***NEW ENGLAND WATER WORKS ASSOCIATION***
***3 VALVE DIFFERENTIAL TEST KIT***
***FIELD TEST PROCEDURE***
***DOUBLE CHECK VALVE ASSEMBLY***

This field test procedure evaluates the operational performance characteristics as specified by nationally recognized industry standards of the independently-operating internal spring loaded check valves while the assembly is in a no-flow condition. This field test procedure utilizes a three valve differential pressure test kit to measure the static differential pressure across the check valves. This field test procedure will reliably detect weak or broken check valve springs and validate the test results by determining that a no-flow condition exists while not closing the upstream shut-off valve. This test procedure will work with all three valve differential pressure test kits.

Prior to initiating the test, the following preliminary testing procedures shall be followed:

1. The device has been identified.
2. The direction of flow has been determined.
3. The test cocks have been numbered and adapters have been installed.
4. The test cocks have been flushed.
5. Permission to shut-down the water supply has been obtained.
6. The downstream shut-off valve has been closed. (See NOTE A)
7. The device is inspected and evaluated for a backpressure condition.

The double check valve assembly field test procedure will be performed in the following sequence to evaluate that:

1. The first check valve has a minimum differential pressure across it of 1 PSID.
2. The second valve has a minimum differential pressure across it of 1 PSID.
3. The device is in a no-flow condition at the time of the test (no demand downstream).
4. Optional – The downstream shut-off valve is tight.

NOTE A : Prior to closing the downstream shut-off valve, if it is determined that the device may be prone to backpressure, a standard PSI calibrated pressure gauge should be connected to test cock #1 and test cock #4. The pressure readings (PSI) should be noted. See Diagram Number 1.

a. If the pressure (PSI) reading at test cock #1 is higher than the pressure (PSI) reading at test cock # 4, close the downstream shut-off valve and proceed to Step 1, number 3.

b. If the pressure (PSI) reading at test cock #1 is lower than the reading at test cock #4, the device is in a backpressure condition and the downstream shut-off valve must be closed prior to performing the test of the device. See Diagram Number 2.
    i. After closing the downstream-shut off valve, test cock #4 should be bleed again and the pressure readings at test cock #1 and #4 should be noted. If the pressure reading at test cock #1 is higher than the reading at test cock #4, proceed to Step 1, number 3. If the pressure reading at test cock #1 is still lower than the reading at test cock #4, the downstream shut-off valve is considered leaking and a backpressure condition still exists. The downstream shut-off valve must be reclosed, repaired, or a no-flow condition must be established before testing the device. The device cannot be tested in a backpressure condition.

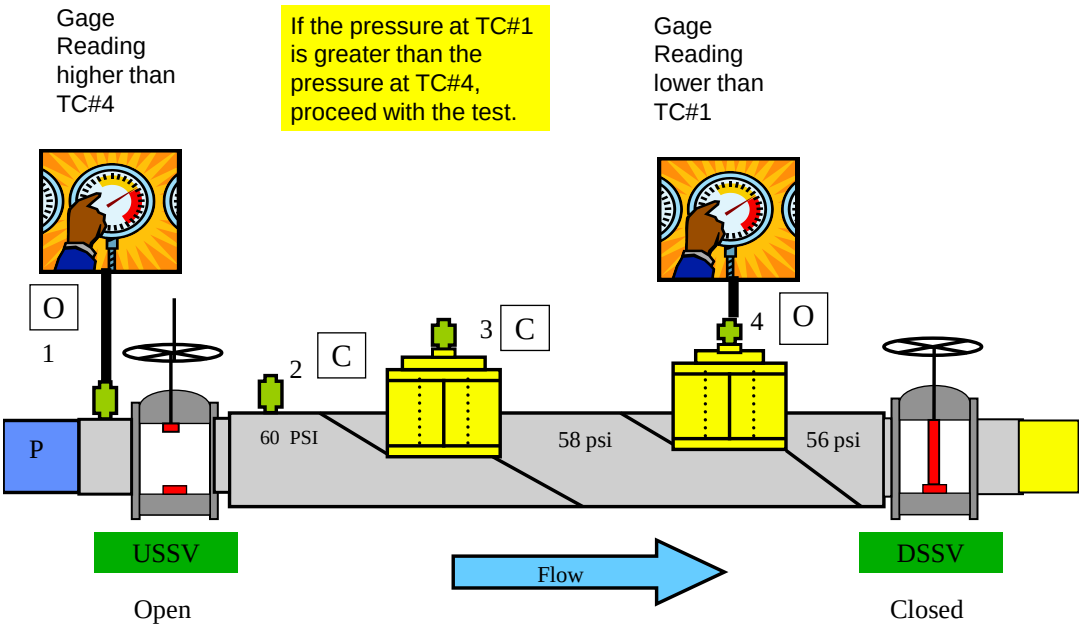



Diagram Number 1

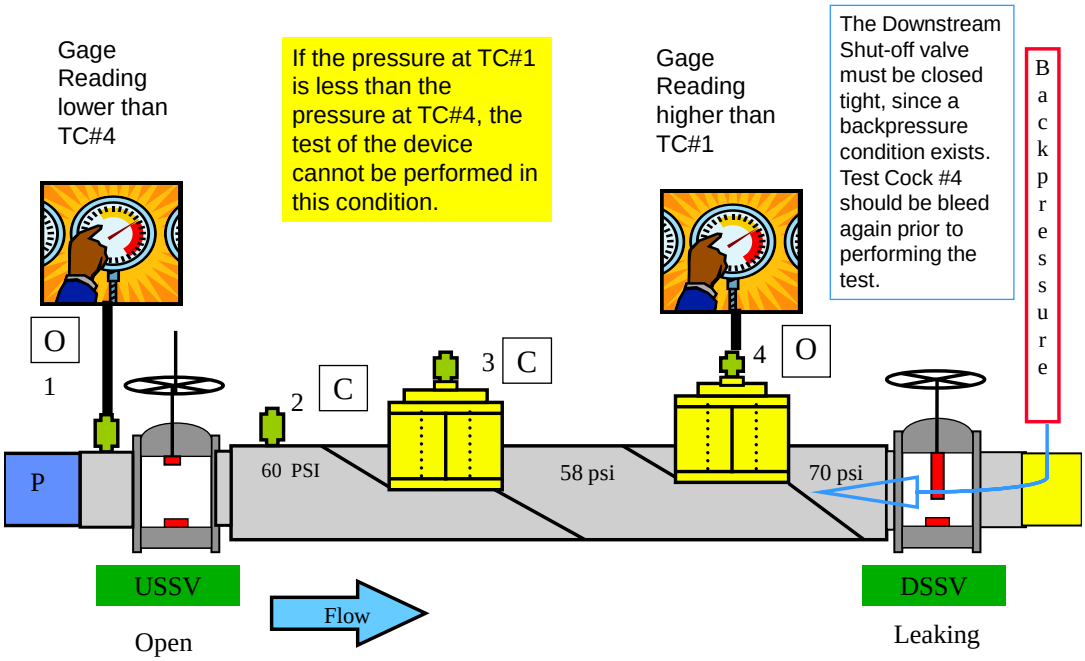


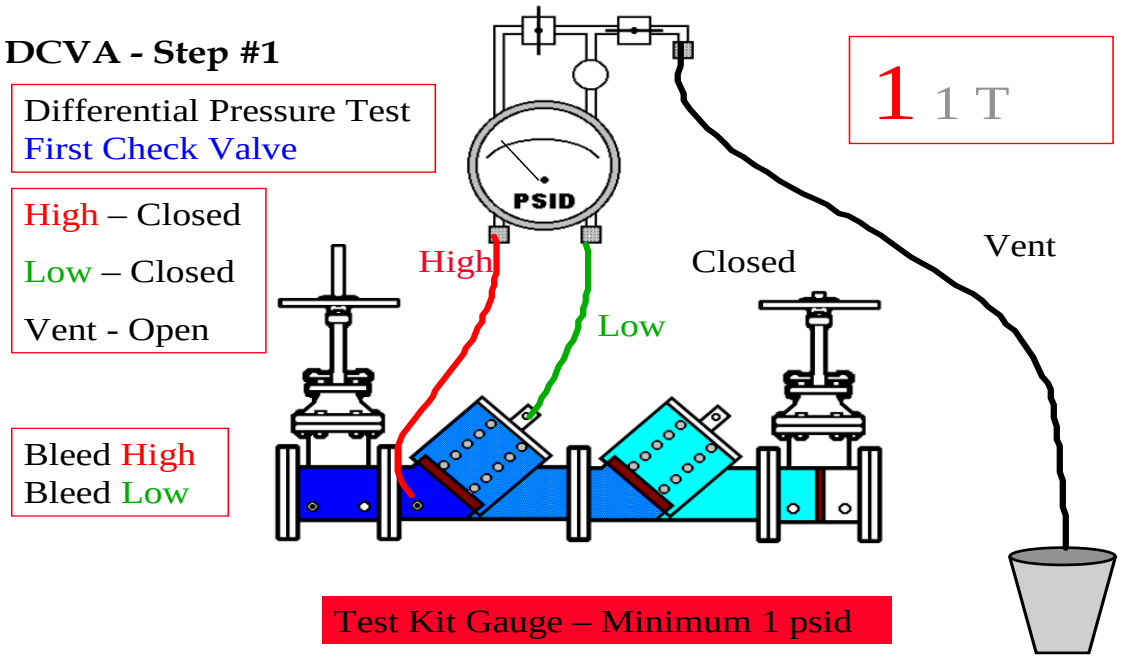

Diagram Number 2

**DOUBLE CHECK VALVE ASSEMBLY 3 VALVE FIELD TEST PROCEDURE**

**Step 1: Test the first check valve to determine that it has a minimum static differential pressure across it of 1 PSI.**

1. Verify that upstream shut-off valve is open.
2. Close the downstream shut-off valve (If it is determined that the device is prone to backpressure as in a fire protection system, see NOTE A prior to closing the downstream shut-off valve.)
3. Orientate the test kit. Close high and low control valves on the test kit. Open the vent control valve.
4. Connect the high pressure hose to test cock # 2.
5. Connect the low pressure hose to test cock # 3.
6. Open test cocks # 2 and # 3.
7. Open the high control valve on the test kit to bleed the air from the high pressure hose. Close the high control valve. (Water will bleed through the vent hose.)
8. Open the low control valve on the test kit to bleed the air from the low pressure hose. Close the low control valve. (Water will bleed through the vent hose.)
9. The differential pressure gauge reading should be a minimum of 1 PSID. This differential pressure gauge reading is the apparent reading. This gauge reading cannot be validated until it is confirmed that the device is in a no-flow condition. (See NOTE B)
10. Close test cocks # 2 and # 3. Disconnect the hoses.

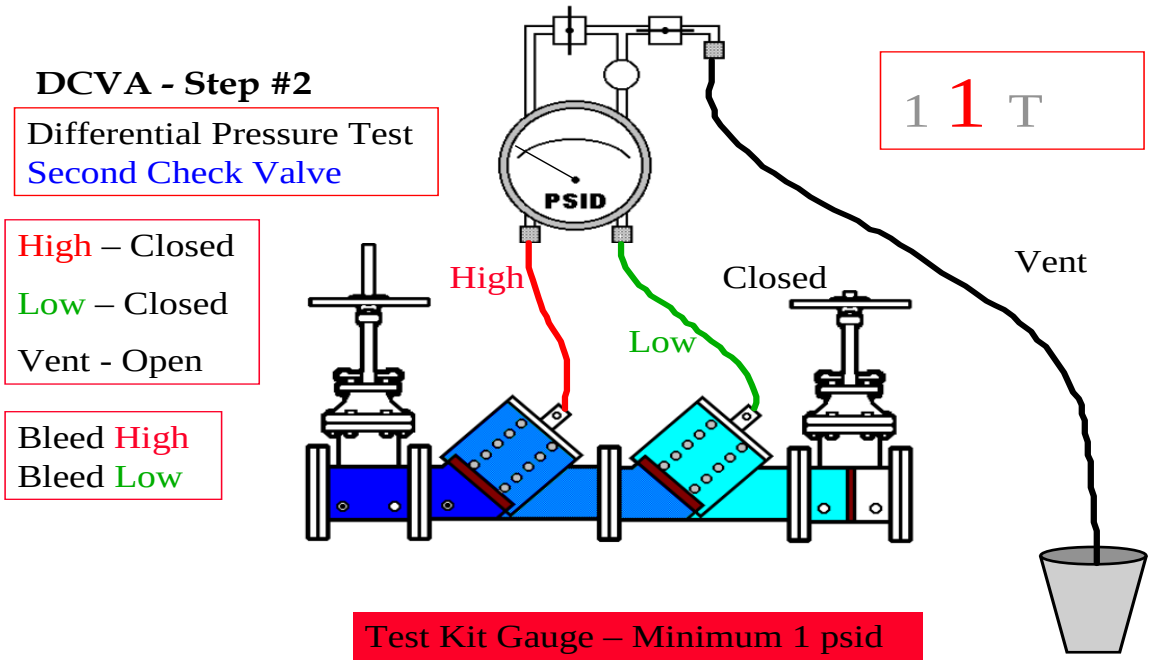
NOTE B: If the differential pressure is 0 PSID, this is an indication that the first check valve is leaking and the device and downstream-off valve cannot be tested for tightness using the procedure outlined in Step 3. However, an affirmation can be made that since the first check valve has a differential pressure of 0 PSID, the device is in a no-flow condition. The gauge would record a positive PSID if the device was in a flow condition. The second check valve can and should be tested to determine if the device is providing protection.



**Step 2: Test second check valve to determine that it has a minimum static differential pressure differential across it of 1 PSI.**

1. Orientate the test kit valves. Close high and low control valves. Open vent control valve.
2. Connect the high pressure hose to test cock # 3.
3. Connect the low pressure hose to test cock # 4.
4. Open test cocks # 3 and # 4.
5. Open the high control valve on the test kit to bleed the air from the high pressure hose. Close the high control valve.
6. Open the low control valve on the test kit to bleed the air from the low pressure hose. Close the low control valve.
7. The differential pressure gauge reading should be a minimum of 1 PSID. The differential pressure gauge reading is the apparent reading. This gauge reading cannot be validated until it is confirmed that the device is in a no-flow condition. (See NOTE C)
8. Close tests cocks # 3 and # 4. Disconnect the hoses.

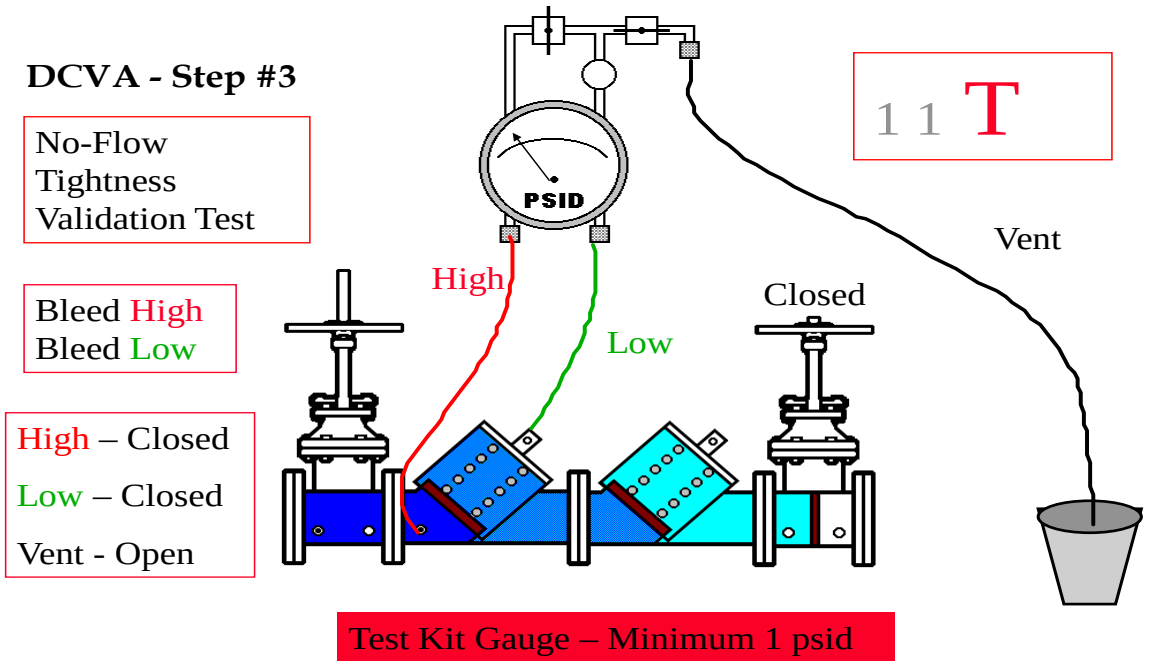
NOTE C: If the differential pressure is 0 PSID, this is an indication that the second check valve is leaking and the device and downstream shut-off valve cannot be tested for tightness using the procedure outlined in Step 3. However, the device should be tested for backpressure, since a 0 PSID reading across the second check valve may be an indication that the downstream shut-off valve is leaking and the device is in a backflow condition.



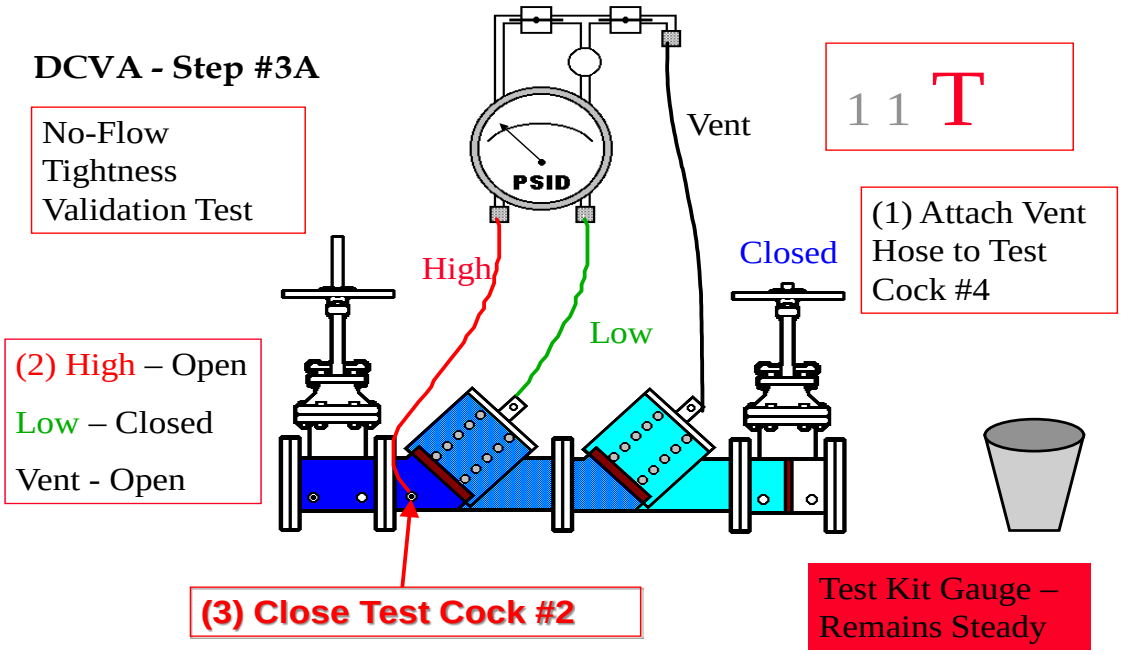
**Step 3: Tightness Validation Test - Test the Device for No-Flow.**

To test the device for No-Flow, both check valves must be tight and holding a minimum differential pressure of 1 PSID, there must be little or no fluctuation of inlet supply pressure. Any backpressure situation should be evaluated. The upstream shut-off valve is open and the downstream shut-off valve is closed.

1. Orientate test kit valves. Close high and low control valves. Open vent control valve.
2. Connect the high pressure hose to test cock # 2 and the low pressure hose to test cock # 3.
3. Open test cocks # 2 and # 3.
4. Open the high control valve on the test kit to bleed air from the high pressure hose. (Water will discharge out of the vent host.) Close the high control valve.
5. Open the low control valve on the test kit to bleed air from the low pressure hose. (Water will discharge out of the vent host.) Close the low control valve.
6. The differential pressure gauge reading should be a minimum of 1 PSID.
7. Elevate the vent hose and open the low control valve to fill vent hose with water. Close the low control valve and connect the vent hose to test cock # 4. Open test cock # 4.
8. Open the test kit high control valve. (This supplies high pressure water downstream of check valve number 2.) If the differential pressure drops to zero immediately and the second check valve differential pressure was positive, this may be an indication that the second check valve O-Ring is not functioning properly. If the differential pressure rises, close test cock # 4 immediately. (See NOTE D)
9. Close test cock # 2. (This stops the supply of high pressure water to the test kit gauge and downstream of check valve number 2.)
10. Observe the test kit needle. If the differential pressure gauge reading holds steady, the device is recorded as being under a No-Flow condition. (See NOTE E) If the differential pressure gauge reading drops to zero, the device is in a flow conditions and downstream shut-off valve is recorded as leaking (See NOTE F)



**NOTE D:** If a backpressure condition is present with a leaking downstream shut-off valve and with the high and vent control valves open, non-potable water will pass through the test kit and be introduced into the potable water supply. If this occurs, test cock #4 should be closed immediately, the test should be discontinued and the test kit should be removed flushed-out with potable water. The assembly should be tested for backpressure as stated above and retested making sure that the downstream shut-off valves is closed tight or no-flow can be achieved and validated.




**NOTE E:** To determine the tightness of the downstream shut-off valve, a demand downstream of the backflow prevention device assembly shall be created while performing the no-flow test. If the needle on the test kit remains steady during a demand condition, the downstream shut-off valve is considered holding tight. If under a demand condition the needle on the test kit drops to zero, the downstream shut-off valve is considered leaking. If there is no water demand downstream of the backflow prevention device assembly, the tightness validation of the downstream shut-off valve may not be possible, since a leaking downstream shut-off valve with a no-flow condition will emulate a tight downstream-shut off valve.

**NOTE F:** With a leaking downstream shut-off valve, the device is in a flow condition and the previous readings taken are invalid. The device does not fail the test, since it cannot be tested in a flow condition. To proceed with the test of the device, a non-flow condition shall be achieved, either through the repair of the downstream shut-off valve, the operation of an additional shut-off valve downstream or by another means of validating that the device is under a no-flow condition.

**Concluding Procedures** This completes the standard field test for a double check valve assembly. Before removing the test equipment, the tester should ensure that all test cocks have been closed and the downstream shut-off valve is open, thereby reestablishing flow. All test data should be recorded on appropriate forms.