

# BACKFLOW PREVENTION ASSEMBLY

## APPROVED FIELD TESTING PROCEDURES

DCVA WITH A VERTICAL SIGHT TUBE

DCVA WITH A THREE (3) VALVE DIFFERENTIAL GAGE

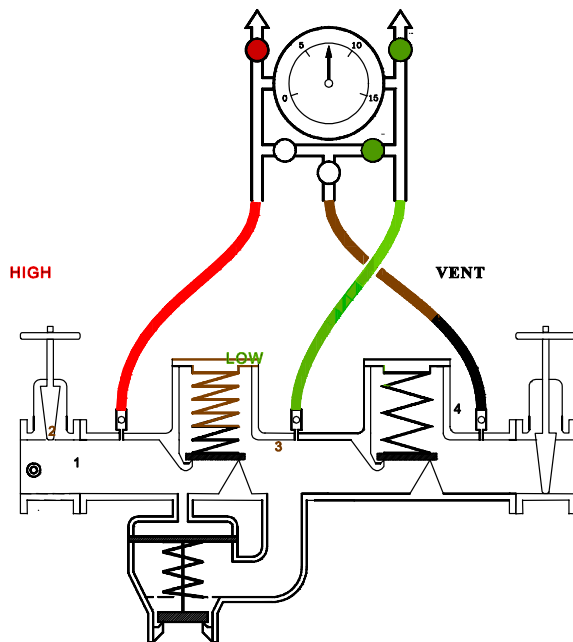
DCVA WITH A FIVE (5) VALVE DIFFERENTIAL GAGE

PVB WITH A THREE (3) VALVE DIFFERENTIAL GAGE

PVB WITH A FIVE (5) VALVE DIFFERENTIAL GAGE

RP WITH A THREE (3) VALVE DIFFERENTIAL GAGE

RP WITH A FIVE (5) VALVE DIFFERENTIAL GAGE



DCVA test with a Vertical Sight Tube in the direction of flow. Advise customer for water being off - verify BFP for testing - observe area around BFP for leaks, damage, or foreign matter. Flush all TC'S, starting with TC 1. This test is called a "Direction of Flow Test."

### NOTIFY, IDENTIFY, OBSERVE & INSPECT

**\*\*IMPORTANT:** The 28" column of water must be measured at the water level in the short tube ("0" reference point) of the check valve you are testing. This is particularly important when testing a backflow prevention assembly that is installed in the vertical orientation.\*\*

- CV 1            Attach compensating tee and vertical sight tube hose to TC 2  
                  Install short tube to TC 3  
                  Close shutoff 2  
                  Open TC 2 to fill vertical sight tube - close TC 2  
                  Open TC 3 to fill short tube - close TC 3  
                  Close shutoff 1 - pressure is now "captured" in BFP  
                  **Open TC 3 to relieve CV 1 disc compression - now open TC 2**  
                  If water level holds at 28" above water level in short sight tube on TC 3 **for two minutes,**  
                  Then **record** CV 1 holds tight (direction of flow)
- CV 2            Close TC 2 and TC 3  
                  Move short tube from TC 3 to TC 4  
                  Move compensating tee and vertical sight tube hose from TC 2 to TC 3  
                  Open shutoff 1 - open TC 3 to fill sight tube - close TC 3  
                  Open TC 4 to fill short tube - close TC 4  
                  Close shutoff 1 - pressure is now "captured" in BFP  
                  **Open TC 4 to relieve CV 2 disc compression - now open TC 3**  
                  If water level holds at 28" above water level in short sight tube on TC 4 **for two minutes,**  
                  Then **record** CV 2 holds tight (direction of flow)
- FINAL            Close TC's - remove compensating tee, brass fittings, vertical sight tube hose and short  
                  tube. Open customer's hose bib to flush any debris. Open shutoff 1, open shutoff 2.  
                  Close customer's hose bib.

\*\* Technical information: 1.0 PSI is equal to a column of water measuring 27 & 23/32 of an inch. It is a common practice to refer to this as 27 & 3/4, or 28 inches. Either is acceptable. Ensure the vertical sight tube is positioned at the water level in the short sight tube when performing this test.\*\*

**DCVA** test with Differential Pressure Gage, single hose, in the direction of flow. Advise customer for water being off - verify BFP for testing - observe area around BFP for leaks, damage, or foreign matter. Flush all TC's starting with TC 1. This test is called a "Direction of Flow Test."

**NOTIFY, IDENTIFY, OBSERVE & INSPECT**

**\*\*IMPORTANT:** Gage diaphragm and low hose must be level with the water level in the short tube ("0" reference point) downstream of the check valve being tested. This is particularly important when testing a backflow prevention assembly installed in the vertical orientation. Deviation from this procedure is not accurate, does not determine the true integrity of each check valve, and invalidates this direction of flow test.\*\*

**THESE DIRECTIONS ARE FOR THREE (3) VALVE TEST KITS**

- CV1            Install compensating tee on TC 2  
                  Install short tube on TC 3  
                  Attach high hose to compensating tee  
                  Open TC 3 to fill short tube - close TC 3  
                  **Open TC 2 slowly** - open high "A" and vent "C" to expel air from gage and BFP – close vent "C"  
                  Close shutoff # 2 - close shutoff # 1. Pressure is now "captured" in BFP - open TC 3  
                  **TC 2 must remain open**  
                  If needle on gage holds at 1.0 PSI or greater at the water level in the short tube,  
                  Then CV 1 holds tight - **Record This Numerical Value**
- CV2            Close TC 2 and TC 3  
                  Move short tube from TC 3 to TC 4  
                  Move compensating tee and high hose from TC 2 to TC 3 - open shutoff #1  
                  Open TC 4 to fill short tube - close TC 4  
                  **Open TC 3 slowly** - open vent "C" to expel air from gage and BFP  
                  Close "C"  
                  Close shutoff # 1. Pressure is now "captured" in BFP  
                  Open TC 4 - **TC 3 must remain open**  
                  If needle on gage holds 1.0 PSI or greater at the water level in the short tube,  
                  Then CV 2 holds tight - **Record This Numerical Value**
- FINAL            Close all TC's. Remove high hose, compensating tee and all brass fittings. Open the customer's hose bib to flush any potential debris from line. Open shutoff #1, then shutoff #2. Close customer's hose bib.

**DCVA** test with Differential Pressure Gage, single hose, in the direction of flow. Advise customer for water being off - verify BFP for testing - observe area around BFP for leaks, damage, or foreign matter. Flush all TC's, starting with TC 1. This test is called a "**Direction of Flow Test.**"

**NOTIFY, IDENTIFY, OBSERVE & INSPECT**

**\*\*IMPORTANT:** Gage diaphragm and low hose must be level with the water level in the short tube ("**0**" reference point) downstream of the check valve being tested. This is particularly important when testing a backflow prevention assembly installed in the vertical orientation. Deviation from this procedure is not accurate, does not determine the true integrity of each check valve, and invalidates this direction of flow test.\*\*

**THESE DIRECTIONS ARE FOR FIVE (5) VALVE TEST KITS**

- CV1            Install compensating tee on TC 2  
                  Install short tube on TC 3  
                  Attach high hose to compensating tee  
                  Open TC 3 to fill short tube - close TC 3  
                  **Open TC 2 slowly** - open high bleed to expel air from gage and BFP - close high bleed  
                  Close shutoff # 2 - close shutoff # 1. Pressure is now "captured" in BFP - open TC 3  
                  **TC 2 must remain open**  
                  If needle on gage holds at 1.0 PSI or greater at the water level in the short tube,  
                  Then CV 1 holds tight - **Record this Numerical Value.**
- CV2            Close TC 2 and TC 3  
                  Move short tube from TC 3 to TC 4  
                  Move compensating tee and high hose from TC 2 to TC 3 - open shutoff #1  
                  Open TC 4 to fill short tube - close TC 4  
                  **Open TC 3 slowly** - open high bleed to expel air from gage and BFP - close high bleed  
                  Close shutoff # 1. Pressure is now "captured" in BFP  
                  Open TC 4 - **TC 3 must remain open**  
                  If needle on gage holds 1.0 PSI or greater at the water level in the short tube  
                  Then CV 2 holds tight - **Record This Numerical Value.**
- FINAL        Close all TC's. Remove high hose, compensating tee and all brass fittings. Open the customer's hose bib to flush any potential debris from line. Open shutoff #1, then shutoff #2. Close customer's hose bib.

**PVB** test with a Differential Pressure Gage, single hose, in the direction of flow. Advise customer for water being off. Verify BFP for testing. Observe area around BFP for leaks, drips, or foreign matter. Flush both test cocks. This test is called a **“Direction of Flow Test.”**

### **NOTIFY, IDENTIFY, OBSERVE & INSPECT**

**\*\*IMPORTANT: Gage diaphragm and low hose must be level with test cock #2 and/or the area between the check valve and the air-inlet valve.\*\***

### **THESE DIRECTIONS ARE FOR THREE (3) VALVE TEST KITS**

**PREP** Notify customer and inspect area. **Remove canopy.** Flush TC’s. Install fittings. Close valves “A”, “B”, and “C” on gage.

**AIR INLET VALVE** Attach high hose to TC 2  
Open TC 2 very slowly  
Open high “A” and vent “C” to expel air from gage and PVB  
Close vent “C” - close shutoff #2 - close shutoff #1  
Pressure now “captured” in PVB  
Open vent “C” **very slowly w/finger on top of inlet valve**  
Observe when air-inlet valve opens - the gage needle must read 1.0 PSI or greater  
**Record This Numerical Value**  
Close vent “C”

**CHECK VALVE** Close TC 2-remove high hose from TC 2 - open shutoff #1  
Attach high hose to TC 1 - open TC 1 very slowly  
Open vent “C” to expel air from gage and PVB. “A” is already open from the air-inlet test - close vent “C” - close shutoff #1  
Pressure now “captured” in PVB  
Open TC 2 - when water stops running from TC 2, the gage needle must read 1.0 PSI or greater - **Record This Numerical Value**

**FINAL** Close both TC’s. Remove all equipment. Replace canopy.  
Open shutoff #1. Slowly open shutoff #2.

**\*\*A PVB must be 12" above all fixtures and not be subjected to backpressure. To verify the PVB is 12" above the highest open fixture or irrigation head, close shutoff #1. Open TC 2 and open shutoff #2. If water continues to run out of TC 2 for more than a minute or two, there is backpressure on PVB, or it is below the highest fixture or irrigation head.\*\***

**PVB** test with a Differential Pressure Gage, single hose, in the direction of flow. Advise customer for water being off. Verify BFP for testing. Observe area around BFP for leaks, drips, or foreign matter. Flush both test cocks. This test is called a **“Direction of Flow Test.”**

**NOTIFY, IDENTIFY, OBSERVE & INSPECT**

**\*\*IMPORTANT: Gage diaphragm and low hose must be level with test cock #2 and/or the area between the check valve and the air-inlet valve.\*\***

**THESE DIRECTIONS ARE FOR FIVE (5) VALVE TEST KITS**

- PREP** Notify customer and inspect area. **Remove canopy.** Flush TC’s. Install fittings  
Close all valves on gage
- AIR INLET VALVE** Attach high hose to TC 2  
Open TC 2 very slowly  
Open high bleed valve to expel air from gage and PVB  
Close high bleed valve - close shutoff #2 close shutoff #1  
Pressure now “captured” in PVB  
Open high bleed valve **very slowly w/finger on top of inlet valve** - observe when air-inlet valve opens - the gage needle must read 1.0 PSI or greater  
**Record This Numerical Value**  
Close high bleed valve
- CHECK VALVE** Close TC 2 - remove high hose from TC 2 - open shutoff #1  
Attach high hose to TC 1 - open TC 1 very slowly  
Open high bleed valve to expel air from gage and PVB  
Close high bleed valve - close shutoff #1  
Pressure now “captured” in PVB  
Open TC 2 - when water stops running from TC 2, the gage needle must read 1.0 PSI or greater  
**Record This Numerical Value.**
- FINAL** Close both TC’s. Remove all equipment. Replace canopy.  
Open shutoff #1. Slowly open shutoff #2

**\*\*A PVB must be 12" above all fixtures and not be subjected to backpressure. To verify the PVB is 12" above the highest open fixture or irrigation head, close shutoff #1. Open TC 2 and open shutoff #2. If water continues to run out of TC 2 for more than a minute or two, there is backpressure on PVB, or it is below the highest fixture or irrigation head.\*\***

RP test with Differential Pressure Gage. Advise customer for water being off - verify BFP for testing - observe area for leaks, drips, or foreign matter. This test is called a **"Differential Pressure Test."**

**NOTIFY, IDENTIFY, OBSERVE & INSPECT**

**THESE DIRECTIONS ARE FOR THREE (3) VALVE TEST KITS**

**Test #1-CV 1 Apparent Differential Pressure**

Close shutoff #2 - flush all TC's correctly (open 4, 3, 2, 1 - close 1, 2, 3, 4)  
Close "A", "B", "C" on test kit  
High hose to TC 2- low hose to TC 3 - open TC 3 slowly  
Open "C" then "B" to bleed air from low side thru vent hose  
Slowly open TC 2 - partially open "A" to bleed air from high side thru vent hose  
Close "A", "B", then "C"  
Observe this **apparent** differential pressure to be **at least 5.0 PSI or greater.**  
**\*\*Record CV 1 Holds Tight\*\***

**Test #2-Relief Valve Opening**

Open "A" - **SLOWLY OPEN** "B" **ONLY** until gage needle begins to drop - leave "B"  
in that position  
Place hand under relief valve vent  
Observe the instant water is vented - **This value must be 2.0 PSI or greater**  
**\*\*Record This Numerical Value as the Relief Valve Opening.\*\*** (2.0, 2.6, etc.) close "B"

NOTE: If gage needle drops only slightly and relief valve fails to open, or opening "B" more than "slightly" is needed to cause the needle to drop, then shutoff # 2 is probably leaking.

**Test #3-CV 2 Holds Tight Against Backpressure**

Vent hose to TC 4 - open "C"  
Bleed air from vent hose by loosening hose connection at TC 4; re-tighten hose connection at TC 4  
Reset gage to a static condition by loosening low hose at TC 3; re-tighten low hose connection at TC 3  
Open TC 4 (gage needle may fall slightly due to disc compression). \*If gage needle falls and the RV opens, CV 2 may not be leaking at all. Disc compression may have caused CV 2 to compress, decreasing the differential pressure in the "zone". To verify, reset gage to a static condition by loosening low hose at TC 3; re-tighten low hose connection at TC 3. If gage needle remains steady and water does not drip from the relief valve, then  
**\*\*Record CV 2 Holds Tight\*\***

NOTE: To positively verify the condition of shutoff #2, with "A" and "C" still open, close TC 2. If shutoff #2 is leaking, gage needle will fall to 0.0 PSI, but the relief valve will not open. If gage needle rises, then shutoff #2 is leaking and there is backpressure in the customers system. **\*\*NOTE---Be prepared to close vent by-pass valve.\*\***

**Test #4-Differential Pressure Of CV 1**

**Open TC 2** - close TC 4-close "A" - disconnect vent hose from TC 4 - vent hose no longer used  
Open "B" to bleed air thru vent hose (this releases disc compression and resets gage to static) Close "B"  
Observe the differential pressure to be **at least 5.0 PSI or greater, and at least 3.0 PSI greater than the relief valve opening noted above**  
**\*\*Record This Numerical Value as the "Differential Pressure of CV #1"** (6.8, 7.2, etc.)

**Test #5 - Differential Pressure Of CV 2**

Close TC 2 and TC 3  
High hose to TC 3 - low hose to TC 4  
Open "A" and "B" to bleed any residual pressure thru vent hose (**"C" is already open from test #3 above**)  
Close "A", then "B"  
Open TC 4 - open "B" to bleed air on low side thru vent hose  
Open TC 3 - open "A" to bleed air on high side thru vent hose - close "A" first, then "B"  
Observe the differential pressure to be **at least 1.0 PSI or greater**  
**\*\*Record this numerical value as the "Differential Pressure of CV #2"** (1.6, 1.8, etc.)

End of test. Close all TC's. Remove all fittings and hoses. Open customer's hose bib.  
Open shutoff #2 **SLOWLY** to restore system supply. Close customer's hose bib.

RP test with Differential Pressure Gage. Advise customer for water being off - verify BFP for testing - observe area for leaks, drips, or foreign matter. This test is called a "**Differential Pressure Test**".

**NOTIFY, IDENTIFY, OBSERVE & INSPECT**

**THESE DIRECTIONS ARE FOR FIVE (5) VALVE TEST KITS**

**Test #1 - CV 1 Apparent Differential Pressure**

Close shutoff 2 - flush all TC's correctly (open 4, 3, 2, 1 - close 1, 2, 3, 4)  
Close all 5 valves on test kit  
High hose to TC 2 - low hose to TC 3  
Slowly open TC 3, then open low bleed valve  
Slowly open TC 2, then open high bleed valve  
Close high bleed valve, close low bleed valve  
Observe this **apparent** differential pressure to be at least 5.0 PSI or greater, then  
**\*\*Record CV #1 Holds Tight\*\***

**Test #2- Relief Valve Opening**

Open high control valve 1 turn;  
Slowly open low control valve no more than 1/4 turn - place hand under vent  
Observe the instant water is vented - this value must be 2.0 PSI or greater  
**\*\*Record This Numerical Value as the Relief Valve Opening\*\*** (2.2, 2.6, etc.)  
Close low control - high control can remain open for remainder of test

NOTE: If gage needle drops only slightly and relief valve fails to open, or opening low control valve more than 1/4 turn is needed to cause the needle to drop, then shutoff # 2 is probably leaking.

**Test #3- CV 2 Holds Tight Against Backpressure**

Slightly open by-pass (vent) valve - attach to TC 4  
Close by-pass (vent) valve - open TC 4  
Reset gage by opening low bleed valve to "pin gage" - close low bleed valve  
Open by-pass (vent) valve 1 turn (gage may decrease slightly due to disc compression). \*If gage needle falls and the RV opens, CV 2 may not be leaking at all. Disc compression may have caused CV 2 to compress, decreasing the differential pressure in the "zone". To verify, reset gage by opening then closing low bleed valve. If needle holds steady, and water does not drip from relief valve vent, then  
**\*\*Record CV 2 Holds Tight\*\***

NOTE: To positively verify the condition of shutoff #2, with vent valve still open, close TC 2. If shutoff #2 is leaking, the gage will fall to 0.0 PSI, but the relief valve will not open. If gage needle rises, then shutoff #2 is leaking and there is backpressure in the customers system. If shutoff #2 is leaking, values for the RV and both CV's are inaccurate. **\*\*Note---Be prepared to close vent by-pass control valve.\*\***

**Test #4 - Differential Pressure Of CV 1**

**Open TC 2** - reset gage to relieve disc compression by opening low bleed valve. (This step removes the backpressure on CV #2) - close low bleed valve  
Observe the differential pressure to be at least 5.0 PSI or greater, and at least 3.0 PSI greater than the relief valve opening noted above  
**\*\*Record This Numerical Value as the "Differential Pressure of CV 1"** (6.8, 7.2, etc.)

**Test #5 - Differential Pressure Of CV 2**

Close all TC's - close by-pass (vent) valve  
Remove by-pass (vent) hose from TC 4 (**by-pass hose is no longer used**)  
Move low hose to TC 4 - move high hose to TC 3  
Open TC 4, open low bleed valve - open TC 3, open high bleed valve  
Close high bleed valve first, then slowly close low bleed valve  
Observe the differential pressure to be at least 1.0 PSI or greater, then  
**Record This Numerical Value as the "Differential Pressure of CV #2"** (1.4, 1.6, etc.)

End of test. Close all TC's. Remove all hoses and fittings. Open customer's hose bib.  
Open shutoff **slowly** to restore system supply. Close customer's hose bib.