



Required Levels of Backflow Protection for Potable Water Service Connections

The type of backflow protection required for potable water service connections must be consistent with the degree of potential health hazard to the public water supply presented by hazards on a customer's premises. The higher the potential health hazard, the higher the required level of protection.

Containment

The types of backflow protection that may be required for **containment at connections** to the public water system, listed according to increasing level of protection, are a double-check valve assembly (DC), reduced pressure principle backflow prevention assembly (RP), and air gap separation. The required levels of protection in the City and County of San Francisco are set forth in **Table 1, attached**.

Isolation

For **isolation of a hazard within a property**, the minimum level of backflow protection must be as set forth in the California Plumbing Code, **except that an RP is required in the situations specified in Table 2**.

Auxiliary Water Systems

Potable water service connections to properties with onsite auxiliary water systems must have a containment RP at the point of connection to the public water system. In addition, if potable water is used as makeup water to an auxiliary water storage tank, an air gap is required.

Air Gap Separation

An air gap is a physical break between a supply pipe and a receiving vessel. Air gaps can be fabricated from commercially available plumbing components or purchased as separate units and integrated into plumbing and piping systems, but they must be outside of the receiving vessel and able to be visually verified during inspection. Requirements for air gaps are set forth in the California Plumbing Code, Chapter 6, Section 603:

- The outlet of a pipe and the top of the reservoir (overflow rim) or drain must have a vertical separation of at least twice the inner diameter (ID) of the pipe upstream of the air gap or 1 inch, whichever is greater.
- If the air gap is near a wall, where "near" is defined as less than three times the ID of the pipe, the vertical separation must be at least three times the ID of the pipe or 1½ inches, whichever is greater.
- If the air gap is near a corner, where "near" is defined as less than four times the ID of the pipe away from intersecting walls, the vertical separation must be at least four times the ID of the pipe or 2 inches.



Table 1: Hazard Criteria and Required Backflow Protection for Containment

Attention: See footnotes for important information.

Hazard Criteria	Required Level of Protection
Hazardous Substances/Wastewater	
• Hazardous substances handled in any way the substances could enter the Public Water System • Mobile home park, recreational vehicle park, or campgrounds with recreational vehicle hookups • Self-contained, self-cleaning public toilet • Sewage handling facility • Wastewater lift stations and pumping stations • Wastewater treatment processes, handling, or pumping equipment that is interconnected to a piping system connected to the Public Water System	AG or RP ¹
Medical/Laboratory/Research	
• Biotech facility • Dental office with water-connected equipment • Kidney dialysis facility • Laboratory • Medical facility/hospital/clinic • Mortuary • Veterinarian facility	AG or RP ¹
Manufacturing/Processing/Storage	
• Chemical plant • Electronics manufacture • Metal-plating facility • Petroleum processing or storage plant • Radioactive material storage, processing plant, or nuclear reactor	AG or RP ¹
Commercial	
• Business park with a single meter serving multiple businesses • Car wash • Dry cleaner facility • Gas station • Hotel/motel • Industrial or commercial laundry facility • Pet grooming	AG or RP ¹

Irrigation Systems	
• Cemetery • Dedicated irrigation service • Premises with irrigation system into which fertilizers, herbicides, or pesticides are or can be injected	RP
Water Storage Tanks	
• Drinking water storage tank overflow connected to a sump or storm drain • Water storage facility not under control of the PWS	AG
Other	
• Agricultural premises • Airport • Auxiliary Water supply • Dual-Plumbed Property • Dockside watering point or marine facility • Fire station • Incarceration facility (prison) • Private water distribution main • Railroad maintenance facility • Solid waste disposal facility	AG or RP ¹
Miscellaneous Conditions	
• Intricate plumbing and piping arrangements³ • Repeated history of Cross-Connections being established or re-established² • Restricted entry to a Property or parts of a Property such that Hazard Assessments cannot be made with sufficient frequency or at sufficiently short notice to assure that Cross-Connections do not exist • Unabated internal Cross-Connections • Any other On-Site Hazard that the General Manager identifies as requiring abatement for the protection of the Public Water System	AG or RP ¹
Properties with Multiple Service Connections to the PWS	
• Properties with multiple service connections, excluding fire services, at least one of which requires Backflow protection for Containment	Varies ³
Buildings 4 or More Stories High or Water Supply Over 40 Feet Above Water Meter	
• Buildings 4 stories or more in height or water supply greater than 40 feet above the water meter	RP ⁴

Fire Protection Systems	
Properties where the fire protection system is supplied from the PWS and interconnected with an onsite Auxiliary Water supply	AG
Properties where the fire protection system is supplied from the PWS with no interconnections with Auxiliary Water supplies	DCDA or DCDA-II
Properties where chemicals can be injected into the fire system	RPDA or RPDA-II
Properties under the jurisdiction of the San Francisco Port Authority	RPDA or RPDA-II
Construction/Miscellaneous Hydrant Use	
- Temporary connections to hydrants for miscellaneous uses, including construction and special events⁴ - Temporary connection to existing water service line during construction (non-standard service)	RP ⁵
Temporary connections to hydrants for filling water tanks on vehicles, such as for street sweeping	RP or AG ⁵
Temporary Connections to Hydrants for Firefighting	
Fire trucks that are connected to low-pressure hydrants shall not be connected at the same time to any high-pressure hydrants that are a part of the San Francisco Auxiliary Water Supply System, also known as the San Francisco Emergency Firefighting System	Spring-loaded check valve ⁶

Notes for Table 1:

- 1 The General Manager will determine the required level of protection based upon a Hazard Assessment.
- 2 In addition to the required level of protection for the identified hazard criterion, the General Manager may also require the Property Owner to designate a User Supervisor, and the Property Owner and User Supervisor shall comply with the requirements of Rule 12.
- 3 All service connections, excluding fire services, must have at least the same level of protection, which must address the highest degree of hazard on the Property. For example, if one connection requires an RP, then every connection must have an RP.
- 4 The General Manager may, within the General Manager's sole discretion, authorize the installation of a DC instead of an RP if flooding is a concern (e.g., a substantial risk to life or property). This allowance may be considered for new BPA installations and replacements starting in 2026. DCs installed before 2026 are considered to be in compliance. Future replacements of any such DCs must be an RP unless the General Manager authorizes a DC.
- 5 All Customer plumbing must be downstream of the SFPUC-issued meter and RP that Customers are required at all times to use when accessing temporary water supply through low-pressured hydrants, in accordance with all SFPUC rules and regulations.
- 6 The State Water Resources Control Board approved the use of spring-loaded check valves on hydrants during firefighting in Compliance Order 02-04-95CO-006. The order requires a Water Quality Division Water Service Inspector who is also a Cross-Connection Control Specialist to respond to all two-alarm and higher fires to check for Cross-Connections between the Public Water System and the San Francisco Auxiliary Water Supply System, also known as the Emergency Firefighting Water System.

**Table 2: Hazard Criteria and Required Backflow Protection for
Isolation of Hazards within a Property**

Hazard Criteria	Required Level of Protection
Auxiliary Water storage tank with potable water makeup supply	AG
Irrigation systems into which fertilizers, herbicides, or pesticides are or can be injected	RP
Carbonators in systems with upstream copper pipe	RP
Industrial water chillers	RP
Sewage and hazardous or potentially hazardous substances: at the connection of potable water piping within a facility to a system conveying a fluid that is not potable	AG