PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

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BACKFLOW ASSEMBLY INSTALLATION REQUIREMENTS

1. Premises-Isolation assemblies (those installed that directly protect the public water supply) must be installed on private property at the property line on the centerline of the service, immediately adjacent to the water service connection and be compliant with all applicable criteria stated herein. The supply side of all premises-isolation assemblies must be plumbed with potable water piping. Premises-Isolation assemblies installed in buildings and those that extend beneath the R.O.W. shall be installed immediately at the service connection as it runs perpendicular from the water main, as close to the water main as possible and be compliant with all other applicable criteria stated herein. *On a case-by-case basis and with prior Water Bureau approval, in some instances a* ***domestic*** *Premises–Isolation backflow assembly may be installed at a point prior to any piping branches and/or run of exposed piping in the plumbing system as opposed to immediately at the service connection to the property.* Point-of-Use assemblies (those installed on piping branches, i.e. irrigation systems, process water, etc…) must be installed on private property in conformance with the local plumbing code. Point-of-Use assemblies installed as Premises-Isolation protection shall require prior Water Bureau approval. Only approved Double Check Valve and Reduced Pressure Type backflow assemblies, in an approved configuration may be used as premises-isolation backflow protection. State and/or City required premises-isolation backflow protection is a condition of water service and/or continued service where an existing service requires premises-isolation.

2. The installation of a backflow assembly may alter system operating pressure, flow and/or influence other hydraulic functions. Additionally, thermal expansion may result from the installation of a backflow assembly. The water user/installer is responsible for ensuring system operating requirements meet all applicable State and City codes.

3. Retro-Fit/Replacement backflow assembly installations shall meet current State and City installation requirements.

4. Backflow assemblies must be protected from severe environmental conditions.

5. Backflow assemblies shall be approved by the Oregon Health Authority. Installations shall meet minimum application requirements of OAR 333-061-0070 Tables 48 and 49, respectively. Only assemblies approved by OHA and the Water Bureau may be installed vertically. In addition to Title 21 & 28 of the City Code, OAR 333-061-0070, Section 13, shall apply to all existing premises-isolation backflow assembly installations.

6. Assemblies shall be readily accessible with adequate room for testing and maintenance:
   - Assemblies 2" and smaller (excludes DCDA's, see next bullet) shall maintain at least 4" clearance on all sides and at both ends respectively.
   - Assemblies larger than 2" (includes 2" DCDA's) shall maintain at least 4" clearance on the backside, 3" at both ends, 12" underneath, 24" in front and 36" vertically.

7. A minimum of a Double Check Valve Assembly (DCVA) must be installed on water services:
   - If the water meter is 2" or larger.
   - If the service is for commercial use and/or serves a mixed-use/multi-tenant property (this includes properties where a vending cart(s) are permitted).
   - If the Water Bureau determines the backflow potential warrants.

8. Premises-Isolation assemblies installed over 5' to top of assembly above finished floor elevation must have a permanently installed scaffold or platform. A rigid, vertically mounted ladder must be installed for access to the assembly. Ladder installations must comply with the Occupational Safety and Health Administration and State of Oregon Occupational Safety and Health codes.

9. Title 21.24.040 requires access be granted to all buildings and premises for inspection of water piping, as described therein.

10. Upon completion of a premises-isolation backflow assembly installation, the Portland Water Bureau must be notified. All premises-isolation assemblies must be inspected and/or tested by a Water Bureau Water Quality Inspector. All premises-isolation backflow assemblies must be tested and registered with the Water Bureau prior to water service activation.

11. Assemblies over 2" in size shall be supported by rigidly mounted metal supports (Standon Pipe Supports or equivalent) underneath the flanges at both ends of the assembly. All above-ground enclosures for assemblies shall be provided with concrete floors, which may not be less than 4" in thickness. If suspended from a ceiling, metal pipe hangers designed to carry the full load of the assembly are required to be installed.

ADDITIONAL INSTALLATION REQUIREMENTS FOR VAULTS AND ENCLOSURES

When a Double Check Valve Assembly (DCVA) or a Double Check Detector Assembly (DCDA) is installed in a vault the following shall be provided:

1. Adequate drainage: Backflow assemblies shall not be installed in locations subject to continuous immersion. Basement or vault installations must be provided with adequate drainage. Drains may not be connected or discharge to sewers, catch basins, below the flood rim of swales or river banks. A sump pump will be required if vaults are unable to be kept free of standing water. Sump pump discharge piping must meet the aforementioned vault drainage requirements.

2. Vault lid with frame and hinged cover: (Utility Vault or equivalent) where applicable use Center-Offset frame and cover lids (Utility Vault or equivalent). These will allow for necessary clearance for ladders in single assembly installations. For multiple assemblies in the same vault, (Utility Vault or equivalent) centered frame & cover lids may better accommodate installation criteria. A minimum 30" manhole cover, with a recessed lift handle, may be used in parking lot and driveway installations, only where traffic loading exceeds that of a traffic rated frame and cover (Utility Vault H-20 rating or equivalent). Applicable for 2" and larger DCVA's and all DCDA's regardless of size.

3. An approved rigidly mounted ladder, with an extension which extends 3' above the vault lid (Utility Vault Pull-Up Extension, Bilco LU-1 or equivalent) is required if the vault or chamber is 4' or greater in depth. The ladder shall be mounted vertically in the entryway of the vault or chamber and be securely anchored at top and bottom. The top and bottom rungs must be within 12" of the opening and floor, respectively. All rungs must have at least 7" of toe clearance, with the exception; if the top rung is at the same elevation as the opening the clearance may be no less than 2.5". The ladder shall not infringe on the installation clearances for the type of assembly required. For single & multiple assembly installations, refer to item #2 above to ensure proper ladder placement.

4. A moisture-proof light fixture will be required if adequate lighting is not available.

5. At least 6' of vertical headroom is required in all vaults, chambers and basement installations. Full opening double doors (Utility Vault or equivalent) can be used to obtain the 6' requirement but must encompass the entire lay-length of the assembly and must not encroach on required ladder clearances. Refer to item #2 above for proper vault lid and frame & cover applications.

6. Assemblies 2" and smaller that are configured in the "Y" pattern design shall be installed on their side with the test cocks facing up.

7. It is recommended when 2" and 1-1/2" Double Check Valve Assemblies (Excludes fire service assemblies, see page 4) are installed below grade the Carson Industries plastic box #1730-18 be used or equivalent. For 1" and smaller assemblies, Carson Industries box #1419-18 is recommended or equivalent. All assemblies 2" and smaller (Excludes fire service assemblies, see page 4) shall be installed no more than 24" below finished grade. If installed deeper, clearances shall meet those specified on page 1 item 6 (second bullet).

8. In addition to Portland Water Bureau requirements, all vault installations must meet City of Portland Bureau of Development Services standards, and subject to all applicable permit requirements.

9. All backflow assemblies installed below grade shall be provided with test cock plugs.

10. For assemblies larger than 2" (Includes 2" and *smaller* fire service DCDA's, see page 4), only pre-cast vaults (Utility Vault or equivalent) that accommodate the installation criteria will be accepted. Applicable to all below grade new service and retro-fit of existing service installations.

11. Backflow assemblies may be installed in above ground enclosures. Above ground enclosures may have clearances less than those mentioned on page 1 item 6, provided they are equipped with removable panels or doors that create clearances equal to or greater than those described herein for testing and maintenance. Such installations must be protected from freezing.

12. All vaults and enclosures for backflow assemblies shall be kept free of any debris, objects that interfere with these installation requirements and those applicable to OAR 333-061-0071. Vaults and enclosures shall not contain loose fill materials of any kind.

INSTALLATION REQUIREMENTS FOR THE
REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA)

When a Reduced Pressure Type Backflow Assembly (RPBA) is installed the following will be required:

1. An approved air-gap shall be located directly below the relief valve orifice. The air-gap shall be at least twice the inside diameter of the supply piping measured vertically above the top of any drain or receiving vessel. The air-gap shall never be less than 1".

2. When the RPBA is installed in an above ground enclosure, the enclosure drain shall drain to finished grade and be able to discharge the full rated flow of the relief-valve. The relief-valve shall be located at least 12" above the top of the drain opening.

3. When a RPBA is installed in an enclosure in a berm or hillside, the enclosure shall be equipped with a horizontal bore-sight drain to daylight, which must discharge to finished grade and/or be above the 100 year flood plane, whichever is greater. The top of the drain must be at least two supply pipe diameters below the relief valve. The bottom of the discharge end of the bore-sight drain must be at least 12" above the flood rim of any physical feature such as but not limited to; ponds, fountains, lakes, rivers, swales and/or any other type of receiving vessel. The bore-sight drain must be screened off at both ends and not have a lay length of more than 20'. The bore-sight drain shall never be connected to sewers, catch basins, sumps, dry wells or other similar facilities.

4. The proposed installation of a RPBA in an area that *may* be subject to flooding shall be reviewed and approved by the Portland Water Bureau on a case-by-case basis.

5. Reduced pressure backflow assemblies are to be installed on all water service connections that pose a risk to health. The Portland Water Bureau shall determine the degree of risk. A reduced pressure backflow assembly installed in a potable water supply line must meet applicable Plumbing Code requirements in addition to these requirements and be compliant with all applicable rules as outlined in Oregon Administrative Rule 333-061-0070, Tables 48 and 49, respectively.

6. A Reduced Pressure Type Backflow Assembly will be required to be installed on all water service connections to properties that are equipped with rainwater-harvesting (excluding those that simply capture rainwater in a container and *gravity-feed* to landscape), storm-water or groundwater recovery and reuse systems and or that use or reuse treated wastewater (grey and/or black-water) on site. Installation must be at the service connection to the property on the centerline of the service as the service runs perpendicular from the city water main and be located prior to any branches and/or run of exposed piping in the plumbing system.

REQUIREMENTS FOR BACKFLOW ASSEMBLIES INSTALLED ON FIRE SERVICES

1. A Double Check Detector Assembly (DCDA) is typically the type of backflow assembly installed on fire sprinkler water services. See note below. If the fire sprinkler service is fully metered (a meter approved by the Water Bureau for billing purposes) a Double Check Valve Assembly (DCVA) or Reduced Pressure Backflow Assembly (RPBA) may be installed depending on sprinkler system type. NOTE: A Reduced Pressure Detector Assembly (RPDA) is required to be installed when; rainwater-harvesting, storm-water or groundwater recovery and reuse systems are installed and/ or that use or reuse treated wastewater (grey and/or black-water) for the purpose of augmenting the fire sprinkler system in any capacity.

2. Backflow assemblies installed on water services for fire use only: Must be installed on private property at the property line on the centerline of the service, immediately adjacent to the service connection and be as close to the city water main as possible. If the available area between a building and the property line is adequate (determined by the Bureau), the vault, chamber or housing for the type of backflow assembly required must be installed outside the confines of the building or structure. If the available area is not able to accommodate the enclosure required (determined by the Bureau), the assembly must be installed immediately on the inside building wall at the elevation the service enters as it runs perpendicular from the city main, on the centerline of the service between one and five feet above finished floor to top of assembly. Prior to installing a backflow assembly within a building, accurate drawings must be submitted to the Portland Water Bureau, Water Quality Inspection Group for approval. Drawings must show property lines, building set backs, identify street frontage, water main, service location and proposed backflow assembly location. An inspection fee shall be paid to Water Bureau Development Services prior to replacement of an existing assembly or newly installed assembly on a dedicated fire service. Where existing fire sprinkler system water piping is significantly remodeled (significance determined by the Bureau) or modified, unapproved assemblies and or devices are to be replaced with those currently approved. The installation must be compliant with these rules and any applicable OAR Chapter 333 Rules. See OAR 333-061-0070, Section 13, which specifically addresses existing installations. *Additionally, all piping for fire sprinkler system*

backflow assembly installations must be compliant with the local Fire code. Underground piping typically requires a minimum 3 feet of cover and may also require a permit be taken out from the Fire Marshal's office.

3. Where anti-freeze compounds or any other chemicals are added to a fire sprinkler system, a Reduced Pressure Detector Assembly (RPDA) will be required unless a smaller RPBA and thermal expansion tank can be code compliantly located isolating this use (the Bureau will determine if this is an option). Where it is possible for a fire sprinkler system to be connected to or augmented by any auxiliary water source a RPDA will be required. The RPDA shall be installed at the service connection as outlined herein. All applicable RPBA installation criteria shall apply (see pg. 3). For fire systems that utilize storage tanks; the make up water line to the tank must be equipped with a Water Bureau approved air-gap or RPBA. Otherwise an RPDA will be required at the service connection to the property and installed as outlined herein.

4. When a DCDA is installed in a vault the metered by-pass must be plumbed on the side of the assembly opposite of the ladder. 4" clearance is required between the wall and the bypass. Thus the assembly must be accommodated with a minimum of 24" clearance in front, 4" behind, 12" underneath, 3" at both ends and 36" vertically.

BYPASS METERS EQUIPPED WITH TOUCHREAD REGISTER AND TOUCH PADS

1. All Double Check Detector Assemblies (DCDA's) and Reduced Pressure Detector Assemblies (RPDA's) installed on fire services must be equipped with a Water Bureau approved bypass meter and compatible touch-pad. The touch-pad must be accessible from the right-of-way.

2. Only 5/8"x 3/4" Neptune T-10 meters with PROREAD or AUTOREAD registers are to be used. Registers must read in cubic-feet. Touch-pads must be compatible with these meters. Compatible touch-pads for the above meter are Neptune model #12081-000 (wall mount application), Neptune model 12223-150 (vault door application, requires 1 ¾" hole).

3. All wiring from the touch-pad to the bypass meter shall be insulated 1 pair solid 22 AWG copper wires secured so as not to interfere with the operation and maintenance of the backflow assembly. The wiring shall not encumber the vault opening or ladder. Where the touch-pad wire follows the path of other electrical wiring, shielded wire as described above shall be used. Splices shall be made with 3M Scotchlok moisture resistant connectors part number UR or UY or equivalent. All splices shall be accessible.

4. Touch-pad mounting options:
   - On an outside building wall, at a height between 1' and 5' above the floor or finished grade and within 50' of the backflow assembly.
   - May be mounted on the vault door. This orientation should locate the touch-pad near the hinged portion of the door so as not to stress the wire between the touch-pad and meter when the door is fully opened.
   - May be installed in the concrete portion of the vault top, the touch pad must be easily accessible for replacement.
   - If touch-pad wire must be run underground the wire must be routed through PVC conduit from the meter to the touch-pad.
   - Touch-pads not installed in vault doors or on a building face shall be installed using the Brooks #37, 12" X 20" box w/T&R lid.
   - The touch-pad must be rigidly mounted.