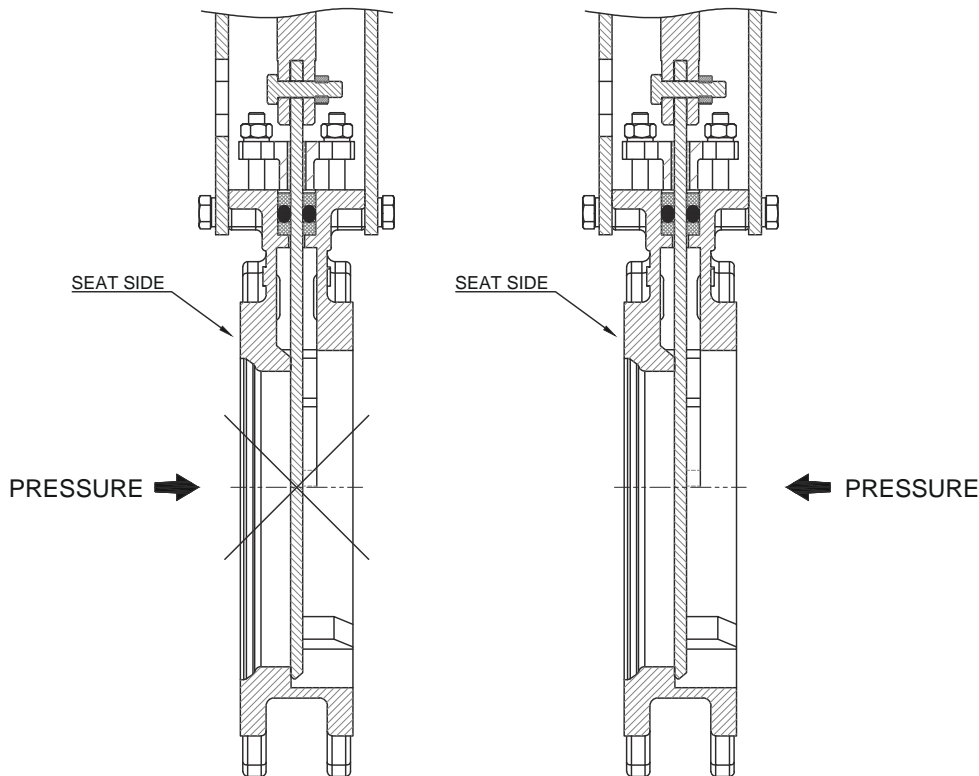
### General Guidelines

- Handling and maintenance in charge of the valve must be qualified and trained in valve operations.
- Use appropriate personal protection equipment (Gloves, safety shoes, etc.).
- Shut off all operating lines to the valve and place a warning sign. Isolate the valve completely from the process.
- Release process pressure.
- Drain the process fluid from the valve and insert the open-closed lockout (if the valve has it).
- Before installation, inspect the valve body and components for any damage that may have occurred during shipping or storage.
- Make sure the internal cavities within the valve body are clean.
- Inspect the pipeline and mating flanges, making sure the pipe is free of foreign material and that the flanges are clean.

### CU27 Installation

As the CU27 valve is uni-directional (shuts off in one direction only), the shut off direction of the process must be considered during the installation. The arrow indicated on the valve body represents the

direction of shutoff of the process fluid. Installation and correct orientation with respect to the shut off direction is the responsibility of the user.



**Figure 4:**

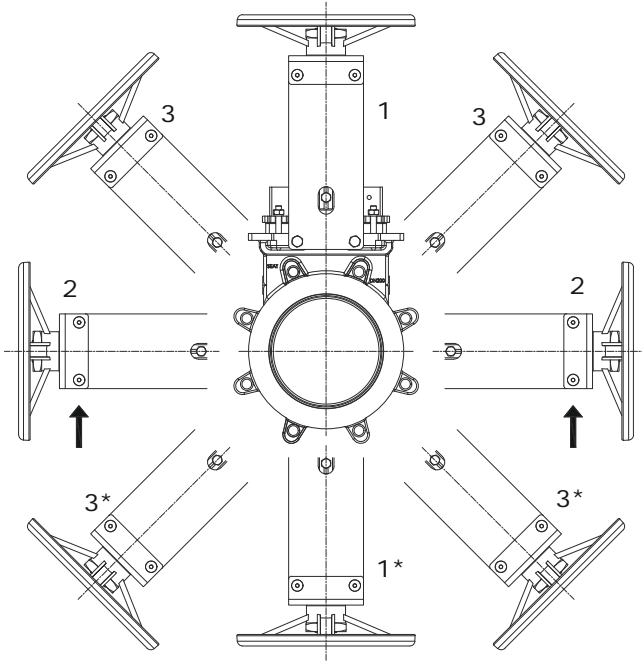
Refer to [Table 2: Recommended fasteners and torques for CU27](#) on page 11.

#### CB27 Installation

As the CB27 valve is bi-directional (shuts off in both directions), it permits installation without considering the flow direction. Install the valve in the fully open position only. Special care should be taken to maintain the correct distance between the flanges and to ensure that they are parallel to the valve body. Incorrect alignment of the valve can cause body deformation, which can lead to difficulties in operation. Refer to [Table 3: Recommended fasteners and torques for CB27](#) on page 12.

## 4.3 Piping Installation

The valve can be mounted in any position with regard to the pipe. However, it is advisable to place it vertically in a horizontal pipeline if the installation allows it. With larger diameter valves (> 12" mm), valves with heavy actuators (pneumatic, electric, etc.), or with the valve installed horizontally or at an angle on a horizontal pipeline, the installation will require the construction of suitable supports. See Figure below and consult the technical department at ITT. \* For these positions please consult ITT Engineered Valves.



**Installation Check**

Once the valve is installed, verify that the flanges have been fastened correctly and that all electrical and / or pneumatic connections have been properly made. Where electric accessories are mounted on the valve (i.e. solenoid valves, limit switches, positioners, etc.) the corresponding grounding connections must be made before it is put into operation. The operation of automated valves is limited only with fitted gate covers.

Valves should be initially operated without any flow in the pipeline. Then, operation of the valve and seal can be tested with the flow in pipeline. It should be noted that the packing material might be loosened during shipping and storage, which can cause minor packing leakage. This can be corrected by tightening the gland. The gland nuts shall be tightened gradually in a crosswise direction until the leakage stops. See below table for fastener torques.

Valve Size	Torque (ft.-lb.)
2" - 4"	15
6" - 8"	22
10" - 24"	26

The diagram shows a gland nut assembly. It consists of a horizontal bar with a handle on the right side, labeled '1'. There are four circular glands along the bar, labeled '2', '3', and '4' from left to right. Each gland has a central nut and a surrounding flange.

**Figure 5: Fastener torques**

Check that there is no metal contact between the gland follower and the gate. If the gland follower nuts are tightened too hard the force needed to operate the valve will increase, the valve function will be affected and the packing life could be shortened. Once performance has been tested, the valve can be put into operation.



# 5 Operation

## 5.1 Range of operators

### Hand Wheel

To open the valve, turn the hand wheel counterclockwise. To close the valve, turn the hand wheel clockwise. See general assembly drawing for more details.

### Bevel Gear

The bevel gear is designed for full force below 30Kg. To open the valve, turn the hand wheel counterclockwise. To close the valve, turn the hand wheel clockwise. See general assembly drawing for more details.

### Pneumatic Cylinder

Cylinder operated valves are generally supplied with a double acting pneumatic actuator. The inlet air pressure should be between 60 - 90 psi. It is essential for a good maintenance of the cylinder that air should be well dried, filtered and lubricated. It is recommended to actuate the cylinder 3-4 times before the start up, once it is installed in the pipeline.

# 6 Maintenance

## 6.1 Precautions



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**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 fluid in the line.
- 

## 6.2 Inspection

### 6.2.1 Visual inspection

Periodic inspections should be made as valves may wear over time due to the erosive or corrosive nature of the service conditions. Regular inspection of the gate, stem and stem components must be performed periodically to identify any signs of corrosion, wear, and / or damage caused by the process media. Replace parts with excessive erosion or corrosion.

## 6.3 Lubrication

### 6.3.1 Stem lubrication

Look for corrosion, galling or lack of lubrication on the stem, stem nut and extension stem (if any). Lubricant for the stem or stem threads can be applied directly to them. Recommended stem lubricants include:

- Industrial Grease-Medium (Chevron)
- C5-A Compound (Fel-Pro)
- XL 47-F-2-75 (Moly)
- Molytex Grease #2 (Texaco)

### 6.3.2 CB27 seat lubrication

The CB27 bi-directional elastomer seal should be lubricated every 100 operations for 2" - 10" (DN 50-DN250) and every 50 strokes for 12" - 24" (DN 300 - DN 600) sizes. Special application cases may require more or less frequent lubrication based on the pipe line process fluid. Where the valves are operated less frequent than once per month, the valve should be lubricated prior to the next stroke.

The gate may be lubricated directly on the gate edges where it contacts the elastomer seat (see [3.2.2 General diagram on page 10](#)). Prior to lubrication completely wipe out the edges of the gate to remove sediments / dust that may be present.

Seat life can be improved if the valve gate is wiped clean occasionally. Failure to use ITT recommended type of lubricant will considerably reduce the life of the valve. Under no circumstances should a hydrocarbon based lubricant be used. Improper use of lubrication will void the valve warranty. Recommended seat lubricants include:

- Dow 111 (Dow corning)
- Dow 44 (Dow corning)
- Compound G661 (GE)
- Rhodorsil 111 (Rhone-Polenc)
- Sil Glyde (AGS Company)
- Dow 7 (Dow corning)
- Complex 821 (NFO)

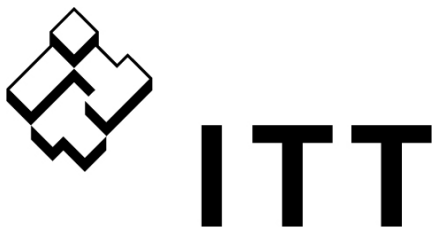
## 6.4 Repack the stuffing box

1. De-pressurize the system and place the valve in the closed position.
2. Unbolt the spindle or stem from the gate.
3. Loosen the screws of the support plate and remove it (without loosening the operator from the plates).
4. Loosen the nuts of the gland follower and remove the gland.
5. Remove the old gland packing rings and clean out the gland area. For CB27 valves up to 20", check the scrapper at the bottom of the gland area for damage and replace as needed.
6. Insert the new gland packing rings, making sure that the ring joints alternate (the first on one side of the gate, the next one on the other side to stagger the packing joints).
7. Once the necessary gland packing rings are inserted, replace the gland follower and fasteners and proceed with a steady initial tightening of the fasteners. See [Figure 5: Fastener torques on page 14](#) for recommended packing torque.
8. Replace the support plate (with the actuator) and tighten the fasteners.
9. Reattached the spindle or stem to the gate.
10. Stroke the valve several times under pressure to break in the gland packing.
11. Once the valve is installed and the system is pressurized, check the gland packing for leakage. If leakage occurs, re-tighten the gland follower to the proper torque.

## 6.5 Replace the seats

Consult factory for procedure to replace the CB27 seat.

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this document and more information:  
[www.engvalves.com](http://www.engvalves.com)



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