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 immediately adjacent to the water service connection to the premises 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 including those permitted to extend beneath the R.O.W. shall be installed immediately at the service connection as it runs perpendicular from the water main and be compliant with all other applicable criteria stated herein. *On a case-by-case basis with prior Water Bureau approval and provided there are no OAR conflicts, 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. 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, such shall not be removed or relocated without first contacting Water Bureau Water Quality Inspections.

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 42 and 43, 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. See required headroom clearances for vault, chamber/enclosure and basement installations on Page 2 Item 5.

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 supplies 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 for new construction and/or replacement of an existing assembly, the Portland Water Bureau must be notified. Assemblies must be inspected by a Water Bureau Water Quality Inspector and will require that a Backflow Inspection Fee be paid.

11. Water service will not officially be activated and is subject to termination at any time until all installation related work has been completed. Work shall be completed prior to issuance of final occupancy permit from the Building Inspector.

12. 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/pads, which may not be less than 4" in thickness. If suspended from ceilings, pipe hangers designed to carry the full load of the assembly must 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. Vault installations must be provided with adequate drainage and 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. Ladder orientation shall not impede clear access to the assembly and/or vault floor. 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 for all vault, chamber, enclosure 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 will be 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. This applies to all below grade new service and retro-fit of existing service installations.
11. Above ground enclosure installations 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. Wood framed enclosure will be approved on a case-by-case basis and approved drawings submitted to the Bureau are required prior to construction. 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)

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". A RPBA must always be installed above finished grade meeting applicable drainage requirements unless an alternate enclosure installation is able to meet all applicable criteria as stated herein. See item #2 for assemblies "Installed on Fire Services" for above-finished-floor (AFF) elevation criteria.

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 plain, 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. Basement installations must provide for RPBA discharge capabilities.

5. An RPBA shall be installed on all water service connections that pose a risk to health. The Portland Water Bureau shall determine the degree of risk. A RPBA installed in a potable water system must meet applicable Plumbing Code requirements and be compliant with all applicable rules as outlined in Oregon Administrative Rule 333-061-0070, Tables 42 and 43, respectively.

6. A reduced pressure type backflow assembly is required to be installed on all water service connections to properties having private wells, water features, geothermal heating & cooling systems, hydronic heating systems, cooling towers, that front rivers, lakes/ponds or other water sources that can be connected to; are equipped with storage tanks, rainwater-harvesting (excluding those that simply capture rainwater in a small 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. A RPBA will be required to be installed on any water service that provides for the use of water as a medium for purposes other than potable drinking water and/or where the water is treated in any way. Assemblies must be installed on private property at the property line immediately adjacent to the service connection to the premises.

7. A RPBA shall be installed on all service connections to industrial premises where complex (degree of complexity to be determined by the bureau) intricate plumbing systems exist.

8. A reduced pressure type assembly shall be installed on all water service connections to high-rise buildings (high-rise building: where a building is 75-feet or greater above its lowest finished floor elevation to top of structure).

9. A reduced pressure type backflow assembly will be required on services to premises with piping systems adjacent to waterways that may be subject to immersion due to periods of high water incidents. If available, current GIS data will be used to make this determination.

10. A RPBA shall be installed on domestic water services to mixed-use and multi-tenant buildings.

11. A RPBA shall be installed on domestic water services to shell building structures where occupancy is undetermined at the time of construction and/or renovation.

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, immediately adjacent to the service connection to the premises 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. If the service enters the building from below grade or at an elevation less than 1 foot above finished floor, the assembly is to be raised to 1 foot above finished floor. If the service enters at a point greater than 5 feet above finished floor the assembly must be dropped down to 5 feet above of finished floor elevation (measured to top of assembly). If the service enters the building at an elevation between one and five feet above finished floor, the assembly must be installed at service entrance elevation. Services that enter at elevations excessively (to be determined by the Water Bureau) greater than 5 feet above finished floor will require a permanently mounted platform be installed as outlined herein. 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 setbacks, 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, chemicals, gases or other additives are added to a fire sprinkler system, a Reduced Pressure Detector Assembly (RPDA) will be required. Where it is possible for a fire sprinkler system to be connected to or be 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). Fire systems that incorporate the use of storage tanks shall be equipped with a RPDA and are required to be installed at the service connection to the premises 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 and 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 PAD OR RADIO SIGNAL TRANSMITTERS

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-pads or transmitters must be rigidly mounted and be serviceable. Mounting hardware must be of a type whereby removal and reinstallation may be accomplished without damaging the unit.