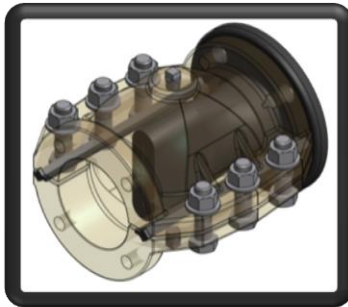


CHECK VALVES

INSTALLATION, OPERATION, & MAINTENANCE INSTRUCTIONS



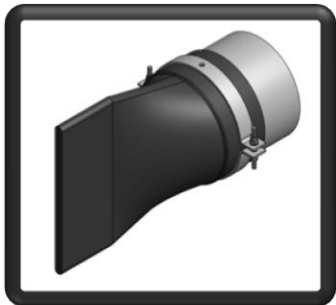
CPF



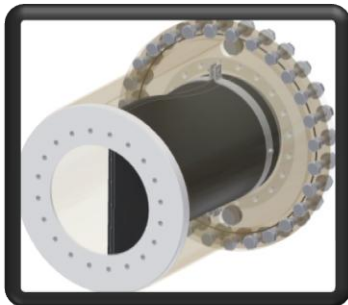
CPJ (Split Body)



CPI



CPO

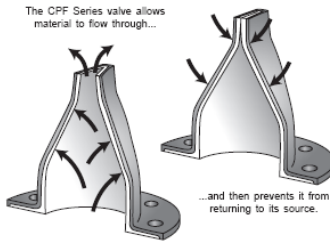


CPJ (Spool Body)



CPI-IN

OPERATION

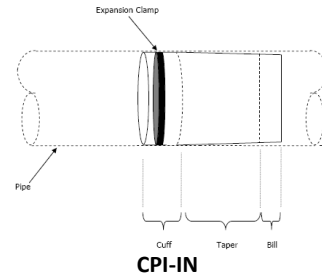
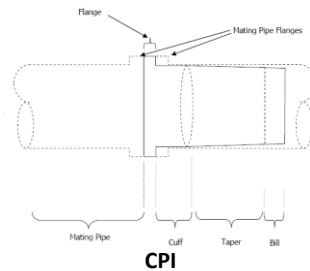
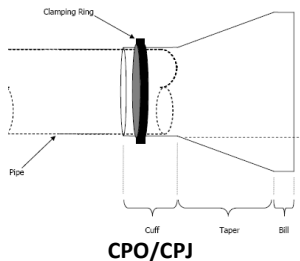
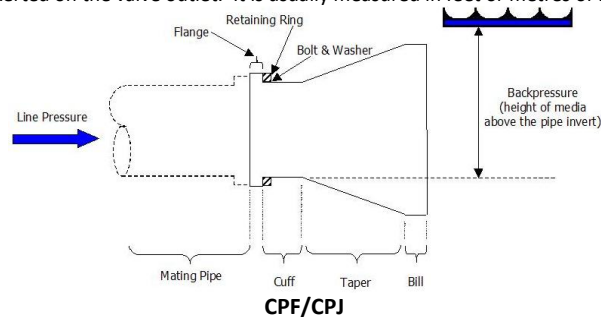


EVR Duckbill Check Valves are custom made and are intended for specific applications. They are designed to respond to criteria unique to their purpose, such as line pressure, backflow pressures, and chemical compatibility. Should the conditions be altered or changed significantly, it could affect the normal operation of the valves.

EVR duckbill check valves operate based on differential pressure. When the line pressure (at the valve inlet) exceeds the backpressure (at the valve outlet), the valve opens and flow is created. When the backpressure exceeds or overcomes the line pressure, the bill of the valve seals shut, thereby preventing any backflow from occurring.

TERMINOLOGY (refer to diagrams below)

Cuff:	The round portion of the valve from taper to the flange (where applicable).
Taper:	The taper transforms the round shape of the valve cuff to the vertical shape of the valve bill. Reinforcement in the taper is customized to suit each application's expected inlet pressures and backpressures.
Bill:	The outlet end of the valve. The bill contorts to allow flow through the valve yet closes tight during 'no flow' or reverse pressure conditions. The bill can be straight or curved, depending on the application.
Tube:	The inner surface. This is constructed using an elastomer that is most suitable for the process fluid.
Cover:	The outer surface of the valve. This is made from an elastomer that is most suitable for the external environment.
Retaining Ring:	Supplied with the valve, the duckbill flange is 'sandwiched' between the mating pipe flange and the retaining ring.
Clamps:	Supplied with the valve, the duckbill cuff is squeezed between the mating pipe and the clamp(s) (inside or outside of the pipe).
Line Pressure:	The fluid pressure applied to the valve inlet (used to open the valve).
Backpressure:	The fluid pressure exerted on the valve outlet. It is usually measured in feet or metres of fluid above the pipe invert.



INSTALLATION

Ensure that pipelines have been depressurized prior to installation, removal, or servicing the check valve. For best performance, bills should be installed as close to the vertical position as possible. In cases where clearance below the pipe outlet is minimal, the duckbill should be rotated only enough as required to avoid contact with the ground. Please contact your EVR representative or EVR's offices directly to discuss this application.

NOTE: Debris caught under and/or around any check valve can potentially affect its operation. Therefore, ensure that there is approximately 6" of ground clearance between the bill of the valve and the ground during and after installation. There must also be adequate clearance on all sides and downstream of the valve, so that it cannot be damaged from exterior contact with abrasive materials or structures. For installations where the valve must be discharging into fast-moving media or waves at angles not in line with the flow, or waves, additional barriers are required to protect the valve from strong currents or excessive side loads. It is also recommended to protect the check valve from direct sunlight whenever possible.

CPF/CPI INSTALLATION

1. Do **NOT** install against raised-face flanges (only to smooth-face flanges). Remove all burrs or sharp edges from the pipe flange faces and wipe clean of oil, grease, etc. Apply a thin coat of graphite or glycerine to the pipe flange face. This will ease installation and allow for easy removal at a later date.
2. Lift the duckbill check valve into position and align the bolt holes of the pipe flange, check valve flange and the retaining ring. Ensure that the check valve's bill is oriented in a vertical position.
3. After the duckbill check valve and retaining ring (where applicable) are in the correct position, push two (2) bolts through to ensure alignment. After the proper alignment has been obtained, install the remaining nuts and bolts using washers at the split holes (if the Check Valve comes with a retaining ring).
4. Use two wrenches when installing the Check Valve. Tighten all flange bolts in a criss-cross pattern similar to the one shown in Figure 2 to the maximum torque recommended in Figure 3.
5. Do not weld near the Check Valve.



CPO/CPI-IN INSTALLATION

1. The outer (CPO) or inner (CPI-IN) surface of the pipe must be smooth and free of burrs and sharp edges. Before installing the valve, verify its fit by measuring the ID or OD of the cuff and the ID or OD of the pipe.
2. Slide the clamp(s) along the pipe or leave them on the valve cuff for CPO valves. Do not tighten until after the valve is in place. Clamps for CPI-IN valves may be installed with the valve or slipped in after the valve is in place.
3. Slip a CPO evenly over the end of the pipe until the entire length of the valve cuff is in contact with the pipe. Slip a CPI-IN inside the pipe until the entire valve is inside the pipe. Ensure that the check valve's bill is oriented in a vertical position.
4. After the check valve is properly positioned, install the clamp(s). Where 2 clamps are required, they should be rotated 90 degrees relative to each other. This will ensure that even pressure is distributed around the cuff. A thin coat of mild lubricant or glycerine may be applied on the inner surface(s) of the clamp(s). This will reduce the friction when tightening the clamp(s).
5. Ensure that the valve is snug to the pipe and be careful not to over-torque the clamps.
 - a. The recommended torque values for gear clamps 1-3/4" and smaller is 3ft-lbs. For sizes larger than 1-3/4" the torque value is 5 ft-lbs or as otherwise noted by the EVR Technical Department.
 - b. For larger CPO valves that do not use gear clamps, the inner sets of nuts (Figure 1 – nuts 2 and 3) clamp the valve to the pipe. These nuts should be tightened until the slack is removed from the rubber cuff and the valve cuff is snug against the outside of the pipe. With a torque wrench set at 10 ft-lbs, torque the nuts until a snug fit is achieved. This will ensure the valve cannot be physically removed from the pipe. For valves 32" and up, a 20 ft-lbs torque setting is required. The outer sets of nuts (Figure 1 – nuts 1 and 4) lock the first set of nuts in place. This will prevent the clamps from loosening on the valve.
6. DO NOT use a lubricant to aid in the installation of the valve onto or inside the pipe. It could cause the valve to slip out of position.
7. Metal clamps on large size check valves (12" and larger) are provided with drilled holes for anchor bolts. These holes are used as a pattern for drilling through the rubber and the outfall pipe. These anchor bolts should be installed 90 degrees to the clamp and may also be used on smaller valves provided that this requirement is discussed prior to valve manufacture. See "Securing CPO and CPI-IN Check Valves" (below) for clarity.

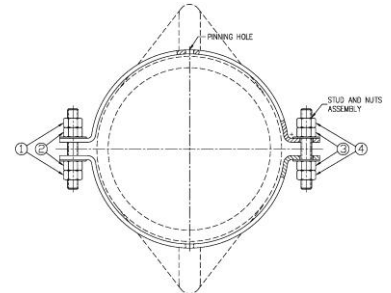
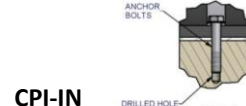
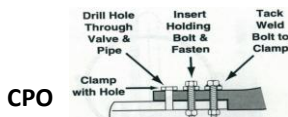


Figure 1

Securing CPO and CPI-IN Check Valves

Anchor bolts are recommended to further secure the check valve into position. Using the clamp(s) as a template, drill a hole(s) through the valve cuff and through the pipe using a drill bit. Insert a stainless steel anchor bolt through the clamp hole, the cuff and the pipe and secure the anchor bolt with stainless steel nut, and washers. Anchor bolts are not supplied with the valves since pipes vary in thickness. For installations that may not permit the installer to access the inside or outside of the pipe (to place the nuts on the anchor bolts), simply place the anchor bolt(s) into the hole(s) and tack-weld the anchor bolt to the clamp, thus creating a pin(s) to hold the valve. **Exercise caution to minimize heat and splatter near the check valve and perform welding away from the joint wherever possible.**



CPJ INSTALLATION

Note: CPJ Split Body Design

- Downstream gasket required (not supplied with check valve).
- Do **NOT** install against raised-face flanges (only to smooth-face flanges).

CPJ Spool Body Design

- Upstream and downstream gaskets required (not supplied with valve).
- These units can be installed against raised-face flanges.

1. Remove all burrs or sharp edges from the pipe flange faces and wipe clean of oil, grease, etc.
 - a. For CPJ Split Body Design - On the upstream flange of the duckbill check valve, (where the duckbill's rubber flange will mate to the upstream pipe flange), apply a thin coat of graphite or glycerine to the pipe flange face. This will ease installation and allow for easy removal at a later date. No upstream gasket is required between the rubber duckbill flange and the mating pipe flange.
 - b. For CPJ Spool Body Flanges and CPJ Split Body Downstream Flange - A gasket (not supplied) should be used between the mating metal flanges.
2. Lift the duckbill check valve into position, ensuring that the valve is oriented in the correct direction of flow, (i.e. the bill end should be on the downstream side of the valve). Align the bolt holes of the pipe and check valve flanges and ensure the check valve's bill is oriented in a vertical position or as nearly vertical position as possible.
3. After the duckbill check valve is in the correct position, push two (2) bolts through each of the mating pipe flanges/check valve flange to ensure alignment. After the proper alignment has been obtained, install the remaining bolts and nuts.
 - a. For CPJ Split Body Design - On the upstream flange of the duckbill check valve, (where the duckbill's rubber flange will mate to the upstream pipe flange) - tighten all flange bolts in a criss-cross pattern similar to the one shown in Figure 2 to the maximum torque recommended in Figure 3.
 - b. For CPJ Spool Body Flanges and CPJ Split Body Downstream Flange – tighten all flange bolts as per standard mating metal flange standards.
4. Do not weld near the Check Valve.

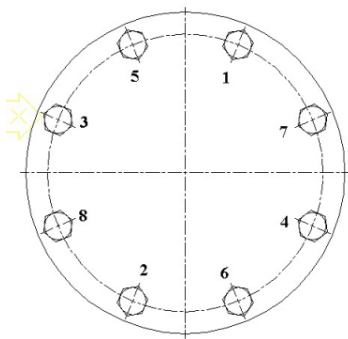


Figure 2

Pipe Size ID (in)	Torque (ft-lbs)*	Torque (Nm)*
1 - 2	20	27
2.5 - 5	25	34
6 - 12	35	48
14 - 18	50	68
20 and larger	60	82

*Torque settings are approximate and are as recommended by the Fluid Sealing Association Std FSA-PSJ-702-06 "Rubber Flanged Non-Metallic Expansion Joint Installation, Maintenance and Storage" Manual.

a) To prevent leakage, the flange bolts should be retightened after one week of operation and checked periodically thereafter.

b) Torque values are approximate. After installation, the system should be pressurized and examined to confirm a proper seal.

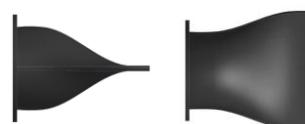
Figure 3

STORAGE

- Duckbill check valves should be stored vertically (**Figure 4a**) with the bill facing upward, not on their side (**Figure 4b**)
- Check valves should be stored in a cool, dry location with maximum ventilation.
- Check valves should not be stacked, nor should anything be stored on top of their bills. They should remain on a skid until ready for use.
- Do not drop, bend, or twist the valve, as damage may occur.
- The valve should be wrapped in black plastic to avoid contact with sunlight and/or ultra-violet light. This will extend the shelf life.
- Avoid exposure to light, electric motors, dirt, or chemicals. Resilient check valves are subject to deterioration (hardening and becoming brittle) when exposed to ozone and non-compatible chemicals



YES
Figure 4a



NO
Figure 4b

MAINTENANCE

Periodically, an inspection should be performed to verify the valve's performance:

- Inspect the tube and cover for cuts, checking, and fissures. Do not be alarmed if small cuts have formed in the outer cover. If necessary, repairs can be made on site with a repair compound. If significant fissures are noticed where fabric is exposed and torn, the valve must be replaced. Please contact EVR.
- If blisters, deformation, or delamination is noted inside the valve, this is an indication that the media or higher than expected temperatures are attacking the tube. The valve should be replaced as soon as possible. Please contact EVR.
- Inspect the valve for entrapped foreign objects, which may have lodged between the lips of the valve and could prevent the valve from checking.
- Clean out ports are provided on CPJ bodies to allow drainage of the valve prior to performing any inspections or maintenance. (Note: Drainage ports are located on the inlet flange of CPJ Spool Body valves. For CPJ Split Body valves, the drainage ports are located mid-way along the valve body).
- Verify that there is clearance between the bottom of the bill and the ground and that no debris is trapped there.

If a build up of debris occurs within the valve, line pressure should flush it out. In some instances, a wooden plank 1" x 4" or 1½" x 12" may be **temporarily** inserted into the bill of the valve and rotated 90°. This will clear the check valve of any debris that may be trapped in the bill.

WARRANTY

All products manufactured by Elasto-Valve Rubber Products Inc. (EVR) are guaranteed against defects resulting from faulty workmanship or materials for one (1) year from date of shipment to Buyer. If any such product is found to be defective by reason of faulty workmanship or materials, then upon written notice and return of the product, and at EVR's sole discretion, the defective product will be replaced or repaired by EVR free of charge at EVR's factory. Claims for labour costs and other expenses required to replace and/or transport such defective product or to repair damage resulting from the use thereof will not be allowed by EVR. Our liability does not include consequential damages and is limited to the price paid for the defective product.

EVR shall not be bound by any other warranty other than the above set forth unless such warranty shall be agreed in writing by EVR.

All EVR literature is published in good faith and is believed to be reliable at time of print; however, due to product design changes, EVR reserves the right to make alterations from published materials at any time. Formal approval drawings are available to confirm individual products upon request at time of order.

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