INSTALLATION / OPERATION / MAINTENANCE

Rubber-Flex Duckbill Check Valves

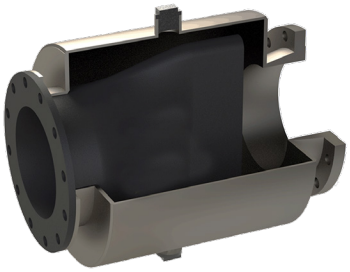
Model RF-DBF

Model RF-DBI

Model RF-DBO

Model RF-DBI-IN

Model RF-DBI-LH



Model RF-DBJ

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1.0 Introduction

Cla-Val Rubber-Flex Duckbill Check Valves are designed to provide outstanding back-flow prevention; eliminating costly and unwanted backflow from rivers, oceans, storm water, and is an excellent choice for sewage diffuser systems. Cla-Val Rubber-Flex Duckbill Check Valves are fully passive flow devices requiring neither maintenance nor any outside sources of power or manual assistance to operate. They are offered as direct replacements for ineffective and maintenance ridden flap-type check valves as well as for new/existing construction and custom applications. Each check valve is manufactured to exacting specifications ensuring a perfect fit and usability and is available in a wide variety of elastomers to meet the design requirements of the application. This installation, operation and maintenance manual will cover the general practices for the proper installation, operation and maintenance of Cla-Val Rubber-Flex Duckbill Check Valves.

1.1 Model RF-DBF: Rubber-Flex Duckbill Check Valve

This type of rubber check valve is designed to bolt directly to existing flanges or new installations. Flanges are drilled to ANSI 125/150# standard but other drill patterns are available upon request. This style of rubber check valve can be installed in either vertical or horizontal applications. Available in a standard duck bill design (Style 710) as well as an eccentric sloped bottom design for applications requiring special installation clearances.

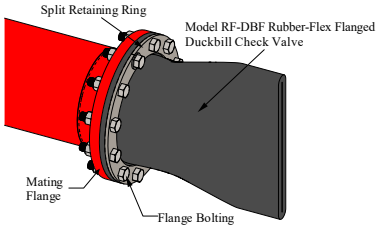

Figure 1: Model RF-DBF

1.2 Model RF-DBI: Rubber-Flex Flanged In-Line Duckbill Check Valve

This type of rubber check valve is designed to fit directly inside of existing piping systems. The design is supplied with a flat face rubber flange which allows installation between existing pipe flanges eliminating the requirement for a valve body. Flanges are drilled to ANSI 125/150# standard but other drill patterns are available upon request. This style of rubber check valve can be installed in either vertical or horizontal applications.

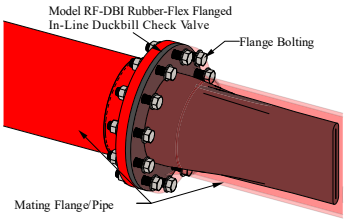

Figure 2: Model RF-DBI

1.3 Model RF-DBO: Rubber-Flex Slip-On Duckbill Check Valve

This type of rubber check valve is designed to easily slip over an existing pipe and is affixed to the pipe with heavy-duty stainless-steel clamps. This style of rubber check valve can be installed in either a vertical or horizontal orientation for most applications. Available in a standard duck bill design as well as an eccentric sloped bottom design for applications requiring special installation clearances. *Note: External Clamp shown is of a general style and will change depending on the size of the supplied check valve.*

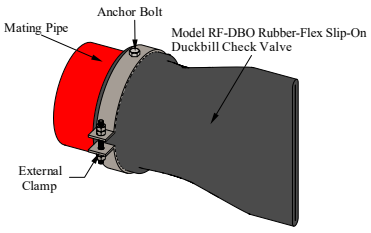

Figure 3: Model RF-DBO

1.4 Model RF-DBI-IN: Rubber-Flex Slip-In In-Line Duckbill Check Valve

This type of rubber check valve is designed to slip directly inside of an existing pipe and is supplied with a stainless-steel expandable clamp to secure in place. This style of rubber check valve can be installed in either a vertical or horizontal orientation for most applications.

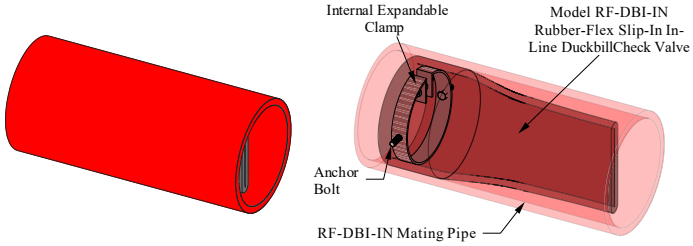

Figure 4: Model RF-DBI-IN

1.5 Model RF-DBJ: Rubber-Flex Jacket Style Duckbill Check Valve

This type of rubber check valve is designed with a full metal enclosure which allows easy installation in existing piping systems. Flanges are drilled to ANSI 125/150# standard but other drill patterns are available upon request.

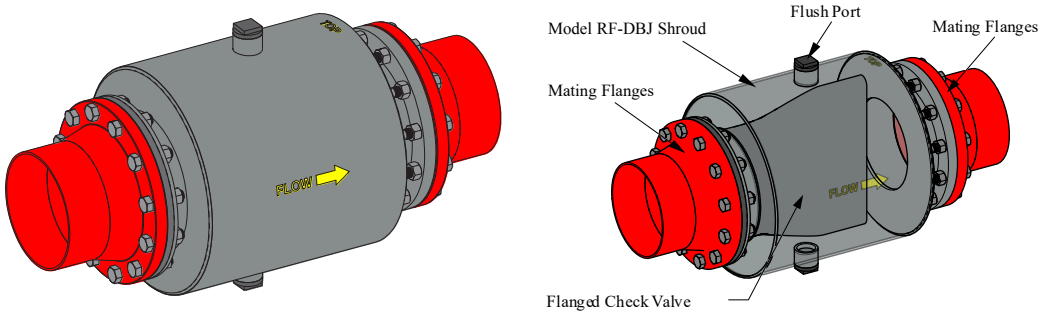

Figure 5: Model RF-DBJ

1.6 Model RF-DBI-LH: Rubber-Flex Low Head Loss In-Line Duckbill Check Valve

This type of rubber check valve is designed to slip directly inside of an existing pipe with the supplied stainless-steel expandable clamp or retaining ring to secure in place; it can be fastened from either the inlet or discharge end of the valve. The standard valve must be installed in a truly round pipe. Out of round pipe may cause distortion of the valve causing valve failure.

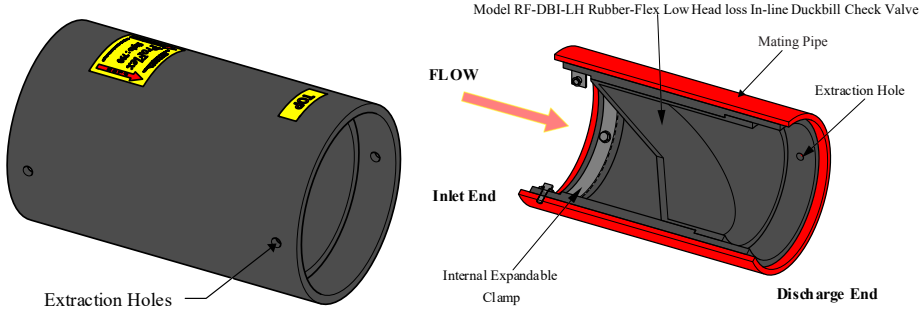

Figure 6: Model RF-DBI-LH Rubber-Flex Low Head Loss Flanged In-Line Duckbill Check Valve

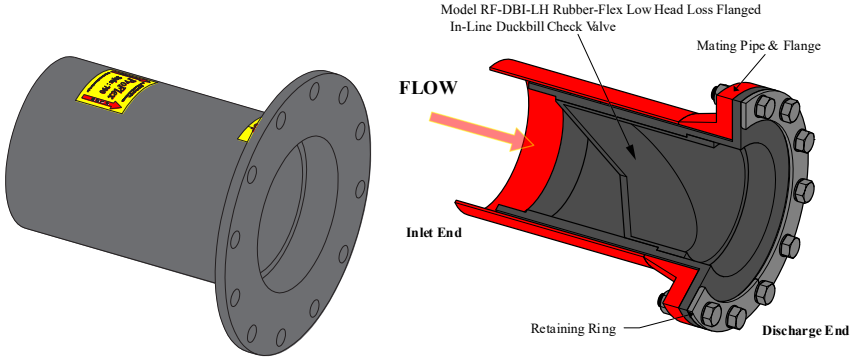

Figure 7: Model RF-DBI-LH Rubber-Flex Low Head Loss Flanged In-Line Duckbill Check Valve

Note: For flanged versions of the Model RF-DBI-LH Low Head Loss In-Line Rubber Check Valves the integrated rubber flange can be located on either the inlet or discharge end depending on required installation orientation.

2.0 Storage and Handling

2.1 Storage

2.1.1 Inside

The ideal storage location for a Cla-Val Rubber-Flex Duckbill Check Valve is in a warehouse setting with a relatively dry and cool location. Store the check valve in a vertical position on a pallet or wooden platform similar to as shown in Figure 5 below.

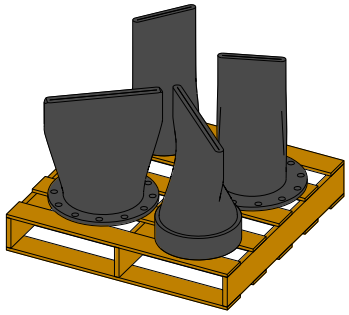

Figure 8: Typical Check Valve Storage Position

2.1.2 Outside

If the rubber check valve is to be stored outside, keep the check valve protected in a waterproof crate until ready for installation. Keep the check valve protected from any external elements such as direct UV exposure. Do not lay other boxes on top of the check valve or check valve box.

2.2 Handling

Care should be taken when handling the Cla-Val Rubber-Flex Duckbill Check Valves whether big or small to reduce the possibility of damaging the check valve during installation. For large size check valves, special care should be taken in loading, hoisting, and lowering; being careful not to hit adjacent equipment, forklift tines, crane cables, etc. Model RF-DBF & RF-DBO valves 36" and larger are manufactured with a lifting support hole to assist in the safe and proper lifting/installation of these check valves. The lifting support holes are not intended to support the entire weight of the check valve and care must be taken to adequately support the cuffed or flanged end as well. *Note: Cla-Val will not be responsible or liable for damage to the rubber check valve, adjacent equipment, or injury to personnel if these steps are not taken.*

3.0 Prior to Installation

3.1 Inspect the Received Check Valve

Rubber-Flex check valves are fully inspected at the factory and are carefully packaged to arrive at the job site ready for installation. Upon receipt of the check valve(s), inspect for damage that may have occurred during transportation and immediately contact your transportation company to report any damage. Check the item(s) received against the packing slip to ensure that all items have been received. For any questions or concerns about the received product contact your Agent or Cla-Val at info@cla-val.com or for immediate assistance call (800) 942-6326

3.2 Verify the System Parameters

Check the system design parameters for the application to ensure the specified/supplied Cla-Val Rubber-Flex Duckbill Check Valve(s) will meet the system requirements.

3.3 Check Valve Mating Surface

Inspect the mating flange/surface to ensure that it is undamaged and clean and free of all foreign matter before installation of the check valve. For slip-on style of rubber check valves, the mating pipe must be free of sharp edges which may damage the inside sealing diameter of the check valve.

3.4 Safety Area

Always check your work area before installation for safety hazards which may cause injury or damage to personnel or product. Develop and discuss a safety and exit plan for you and your fellow employees in the event of an emergency.

4.0 Installation

Note: Each Cla-Val Rubber-Flex Duckbill Check Valve installation can be considered a major pipe installation and the same safety requirements as used in pipe contracting installations should be implemented. Each Cla-Val Rubber-Flex Duckbill Check Valve regardless of size should be installed in the same manner. Cla-Val will accept no responsibility for an improperly installed Rubber-Flex check valve(s) or the improper use of this product. Incorrect installation may result in injury to personnel, reduced check valve service life and/or damage to other adjacent equipment.

4.1 Rubber-Flex Check Valve Installation

4.1.1 Style 710/711: Model RF-DBF: Rubber-Flex Flanged Duckbill Check Valve Installation

4.1.1.1 Step 1: Align

Position/Align the Flanged Rubber check valve into the system. For horizontal applications the bill of the check valve should be in vertical orientation relative to the ground unless there are clearance issues. For the eccentric sloped bottom design the eccentric slop to be positioned at the bottom or 6 o'clock position of the valve installation. In the case of clearance issues the check valve may be rotated to a maximum of 35 degrees to allow clearance to the ground.

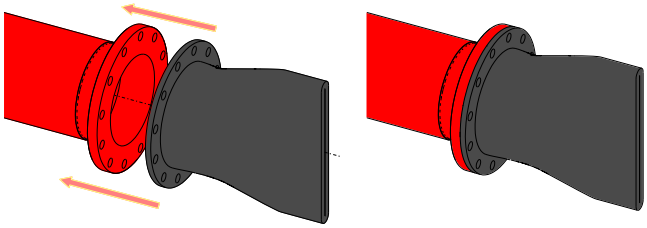

Figure 9: Model RF-DBF Installation Step 1

4.1.1.2 Step 2: Retaining Rings

Position the split retaining rings onto the flange of the check valve. Use a flat washer to properly cover the split in the retaining ring.

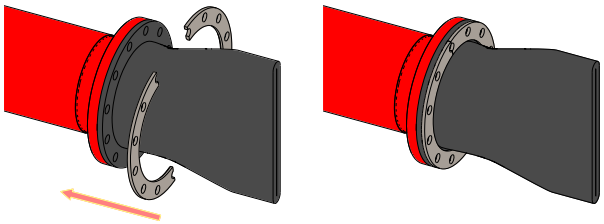

Figure 10: Model RF-DBF Installation Step 2

4.1.1.3 Step 3: Flange Bolting

Insert the flange bolting and tighten the flange bolting hardware to a "snug" tight fit before torqueing. Proceed to section 4.1.7 for proper bolt torqueing and a sample torqueing pattern.

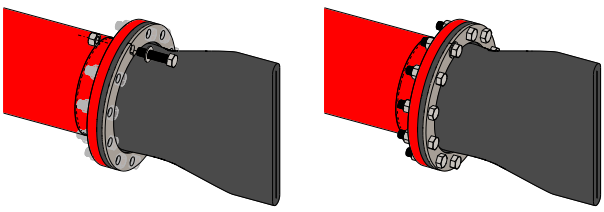

Figure 11: Model RF-DBF Installation Step 3

4.1.2 Model RF-DBI: Rubber-Flex Flanged In-Line Duckbill Check Valve

4.1.2.1 Step 1: Insert

Insert the Slip-In flanged rubber check valve into the existing pipe. For horizontal applications the bill of the check valve should be installed in a vertical orientation in the mating pipe as shown in below in Figure 9.

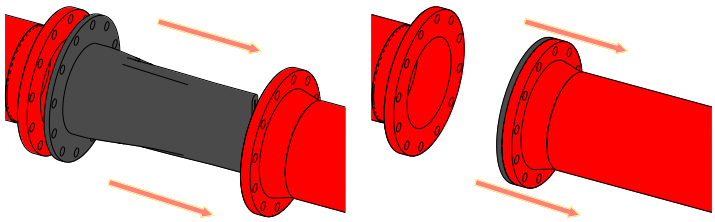

Figure 12: Model RF-DBI Installation Step 1

4.1.2.2 Step 2: Attach

Re-attach the 2 mating pipe flanges.

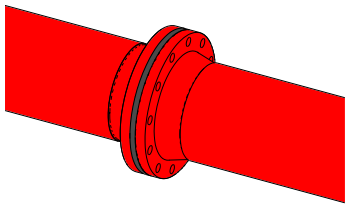

Figure 13: Model RF-DBI Installation Step 2

4.1.2.3 Step 3: Flange Bolting

Add the flange bolting to the installation and tighten to a “snug” tight fit before torqueing. Proceed to step 4.1.7 for proper bolt torqueing and a sample torqueing pattern.

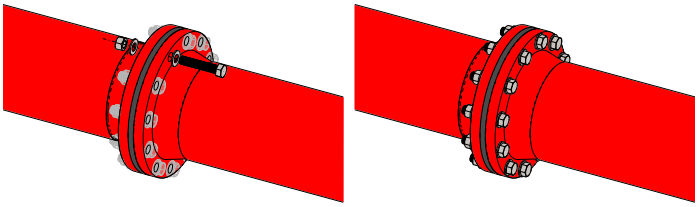

Figure 14: Model RF-DBI Installation Step 3

4.1.3 Model RF-DBO: Rubber-Flex Slip-On Duckbill Check Valve Installation

4.1.3.1 Step 1: Slip-On

For Slip-On rubber check valves, slip the rubber check valve over the existing pipe. For horizontal applications the bill of the check valve must be installed in a vertical orientation relative to the ground unless there are clearance issues. For the eccentric sloped bottom design the eccentric slop to be positioned at the bottom or 6 o’clock position of the valve installation. In the case of clearance issues the check valve may be rotated to a maximum of 35 degrees to allow clearance to the ground. To ease installation, it is acceptable but not necessary to add soapy water to the exterior of the pipe to facilitate the installation of the check valve.

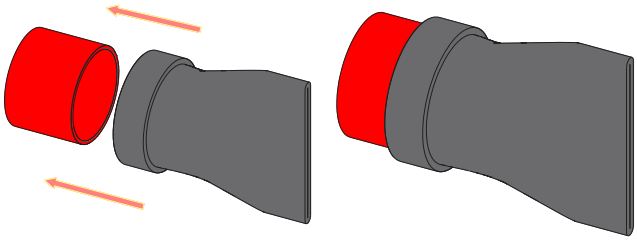

Figure 15: Model RF-DBO Installation Step 1

4.1.3.2 Step 2: External Clamps

Add the external clamps to the slip-on rubber check valve. For nominal diameters less than or equal to 10" the check valve will be supplied with either T-Bolt or Worm Gear Clamps. For nominal diameters greater than 10", the check valve(s) will be supplied with fabricated stainless-steel clamp(s). If the valve is supplied with more than one fabricated stainless-steel clamp, then rotate the additional clamps which will place the clamping section at opposite angles from the first clamp. This will ensure that even pressure is applied to the valve. *Note: The supplied number of clamps will vary depending on size and application.*

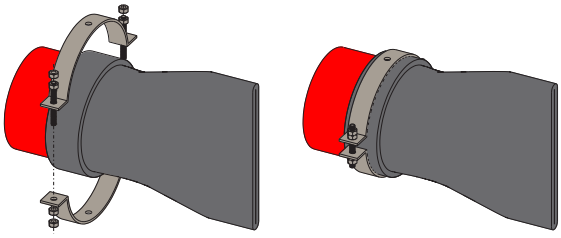

Figure 16: Model RF-DBO Installation Step 2

4.1.3.3 Step 3: Tighten Clamps

Tighten the external clamp until the rubber is compressed by the external clamp and a tight fit is achieved then proceed to section 4.1.8 for anchor bolting/pinning to anchor the slip-on check valve to the mating piping.

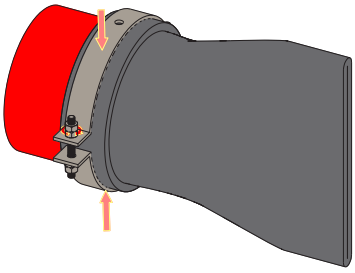

Figure 17: Model RF-DBO Installation Step 3

4.1.4 Model DBI-IN: Rubber-Flex Slip-In In-Line Duckbill Check Valve Installation

4.1.4.1 Step 1: Slip-In

Insert the slip-in check valve inside the existing pipe. For horizontal applications the bill of the check valve must be installed in vertical orientation as shown below in Figure 15.

Cla-Val has made a 1/8" thick " filler " strip available when the OD of the 740 and the ID of Customers pipe is found to have a space than specified. This strip is available in 3" wide x 10 feet long and shall be wrapped around the OD of the valve in proximity of the Internal clamp area. This will provide a better seal in the event of gap between the pipe and the valve. The strip is supplied with a 3m adhesive backing which makes it bond to the exterior of the valve.

The strip can be wrapped around the valves perimeter directly above the inner clamp locations which will then increase the OD of the valve allowing a closer fit to the mating pipe Id.

Cla-Val will assist you in the amount required or a Pi calculation can also be used. Valve OD x 3.14 + the pipe diameter differential can be easily calculated.

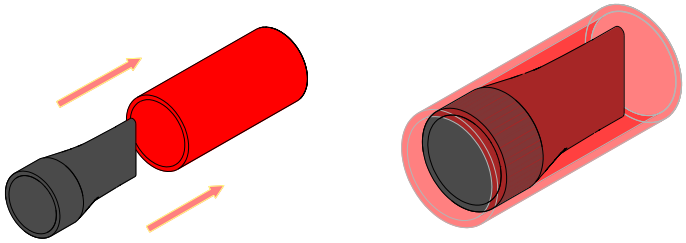

Figure 18: Model DBI-IN Installation Step 1

4.1.4.2 Step 2: Insert Clamp

Insert and the expandable internal clamp into the rubber check valve. For dry or hot installations, it is recommended to apply a layer of lubricant (such as Dow Corning 111 Compound) to the internal expandable clamp to assist in proper placement and sealing of the clamp.

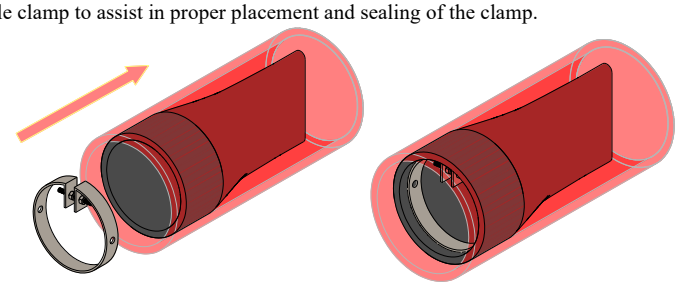

Figure 19: Model DBI-IN Installation Step 2

4.1.4.3 Step 3: Expand Clamp

Tighten the expandable internal clamp until the stainless-steel portion of the clamp has embedded itself into the rubber cuff of the valve. Once the clamp has been sufficiently held in place tap the clamp with a 4-5 pound hammer on the inner section of the clamp in a circular motion to further embed the clamp into the rubber. Re-tighten the clamp to ensure a proper seal. Once the clamp is properly sealed, tighten the lock nut on the internal expandable clamp and proceed to section 4.1.8 for anchor bolting/pinning to anchor the slip-in check valve to the mating pipe. When installing multiple internal expandable clamps ensure the clamps are evenly spaced/rotated to provide even clamping pressure as well as with the internal expandable fasteners located in a position that minimizes flow interference. *Note: This style of check valve installation relies on external pressure of the internal expandable clamp to ensure that the valve does not move, care should be taken to ensure proper sealing. When installing the check valve on corrugated pipe the clamp(s) shall be positioned at the lowest part of corrugation, at the minimum ID of the pipe.*

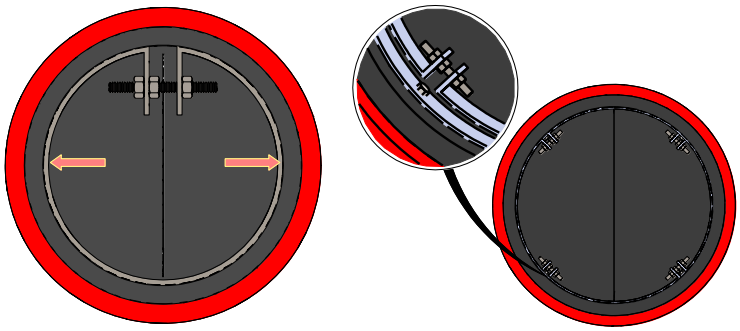

Figure 20: Model DBI-IN Installation Step 3

4.1.5 Model RF-DBJ: Rubber-Flex Jacket Style Duckbill Check Valve Installation

4.1.5.1 Step 1: Align/Insert

Align/Insert the Model RF-DBJ Assembly into the required breach opening noting the position of flow and orientation of the valve. The assembly should be installed to where the top notation on the style 750 shroud is in the vertical position as shown in Figure 21. Use a gasket where required, supplied by others. *Note: Ensure the bill of the check valve is in the vertical position when installed.*

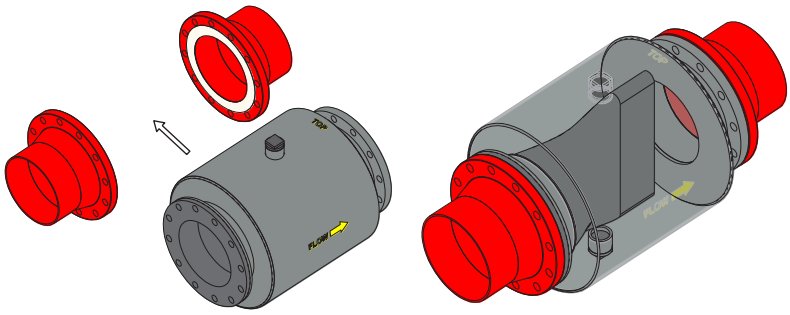

Figure 21: Model RF-DBJ Installation Step 1

4.1.5.2 Step 2: Flange Bolting

Secure the Model RF-DBJ assembly to the mating flanges with the appropriate flange bolting hardware. Follow the procedures in section 4.1.7 for proper flange bolt torqueing.

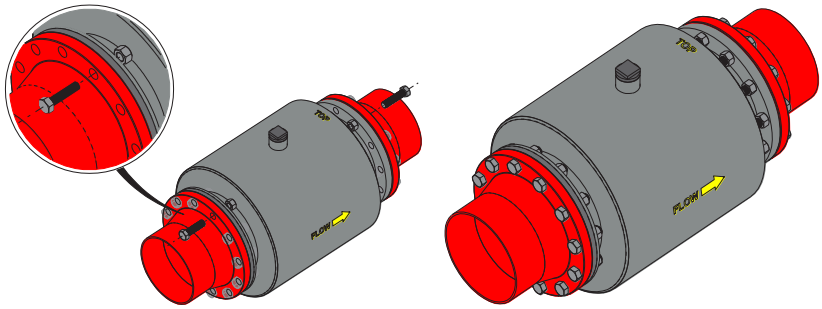

Figure 22: Model RF-DBJ Installation Step 2

4.1.6 Model RF-DBI-LH: Rubber-Flex Low Head Loss In-Line Duckbill Check Valve Installation

4.1.6.1 Slip In Model RF-DBI-LH

4.1.6.1.1 Step 1: Insert Valve

The RF-DBI-LH valve must be installed in a horizontal pipe and will be supplied with a "FLOW" direction label and a "TOP" label to ensure proper installation orientation within the pipe. Insert the slip-in check valve inside the existing pipe and push until inlet/discharge end is flush with end of pipe.

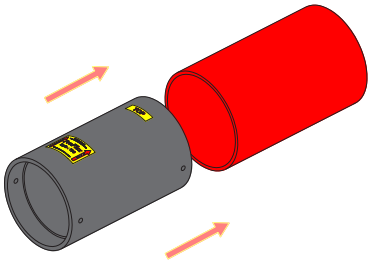

Figure 23: Model RF-DBI-LH Installation Step 1

NOTE: It is imperative that caution is given to ensure the valve is installed at the 12:00 position. It has been noted that backflow leakage may occur at the 4:00 and 8:00 o'clock position as the valves cone sealing area is being subjected to uneven back pressures.

4.1.6.1.2 Step 2: Insert Clamp

Insert the expandable internal clamp(s) into the rubber check valve in either the inlet or discharge end depending on installation orientation and ensuring that the adjustable bolts are located at the top of the valve. When installing multiple internal expandable clamps ensure the clamps are evenly spaced/ rotated to provide even clamping pressure as well as the internal expandable fasteners located in a position that minimizes flow interference. For dry or hot installations, it is recommended to apply a layer of lubricant (such as Dow Corning 111 Compound) to the internal expandable clamp to assist in proper placement and sealing of the clamp.

Figure 24: Model RF-DBI-LH Installation Step 2

Cla-Val has made a 1/8" thick " filler " strip available when the OD of the RF-DBI-LH and the ID of Customers pipe is found to have a space than specified. This strip is available in 3" wide x 10 feet long and shall be wrapped around the OD of the valve in proximity of the Internal clamp area. This will provide a better seal in the event of gap between the pipe and the valve. The strip is supplied with a 3m adhesive backing which makes it bond to the exterior of the valve.
The strip can be wrapped around the valve's perimeter directly above the inner clamp locations which will then increase the OD of the valve allowing a closer fit to the mating pipe Id.
Cla-Val will assist you in the amount required or a Pi calculation can also be used. Valve OD x 3.14 + the pipe diameter differential can be easily calculated.

4.1.6.1.3 Step 3: Expand Clamp

Tighten the expandable internal clamp until the stainless-steel portion of the clamp has embedded itself into the rubber cuff of the valve. Once the clamp has been sufficiently held in place tap the clamp with a 4-5 pound hammer on the inner section of the clamp in a circular motion to further embed the clamp into the rubber. Re-tighten the clamp to ensure a proper seal. Once the clamp is properly sealed, tighten the lock nut on the internal expandable clamp and proceed to section 4.1.8 for anchor bolting/pinning to anchor the check valve to the mating pipe. *Note: This style of check valve installation relies on external pressure of the internal expandable clamp to ensure that the valve does not move, care should be taken to ensure proper sealing. When installing the check valve on corrugated pipe the clamp(s) shall be positioned at the lowest part of corrugation, at the minimum ID of the pipe.*

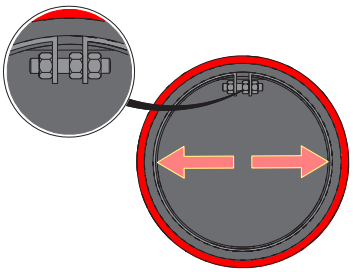

Figure 25: Model RF-DBI-LH Installation Step 3

4.1.6.2 Flanged Model RF-DBI-LH

4.1.6.2.1 Step 1: Insert

The RF-DBI-LH valve must be installed in a horizontal pipe and will be supplied with a "FLOW" direction label and a "TOP" label to ensure proper installation orientation within the pipe. Insert the slip-in flanged check valve inside the existing pipe and push until flanged inlet/discharge end is flush with end of pipe. *Note: Model RF-DBI-LH Flanged Check Valve can be supplied with the integrated rubber flange in the inlet or discharge position depending on the required installation parameters.*

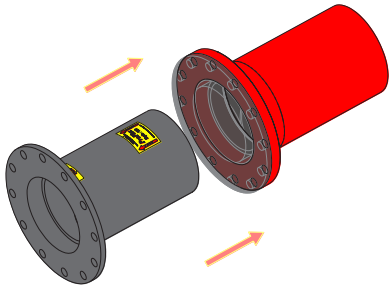

Figure 26: Model RF-DBI-LH Flanged Installation Step 1

4.1.6.2.2 Step 2: Retaining Ring & Bolting Installation

Attach and secure the retaining ring in place with the flange bolting hardware and proceed to section 4.1.7 for flange bolt torqueing

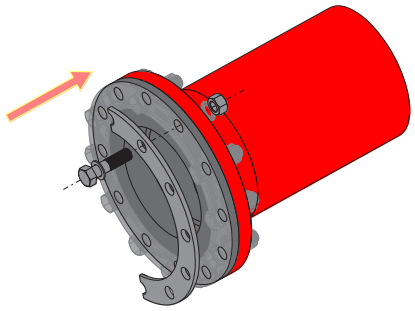

Figure 27: Model RF-DBI-LH Flanged Installation Step 2

4.1.7 Flange Bolt Torqueing (Model RF-DBF/RF-DBI/RF-DBJ & Flanged RF-DBI-LH)

Torqueing should then be accomplished in steps gradually and as evenly as possible around the circumference of the flange. The bolts should be tightened in an alternating sequence similar to a star pattern shown below in Figure 28 to within the proper torque range specified for the size of check valve to be installed. The flange bolting is not considered tight and "locked-on" until the edges of the check valve flange bulges out or extrudes slightly. Refer to appendix A for the proper ranges of torque values as well as further examples of the proper patterns used for torqueing the flange bolting. *Note: Never tighten bolts on a flanged rubber check valve to the point where there is contact between the retaining ring and mating flange. This type of tightening will crush the integrated rubber flange of the check valve and cause a premature failure.*

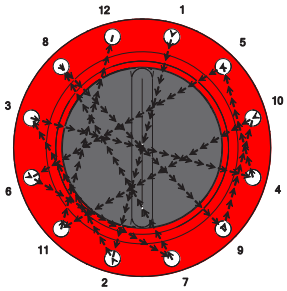

Figure 28: Sample Flange Torqueing Sequence

4.1.8 Anchor Bolts/Pins (Model RF-DBO/RF-DBI-IN/RF-DBI-LH)

After the Check Valve is installed, drill a hole or holes, depending on the valve size number of clamps, through the cuff of the check valve and into the mating pipe using the center hole on the clamp as a guide. Insert a bolt, which will be sufficient in length to completely travel through the clamp, valve and mating pipe. Completely weld or use some other means of ensuring that this bolt/pin will not fall out or be removed.

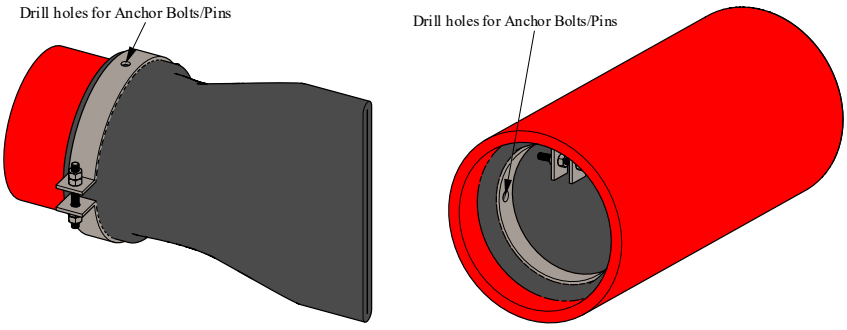

Figure 29: Model RF-DBO, RF-DBI-IN, & RF-DBI-LH Typical Drilled Through Anchor Hole Positions

4.1.8.1 Model RF-DBO: Insert the Bolt/Pin through the drilled hole(s) and completely weld or use some other means of ensuring that this bolt/pin will not fall out or be removed from the expandable clamp.

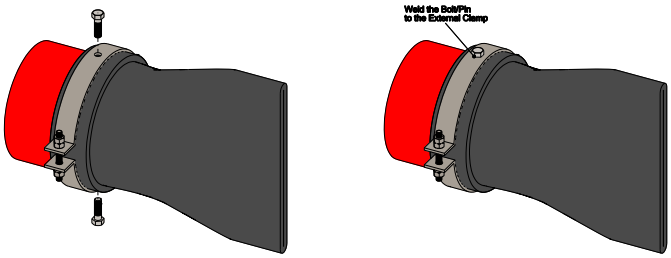

Figure 30: Model RF-DBO Anchor Bolt/Pin Installation

4.1.8.2 Model RF-DBI-IN: Insert the Bolt/Pin through the drilled hole(s) and completely weld or use some other means of ensuring that this bolt/pin will not fall out or be removed from to the internal expandable clamp.

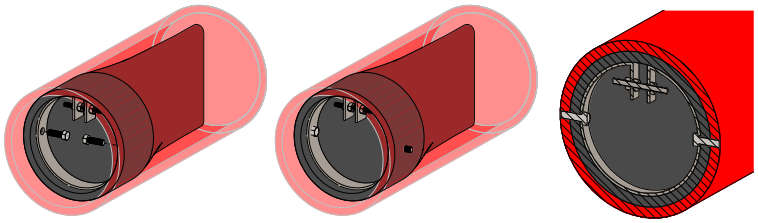

Figure 31: Model RF-DBI-IN Anchor Bolt/Pin Installation

4.1.8.3 Model RF-DBI-LH: Insert the Bolt/Pin through the drilled hole(s) and completely weld or use some other means of ensuring that this bolt/pin will not fall out or be removed from to the internal expandable clamp.

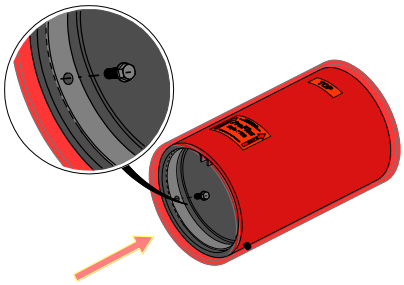

Figure 32: Model RF-DBI-LH Anchor Bolt/Pin Installation

5.0 Operation

The Rubber-Flex Duckbill Check Valves require little operational requirements. Each unit is an elastomeric back flow device which relies solely on inlet flow pressure and back flow pressure to provide operation.

6.0 Maintenance

Rubber-Flex Duckbill Check Valves require little maintenance. Periodic inspections can ensure that the check valve will provide years of maintenance-free service. Check for cuts or gouges which can easily be repaired with a self-curing rubber compound (Contact Cla-Val). Ensure that the bill section is free from any debris that may have been lodged in the bill. This will be the only areas of concern that require periodic inspection.

7.0 Appendix A

7.1 Torque Data

Table 1: Model RF-DBF/RF-DBO/RF-DBJ/RF-DBI-LH	
Size	Approx. Torque Values
1" thru 2"	20 - 40 ft./lbs.
2.5" thru 5"	25 - 60 ft./lbs.
6" thru 12"	35 - 140 ft./lbs.
14" thru 18"	50 - 180 ft./lbs.
20" thru 24"	60 - 200 ft./lbs.
26" thru 40"	70 - 300 ft./lbs.
42" thru 50"	80 - 300 ft./lbs.
52" thru 60"	100 - 400 ft./lbs.
66" thru 72"	200 - 500 ft./lbs.
78" thru 90"	300 - 600 ft./lbs.
96" thru 108"	400 - 700 ft./lbs.
120"	500 - 800 ft./lbs.

7.2 Sample Torqueing Patterns

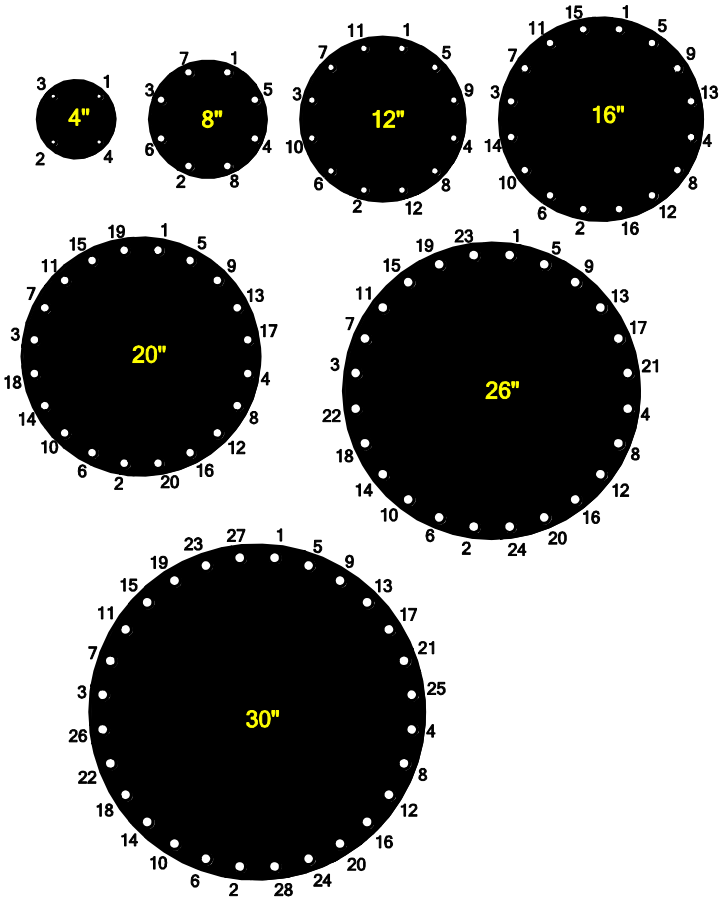

Figure 33: Sample Torque Patterns