



STANLY COUNTY UTILITIES CROSS CONNECTION CONTROL & BACKFLOW PREVENTION MANUAL

September 2010

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Piney Point Water District

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1.0 INTRODUCTION

Backflow assemblies are required to protect the public water systems operated by the purveyor and to provide the highest quality of drinking water possible to the free flowing tap, in accordance with NCAC Title 15 A Subchapter 18C of the County of Stanly Code of Ordinances. Stanly County Utilities shall be responsible for the maintenance and operation of the public water distribution system, the water service laterals and water service meters, in accordance with the Safe Drinking Water Act.

The customer(s) shall be responsible for the maintenance and operation of the private potable water service plumbing and backflow devices beyond the Stanly County Utilities water service meter to the free flowing tap. The participation of each customer is required to ensure the backflow device is properly installed, tested, and maintained.

This technical manual provided information regarding the approved backflow assemblies, enclosures and test kits; and technical specifications regarding the backflow location and installation methods, and backflow testing procedures and requirements; and the required technical details.

The ultimate goal is to provide protection for the water systems operated by the purveyor and to provide the highest quality of drinking water possible to the free flowing tap. The participation of each customer properly installing and maintaining a backflow assemble is one more step in assuring that the public drinking water is safe and clean.

2.0 INSTALLATION

2.1 GENERAL

INSTALLATION

1. Before installation of any backflow prevention assembly, all proper authorities must be contacted to obtain specifications on the type of assembly to install, size, location and rights of way. Local authorities to consider are Stanly County Public Works Backflow Administrator, Fire Marshall, Planning and Zoning Department, County Plumbing Inspector, Public Works and/or the N.C. Department of Transportation.
2. (Note: All installations or replacements of a backflow prevention assembly must be done by a licensed plumber or a licensed utility contractor.) All backflow prevention assemblies shall be tested by a certified backflow technician authorized by the County. The installation of a backflow prevention assembly on a dedicated fire sprinkler service shall be performed by a licensed fire sprinkler contractor or utility contractor. Repairs to a backflow prevention assembly on a dedicated fire sprinkler system may only be performed by a fire sprinkler contractor.
3. Backflow assemblies must be located outside of the building(s). The backflow prevention assembly shall be installed immediately after the water service meter, outside of the public utility easement and/or public road rights-of-way, in accordance with the approved plans, specifications, and details, unless authorized by the County of Stanly Backflow Administrator.
4. All irrigation services tapped off the public water main shall have an above ground reduced pressure backflow prevention assembly located behind the irrigation meter. Any irrigation line tapped off the domestic line shall have an above ground reduced pressure backflow prevention assembly on the irrigation line before any branch of the system.
5. Fire-line services utilizing pumps, fire department connects, (FDC) or of a high hazard shall have a Reduce Pressure Principal Detector Assembly installed. All other will require a Double Detector Check Valve Assembly. All above ground fire-line backflow assemblies shall be concrete pad mounted with a heated protective enclosure to prevent freezing.

2.2 REDUCED PRESSURE BACKFLOW ASSEMBLIES

A.) ABOVE GROUND

1.) Reduced Pressure Backflow Assemblies (RP) shall be installed above ground in an approved enclosure. The relief port shall have a minimum clearance of twelve (12) inches or a maximum of thirty (30) inches to the concrete pad. If the assembly must be installed inside of the building the following clearance specifications must be met:

¾" – 2" must have a minimum clearance of (4) inches between the wall and shut off valves, a minimum of thirty (30) inches from the wall on the side utilizing the test cocks and a minimum of six (6) inches on the opposite side of the assembly. A minimum of four (4) inch floor drain shall be provided for the relief port.

3" = 10" must have a minimum clearance of (8) inches between the wall and shut off valves, a minimum of thirty (30) inches clearance on the side utilizing the test cocks and a twelve (12) inch minimum clearance on the opposite side of the assembly. The floor drain shall be sized in accordance with the manufacturer's flow chart for relief valve.

Outside installation will be required to have an ASSE1060 approved enclosure to prevent the assembly from vandalism and freezing. The protective structure must provide easy access to the assembly for testing or removal. The structure must have adequate drainage provided by hinged door or drain ports. (See Drain Port Sizing Page 3) (Note: Wrapping the assembly with insulation is prohibited). If the structure is non-removable and must be entered in order to test or repair the assembly, the same minimum and maximum clearances that are specified for inside installation shall apply.

2.) If the structure is non-removable and must be entered in order to test or repair the assembly, the same minimum and maximum clearances that are specified for inside installation shall apply. If the backflow assembly is located in area subject to vehicular traffic, then barriers such as bollards or other approved structures shall be provided around the above ground assembly.

B.) INDOOR: Authorized by the Stanly County Backflow Administrator on a case by case basis.

1. If the assembly must be installed inside of the building a floor drain must be provided and sized in accordance with recommended manufacturers specifications. The drainage pipe shall be provided with a vermin screen installed.

2.3 DOUBLE CHECK VALVE BACKFLOW ASSEMBLIES (DCVA)

Double Check Valve Assemblies (DCVA) may be installed in an ASSE1060 approved enclosure above ground or below ground in a vault. If a Double Check Valve Assembly is installed in a vault the size and clearance specifications are as follows:

A). BELOW GROUND:

- 1.) *¾ - inch and 1 – inch Double Check Valve backflow assemblies:* ¾ - inch and 1 – inch Double Check Valve backflow assemblies shall be housed in a backflow box with the minimum inside dimensions of 12 – inches Width, 21 – inches Length, and 12 – inches Depth. The backflow assembly must have at minimum 12 – inches of vertical clearance between the washed stone and the bottom of the backflow assembly and 4 – inches of vertical clearance between the top of the backflow assembly and the backflow box lid. A minimum of four (4) inches of no. 57 wash stone must be in placed in the bottom of the backflow box. If the backflow assembly is located in area subject to vehicular traffic or in a pedestrian sidewalk, then the backflow box will need to be H – 20 traffic rated and set flush to final grade.
- 2.) *2 – inch thru 10 – inch Double Check Valve backflow assemblies:* 2 – inch thru 10 – inch Double Check Valve backflow assemblies shall be installed in a watertight H – 20 traffic rated vault. Such vault shall have positive drainage by gravity to the surface of ground or a catch basin connected to a storm drainage system. The drainage pipe shall be provided with a vermin screen installed. All Double Check Valve Assemblies are required to have a minimum twelve (12) inches to a maximum (30) inches clearance from floor level to underside body.

B). ABOVE GROUND: If drainage cannot be provided, the assembly unit must be installed above ground. Above ground installation will be required to have an ASSE1060 approved enclosure to prevent the assembly from vandalism and freezing. The enclosure shall be mounted on an appropriately sized concrete pad. If the backflow assembly is located in area near vehicular traffic, then barriers such as bollards or other approved structures shall be provided around the above ground assembly.

- 1.) *¾ - inch and 1 – inch Double Check Valve backflow assemblies:* ¾ - inch and 1 – inch Double Check Valve backflow assemblies shall be installed in an ASSE1060 approved enclosure above ground with the minimum inside dimensions of 12 – inches Width, 21 – inches Length, and 22 – inches Depth. The backflow assembly must have at minimum 12 – inches of vertical clearance between concrete pad and the bottom of the backflow assembly and 4 – inches of vertical clearance between the top of the backflow assembly and the backflow enclosure top. The backflow assembly shall not be located in area subject to vehicular traffic or in a pedestrian sidewalk.
- 2.) *2 – inch thru 10 – inch Double Check Valve backflow assemblies:* 2 – inch thru 10 – inch Double Check Valve backflow assemblies shall be installed in an ASSE 1060

approved above ground enclosure. The above ground enclosure shall be suitable in size to encompass the entire backflow assembly. 12 – inches to 30 – inches of vertical clearance shall be maintained between concrete pad and the bottom of the backflow assembly. The backflow assembly shall not be located in area subject to vehicular traffic or in a pedestrian sidewalk.

C). **INDOOR:** If the assembly must be installed inside of the building a floor drain must be provided and sized in accordance with the Drain Port Requirements Table or the recommended manufacturers specifications. The drainage pipe shall be provided with a vermin screen installed.

DRAIN PORT TABLE

<i>RP Size</i>	<i>Drain Port Requirements Table</i>	
	<i>Rectangular Opening (in.)</i>	<i>Circular Opening (dia.)</i>
¾” – 1”	2 ½ h X 5 w	(1) – 4”
2”	3 h X 6 ½ w	(2) – 4”
3”	4 h X 7 w	(3) – 4”
4” – 6”	5 h X 10 w	(4) – 4”
8” – 10”	5 h X 20 w	n/a

2.4 IRRIGATION SYSTEMS

State law requires a separate irrigation meter for all new in-ground irrigation systems connected to the public water supply on land that has been platted after July 1, 2009. The intent of this legislation (House Bill 2499 & House Bill 1766), is to reduce water systems vulnerability to drought and allow them to quicker response to water shortages. Residential and commercial customers, as well as developers now have two options for a ¾" irrigation service:

OPTION 1: SINGLE SERVICE LINE

For new construction with irrigation, one ¾" line will be tapped onto the main, and two meters will be set from the ¾" line. The full connection charge will be collected for the domestic service, while the connection charge for the irrigation tap will be reduced. A full capacity fee will be charged for each of the two services.

On an existing domestic service adding irrigation, a tee will be installed just before the domestic meter on the domestic line. The connection charge for the irrigation tap will be reduced, and a full capacity fee will be charged for the irrigation service.

OPTION 2: DEDICATED SERVICE LINE

The customer can elect to have a separate tap and a separate line run to each meter box. In this case, the standard connection charges and capacity fees will be assessed. This option may be necessary if the existing domestic meter is in a driveway or there is some circumstance that prevents splitting off the single service line.

If customers need more than a ¾" irrigation service, they may purchase larger service for added capacity. Services larger than ¾" will be tapped on the main with standard connection and capacity fees.

BACKFLOW PROTECTION

To ensure the safety of our community's drinking water, a backflow prevention device is required on in-ground irrigation systems. This prevents hazardous substances from inadvertently being drawn into the drinking water system, contaminating it.

The private water service connection (section of pipe between the meter and the backflow preventer including and isolation valve and the backflow preventer itself) serving the irrigation system must be installed by a North Carolina licensed plumbing or utility contractor.

Workmanship and materials for this part of the system must be permitted and inspected by Stanly County Code Enforcement, along with meeting requirements of and inspection from Stanly County Utilities.

Inspections of the private water service connection must be requested and scheduled by the contractor. Stanly County Code Enforcement can be reached at 704.986.3667 and Utilities backflow inspections can be reached at 704.986.3686. Stanly County Utilities will inspect and approve the work prior to activating irrigation water service.

Once the inspection has occurred, a Stanly County Utilities-approved Certified Tester must conduct the initial backflow test. Any deficiencies must be corrected with documentation sent to Stanly County Utilities. Annual testing is required thereafter.

IRRIGATION CONTRACTORS

Installations of new in-ground irrigation systems costing \$2,500 or more must be performed by a North Carolina – licensed irrigation contractor, unless the work is done by the property owner, licensed professional engineer or a registered landscape architect. Exclusions include agricultural and nursery operations. Visit www.nciclb.org for details.

MORE INFORMATION

To request an irrigation meter or for meter and fee questions, call 704.986.3686. To request a backflow inspection, call 704.986.3686. For general backflow questions, please contact Backflow Prevention at 704.983.3204 and ask for Mr. Ronnie Stiller or for Mr. David Fisher.

2.5 APPROVED ASSEMBLIES AND MATERIAL SPECIFICATIONS

1. All backflow prevention assemblies must meet the requirements of Stanly County Public Works and have National approvals from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCFCCHR). The American Society of Sanitary Engineering (ASSE) and must conform to AWWA C506, and adhere to ANSI and ASTM standards. All assemblies installed on fire lines shall have approval by Factory Mutual Systems (FM).
2. All internal parts must be replaceable in line.
3. All assemblies must have four (4) resilient seated test cocks, having ¼ turn ball valves with slotted or lever type operators. These test cocks shall be located in the following order:
 - a. 1st test cock: Before the first shut-off valve.
 - b. 2nd test cock: Between the first shut-off valve and the 1st check valve.
 - c. 3rd test cock: Between the first and second check valve.
 - d. 4th test cock: Between the second check and the second shut-off valve.
4. All ¾" – 2" backflow assemblies must have bronze or stainless steel bodies and bonnets and must be equipped with full port shut-off valves, of line size, having ¼ turn lever type bronze or steel ball valves.
5. All 3" – 10" backflow assemblies shall have contained check valve modules. The bodies and bonnets must be made of one of the following: fusion bonded epoxy-coated cast iron, ductile iron or steel, or made of bronze or stainless steel.
6. Only a backflow prevention device with USCFCCHR approved gate valves located on the inlet and outlet side of a particular manufacture and model will be considered a complete approved assembly by Stanly County Public Works. Residential Dual Check Valves will be exempt from these requirements.
7. If a backflow assembly is not on the approved list it may be submitted for review and approval by the Backflow Administrator. Stanly County Public Works shall have the right to remove any assembly from the approved list if it fails to operate in a satisfactory manner or no longer meets specifications.

APPROVED DOUBLE CHECK VALVE ASSEMBLIES

<u>Manufacturer</u>	<u>Size</u>	<u>Model Number</u>
Ames	1/2" - 10" (SS AND DCA)	2000 B
Conbraco	3/4"	40 - 100
Febco	3/4" - 10" 1/2" - 8" 2 1/2" - 8"	805Y 850 870
Flomatic	3/4" - 8"	DCV
Watts	1/2" - 2" 1/2" - 1" 2 1/2" - 3" 2 1/2" - 10" 4" - 8" 6" & 8"	007QT 775QT 007NRS 709NRS 774NRS 774XNRS
Wilkins	4" & 6" 4" & 6" (N SHAPE) 4" - 10"	350 450 950

2.6 TEST REQUIREMENTS

1. Upon complete installation of all backflow assemblies, the customer is responsible for having a certified backflow technician, approved by Stanly County Public Works to make all tests and repairs. A completed duplicate copy of all tests and repairs must be sent to the Backflow Administrator with in thirty (30) days of completion. The customer must maintain a file of these reports for no less than five (5) years.
2. Before beginning any tests or repairs on a fire protection system the customer will be responsible to notify all parties that could be effected by the shutting off of the water service during any procedures (i.e. alarm company, insurance agents, local fire officials).
3. If an assembly is in need of repair before the annual test period, the customer will be responsible to have repairs made immediately by an approved backflow technician. Any repaired assembly must be tested upon completion of any repairs. All repair parts must be of a manufacturer's approval.

2.7 APPROVED CERTIFIED TESTERS

1. Any person interested in testing backflow assemblies in Stanly County must have a certification from an approved school providing certification in Backflow Prevention Testing and Cross – Connection Control. The following schools have been approved by Stanly County:

Fayetteville Public Works Commission
P.O. Box 1089
Fayetteville, NC 28302
Mr. Ronnie West, Coordinator
Phone: (910) 678 – 7439

City of Raleigh, NC
Department of Public Utilities
P.O. Box 590
Raleigh, NC 27602
Mr. Ben Yarborough, Coordinator
Phone: (919) 870 – 2897

University of Southern California
Foundation for Cross - Connection Control and
Hydraulic Research School of Engineering
BHE 314 University Park MC – 0231
Los Angeles, California
Phone: (213) 743 – 2032

University of Florida
Center for Training Research and Education for
Environmental Occupations (TREEO)
3900 SW 63rd Boulevard
Gainesville, Florida 32608
Phone: (904) 392 – 9570
Fax: (352) 392 – 6910

Charlotte – Mecklenburg Utility Department
System Protection Division – Backflow
Prevention
5100 Brookshire Boulevard
Charlotte, NC 28216
Phone: (704) 399 – 2426

2. All testers must also have a thorough understanding of Stanly County Public Works Backflow Prevention Ordinance and adhere to test procedures for Double Check Valves and Reduce Pressure Principle Assemblies as listed in the current procedures from the University of Southern California Foundation for Cross Connection and Hydraulic Research Manual of Cross – Connection Control.

A person wishing to be put on a list of approved testers for Stanly County Public Works must provide the County with a request letter with their full name, address, phone number (between 8:30 am and 5 pm), a copy of their certification that includes the certificate number, the date that it was obtained and the date that it expires.

3. All testers must also have a thorough understanding of Stanly County Utilities.
4. Full consent from the customer must be granted to the tester before any test procedures take place. The tester must make sure the customer can provide safety for life and property during the entire testing or repair procedures. Until these safety precautions have been met no test shall be completed.
5. A tester will be required to report any improperly installed assembly or installed non-approved manufacturer's parts. Falsification of any records by the tester will result in the immediate removal from the approved tester list and be subject to penalties set forth in the ordinance.

2.8 REQUIREMENTS FOR TEST KITS

All test kits used for testing backflow prevention assemblies shall meet the following requirements for approval by Stanly County Public Works:

1. Must meet the requirements of the University of Southern California Foundation for Cross-Connection and Hydraulic Research standards for differential pressure gauges.
2. Stanly County Public Works will require a calibration certificate (less than one year old) for each kit and re-calibration annually.
3. The test person must supply Stanly County Public Works with the following information for each kit to be registered:

Manufacture Kit
Type of kit (Duplex/Differential)
Serial Number
Owner's Name, Address and Phone
Date of Calibration

APPROVED TEST KITS

ITT BARTON	100 BFT
CONBRACO	40-200-TK
FEBCO	RP TI-1 (RPPA – ONLY)
MIDWEST	MODEL 830 RP
WATTS	MODEL TK-DP

**2.9 GUIDELINES FOR TESTING OF BACKFLOW PREVENTION
ASSEMBLIES ON FIRE LINES**

(Requirements of fire official)

1. TESTERS WILL BE ALLOWED TO SHUT DOWN WATER SUPPLY TO FIRE LINES FOR NO MORE THAN ONE HOUR PER ASSEMBLY. FIRE LINES SHUT DOWN FOR MORE THAN ONE HOUR FOR BFPA TESTING OR REPAIR PURPOSES, WILL RESULT IN THE TESTER BEING SUBJECT TO ALL FINES, PENALTIES OR ARREST.
2. TESTS OR REPAIRS REQUIRING LONGER SHUT DOWN TIME, WILL REQUIRE A REPLACEMENT BFPA TO BE INSTALLED.
3. TESTING OR REPAIRS WILL BE DONE AT TIMES DURING LOWEST PEDESTRIAN OCCUPANCY.
HIGH RISE - AFTER 6:00 pm
MALLS - AFTER 9:30 pm
SCHOOLS - SUMMER OR AFTER CLASSES

*** A LIST OF TIMES FOR OTHER OCCUPANCIES WILL
BE SUBMITTED TO THE TESTER AT PERMIT TIME. ***

4. ADDITIONAL PERMITTING FOR THE TESTING OF FIRE LINES WILL BE REQUIRED FOR TESTERS.
5. A 15 DAY ITINERARY WILL BE SUBMITTED BY ALL FIRE PREVENTION BUREAU PERMITTED TESTERS.
6. IN THE EVENT OF LONG TERM IMPAIRMENT OF THE FIRE LINE SYSTEM, ADDITIONAL CHARGES MAY BE LEVIED AGAINST THE PROPERTY OWNER.

2.10 APPROVED FIELD TEST PROCEDURES FOR BACKFLOW PREVENTION ASSEMBLIES

PREPARATION

1. OBTAIN PERMISSION FROM THE OWNER OR REPRESENTATIVE TO SHUT DOWN THE WATER SUPPLY. JUST PRIOR TO TESTING, THE CUSTOMER SHOULD BE NOTIFIED THAT THE WATER SERVICE WILL BE DISCONTINUED TEMPORARILY

***** IF A FIRE LINE IS SUPPLIED BY THE SERVICE WITH BACKFLOW ASSEMBLY BEING TESTED THE APPROPRIATE OFFICIALS MUST BE NOTIFIED OF THE SHUT DOWN. THE TESTER IS REQUIRED TO MEET ALL CODE AND REGULATIONS AS IMPOSED BY THE GOVERNING FIRE OFFICIAL. SEE BULLETIN #8 GUIDELINES FOR TESTING BACKFLOW PREVENTION DEVICES ON FIRE LINES.**

2. OBSERVE AND RECORD THE PHYSICAL CONDITIONS OF THE ASSEMBLY AND SURROUNDING AREA. OBSERVE THE DIRECTION OF FLOW. IS THIS THE CORRECT ASSEMBLY FOR ITS APPLICATION ?

3. RECORD OR VERIFY THE FOLLOWING INFORMATION ON EACH ASSEMBLY:

MANUFACTURER
MODEL
SERIAL #
SIZE OF ASSEMBLY
LOCATION OF ASSEMBLY

4. DETERMINE WHICH TEST KIT IS REQUIRED FOR ASSEMBLY BEING TESTED
REDUCED PRESSURE PRINCIPLE ASSEMBLY REQUIRES A DIFFERENTIAL GAUGE
DOUBLE CHECK VALVE ASSEMBLY REQUIRES A DUPLEX GAUGE

5. REMOVE ANY LODGED FOREIGN MATERIAL THAT MIGHT INTERFERE WITH TEST. FLUSH TEST COCKS BY OPENING #4 TEST COCK TO MAINTAIN FLOW THROUGH ASSEMBLY, THEN OPEN AND CLOSE TEST COCK #1, #2, #3, THEN CLOSE #4 TEST COCK. ATTACH APPROPRIATE FITTINGS TO TEST COCKS THEN FOLLOW TEST STEPS OUTLINED FOR PARTICULAR ASSEMBLY.

2.11 STEP BY STEP TESTING PROCEDURES FOR REDUCED PRESSURE PRINCIPAL ASSEMBLY

PURPOSE

1. TO VERIFY THAT A MINIMUM OF 5.0 psid. IS MAINTAINED ACROSS CHECK VALVE #1.
2. TO CHECK THAT THE RELIEF VALVE OPENING IS AT OR ABOVE 2.0 psi.
3. TO VERIFY THAT THE CHECK VALVE #2 WILL HOLD TIGHT AGAINST BACK PRESSURE.
4. TO VERIFY THAT A MINIMUM OF 1.0 psid. IS MAINTAINED ACROSS CHECK VALVE #2.

- 1) FOLLOW PREPARATION STEPS, OPERATING TEST COCK #2 VERY SLOWLY. ATTACH THE HIGH PRESSURE HOSE TO TEST COCK #2 AND THE LOW PRESSURE HOSE TO TEST COCK #3. THE HIGH CONTROL VALVE SHOULD BE OPEN ON TEST KIT. IT CAN REMAIN OPEN THROUGHOUT ALL STEPS. THE LOW CONTROL VALVE AND THE BYPASS CONTROL VALVE SHOULD BE CLOSED.
- 2) OPEN THE HIGH AND LOW BLEED VALVES, THEN SLOWLY OPEN TEST COCK #3 AND #2, THIS WILL BLEED AIR FROM TEST KIT AND ASSEMBLY. IT IS IMPORTANT THAT THE TEST COCKS BE OPENED IN THIS ORDER TO PREVENT THE RELIEF VALVE FROM OPENING.
- 3) CLOSE HIGH BLEED VALVE, THEN CLOSE THE LOW BLEED VALVE. CLOSE LOW LAST. CLOSE #2 SHUT-OFF, OBSERVE DIFFERENTIAL PRESSURE ACROSS CHECK VALVE #1. THIS READING SHOULD BE GREATER THAN 5.0 psi.
- 4) OPEN LOW CONTROL VALVE ONE QUARTER TURN ONLY. RECORD THE OPENING POINT OF THE RELIEF VALVE WHEN WATER BEGINS TO DRIP FROM THE ASSEMBLY. THIS READING SHOULD BE GREATER THAN 2.0 psi. CLOSE THE LOW CONTROL VALVE.
- 5) OPEN THE BY-PASS CONTROL VALVE AND BLEED AIR FROM HOSE. LOOSELY ATTACH BY-PASS HOSE TO TEST COCK #4. CLOSE BY-PASS CONTROL VALVE AND TIGHTEN BY-PASS LINE. OPEN TEST COCK #4.
- 6) OPEN LOW BLEED VALVE, AND THEN CLOSE LOW BLEED VALVE. OPEN BY-PASS CONTROL VALVE, THE DIFFERENTIAL SHOULD REMAIN AT OR ABOVE 5.0 psid. RECORD STATUS OF CHECK VALVE #2 (HELD TIGHT OR LEAKED). CLOSE BY-PASS CONTROL VALVE, OPEN LOW BLEED TO RE-ESTABLISH ACCURATE PRESSURE READING ACROSS CHECK VALVE #1, CLOSE LOW BLEED.

- 7) RECORD GAUGE READING. THIS IS THE DIFFERENTIAL PRESSURE ACROSS CHECK VALVE #1. CLOSE TEST COCK #2, #3, THEN TEST COCK #4. BLEED TEST KIT, CLOSE BY-PASS CONTROL VALVE ON TEST KIT. REMOVE HOSES.
- 8) ATTACH HIGH HOSE TO TEST COCK #3, AND LOW TO TEST COCK #4. OPEN HIGH AND LOW BLEED VALVES. OPEN TEST COCK #4 THEN TEST COCK #3. BLEED TEST KIT, CLOSE HIGH BLEED VALVE, THEN CLOSE LOW BLEED VALVE LAST.
- 9) RECORD GAUGE READING. THIS IS THE DIFFERENTIAL PRESSURE AT CHECK VALVE # 2. **THIS READING SHOULD BE GREATER THAN 1.0 psid.** CLOSE TEST COCK #4 AND TEST COCK #3.
- 10) OPEN SHUT OFF VALVE #2. OPEN ALL CLOSED BLEED, AND CONTROL VALVES AND DRAIN TEST KIT. REMOVE HOSES. NOTIFY CUSTOMER WATER SERVICE IS BACK ON.

**BACKFLOW PREVENTER TESTING AND MAINTENANCE
TROUBLE SHOOTING GUIDE
REDUCED PRESSURE PRINCIPLE ASSEMBLY**

NOTE: MANY PROBLEMS CAN BE CORRECTED BY CLEANING THE INTERNAL COMPONENTS. CAREFULLY OBSERVE CONDITION OF ALL COMPONENTS.

PROBLEM	MAY BE CAUSED BY
RELIEF VALVE DISCHARGES CONTINUOUSLY.	<ol style="list-style-type: none"> 1. FAULTY CHECK VALVE #1. 2. FAULTY CHECK VALVE #2 WITH BACK-PRESSURE CONDITION. 3. FAULTY RELIEF VALVE.
RELIEF VALVE DISCHARGES INTERMITTENTLY.	<ol style="list-style-type: none"> 1. PROPERLY WORKING ASSEMBLY WITH BACK SIPHONAGE CONDITION. 2. CHECK VALVE #1 "BUFFER" IS TOO SMALL (ie. LESS THAN 3.0 psi), WITH LINE PRESSURE FLUCTUATION. 3. WATER HAMMER.
RELIEF VALVE DISCHARGES AFTER #2 SHUT-OFF VALVE IS CLOSED. (STEP 3)	<ol style="list-style-type: none"> 1. NORMALLY INDICATES FAULTY CHECK VALVE #1. <ol style="list-style-type: none"> a. DIRTY OR DAMAGED DISC. b. DIRTY OR DAMAGED SEAT.
RELIEF VALVE WOULD NOT OPEN, DIFFERENTIAL ON THE GAUGE WOULD NOT DROP. (STEP 4)	<ol style="list-style-type: none"> 1. LEAKY #2 SHUT-OFF VALVE WITH FLOW THROUGH THE ASSEMBLY.
RELIEF VALVE WOULD NOT OPEN, DIFFERENTIAL DROPS TO ZERO. (STEP 4)	<ol style="list-style-type: none"> 1. RELIEF VALVE STUCK CLOSED DUE TO CORROSION OR SCALE. 2. RELIEF VALVE SENSING LINE PLUGGED.
RELIEF VALVE OPENS TOO HIGH. (WITH SUFFICIENTLY HIGH CHECK VALVE #1 READING OBSERVED) (STEP 4)	<ol style="list-style-type: none"> 1. FAULTY RELIEF VALVE. <ol style="list-style-type: none"> a. DIRTY OR DAMAGED DISC. b. DIRTY OR DAMAGED SEAT.
CHECK VALVE #1 READING TO LOW. (LESS THAN 3.0 psi "BUFFER") (STEP 7)	<ol style="list-style-type: none"> 1. DIRTY OR DAMAGED DISC. 2. DIRTY OR DAMAGED SEAT. 3. GUIDE MEMBERS HANGING UP. 4. WEAK OR BROKEN SPRING.

LEAKY #2 CHECK VALVE.

1. DIRTY OR DAMAGED DISC.
2. DIRTY OR DAMAGED SEAT.
3. GUIDE MEMBERS HANGING UP.
4. WEAK OR BROKEN SPRING.

REPAIR NOTE: LUBRICANTS SHALL ONLY BE USED TO ASSIST WITH THE REASSEMBLY OF COMPONENTS, AND SHALL NOT BE TOXIC. USE ONLY FOOD-GRADE LUBRICANTS.

2.12 STEP-BY-STEP TESTING PROCEDURES FOR DOUBLE CHECK VALVE ASSEMBLY

PURPOSE

1. TO VERIFY THAT #1 AND (#2) CHECK VALVE WILL HOLD TIGHT AGAINST BACK PRESSURE.
2. CONFIRMATION TEST WILL VERIFY WHETHER CHECK VALVE WILL HOLD TIGHT AGAINST BACK PRESSURE AND TO DETERMINE WHETHER EITHER SHUT-OFF VALVES LEAKS.

* INSTRUCTIONS FOR TESTING CHECK VALVE #2 ARE IN PARENTHESES

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- 1) FOLLOW PREPARATION STEPS. ATTACH THE HIGH PRESSURE HOSE TO TEST COCK #2 (#3) AND THE LOW PRESSURE HOSE TO TEST COCK #3 (#4).
- 2) OPEN THE HIGH BLEED AND LOW CONTROL VALVES, THEN CLOSE THE VALVES. CLOSE #2 SHUT-OFF VALVE. CLOSE THE #1 SHUT-OFF VALVE.
- 3) OPEN THE HIGH BLEED VALVE AND REDUCE THE PRESSURE ON THE SUPPLY SIDE TO 2 psi LESS THAN THE PRESSURE ON THE CUSTOMER SIDE.
- 4) OBSERVE WHETHER THE 2 psi SPLIT BETWEEN THE NEEDLES IS MAINTAINED AND RECORD. IF NEEDLES HOLD 2 psi SPLIT CHECK VALVE #1 (#2) IS HOLDING TIGHT. CLOSE ALL TEST COCKS. OPEN #1 SHUT-OFF VALVE. REPEAT STEPS FOR CHECK VALVE #2*. IF SPILT ISN'T MAINTAINED OR IF THERE IS ANY QUESTION ON THE RESULTS OF THIS TEST, DO CONFIRMATION TEST.
- 5) OPEN #1 AND #2 SHUT-OFF VALVE. OPEN ALL CLOSED BLEED AND CONTROL VALVES. REMOVE HOSES, AND NOTIFY CUSTOMER WATER SERVICE IS BACK ON..

CONFIRMATION TEST

- 1) OPEN #1 SHUT-OFF VALVE. SLIGHTLY OPEN LOW CONTROL VALVE TO REMOVE AIR FROM BY-PASS HOSE. CONNECT BY-PASS HOSE TO THE TEST COCK #1 (WET) AND CLOSE LOW CONTROL VALVE OPEN TEST COCK #1.
- 2) CLOSE #1 SHUT-OFF VALVE. LOOSEN THE HOSE CONNECTION AT TEST COCK #3 (#4) TO LOWER PRESSURE IN ASSEMBLY AT LEAST 10

psi. OPEN BOTH HIGH AND LOW CONTROL VALVES SIMULTANEOUSLY AND REDUCE SUPPLY SIDE BY 2.5 psi AND INCREASE CUSTOMER SIDE BY 2.5 psi.

- 3) OBSERVE WHETHER THE 5.0 psi SPLIT IS MAINTAINED, RECORD RESULTS. IF SPLIT CAN BE MAINTAINED WITH CONTROL VALVES CLOSED, CHECK HOLDS TIGHT IF NOT SEE TROUBLE SHOOTING GUIDE.
- 4) CLOSE ALL TEST COCKS. OPEN #1 AND #2 SHUT-OFF VALVE. OPEN ALL CLOSED BLEED AND CONTROL VALVES. REMOVE HOSES, AND NOTIFY CUSTOMER WATER SERVICE IS BACK ON.

**BACKFLOW PREVENTER TESTING AND MAINTENANCE
TROUBLE SHOOTING GUIDE
DOUBLE CHECK VALVE ASSEMBLY**

NOTE: MANY PROBLEMS CAN BE CORRECTED BY CLEANING THE INTERNAL COMPONENTS. CAREFULLY OBSERVE CONDITION OF ALL COMPONENTS.

PROBLEM	MAY BE CAUSED BY
DURING CONFORMATION TEST NEEDLES ON TEST KIT BOTH INCREASE IN PRESSURE.	#1 SHUT-OFF VALVE LEAKS.
DURING CONFORMATION TEST NEEDLES BOTH FALL TO ZERO.	#2 SHUT-OFF VALVE LEAKS. (NO BACK PRESSURE EXISTS)
DURING CONFORMATION TEST NEEDLES CONVERGE.	CHECK VALVE LEAKS.
LEAKY CHECK VALVE	1. DIRTY OR DAMAGED DISC. 2. DIRTY OR DAMAGED SEAT. 3. GUIDE MEMBERS HANGING UP. 4. WEAK OR BROKEN SPRING.

REPAIR NOTE: LUBRICANTS SHALL ONLY BE USED TO ASSIST WITH THE REASSEMBLY OF COMPONENTS, AND SHALL NOT BE TOXIC. USE ONLY FOOD-GRADE LUBRICANTS.

RESULTS OF THE CONFIRMATION TEST ON THE DOUBLE CHECK VALVE ASSEMBLY. THE MOVEMENT OF THE TWO DUPLEX GAUGE NEEDLES WILL INDICATE WHETHER THE CHECK VALVE IS HOLDING TIGHT AGAINST BACK PRESSURE AND, WHETHER ONE OF THE SHUT-OFF VALVES IS LEAKING.

This manual shall supersede all previous versions effective September 1, 2010. An installation in conflict with the standards presented in this manual shall be subject to inspection failure and/or discontinuation of service. Deviations from the standards presented in this manual due to design constraint or physical restriction must receive prior approval from Stanly County Utilities Backflow Administrator.

STANLY COUNTY UTILITIES

Cross Connection Control & Backflow Prevention Manual

September 2003



Stanly County Utilities
Greater Badin Water & Sewer District
Piney Point Water District

201 South Second Street
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INTRODUCTION

This manual has been designed to give specifications as to what test procedures are to be used, approved test kits, approved backflow assemblies and their location of installation. It will also give a better understanding of the responsibilities of the customer, technicians, and purveyor.

The ultimate goal is to provide protection for the water systems operated by the purveyor and to provide the highest quality of drinking water possible to the free flowing tap. The participation of each customer properly installing and maintaining a backflow assembly is one more step in assuring that the public drinking water is safe and clean.

INSTALLATION

1. Before installation of any backflow prevention assembly, all proper authorities must be contacted to obtain specifications on the type of assembly to install, size, location and rights of way. Local authorities to consider are Stanly County Public Works Backflow Administrator, Fire Marshall, Planning and Zoning Department, County Plumbing Inspector, Public Works and N.C. Department of Transportation.
2. (Note: All installations or replacements of a backflow prevention assembly must be done by a licensed plumber or a licensed utility contractor.) Installation of a backflow prevention assembly shall be installed on the outlet side of the meter service. If outside location is not possible, the Backflow Administrator may allow the assembly to be installed just inside the building.
3. Reduced Pressure Principle Assemblies (RPPA) shall be installed above ground in an approved enclosure. The relief port shall have a minimum clearance of twelve (12) inches or a maximum of thirty (30) inches to the concrete pad. If the assembly must be installed inside of the building the following clearance specifications must be met:

¾" – 2" must have a minimum clearance of (4) inches between the wall and shut off valves, a minimum of thirty (30) inches from the wall on the side utilizing the test cocks and a minimum of six (6) inches on the opposite side of the assembly. A minimum of four (4) inch floor drain shall be provided for the relief port.

3" = 10" must have a minimum clearance of (8) inches between the wall and shut off valves, a minimum of thirty (30) inches clearance on the side utilizing the test cocks and a twelve (12) inch minimum clearance on the opposite side of the assembly. The floor drain shall be sized in accordance with the manufacturer's flow chart for relief valve.

Outside installation will be required to have an ASSE1060 approved enclosure to prevent the assembly from vandalism and freezing. The protective structure must provide easy access to the assembly for testing or removal. The structure must have adequate drainage provided by hinged door or drain ports. (See Drain Port Sizing Page 3) (Note: Wrapping the assembly with insulation is prohibited). If the structure is non-removable and must be entered in order to test or repair the assembly, the same minimum and maximum clearances that are specified for inside installation shall apply.

4. Double Check Valve Assemblies (DCVA) may be installed in an ASSE1060 approved enclosure above ground or below ground in a vault. If a Double Check Valve Assembly is installed in a vault the size and clearance specifications are as follows:

3/4" - 1" shall have a clearance of four (4) inches from the end walls to ball valves, eight (8) inches clearance on the side utilizing the test cocks and four (4) inches on the opposite side. Installation may be made in a standard meter box with a minimum four (4) inches of wash stone placed in the bottom of the meter box.

2" - 10" shall be installed in a sealed H-20 traffic rated vault. Such vault shall have positive drainage by gravity to the surface of ground or a catch basin connected to a storm drainage system. The drainage pipe shall be provided with a vermin screen installed. If drainage can not be provided the assembly unit must be installed above ground in an ASSE1060 approved enclosure. The 2" (DCVA) shall have a clearance of four (4) inches from the end walls to ball valves, twelve (12) inches minimum clearance on the test side of the assembly and eight (8) inches minimum clearance on the opposite side. The 3"- 10" (DCVA) shall have a clearance of eight (8) inches from the end walls to the ball valves, thirty (30) inches clearance on the test side of the assembly and twelve (12) inches clearance on the opposite side. **All Double Check Valve Assemblies are required to have a minimum twelve (12) inches to a maximum (30) inches clearance from floor level to underside of body.** Inside installation shall adhere to the same clearance specifications for Reduce Pressure Zone Assemblies.

(Note: Fire line services utilizing pumps or of a high hazard shall have a Reduce Pressure Principal Detector Assembly installed. All other will require a Double Detector Check Valve Assembly. **All fireline backflow assemblies installed above ground shall have heat within protective housing.**)

5. A residential lawn irrigation system tapped off the public water main shall have a backflow prevention assembly located behind the meter service. Any irrigation line tapped off the residential domestic line shall have a backflow prevention assembly on the irrigation line before any branch of the system.

RP Size	Drain Port Requirements	
	Rectangular Opening (in.)	Circular Opening (dia.)
3/4" - 1"	2 1/2 h X 5 w	(1) - 4"
2"	3 h X 6 1/2 w	(2) - 4"
3"	4 h X 7 w	(3) - 4"
4" - 6"	5 h X 10 w	(4) - 4"
8" - 10"	5 h X 20 w	n/a

APPROVED ASSEMBLIES AND MATERIAL SPECIFICATIONS

1. All backflow prevention assemblies must meet the requirements of Stanly County Public Works and have National approvals from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCFCCHR). The American Society of Sanitary Engineering (ASSE) and must conform to AWWA C506, and adhere to ANSI and ASTM standards. All assemblies installed on fire lines shall have approval by Factory Mutual Systems (FM).
2. All internal parts must be replaceable in line.
3. All assemblies must have four (4) resilient seated test cocks, having ¼ turn ball valves with slotted or lever type operators. These test cocks shall be located in the following order:
 - a. 1st test cock: Before the first shut-off valve.
 - b. 2nd test cock: Between the first shut-off valve and the 1st check valve.
 - c. 3rd test cock: Between the first and second check valve.
 - d. 4th test cock: Between the second check and the second shut-off valve.
4. All ¾" – 2" backflow assemblies must have bronze or stainless steel bodies and bonnets and must be equipped with full port shut-off valves, of line size, having ¼ turn lever type bronze or steel ball valves.
5. All 3" – 10" backflow assemblies shall have contained check valve modules. The bodies and bonnets must be made of one of the following: fusion bonded epoxy-coated cast iron, ductile iron or steel, or made of bronze or stainless steel.
6. Only a backflow prevention device with USCFCCHR approved gate valves located on the inlet and outlet side of a particular manufacture and model will be considered a complete approved assembly by Stanly County Public Works. Residential Dual Check Valves will be exempt from these requirements.
7. If a backflow assembly is not on the approved list it may be submitted for review and approval by the Backflow Administrator. Stanly County Public Works shall have the right to remove any assembly from the approved list if it fails to operate in a satisfactory manner or no longer meets specifications.

APPROVED DOUBLE CHECK VALVE ASSEMBLIES

AMES	2000	1/2 - 10 INCH (SS AND DCA)
CONBRACO	40-100	1/2 - 10 INCH
FEBCO	805Y	3/4 - 10 INCH
	850	1/2 - 8 INCH
	870	2 1/2 - 8 INCH
FLOMATIC	DCV	3/4 - 8 INCH
WATTS	007QT	1/2 - 2 INCH
	775QT	1/2 - 1 INCH
	007NRS	2 1/2 - 3 INCH
	709NRS	2 1/2 - 10 INCH
	774NRS	4 - 8 INCH
	774XNRS	6 & 8 INCH
WILKINS	350	4 & 6 INCH
	450	4 & 6 INCH (N SHAPE)
	950	4 - 10 INCH

APPROVED REDUCE PRESURE ZONE ASSEMBLIES

AMES	4000	1/2 - 10 INCH (SS AND DCA)
FEBCO	825	3/4 - 10 INCH
	860	1/2 - 8 INCH
	880	2 1/2 - 10 INCH (N AND Z SHAPE)
FLOMATIC	RPZ	1/2 - 8 INCH
WATTS	009QT	1/2 - 2 INCH
	095QT	1/2 - 1 INCH
	909QT	3/4 - 2 INCH
	009NRS	2 1/2 - 10 INCH
	994NRS	4 & 6 INCH
WILKINS	375	4 INCH
	975	1/2 - 10 INCH

**APPROVED DOUBLE CHECK DETECTOR ASSEMBLIES
FIRELINE**

AMES	3000S	2 - 10 INCH
CONBRACO	40-600	3 - 10 INCH
FEBCO	806DDCA	3 - 10 INCH
	856DDCA	2 1/2 - 8 INCH
	876DDCA	2 1/2 - 10 INCH (N AND Z SHAPE)
WATTS	007DCDA	2 - 3 INCH
	709DCDA	3 - 10 INCH
	774DCDA	4 - 10 INCH
	774XDCDA	6 & 8 INCH
WILKINS	350DCDA	4 & 6 INCH
	450DCDA	4 INCH
	950DCDA	2 1/2 - 10 INCH

**APPROVED REDUCE PRESSURE DETECTOR ASSEMBLIES
FIRELINE**

AMES	5000SS	4 - 10 INCH
CONBRACO	40-700	3 - 10 INCH
FEBCO	826RPDA	2 1/2 - 10 INCH
WATTS	909RPDA	2 1/2 - 10 INCH
WILKINS	975RPDA	2 1/2 - 10 INCH

APPROVED ENCLOSURES

TEST REQUIREMENTS

1. Upon complete installation of all backflow assemblies, the customer is responsible for having a certified backflow technician, approved by Stanly County Public Works to make all tests and repairs. A completed duplicate copy of all tests and repairs must be sent to the Backflow Administrator with in thirty (30) days of completion. The customer must maintain a file of these reports for no less than five (5) years.

Before beginning any tests or repairs on a fire protection system the customer will be responsible to notify all parties that could be effected by the shutting off of the water service during any procedures (i.e. alarm company, insurance agents, local fire officials).

If an assembly is in need of repair before the annual test period, the customer will be responsible to have repairs made immediately by an approved backflow technician. Any repaired assembly must be tested upon completion of any repairs. All repair parts must be of a manufacture's approval.

APPROVED CERTIFIED TESTERS

Any person interested in testing backflow assemblies in Stanly County must have a certification from an approved school providing certification in Backflow Prevention Testing and Cross-Connection Control. The following schools have been approved by Stanly County:

Fayetteville Public Works Commission
P. O. Box 1089
Fayetteville, NC 28302
Mr. Ronnie West, Coordinator
(910) 678-7439

City of Raleigh
Department of Public Utilities
P. O. Box 590
Raleigh, NC 27602
Mr. Ben Yarborough, Coordinator

University of Southern California
Foundation for Cross-Connection Control and
Hydraulic Research School of Engineering
BHE314 University Park MC-0231
Los Angeles, CA 90089-0231
Mr. Paul H. Schwartz, P.E., Coordinator
(213) 743-2032

University of Florida
Center for Training Research and Education for
Environmental Occupations (TREEO)
3900 SW 63rd Boulevard
Gainesville, Florida 32608

Charlotte-Mecklenburg Utility Department
System Protection Division Backflow Prevention
5100 Brookshire Boulevard 5200
Charlotte, North Carolina 28216
Mr. Mark A. Krouse, Coordinator
(704) 391-5159 704-399-2426 ext 294

2. All testers must also have a thorough understanding of Stanly County Public Works Backflow Prevention Ordinance and adhere to test procedures for Double Check Valves and Reduce Pressure Principle Assemblies as listed in the current procedures from the University of Southern California Foundation for Cross-Connection and Hydraulic Research Manual of Cross-Connection Control.

A person wishing to be put on a list of approved testers for Stanly County Public Works must provide the County with a request letter with their full name, address, phone number (between 9 am and 5 pm), the name of the school from which certification was obtained and certificate number.

3. All tests must be done using test kits approved by Stanly County Utilities.
4. Full consent from the customer must be granted to the tester before any test procedures take place. The tester must make sure the customer can provide safety for life and property during the entire testing or repair procedure. Until these safety precautions have been met no test shall be completed.
5. A tester will be required to report any improperly installed assembly or installed non-approved manufacture's parts. Falsification of any records by the tester will result in the immediate removal from the approved tester list and be subject to penalties set forth in the ordinance.

REQUIREMENTS FOR TEST KITS

All test kits used for testing backflow prevention assemblies shall meet the following requirements for approval by Stanly County Public Works:

1. Must meet the requirements of the University of Southern California Foundation for Cross-Connection and Hydraulic Research standards for differential pressure gauges.
2. Stanly County Public Works will require a calibration certificate (less than one year old) for each kit and re-calibration annually.
3. The test person must supply Stanly County Public Works with the following information for each kit to be registered:

Manufacture Kit
Type of kit (Duplex/Differential)
Serial Number
Owner's Name, Address and Phone
Date of Calibration

APPROVED TEST KITS

ITT BARTON	100 BFT
CONBRACO	40-200-TK
FEBCO	RP TI-1 (RPPA – ONLY)
MIDWEST	MODEL 830 RP
WATTS	MODEL TK-DP

REDUCED PRESSURE PRINCIPAL ASSEMBLY TEST PROCEDURES

PREP	Notify customer Inspect area Flush test cocks (open 4, 3, open then close 1, 2, close 3, 4) Install fittings Inspect test kit - close all needle valves
OBSERVE CV1	Attach high hose to test cock #2 Attach low hose to test cock #3 Open test cock #3 slowly then open low pressure bleed valve Open test cock #2 slowly then open high pressure bleed valve Close high pressure bleed valve Close low pressure bleed valve Close shut-off valve #2 Observe check valve 1 - (record as close tight or leaking)
RECORD RELIEF VALUE	Open high control valve two full turns Open low control valve slowly (no more than 1/4 turn) Record relief valve opening (greater or less than 2.0 psid) Close low control valve only
RECORD CV 2 LEAKS OR CLOSED TIGHT	Bleed bypass hose by opening bypass valve Loosely attach bypass hose to test cock #4 Close bypass valve Tighten bypass hose to test cock #4 open test cock #4 Reset gauge - (open and close low pressure bleed valve) Open bypass valve two full turns Observe whether relief valve drips Record check valve #2 as (closed tight or leaking)
<p>NOTE: TO POSITIVELY VERIFY THE CONDITION OF SHUT-OFF #2, WITH VENT VALVE STILL OPEN, CLOSE TC #2, IF SHUT-OFF IS LEAKING, THE GAUGE WILL FALL TO 0.0 PSI BUT THE RELIEF VALVE WILL NOT OPEN. IF GAUGE NEEDLE RISES, THEN SHUT-OFF #2 IS LEAKING AND THERE IS BACKPRESSURE IN THE CUSTOMER'S SYSTEM. IF SHUT-OFF #2 IS LEAKING VALUES FOR THE RELIEF VALVE AND BOTH CHECK VALVES ARE INACCURATE. **NOTE - BE PREPARED TO CLOSE VENT BY-PASS CONTROL VALVE**</p>	
RECORD CV1	Close bypass valve Open test cock #2 Reset gauge - (open and close low pressure bleed valve) Record check valve #1 differential (greater or less than 5.0 psid) Close test cocks 2, 3, and 4 Remove vent hose from test cock #4
RECORD CV2	Move low hose to test cock #4 Move high hose to test cock #3 Open test cock #4 slowly then open low pressure bleed valve Open test cock #3 slowly then open high pressure bleed valve Close high pressure bleed valve Close low pressure bleed valve Record check valve #2 differential (greater or less than 1.0 psid)
FINAL	Close test cocks - remove all equipment Open shut-off #2 slowly

REDUCED PRESSURE ASSEMBLY
TROUBLE SHOOTING

NOTE: Many problems can be corrected by cleaning the internal components.
Carefully observe condition of components.

PROBLEM	MAY BE CAUSED BY
Relief valve discharges continuously	<ol style="list-style-type: none"> 1. Faulty 1st check valve 2. Faulty 2nd check valve with back-pressure condition 3. Faulty relief valve
Relief valve discharges intermittently	<ol style="list-style-type: none"> 1. Properly working assembly with back-siphonage condition 2. 1st check valve "buffer" is too small (example- less than 3.0 psi), with line pressure fluctuation 3. Water hammer
Relief valve discharges after #2 shut-off valve is shut (test #1)	<ol style="list-style-type: none"> 1. Normally indicates faulty 1st check valve <ol style="list-style-type: none"> A. Dirty or damaged disk B. Dirty or damaged seat
Relief valve would not open, differential on the gauge would not drop (test #1)	<ol style="list-style-type: none"> 1. Leaky #2 shut-off valve with flow through assembly.
Relief valve would not open, differential drops to zero (test #1)	<ol style="list-style-type: none"> 1. Relief valve stuck closed due to corrosion or scale 2. Relief valve sensing line(s) plugged
Relief valve opens too high (with sufficiently high 1 st check reading)	<ol style="list-style-type: none"> 1. Faulty relief valve <ol style="list-style-type: none"> A. Dirty or damaged disk B. Dirty or damaged seat
1 st check reading too low (less than 3.0 psi "buffer") (test #1 & #3)	<ol style="list-style-type: none"> 1. Dirty or damaged disk 2. Dirty or damaged seat 3. Guide members hanging up 4. Weak or broken spring
Leaky 2 nd check valve (back-pressure test) 2 nd check valve reading too low (differential test)	<ol style="list-style-type: none"> 1. Dirty or damaged disk 2. Dirty or damaged seat 3. Guide members hanging up 4. Weak or broken spring

Repair Note: Lubricants shall only be used to assist with the re-assembly of components, and **shall be non-toxic.**

DOUBLE CHECK VALVE ASSEMBLY TEST PROCEDURES
DIFFERENTIAL TEST METHOD

PREP

Notify customer
Inspect area
Flush all test cocks
Install fittings
Inspect test kit - close all needle valves

CV #1

Install vertical tube on test cock #3
Install compensating tee on test cock #2
Note: Test gauge and hoses must be at same height
Attach high hose to compensating tee installed on test cock #2
Open test cock #2 slowly
Open high pressure bleed valve - bleed air from gauge
Close high pressure bleed valve
Open test cock #3 to fill vertical tube
Close test cock #3
Close shut-off valve #2
Close shut-off valve #1
Open test cock #3
Note: Gauge must read 1.0 psi or greater to pass
Record value of check valve #1

CV #2

Close test cock #2 and test cock #3
Open shut-off valve #1
Remove vertical tube from test cock #3
Move high hose and compensation tee from test cock #2 to
test cock #3
Install vertical tube on test cock #4
Open test cock #3 slowly
Open high pressure bleed valve - bleed air from gauge
Close high pressure bleed valve
Open test cock #4 to fill tube
Close test cock #4
Close shut off valve #1
Open test cock #4
Note: Gauge must read 1.0 psi or greater to pass
Record value of check valve #2

FINAL

Close test cocks - remove all equipment
Open shut off valve #1
Open shut off valve #2 slowly

