TECHNICAL TIPS
FOR FEBCO BACKFLOW PREVENTION DEVICES
By Michael Ray

When any backflow prevention device fails in the field, it fails in one of two ways:

1) The valve has gotten someone's attention because of some sort of visible leak or discharge caused by either dirt/debris, fluctuating/negative pressure in the system, thermal expansion, or water hammer.
2) The valve appears to be fine during normal operation, but it fails to hold the required check pressures during the yearly test.

I have listed below the most common reasons why FEBCO valves fail in the field. I have listed these valves first by "Type" (RP, DC, etc.) and then by valve "Model" (825Y, 860, etc.). I will start with the most problematic ones first.

I - Reduced Pressure Principle (RP's)

General for all RP's:

The majority of all field calls occur because of their high visibility. When a double check device fails or fouls, nobody knows about it until it is tested. Not so with an RP. 99% of the time the relief valve (RV) will leak when something goes wrong or is starting to go wrong. The most common reasons for a leaking RV are:

1) Problems with the pipe system.
2) Problems with the first check.
3) Problems with the second check.
4) Problems with the relief valve.

You can go a long way to solving the problem before having the valve opened simply by asking a few questions and doing some quick tests. The first question you should ask is **"*How is the relief valve discharging*?"**

Types of RV Discharging:

Sporadic or fluctuating (start stop start stop): Indicates an inconsistent or fluctuating pressure coming into the valve from the system. For whatever reason: construction work, pumps turning on and off, heavy upstream usage, etc. can cause the RV to spit. The best way to handle this problem is to have the customer install some type of pressure regulating valve upstream of the backflow device. This is usually a soft seated single device.

A slight dripping or stream: Usually indicates an accumulation of dirt/deposits on the disc rubbers (1st, 2nd, RV). To determine which part of the valve is causing the problem, before any repairs are started perform the following procedure:

1) Establish flow through the valve, either by creating a demand downstream (turn on sprinklers, faucets, etc.) or by opening the #4 test cock. Opening the #4 test cock is

generally not a problem if the valve is outside but if the valve is indoors then care must be taken to route the water to a drain of some kind.

2) Once flow is established, look to see if the relief valve has stopped leaking. If the leak stops while water is flowing through the valve then the problem is in the 1st check. If the leaking continues then the relief valve is dirty (most likely) or the second check is fouled or damaged and there's a backflow condition.
3) When cleaning or repairing the unit, always inspect the 2nd check disk and holder for damage. Beyond a simple fouling, if the check rubber is diametrically cut where the seat ring normally compresses against the disc, then this indicates severe back pressure in the system and should be investigated by the customer.

Heavy violent discharging: can be caused by several things:

1) A fouled 1st check and/or 2nd check during a backflow condition.
2) The high pressure sensing line going into the relief valve cover is plugged with dirt.
3) A broken 1st check spring.
4) A damaged diaphragm in the relief valve.
5) Severe damage or jamming of the relief valve.

Specific Models:

In addition to the above, listed below are specific items/problems to look per FEBCO RP model.

825Y(A), 1/2"-2":

1) The relief valve Main Stem-item #21, and Guide-item #23, must easily fit and slide together. Surfaces on these parts must be smooth and scale free. The o-ring and o-ring groove on the Main Stem must be clean and slightly lubricated.
2) All seat rings and discs should be free of dirt, corrosion, and defects.
3) The guide section on the Check Cap-item #7, should be free of dirt and corrosion so that the disc holder-item #9, can easily slide in and out.
4) When replacing or flipping over the Check Disc-item #10, make sure there is no dirt or debris in the holder.

825/826YD, 2 1/2"-10" (Dura Check):

1) The check Seat Disc-item #11, must be free of defects and dirt on **both sides of the disc.** The disc seals on both sides simultaneously.
2) For this reason the inside surfaces of the Disc Holder-item #5, must be clean and flat. If the Disk Holder is separated from the Spring Stem - item #7, then make sure that the o-ring seal-item #51, is in good condition and lubricated.
3) The check Seat Ring-item #2, must be free of defects and corrosion. The Seat Ring Bushing-item #2.1, must be screwed in all the way to where the bushing flange is touching the brass Seat Ring. If the bushing backs out then the check disc will not completely seat. The inside diameter of the bushing must be round and not oval shaped.

4) If the Seat Ring is removed, inspect the condition of the fusion epoxy coating under the ring and in the throat of the body. If the epoxy is chipping away then the seat O-ring-item #12, may not seal.
5) When reassembling the Cover-item #4, to the body, make sure that the Spring Module fully engages the guide on the bottom side of the Cover, otherwise the load on the spring could change.
6) The Relief Valve Diaphragms-item #'s 26 & 27, must not be cracked or cut. If the rubber starts to separate from the fabric backing then the diaphragm maybe installed backwards. The rubber side must be facing the high pressure source (RV Cover). Pressure spikes or water hammer can also damage the diaphragms. Please refer to my "Relief Valve Assembly Instructions" for in-depth relief valve assembly information.
7) The Relief Valve Disc-item #32, must be clean and free of defects. The disc can stretch and protrude up around the outside edge when subjected to spikes of high pressure above the rated pressure of the valve (175 psi). This condition will cause the disc to fail.

860/880(U), 1/2"-2" (Master Series):

1) Inspect the Seat Disc-item #5, in the check module for dirt/debris & damage. Also inspect the module Seat Ring section-item #3, for nicks in the seat radius.
2) The module O-ring-item #3.1, must be undamaged, free of dirt, and lightly lubricated with petroleum jelly.
3) Occasionally, the module halves may twist apart and separate, causing the valve to fail test. This problem is generally associated with a procedure on the assembly line and is not considered a field problem.
4) Make sure that the retainer-item #8, is placed between the 1st and 2nd check modules in the proper orientation.
5) Water dripping from the relief valve port: Check the RV Seat Ring-item #12, for nicks. Inspect the RV Seat Gasket-item #12.1, for alignment and flatness. It may become necessary to re-seat the gasket and lubricate it using petroleum jelly.
6) Water dripping from the access hole in the RV Cylinder-item #18, or from the Cylinder threads in the RV Cover-item #19: Loosen the RV Cover Bolts-item #21. Remove the Slide (Plug)-item #18.2, from the Cylinder. Tighten the Retaining Screw-item#17.1, and replace the Slide. Remove the Cylinder and inspect underneath for dirt/debris. Replace the Cylinder and re-tighten the RV Cover bolts to the proper torque.

860/880V, 2 1/2"-10" (Master Series):

1) Inspect the check Disc-item #6, for rocks, tears, cuts, etc. Also inspect the Seat Ring-item #3, for dings and nicks along the radius.
2) If the Seat Ring is removed, inspect the condition of the epoxy coating underneath. The epoxy should be smooth and flat. Wipe away any corrosion or scale.
3) The Seat Ring Nuts should be tighten using a criss-cross pattern until the required torque is achieved, otherwise the seat ring can become warped.
4) When reassembling the Cover-item #2, to the valve body, make sure the Seat Disk is in the closed position, and the Spring Module is in the proper position in the cover.
5) Inspect the RV Diaphragms-item #'s 27 & 37, for damage or tears. If the fabric is separating from the rubber then the diaphragm might be installed backwards.

6) Inspect the Flow Screw-item #28.1, in the Relief Valve to make sure that the holes in it are not blocked with dirt.
7) Inspect the RV Flow Washer-item #39, for the proper orientation. The side with the channels should be facing the Large Diaphragm-item # 27.
8) Inspect the low pressure port in the RV Lower Guide-item #33. It should be unobstructed.
9) Inspect the RV Seat Ring-item #34, for nicks and dings. Also insure that the Lower Guide runs smoothly through the Seat Ring boss so that the RV module assembly will actuate without binding.
10) Never drop or lay a Master Series device onto its side. This can distort the Arm-item #4, and misalign the Spring Module so that the check will not seat.

II-Double Check Assemblies (DC's)

Double Check Detector Assemblies (DCDA's):

805Y(B), 805YD, 806YD, 850(U), 870V, 876V: Follow the same basic guidelines for the related RP models for check assembly inspection.

III-Pressure Vacuum Breaker (PVB):

765, 1/2"-2":

1) Besides freezing weather the PVB must be protected from chemicals in the water such as anti-freeze and rust preventative agents. Also keep chemicals away from the outer surfaces of the PVB such as Chlorine, paint, and insecticides. Most chemicals will make the plastic Bonnet-item #5, and Poppet-item #12, very brittle and they can shatter during startup.
2) Water leaking from the top of the PVB is usually a sign of dirt build-up on the Poppet Seal-item #11. The seal could also have become brittle due to chemicals, ultraviolet radiation, or age.
3) Use only petroleum jelly when lubricating the Bonnet O-ring Seal-item #6. Again, other greases or lubricants will make the plastic brittle.

Notes:

1) For more information refer to the Trouble Shooting Guide found in the Operations & Maintenance Manual for each FEBCO model.
2) Item numbers used in this guide reference the Parts Lists and Diagrams found in the Operations & Maintenance Manuals.