TOWN OF DAYTON WATER DEPARTMENT
OPERATING PROCEDURES AND POLICY MANUAL

I. Introduction

The purpose of the Backflow Prevention Program is to ensure that there is no possible contamination of your drinking water due to improper plumbing interconnections. Examples of potential cross connections are commercial boilers, a facility with chemical usage or a residential property with an irrigation system, garden hoses, etc... The best protection of backflow is an air gap. Another backflow protection is a mechanical valve that senses a flow reversal and stops possibly harmful water from entering our drinking water.

The program is mandated by the U.S. Environmental Protection Agency and the Virginia Department of Health. There are presently 81 businesses connected to the town water system. About 90 percent of these major backflow devices in the system are located in commercial or industrial properties. The backflow device is owned and maintained by the property owner and the testing is performed by a certified and approved backflow tester(s).

Scheduled appointments for the testing are necessary, as commercial properties are tested during normal business hours and most residential properties have the device located on the outside of the building for easy access.

II. A cross connection is any connection through which a non-potable fluid could flow into a potable water system. This fluid flow is called "backflow" and is defined as the flow of gas, water, or other material into a public or private potable water system from any source other than the distribution system.

Backflow may occur at any time when there is an imbalance in the hydraulic forces in a potable water system whereby non-potable water can be forced or drawn into a potable water system. Meter setters for all new residential services will have a double check valve located where the customer will connect to the water system. Additional devices may also be required on; (Examples: garden hose, tank filling locations, hazardous chemical containers, other potentially harmful solutions, etc).

III. Rules & Regulations:

TITLE: CROSS CONNECTION AND BACKFLOW PREVENTION IN THE WATERWORKS SYSTEM FOR THE TOWN OF DAYTON AS PURVEYOR

IV. Administration:

Operations Manager shall administer and enforce this program.

V. Procedures

A. General

1. The Water Operations Supervisor will arrange to have a questionnaire sent to each water supply system customer except those identified in Section VIII of the program.

2. The Water Operations Supervisor will arrange to have trained Personnel conduct a survey of each water supply system identified in Section VIII of the Program.

3. The Water Operations Supervisor will review all new plans for fire service connections and lawn or irrigation systems served by the water works for cross connection control program approval.

4. The Water Operations Supervisor will coordinate cross connection control requirements at new premises with the Rockingham County local building official.

5. The Operations Manager will organize a cross connection control device operational verification program at existing premises with devices installed.

B. Surveys of Water Supply Systems

1. The Water Operations Supervisor will have trained personnel conduct a cross connection control survey of each water supply system identified in Section VIII of the Program with a prepared questionnaire.

2. Available information about the premises to be surveyed will be gathered by the Water Operations Supervisor or inspectors prior to the survey.

3. The Water Operations Supervisor or Inspector(s) will explain the reasons for cross connection control to the water supply owner (representative).

4. The Water Operations Supervisor or Inspector(s) will ask if there are any plans for future expansion and discuss possibility of additional protection requirements.

5. The inspection of the premises will be made to determine if isolation devices should be provided for the protection of the water supply system users.

6. All information will be recorded on the questionnaire. This would include water uses, assessment of degrees of hazard and diagrams.

7. The results of the survey with recommendations for containment devices will be submitted to the Water Operations Supervisor for approval. Recommendations for isolation devices will be submitted to the local building official through the Water Operations Supervisor for approval. When actual potential cross-connections are identified within the water system, isolation devices will be required if within two years of the issuance of the Certificate of Occupancy. All other existing facilities will be subject to voluntary compliance with recommendations made by the Operations Manager and/or Water Operations Supervisor.

8. Notify the water supply system owner in writing as to the required location of the device; type of service, including ASSE and applicable AWWA Standards; installation requirements; testing, inspecting and overhauling requirements; and a deadline for completing the installation.

9. If the water supply system owner fails to install the required device within the deadline, a second notice shall be prepared with notification of termination of water service unless compliance is obtained within five days.

10. Cross connection control surveys of other premises not identified in section VIII of the Program will be scheduled by the Operations manager and the Water Operations Supervisor based on the response to the annual questionnaire.

11. Establish a file or chart as a reminder of re-inspection dates.

C. New Premises (Residential)

1. All permit applications shall be reviewed and approved by the local building official for cross connection control requirements.

2. All nonresidential permit applications shall be reviewed and approved by the Operations Manager and/or the Water Operations Supervisor for containment backflow prevention assembly requirements.

   a. Required level of containment protection will be identified on plans prior to issuance of a building permit.

   b. Permit application will be stamped - CCC reviewed.

   c. Property Owner listed on permit application will be contacted by telephone to explain stamp on plans.

   d. List of approved assemblies and installation requirements for containment assembly will be mailed to owner or contractor as directed by property owner.

   e. Local building official will inquire about proper installation of backflow prevention assembly at rough-in inspection. Contractor will be advised to contact the Operations Manager at (540) 879-2241 to resolve installation problems.

3. Required devices shall be operational prior to issuance of a certificate to occupy. The initial test will be performed by the Water Operations Supervisor or an approved tester.

4. Changes in the use of a building shall be reviewed as a new building.

5. A follow up inspection will be performed after occupancy, if the use of the premises is unknown prior to occupancy.

6. Plans for fire service connections and lawn or irrigation systems served by the waterworks shall be reviewed by the Operations Manager or the Water Operations Supervisor and approval recommendations made to the local building official prior to issuance of a building permit.

7. All residential water supply system openings or outlets subject to contamination shall be fitted with appropriate backflow prevention devices (point of use isolation) and all residential plumbing fixtures or appliances subject to contamination shall be fitted with an appropriate backflow prevention device (area or zone isolation). As a minimum, all outside hose bib connections shall be the automatic draining, frost-proof wall hydrant type (ASSE 1019).

D. Existing Premises

1. Notification of the annual testing of required devices will be the responsibility of The Town of Dayton unless otherwise authorized. Device testers shall have obtained a certificate of completion of a course recognized by the American Water Works Association, the Virginia Department of Health or the Virginia Cross Connection Control Association for testing backflow prevention devices.

2. Annual test results, maintenance records and overhaul records shall be reported to The Town of Dayton within 30 days of completion of testing or work.

3. Annual questionnaires shall be mailed to each water supply system owner except where the premises are scheduled to be inspected by The Town of Dayton.

4. Residential containment devices, such as those devices consisting of dual, independent check valves (ASSE std. 1024), shall be overhauled or replaced every five (5) years. Residential isolation devices which are not testable in line shall be replaced or overhauled every five (5) years.

5. The results of the annual questionnaires shall be reviewed by the Water Operations Supervisor. Based on the questionnaires, cross connection control inspections will be scheduled and appropriate devices required. No response to the questionnaire will result in an inspection and/or disconnection of water service.

6. Premises identified as having a device or air gap installed (containment or isolation) will be inspected by The Town of Dayton annually to reaffirm the degree of hazard and to survey the facility for new hazards. During this inspection, each installed device or air gap will be inspected for appropriateness, proper installation and general appearance. A report will be filed by the Operations Manager and the Water Operations Supervisor with violations noted and/or recommendations for repair, replacement of existing devices and/or installation of additional devices.

7. Questionnaires can be repeated annually at the discretion of the Water Operations Supervisor instead of an annual inspection at residences where devices are installed.

8. Premises requesting a new service connection or a reconnection to the waterworks must be inspected and surveyed for cross connections and the appropriate devices installed, tested and operational prior to making the service connection.

9. Existing premises with individual water supplies may, upon approval of the Operations Manager and/or the Water Operations Supervisor maintain the water supply on the premises if an air gap or physical separation from the premises water supply system is provided and maintained. Annual inspections shall be made to verify the maintenance of the air gap or physical separation. If access is denied for an inspection or the air gap or physical separation has been defeated, then the water service connection shall be disconnected.

VI. RECORDS

A. An up-to-date listing of water supply system owners who have cross connection control devices (including air gaps) shall be maintained by The Town of Dayton. The list will contain:

- owner of premises
- tenant
- name of premises
- service address
- phone number
- location of device
- contact person
- manufacturer of device
- device model number
- device serial number
- device size

B. Cross connection control inspection reports will be maintained by The Town of Dayton for 10 years. These reports will contain:

- inventory information as noted in IV-A
- an assessment of:
- appropriateness of device installation
- general appearance of device
- repair/replacement recommendation
- new/additional device recommendation
- any indication of thermal expansion problems

C. Cross connection control testing reports will be maintained by The Town of Dayton for 10 years. These reports will contain:

- inventory information as noted in IV-A
- line pressure
- results of testing
- test method used
- date and signature of approved tester is required

D. All Testers & Testing Equipment must be certified.

1. Testers
   a. Must register & show documentation with The Town of Dayton & be qualified to test in The Town of Dayton.

   b. Must show certification every two (2) years to The Town of Dayton to stay registered.

2. Equipment
   a. Must be registered & have documentation with The Town of Dayton to be used in The Town of Dayton.

   b. Must show documentation every year to stay registered.

3. If repairs were made, the test report will contain:

   - which parts replaced
   - probable cause of test failure
   - preventive measures taken

E. Questionnaires will be maintained by the Town of Dayton for 10 years. The questionnaire will contain:

   - owner and address of residence
   - occupant if different from owner – phone number
   - brief explanation of the program
   - brief explanation of causes of backflow and control measures
   - some likely household cross connections:
   - a garden hose with its outlet submerged
   - kitchen sink spray hose with its spray head submerged
   - hand-held shower massager with its head submerged
   - garden hose used as an aspirator to spray
   - soap or garden chemicals
   - storm, hot-tub, cistern, or swimming pool connected to the house plumbing system
   - water softeners improperly connected

Specific questions included but not limited to:

- individual wells, springs, on cisterns on the property
- pressure booster pumps
- water storage tanks
- water treatment systems
- outside hose bibs used in conjunction with:
- chemical sprays
- jet spray washers
- swimming pools, hot tubs, saunas, etc.
- lawn irrigation systems
- photographic developing
- utility sinks with hoses extending below sink rim
- animal watering troughs

A listing of all existing cross connection control devices:

- working properly – leaking, noisy
- any modifications or repairs made
- any problems with hot water tank relief valve or faucet washers not lasting very long

Also included with the questionnaire should be:

- educational material
- who to contact for further information
- who to contact if contamination is ever suspected

F. Residential containment device overhaul or replacement reports will be maintained by The Town of Dayton for 10 years. The report will contain:

- inventory information as noted in IV – A
- overhaul/replacement action
- date of action

VII. NOTIFICATION LETTERS (Samples to be included)

- Inspections
- Testing due
- Inspection report
- Test results
- Device required
- Violations

- Termination of service

VIII. REPORTING CONTAMINATION OR SUSPECTED CONTAMINATION

The water supply system owner, Town of Dayton, device tester or any other person should report contamination or the suspicion of contamination to any one or all of the following:

Wade Hill – Operations Manager
Town of Dayton – (540) 879-2241

Water System Supervisor – (540) 879-2275

The Town of Dayton will be responsible for investigating reports and will be responsible for notifying the appropriate Virginia Department of Health, Office of Water Programs, and Lexington Field Office at 540-463-7136.

IX. DEVICE SELECTION GUIDELINES

a. Virginia Cross Connection Control Association – Recommended Best Practice RBP 1.0 – 12/88 Irrigation Systems
b. International National Plumbing Code
c. EPA Cross-Connection Control Manual
d. Virginia *Waterworks Regulations*
e. Manual of Cross Connection Control; University of Southern California FCCCHR
f. Recommended practice for Backflow Prevention and Cross Connection Control: AWWAM14
g. University of Florida Treeo Center

X. FACILITIES REQUIRING PROTECTION

Approved backflow prevention assemblies shall be installed on the service connection to any premises that The Town of Dayton has identified as having a potential for backflow.

The following types of facilities or services have been identified by the Water Operations Supervisor as having a potential for backflow of non-potable water into the public water supply system. Therefore, an approved backflow prevention assembly will be required on all such services according to the degree of hazard present. Other types of facilities or services not listed below may also be required to install approved backflow prevention assemblies if determined necessary by the Water Operations Supervisor. As a minimum requirement, all commercial services will be required to install a Double Check Valve Assembly, unless otherwise listed in the Program.

- Aircraft and Missile Plant: RPZ

- Automotive Services Stations, Dealerships, etc.

  i. No Health Hazard: DCVA
  ii. Health Hazard: RPZ

- Automotive Plants: RPZ

- Auxiliary Water Systems

  i. Approved Public/Private Water Supply: DCVA
  ii. Unapproved public/Private Water Supply: AG
  iii. Used Water and Industrial Fluids: RPZ

- Bakeries

  i. No Health Hazard: DCVA
  ii. Health Hazard: RPZ

- Beauty Shops/Barber Shops

  i. No Health Hazard: DCVA
  ii. Health Hazard: RPZ

- Beverage and Food Processing Plants: RPZ

- Breweries: RPZ

- Buildings – Hotels, apartment houses, public and private buildings, or other structures having unprotected cross connections.

i. (Under five stories) No Health Hazard: DCVA
ii. (Under five stories) Health Hazard: RPZ
iii. (Over five stories) All: RPZ

- Canneries, packing houses, and rendering plants: RPZ

- Chemical plants – Manufacturing, processing, compounding or treatment: RPZ
- Chemically contaminated water systems: RPZ

- Commercial car-wash facilities: RPZ

- Commercial greenhouses and nurseries: RPZ

- Commercial sales establishments (department stores, malls, etc).

i. No Health Hazard: DCVA
ii. Health hazard: RPZ

- Concrete/asphalt plants: RPZ

- Dairies and cold storage plant: RPZ

- Dye Works: RPZ

- Farms where water is used for other than household purposes: RPZ

- Film laboratories: RPZ

- Fire service systems

i. No Health Hazard: DCDA
ii. Health Hazard: (Booster Pumps, Foam, Antifreeze Solution, etc.):RPDA

- Health Clubs with swimming pools, therapeutic baths, hot tubs or saunas: RPZ

- Hospitals, medical buildings, sanitariums, morgues, mortuaries, autopsy facilities, nursing and convalescent homes, medical clinics, and veterinary hospitals: RPZ

- Laboratories: RPZ

- Laundries: RPZ

- Lawn irrigation systems: RPZ or PVB where approved

- Metal manufacturing, cleaning, processing, and fabricating plants: RPZ

- Mobile home parks

i. No Health Hazard: DCVA
ii. Health Hazard: RPZ

- Oil and gas production, storage or transmission properties:RPZ

- Paper and paper products plant: RPZ

- Pest control: RPZ

- Pharmaceutical Plants :RPZ

- Plating plants: RPZ

- Power plants: RPZ

- Radioactive materials or substances – plants or facilities handling: RPZ

- Restaurants

i. No Health Hazard: DCVA
ii. Health Hazard: RPZ

- Restricted, classified, or other closed facilities: RPZ

- Rubber Plants (natural or synthetic): RPZ

- Sand and gravel plants: RPZ

- Schools and colleges with laboratory facilities: RPZ

- Sewage and storm drain facilities: RPZ

- Swimming Pools: RPZ

i. No Health Hazard (i.e., air gap): DCVA
ii. Health hazard (i.e., direct connection): RPZ

- Fish or Plant Ponds: RPZ

- Pond or Lakes with Fountains: RPZ

- Waterfront facilities and industries: RPZ

RPZ	=	Reduced Pressure Principle Assembly
DCVA	=	Double Check Valve Assembly
AG	=	Air Gap
DCDA	=	Double Check Detector Assembly
RPDA	=	Reduced pressure Detector Assembly
PVB	=	Pressure Vacuum Breaker

All assemblies and installations shall be subject to inspection and approval by the Water Department.

XI. DEVICE SELECTION – based on degree of hazard and method of potential backflow:

ASSE#	Degree of Hazard	Method of backflow		Device
	High	BP or BS		Air Gaps
	"	BP or BS	RPZ	1013
	Low	BP or BS	DCVA	1015
	"	BP or BS	PVB	1020
		BS	AVB	1001
	"	BS	HBVB	1011
	"	BS	Hydrant w/AVB	1019
	"	BP or BS	Double Check W/Vent	1012
	"	BP or BS	Double Check W/o Vent	1024
	"	BP or BS	Dual Check for Carbonated Bev. Dispensers	1032

NOTES:
Degree of Hazard – See Table 1 – Determination of Degree of Hazard in the Program.
Air gaps give the highest degree of protection and shall be used whenever practical to do so in high hazard situations subject to back pressure.
BS means backflow by back siphon age.
BP means backflow by back pressure or superior pressure device.
AVB means an atmospheric vacuum breaker.
PVB means a pressure vacuum breaker.
HBVB means a hose bib type atmospheric vacuum breaker.
Hydrant means a through-the wall type hydrant.
Yard Hydrants which are frost proof and drain the water in the barrel into an internal reservoir will not drain automatically when fitted with a HBVB.
DCVA means a double check valve assembly.
Double check without a vent means a device composed of two independently acting check valves.
Double check with a vent means a device composed of two independently acting check valves with an intermediate atmospheric vent. **RPZ** means reduced pressure principle assembly.

XII. DEVICE TESTABILITY/SERVICEABILITY

1. Containment or isolation devices used within the premises water supply system that are capable of being tested and repaired in-line include the RPZ, DCVA & PVB.

2. Residential Dual Checks with or without an intermediate atmospheric vent are testable but must be removed for testing. Some can be overhauled in-line.

3. Generally, a visual inspection is the only way to inspect most HBVB since they can not be removed. Some manufacturers do provide wall hydrant type HBVH with removable vacuum breakers which can be easily removed for inspection and replacement.

4. Pipe connected AVB can be inspected by removing the top cover.

5. Air gaps require only a visual inspection.

6. Testing of backflow prevention assemblies shall be made by a Virginia certified backflow prevention assembly tester, authorized or employed by The Town of Dayton. Such tests are to be conducted upon installation and repair thereafter at a frequency to be determined by the

Town of Dayton. A record of all testing and repairs is to be retained by the customer.

7. Any time that repairs to backflow prevention assemblies are deemed necessary, whether through required testing or routine inspection by the owner or by the Water Operations Supervisor, these repairs must be completed within a specified time in accordance with the degree of hazard. In no case shall this time period exceed:

   Health Hazard Facilities – 14 days
   Non-Health Hazard Facilities – 21 days

8. All backflow prevention assemblies with test cocks are required to be tested with a minimum frequency as determined by The Town of Dayton. Testing requires a water shutdown usually lasting five (5) to twenty (20) minutes. For facilities that require an uninterrupted supply of water, and when it is not possible to provide water service from two separate meters, provisions shall be made for a **"parallel installation"** of backflow prevention assemblies.

9. All Virginia certified backflow prevention assembly testers must obtain and employ backflow prevention assembly test equipment which meets the University of Southern California's Foundation for Cross Connection Control and Hydraulic Research approval. All test equipment shall be registered with the Town of Dayton. All test equipment shall be checked for accuracy annually (at a minimum), calibrated, if necessary, and certified to the Town of Dayton as to such accuracy/calibration employing a calibration method acceptable to the Town of Dayton.

10. All Virginia certified testers which meet the requirements in **Section X**; **Paragraph 6** shall be registered with the Town of Dayton & shall prove certification every **two years**.

XIII. INSTALLATION REQUIREMENTS

A. General

1. All backflow prevention assemblies shall be installed in accordance with the specifications furnished by the Town of Dayton and/or the manufacturer's installation instructions.

2. All backflow prevention assemblies shall be installed according to the requirements outlined in the Uniform Statewide Building Code.

3. All new construction plans and specifications, when required by the Uniform Statewide Building Code and the Virginia Department of health, shall be made available to the Water Department for review and approval and to determine the degree of hazard.

4. Ownership and maintenance of the assembly shall be the responsibility of the customer.

5. All double check valve assemblies must be installed in drainable pits whenever below ground installation is necessary, in accordance with detailed specifications provided by the Town of Dayton.

6. Reduced pressure principle assemblies must be installed in an easily accessible location, and location in which no portion of the assembly can become submerged under any circumstances **(pit and/or below grade installations are prohibited).**

7. The installation of a backflow prevention assembly which is not approved must be replaced with an approved backflow prevention assembly.

8. The installer is responsible to make sure a backflow prevention assembly is working properly upon installation and is required to contact the Town of Dayton within three (3) days after a reduced pressure principle backflow preventer (RPZ), double-check valve assembly (DCVA), or pressure vacuum breaker (PVB), double check-detector assembly (DCDA), reduced pressure principle detector assembly (RPDA) is installed.

9. Following installation, all RPZ, DCVA, PVB, DCDA, and RPDA are required to be tested by a Virginia certified backflow prevention assembly tester within ten (10) days. This initial test and inspection may be provided by the Water Department. The following information shall be obtained at the initial inspection:

    - service address where assembly is located
    - owner (and address, if different from service address)
    - description of assembly's location
    - date of installation
    - installed (include name, plumbing company represented, plumber's license number, and project permit number)
    - type of assembly, size of assembly
    - manufacturer, model number, serial number
    - test results/report

10. When it is not possible to interrupt water service, provisions shall be made for a "parallel installation" of backflow prevention assemblies. The Town of Dayton will not accept an unprotected bypass around a backflow preventer when the assembly is in need of testing, repair, or replacement.

11. The consumer shall, upon notification, install the appropriate containment assembly not to exceed the following time frame:

    - Health Hazard. . . . . 30 days
    - Non-health Hazard . . . . . 60 days

B. Requirements for Above Ground Installations of Reduced Pressure Principle and Double Check Valve Assemblies

1. The backflow preventer must be installed a minimum distance of five (5) feet from the meter service. Installations of backflow preventers within the utility right of way will not be approved.

2. Reduced pressure principle assemblies must be installed in a horizontal position or a vertical position and in a location in which no portion of the assembly can become submerged under any circumstances.

3. Double check valve assemblies may be installed in a Vertical position provided the flow of water is in an upward direction.

4. Reduced pressure principle backflow preventers, must be installed above ground. Double check valve assemblies must be installed above ground wherever a drainable vault cannot be used. Backflow prevention assemblies installed inside the building are preferred. Where this is not possible, outside installations are permitted with prior approval and inspection by the Water System Supervisor.

5. Backflow preventers installed inside must be a minimum distance of twelve (12) inches above the floor, and no higher than four (4) foot above the floor, with adequate clearance around the backflow preventer for testing, and/or repair of the backflow prevention assembly. Wherever a reduced pressure principle backflow preventer is installed inside a building, an air gap drain line large enough to carry off the discharge of water from the relief valve shall be installed.

6. Backflow prevention assemblies installed outside, above ground, must be protected from freezing. The backflow prevention assembly must be installed a minimum distance of twelve (12) inches above the ground, and no higher than four (4) foot above ground. Landscaping is allowed around the backflow preventer, but must not interfere with the required annual testing, and/or repair of the backflow prevention assembly. AVB preventers must be 12" above highest fixture.

7. Backflow prevention assemblies two (2") inches and larger must be supported to allow for the weight of the backflow prevention assembly. Support construction can be cinder block, brick, and steel or approved plastic supports. Supports must have a proper footing (four (4) inches of concrete) for supports to rest upon. Backflow prevention assembly's supports must not interfere with

the valves, test cocks, testing, and/or repair of the backflow prevention assembly.

8. All piping must be ductile iron, or copper "K/ L" type.

9. Before starting installation of a backflow preventer, contact the Town of Dayton to assist you to insure proper installation of the backflow prevention assembly, and to insure the backflow prevention assembly does meet the current Town of Dayton approval list.

C. Requirements for Below Ground Installations of Double Check Valve Assembly Backflow Preventers 2 ½" through 10"

1. Double check valve assembly backflow preventers installed below ground must be in a drainable vault. The vault shall have positive drainage with adequate gravity drainage to daylight. Drainage with the use of a sump pump with a high water alarm may be used with prior approval and inspection by the Water System Supervisor. Below ground installations with gravity drain to storm drainage system are not acceptable.

2. The backflow preventer must be installed a minimum distance of five (5) feet from the meter service. Installations of backflow preventers within the utility right of way will not be approved.

3. Vault walls must be constructed with eight (8) inch cinder blocks or 4" concrete. The vault shall be large enough to allow twelve (12) inches minimum clearance between the vault walls to each side of the backflow preventer, twelve (12) inches minimum clearance between the vault walls on each end of the vault to the inlet and outlet valves of the backflow preventer. Specific details on vault construction shall be obtained from the Town of Dayton prior to construction.

4. The floor of the vault must be gravel with a minimum depth of twenty-four (24) inches. The distance between the lowest point of the backflow preventer to the surface of the gravel shall be no less than twelve (12) inches.

5. Backflow preventers must be supported to allow for the weight of the assembly. Support construction can be cinder blocks, bricks, steel, or approved plastic supports. Supports must have a proper footing (four (4) inches of concrete) below the gravel for supports to rest upon. Assembly supports must not interfere with valves, test cocks, testing, and/or repair of the backflow prevention assembly.

6. All piping within the vault must be ductile iron, steel or copper "K/ L" type pipe.

7. Vault lids must be one-quarter (1/4) inch thick deck steel, or approved aluminum and must cover the total outside dimensions of the vault walls, and must also be to the grade of the ground surface or higher. Vault lids shall not exceed 135 pounds. Vaults that require large sections of vault lids must be hinged for removal of the lid for access during testing and maintenance of the backflow assembly. Large vault lids must be supported to insure lids will not warp or fall in. Angle iron, 2" x 2" x ¼", must be used on the bottom of the lids to prevent warping of the vault lids.

D. Requirements of Below Ground Installations of Double Check Valve Assembly Backflow Preventers ¾" through 2"

1. The backflow preventer must be installed a minimum distance of five (5) feet from the meter service. Installations of backflow preventers within the utility right of way will not be approved.

2. Double check valve assembly backflow preventers may be installed in plastic boxes provided they are not located in driveways, or sidewalks. Enclosures made of cinder blocks with deck steel lids, or approved aluminum, steel boxes, or pre-cast concrete boxes are approved to be used in driveways and sidewalks.

3.A. Backflow preventers three quarter (3/4) inch and one (1) inch in size must be installed in an enclosure with a minimum size of twelve (12) inches deep, twenty (20) inches wide, and twenty four (24) inches long.

B. Backflow preventers one and one half (1-1/2) inches and two (2) inches in size must be installed in an enclosure with a minimum size of eighteen (18) inches deep, thirty (30) inches wide, and forty (40) inches long.

4. The backflow preventer must be installed in the center of the enclosure to allow adequate clearance for the testing, and/or repair of the backflow prevention assembly.

5. The floor of the enclosure must be gravel with a minimum depth of twelve (12) inches. Installations in wet areas will be subject to prior approval and inspection by the Town of Dayton. The distance between the lowest point of the backflow preventer to the surface of the gravel shall be no less than (6) inches.

6. Should you have any questions concerning the above mentioned specifications, contact Town of Dayton at (540) 879-2241 to assist you to ensure proper installation of the backflow prevention assembly, and to ensure the backflow prevention assembly does meet the current Town of Dayton approval list.

E. For installation Requirements for Pressure and Atmospheric Vacuum Breakers please contact the Town of Dayton at (540) 879-2241

XIV. THERMAL EXPANSION

Normally as water is heated it would back up into the service line into the main if no usage was occurring. Installation of backflow prevention devices or certain plumbing appurtenances at the service connection or within the water supply system prevent backflow of water from the premises to the distribution system creating a closed system. When the hot water heater is operating, water is expanding and pressure is increasing, thermal expansion in a closed plumbing system under no flow conditions may cause the emergency temperature and pressure relief valve to open and close frequently and may reduce the life of plumbing fixtures and piping.
The temperature and pressure (T&P) relief valve is an emergency relief valve, not an operating control valve. If the (T & P) relief valve is used frequently, its useful life will be shortened and could cease to function.

Thermal expansion can cause damaging stress and strain to water heaters, solenoid valves, O-rings, float valves, pump seals, and plumbing fixtures or fittings.

Generally, 80 psi for a short period of time is the maximum pressure under no flow conditions most fixtures, appliances, or appurtenances should be subjected to.

Where thermal expansion is a problem the following devices could be installed:

- A bladder or diaphragm type expansion tank;
- An auxiliary pressure relief valve;

- an anti-siphon ball cock with auxiliary relief valve into the
- toilet tank set at no more than 80 psi;

Installation should be in strict accordance with the manufacturers instructions, the Uniform Statewide Building code and the National Sanitation Foundation.

Lowering the temperature on the water heater thermostat(s) may also reduce thermal expansion.

Customers will be advised of the potential for thermal expansion prior to or during installation of a backflow prevention device. Solutions to thermal expansion will be at the discretion of the water supply system owner and at the expense of the water supply system owner.