04
Check Valves
Introduction

- Check valves are valves with automatic action, they work without external controls and depends for their working on the sense of the flow or the pressures in the pipe system.
- Its main function is to allow the fluid pass through only in one sense of the installation, allowing to work without fluid in the opposite sense or to avoid emptying situations in the line.
- Usually they use a mobile ball or a closing cone and a spring, that allows the opening of the valve only in one sense.
- There are several versions depending on the kind of installation where they are used: check valves, foot valves or swing check valves.
- It’s important to take in consideration the pressure loss and the way the closing is did, depending on the use we would gave to the valve.
Advantages and disadvantages

✓ They avoid the backguard of the fluid in the installation
✓ They are necessary for all the installations which uses pumps, turbines, etc. to avoid the water hammers
✓ They are also useful in irrigation applications or similar, where dirty or chemical products are carried and we don’t want them to do the opposite way
✓ They keep the flow and the pressure in the system

✗ It can’t be controlled the pass of the fluid, it only exist flow in one sense and not in the opposite
✗ It not allows to know the position of the valve (open/close)
✗ The installation must be done at a reasonable distance (ask us) of any pump, turbine, etc.
Operation

- **Spring**
  - Closing with a cone pushed by a spring that helps to do a completely watertight closing.
  - The difference between the pressure of two points in the installation is able to break the spring resistance, in this way the fluid pass in the predicted sense and not in the opposite.

- **Ball**
  - Closing with a ball that push against a closing ring.
  - The ball closing is ever by gravity, which means that the installation position is usually in vertical systems and with an inverse pressure in fluid presence.

- **Swing check**
  - The swing check valve has only one opening sense.
  - Its installation almost doesn’t requires space in the system.
Operation: foot valves

▪ Foot valves are a particular type of check valves which are installed on the base of an aspiration pipe of a pump to prevent the impulsion pipe from emptying.
▪ The valve must be installed between the pump and the tank in order to let the fluid access the pump and stopping it when returning to the tank.
▪ The entry of the valve is protected by a screen filter to prevent the entry of unwanted elements which could exist in the tank or deposit.
When could use each type...

<table>
<thead>
<tr>
<th>Transported material</th>
<th>Installation</th>
<th>Materials</th>
<th>Piping</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring</strong></td>
<td>Any kind of liquid</td>
<td>Horizontal or vertical</td>
<td>Metallic spring (corrosion)</td>
<td>Pressure loss, very reliable closing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ball</strong></td>
<td>Clean liquids, non</td>
<td>Usually vertical</td>
<td>Completely made in plastic</td>
<td>Ideal for high flows</td>
</tr>
<tr>
<td></td>
<td>viscous and without</td>
<td></td>
<td></td>
<td>Very low pressure loss</td>
</tr>
<tr>
<td></td>
<td>suspended particles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Swing check</strong></td>
<td>Any kind of liquid,</td>
<td>Vertical for better reliability</td>
<td>All the parts in contact with</td>
<td>Very high flows</td>
</tr>
<tr>
<td></td>
<td>it doesn’t obstruct</td>
<td>(horizontal is possible),</td>
<td>the fluid are made in plastic</td>
<td>Used for big sizes and low pressures</td>
</tr>
<tr>
<td></td>
<td>the liquid pass</td>
<td>minimum space required</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>through</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cepex Check Valves

- Sizes from D16 (3/8”) up to D110 (4”) / Swing check from D75 to D225 (2½” - 8”)
- Working pressure 20°C (73°F) water temperature (spring/ball):
  - D16 – D63 (⅜” - 2”): PN 16
  - D75 – D110 (2½” - 4”): PN 10
- Working pressure 20°C (73°F) water temperature (swing check):
  - D75 – D140 (2½” - 5”): PN 10
  - D160 – D225 (6” - 8”): PN 6
- Threaded and solvent connections in spring, ball and foot valves (flange connections in swing check valve).
- Minimum pressure loss in all the sizes.
## Range

### Spring check & Spring foot valves

<table>
<thead>
<tr>
<th>Material</th>
<th>O-Rings</th>
<th>Sizes</th>
<th>PN</th>
<th>Connections</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC-U</td>
<td>EPDM</td>
<td>D10-D03 (3/8”-2”)</td>
<td>At 20°C 10 bar</td>
<td>Female socket</td>
<td>Metric BS</td>
</tr>
<tr>
<td></td>
<td>FPM (Viton®)</td>
<td>D076-D110 (2½”-4”)</td>
<td>(240 PSI @ 73°F)</td>
<td>Female threaded</td>
<td>ASTM</td>
</tr>
<tr>
<td>Corzan® CPVC</td>
<td>EPDM</td>
<td>D16-D03 (3/8”-2”)</td>
<td>At 20°C 10 bar</td>
<td>Female socket</td>
<td>Metric BS</td>
</tr>
<tr>
<td></td>
<td>FPM (Viton®)</td>
<td>D076-D110 (2½”-4”)</td>
<td>(240 PSI @ 73°F)</td>
<td>Female threaded</td>
<td>ASTM</td>
</tr>
</tbody>
</table>

### Ball check & Ball foot valves

<table>
<thead>
<tr>
<th>Material</th>
<th>O-Rings</th>
<th>Sizes</th>
<th>PN</th>
<th>Connections</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC-U</td>
<td>EPDM</td>
<td>D16-D03 (3/8”-2”)</td>
<td>At 20°C 10 bar</td>
<td>Female socket</td>
<td>Metric BS</td>
</tr>
<tr>
<td></td>
<td>FPM (Viton®)</td>
<td>D076-D110 (2½”-4”)</td>
<td>(240 PSI @ 73°F)</td>
<td>Female threaded</td>
<td>ASTM</td>
</tr>
<tr>
<td>Corzan® CPVC</td>
<td>EPDM</td>
<td>D16-D03 (3/8”-2”)</td>
<td>At 20°C 10 bar</td>
<td>Female socket</td>
<td>Metric BS</td>
</tr>
<tr>
<td></td>
<td>FPM (Viton®)</td>
<td>D076-D110 (2½”-4”)</td>
<td>(240 PSI @ 73°F)</td>
<td>Female threaded</td>
<td>ASTM</td>
</tr>
</tbody>
</table>

### Swing check valves

<table>
<thead>
<tr>
<th>Material</th>
<th>O-Rings</th>
<th>Sizes</th>
<th>PN</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC-U</td>
<td>EPDM</td>
<td>D75-D140 (2½”-6”)</td>
<td>At 20°C 10 bar</td>
<td>ISO/DIN</td>
</tr>
<tr>
<td></td>
<td>FPM (Viton®)</td>
<td>D180-D225 (8”-8”)</td>
<td>(150 PSI @ 73°F)</td>
<td>ANSI/ASTM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>At 20°C 8 bar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(60 PSI @ 73°F)</td>
<td></td>
</tr>
</tbody>
</table>
Features and benefits

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal or vertical installation (spring and swing check)</td>
<td>They could adapt themselves to any kind of system</td>
</tr>
<tr>
<td>End connectors installation (spring and ball)</td>
<td>Easy and without the need of tools</td>
</tr>
<tr>
<td>Possibility of changing the end connectors (spring and ball)</td>
<td>The type of union may be changed (female solvent socket or threaded) for different ones</td>
</tr>
<tr>
<td>Double union (spring and ball)</td>
<td>It allows the maintenance in both sides of the valve</td>
</tr>
<tr>
<td>Different materials PVC-U and PVC-C (spring and ball)</td>
<td>Good for any kind of installation (even the most demanding ones)</td>
</tr>
<tr>
<td>Stainless steel spring</td>
<td>Avoids the corrosion at maximum possible</td>
</tr>
<tr>
<td>Slow closing</td>
<td>Security against the water hammers</td>
</tr>
<tr>
<td>Threaded seal-carrier (spring and ball)</td>
<td>It allows the maintenance upstream without emptying the system</td>
</tr>
<tr>
<td>Only plastic parts are in contact with the fluid (swing check and ball)</td>
<td>Avoids corrosion problems</td>
</tr>
<tr>
<td>Flange installation in swing check valve</td>
<td>Easy installation and minimum space required</td>
</tr>
<tr>
<td>Minimum installation space required</td>
<td>Ideally suited for systems with lack of space</td>
</tr>
</tbody>
</table>
Explosion

## Parts

1. **Body**  
PVC-U/PVC-C

2. **Closing cone / Ball**  
PVC-U/PVC-C

3. **Spring**  
Stainless steel AISI 302

4. **Union nut**  
PVC-U/PVC-C

5. **End connector**  
PVC-U/PVC-C

6. **Closing ring**  
EPDM/Viton®

7. **Body o-ring**  
EPDM/Viton®

8. **End connector o-ring**  
EPDM/Viton®

9. **Seal-carrier**  
PVC-U/PVC-C

10. **Foot valve screen**  
PP
Explosion

Parts
1. Body PVC-U
2. Flap PVC-U
3. Cap EPDM/FPM
4. Body o-ring EPDM/FPM
5. Flap O-ring EPDM/FPM
Installation

- Unscrew the union nuts and separate the end connectors.
- Place the end connectors over the end of the pipe.
- When the necessary time has passed, introduce the valve body and tighten the union nuts by hand.

- Swing check valves are normally installed between flanges.
Calidad

- **Tests on assembled valves (according to european standards):**
  - Pressure
  - Watertightness
  - Packaging
  - Traceability

- **Watertightness test:**
  - Applied to 100% of Cepex valves production.
  - Air is injected inside the valve through a microfugometer.
  - The valve passes the test if no air-leaks happen.

*All these controls are explained in the Quality Tests CSF.*
Assembly

Semi-automatic assembly line for check valves
Packaging

New box design:
- Strong
- Sub-standard: carton boxes

New label design
- Includes Cepex and certifications logos.
- Improves barcode placing, making easier reading.
Applications. Using examples:

- To avoid emptying in the pump aspiration.
- To avoid the return of the fluid so this makes the pump turn in the opposite sense.
- Installation with ascending sense (they are used for the fluid return).
- In impulsion stretches to avoid the water hammer and to reduce the maximum overpressure.
- In systems with irrigation heads, where the return of the treated water could contaminate the rest of the system.
Applications

- Industry
- Fluid distribution
- Irrigation

Riverhead Water District
• 3D/2D CAD Library

- Free download of 3D and 2D models through www.cepex.com.

- All Cepex products catalogue available.

- Multiformat.

- Multilanguage.
Cepex
Sales
Folder
12/2006

01 PVC Pressure Fittings
02 PP Compression Fittings
03.s Ball Valves [STD] Series **NEW!**
03.i Ball Valves [IND] Series **NEW!**
03 Ball Valves
**04 Check Valves**
05.s Butterfly Valves Standard Series **NEW!**
05.i Butterfly Valves Industrial Series **NEW!**
05.c Butterfly Valves Classic Series
06 Valve Boxes Pro Series
07 PE 100 Fittings
08 PVC Flexible Pipe
09 Actuated Valves
10 Hydraulic Valves
11 Filtration

A Plastics Market
B Fluid Dynamics
C Plastic Types
D Union Types
E Quality Tests