



Homeowner plumbing guide

Based on requirements found in the most current edition of the National Plumbing Code of Canada

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This information is only a guide and, as a homeowner, you must have a basic knowledge of plumbing systems to take on any installations or renovations. Other methods of installation may be acceptable; however, all installations must meet the most current requirements of the National Plumbing Code of Canada.

Permits and inspections

The Province of Alberta Safety Codes Act Permit Regulation requires a plumbing permit to install, alter or add to a plumbing system.

An active plumbing permit is required before any inspections can be booked. All plumbing installations and renovations must have a City of Calgary plumbing and gas safety codes officer perform two onsite inspections: a rough inspection (prior to concealing) and a final inspection (once the plumbing is complete).

Please note: The plumbing inspection is separate from the building and electrical permit inspections.

Booking an inspection

- Homeowner Plumbing permits can be booked through 311online services (calgary.ca/311online) using your permit number and selecting: Inspection-Residential Improvement Projects Electric/ Plumbing/Gas Fireplace.
- Access must be arranged by homeowner and someone 18 years or older must be present.
- Appointments are not possible; your inspections will either be in the morning (between 8 a.m. and noon), or in the afternoon (between noon and 4:30). You can contact 311 on the morning of your inspection to find out if a morning or afternoon visit is scheduled.
- Additional inspections may be required.

If you wish to cancel your inspection, please call 311 and provide your electrical permit number and address.

Rough inspection	Final inspection
<ul style="list-style-type: none"> • All plumbing drainage and venting must be installed and complete. • Waterlines must be installed and connected to the rest of the water distribution system. • All drains, vents and waterlines must be properly supported. • The bathtub/shower valve must be installed. 	<ul style="list-style-type: none"> • All fixtures and equipment must be installed and ready for use. • Temperature of water at the bathtub and shower must not exceed 49 degrees Celsius. • All piping designed for future fixtures must be sealed with an approved plug or cap. • Toilets must be provided with a shut off valve.

Possible outcomes

The plumbing and gas safety codes officer will advise of the inspection outcome. There are three possible outcomes:

- **Not acceptable:** re-inspection required
- **Acceptable:** continue with installation
- **Acceptable with conditions:** continue with installation; it is up to the homeowner to ensure the conditions are met.

The plumbing system

The plumbing system in a home has four basic elements:

1. **The water supply and distribution system:** The water pipes that transport potable water from the source, including a water heater, to fixtures and devices.
2. **The drainage system:** consists of the drain and sewer pipes that transport waste fluids from the fixtures to the municipal sewer system.
3. **The venting system:** consists of pipes connected to the drainage system, typically terminated in open air above the roof for air circulation and to protect trap seals removing sewer gases and helps the drainage system to work properly.
4. **The fixtures and appliances:** sinks, water closets, laundry tubs, water heaters, washing machines, etc. All fixtures are required to be equipped with a trap, which provides a water seal in the drain preventing sewer gas emissions. The trap must be vented.

Low water use and fixtures

Low water use fixtures are designed to use less water while maintaining the same level of performance as older fixtures. Faucets, shower heads and toilets are just a few examples of fixtures available in low water use models. The City of Calgary's Water Utility Bylaw and the National Plumbing Code of Canada require all new homes and renovations that require a plumbing permit to have low water use fixtures in place.

Required fixture flow rates

- Toilets: no greater than six litres (1.6 US gallons) per flush
- Showerheads: no greater than 9.5 litres per minute
- Faucets: no greater than 8.3 litres per minute

Information on fixture flow rates can be found on the product package or labeling and on the fixture itself.

Materials

All materials, fixtures and appliances in a plumbing system must meet prescribed standards, certified by the Canadian Standards Association or other accredited testing agency. Installing any element of a plumbing system that does not meet the required standard is not acceptable.

The drainage and venting system

General piping requirements

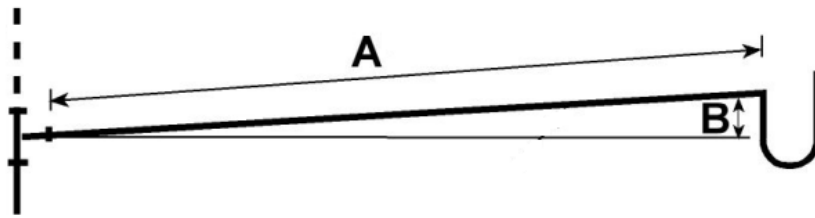
- All horizontal drainage piping must grade a minimum of 1/4" (6mm) per foot up to and including 3" (75mm) in diameter, 4" may grade at 1/8" (3mm) per foot.
- Drains and vents must be adequately supported by a firm base or hanger.
- All fixtures located below grade must be protected from backflow.
- Drain piping must be protected from freezing.
- Tee fittings or 90 degree elbows must not be used in the horizontal portion of a drainage system. All changes in direction are to be made using Y and 45 degree bends. With the exception of the piping immediately below a water closet, a 90 degree elbow may be used to change direction from horizontal to vertical in the direction of flow.
- One 90 degree elbow is allowed in the horizontal position when penetrating the wall serving a sink.
- Clean outs are required at the base of soil and waste stacks.
- The maximum change in direction on a trap arm is 135 degrees.
- Except for a water closet the total fall from the trap to the vent must not exceed the diameter of the trap arm.
- A 90 degree elbow or tee fitting may be used in the venting system, excluding use on wet vents.
- The vent must tie into the house venting system and must not have any dips or sags where moisture can build up and prevent air flow in the system.
- A vent pipe must rise above flood level rim before connecting into another vent pipe.
- A vent pipe penetrating the roof must increase one pipe size to at least 3" (75 mm) immediately before its penetration, to protect from frost closure.

Minimum size of fixture outlet pipes

Fixture	Minimum size (inches)
Toilet	3"
Clothes Washer	2"
Lavatory (Basin) Sink	1 ¼"
Bathtub	1 ½"
Shower	1 ½"
Sink - one and two compartments	1 ½"

Although 1 ¼" minimum pipe size is required to serve a lavatory (basin), sink 1 ½" pipe size is typically used due to cost and availability in the market.

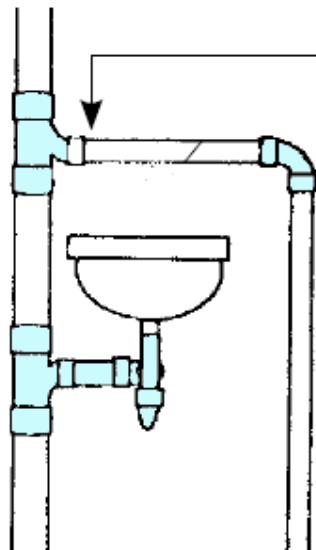
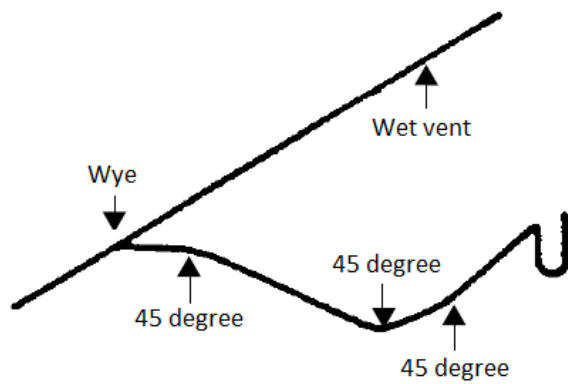
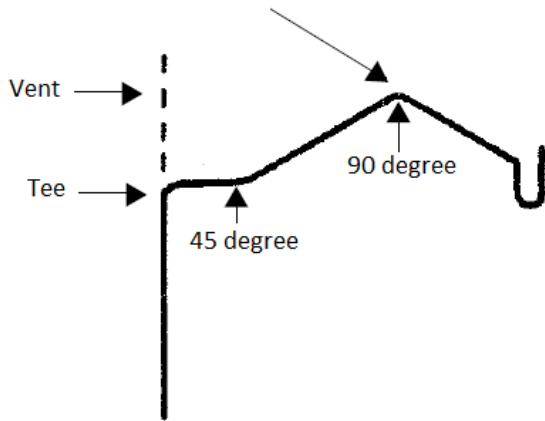
Drawings for reference



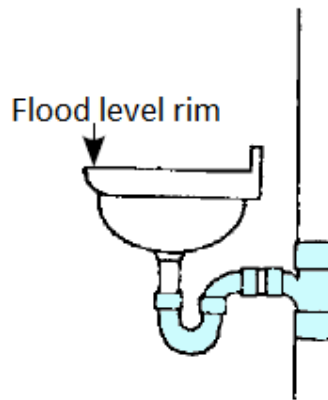
The developed length of "A" must be at least twice the size of the trap arm pipe size diameter.

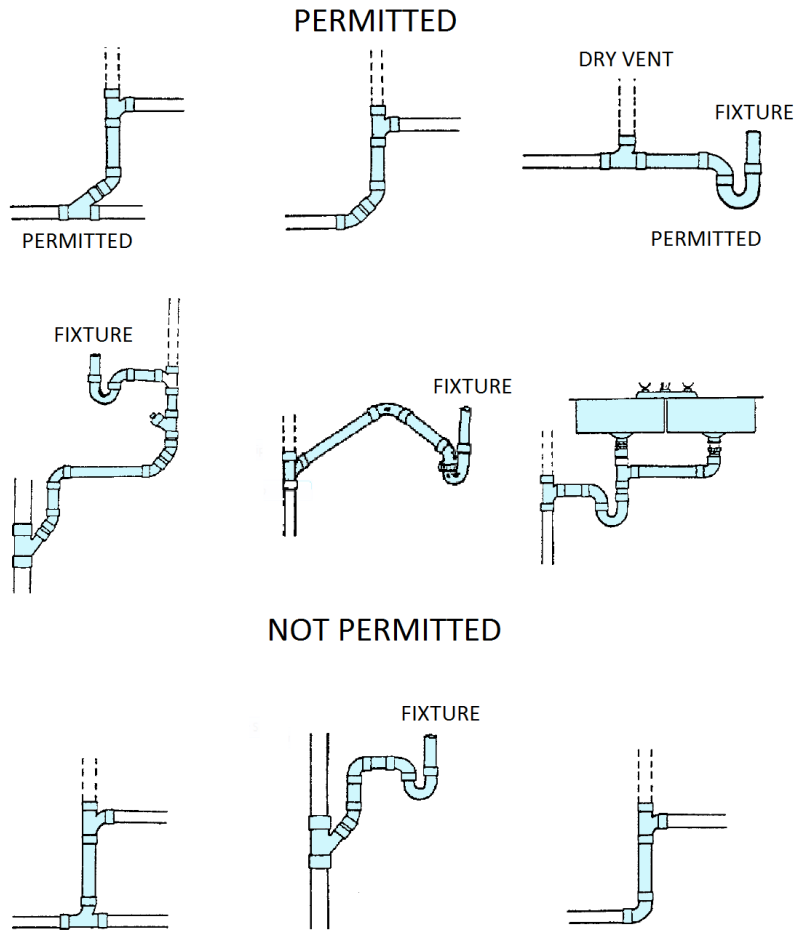
The fall of "B" must not be greater than the trap arm pipe size diameter.

One 90 degree elbow is allowed in the horizontal position when penetrating the wall serving a sink.



A vent pipe must rise above flood level rim before connecting into another vent pipe





Protection from backflow

All fixtures installed below street level must be protected by a backwater valve, to prevent sewer back-up.

- A normally closed backwater valve must be installed to protect the branch drain.
- A normally open backwater valve may be installed on a building drain or building sewer.



Normally open backwater valve



Normally closed backwater

Typical plumbing installations

Three-piece bathroom

Toilet

- The minimum wet vent pipe size serving a toilet is 2" (50 mm).
- The maximum distance a toilet can be from a vent/wet vent is 10' (3 m).
- Standard distance from a wall to the center of a toilet is 12" (305 mm).

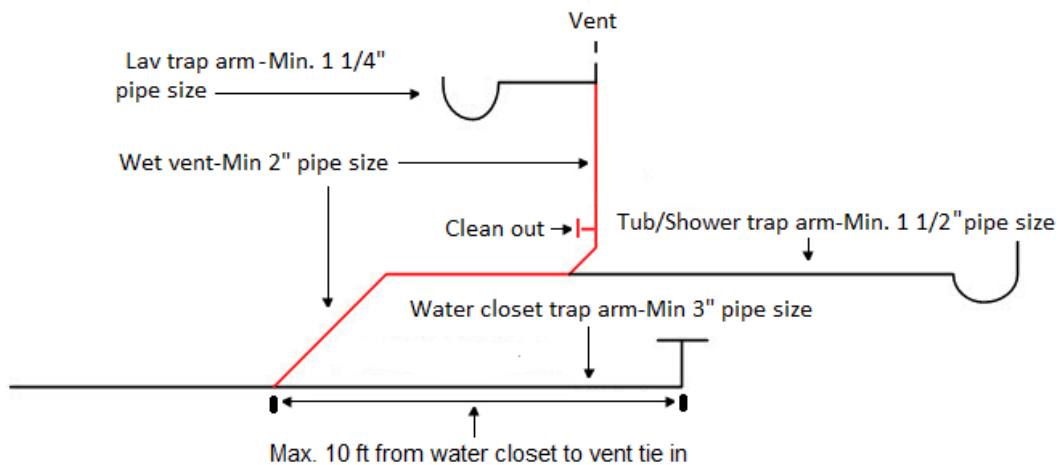
Sink

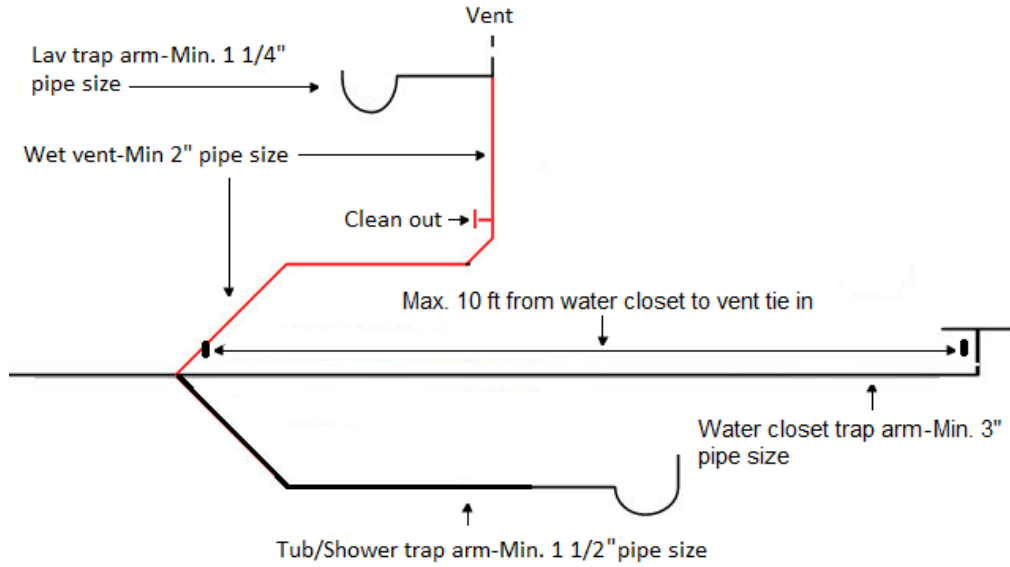
- Standard drain height from floor for a sink is 18" (457 mm) and the water lines are 21" (533 mm).

Shower

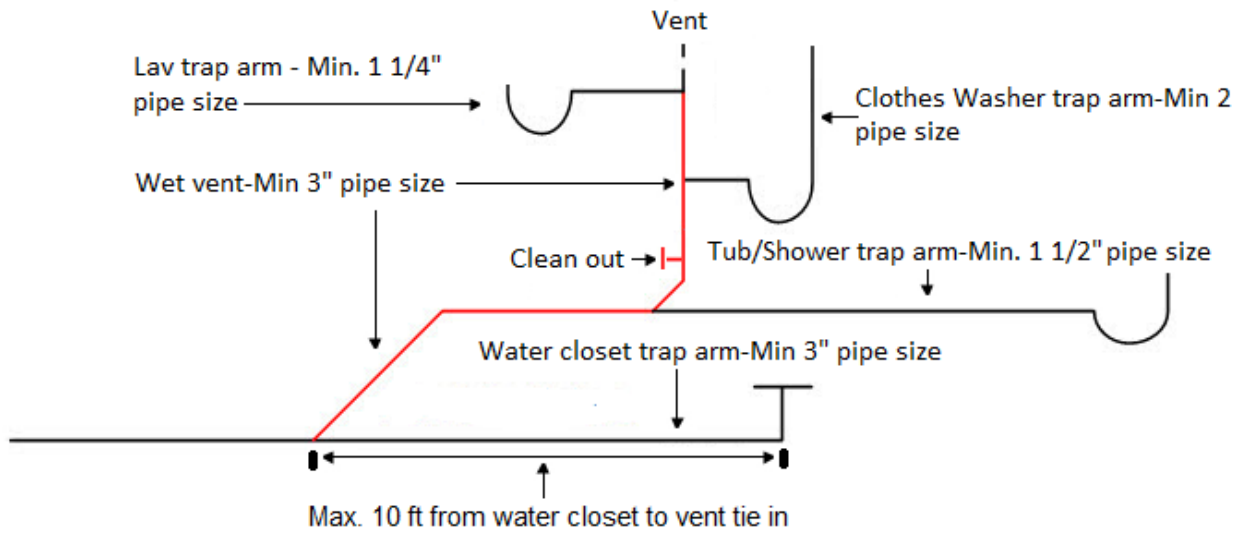
- A bathtub/shower P-trap installed below the floor must be of the solid weld type.

Examples of typical bathroom plumbing installations



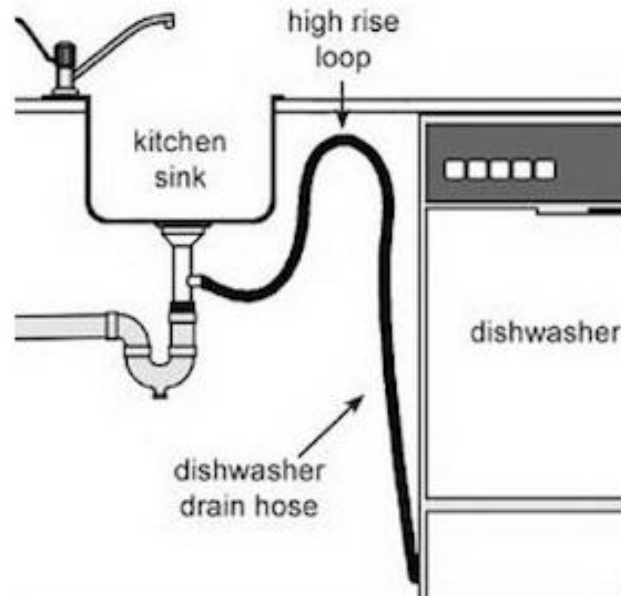


Typical bathroom plumbing installation with addition of clothes washer



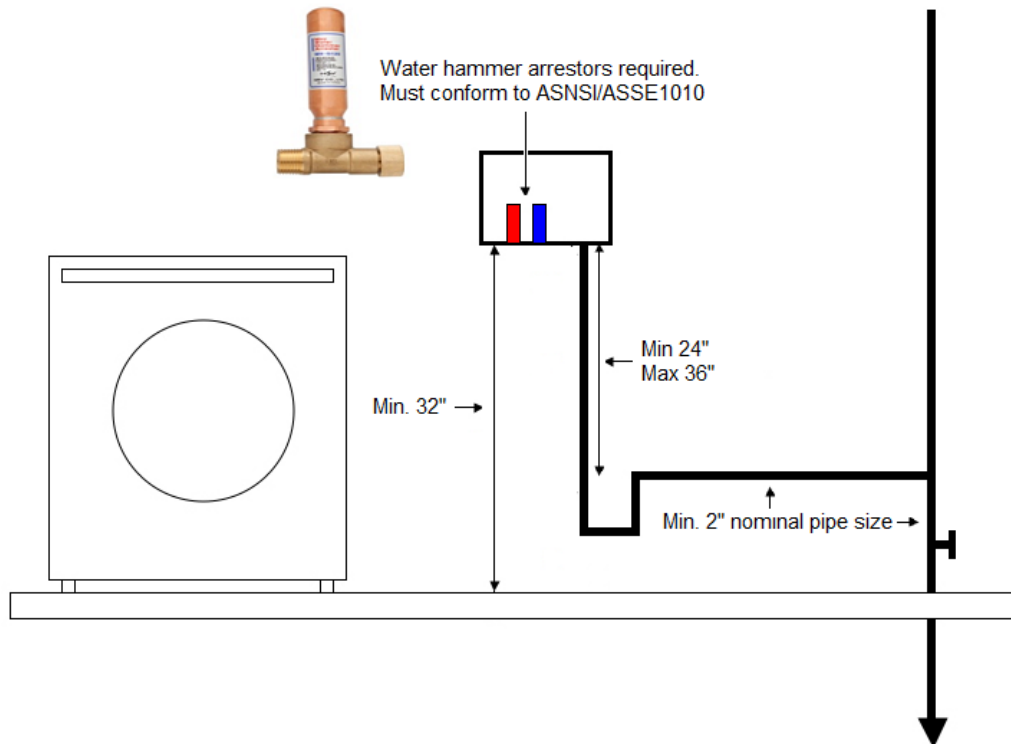
Kitchen

- The minimum drain pipe size for a kitchen sink is 1 ½" (38 mm).
- Dishwasher drain fittings must be installed upstream of the trap and the pump discharge line must rise as high as possible to just under the counter, to prevent the escape of sewer gases into the dishwasher.
- If the sink is to be installed on a kitchen island, an approved air admittance valve may be installed in an accessible location that allows air to enter.



Clothes washer/laundry box

- A clothes washer drain must be a minimum of 2" (50 mm) pipe size.
- The fixture outlet pipe serving a clothes washer must be a between 24" (600 mm) and 36" (915 mm) long.
- The 2" (50 mm) trap arm for the clothes washer must not exceed 8' (203 mm) in length.
- The drain outlet must be a minimum of 32" (813 mm) above the floor.



Water supply and distribution system

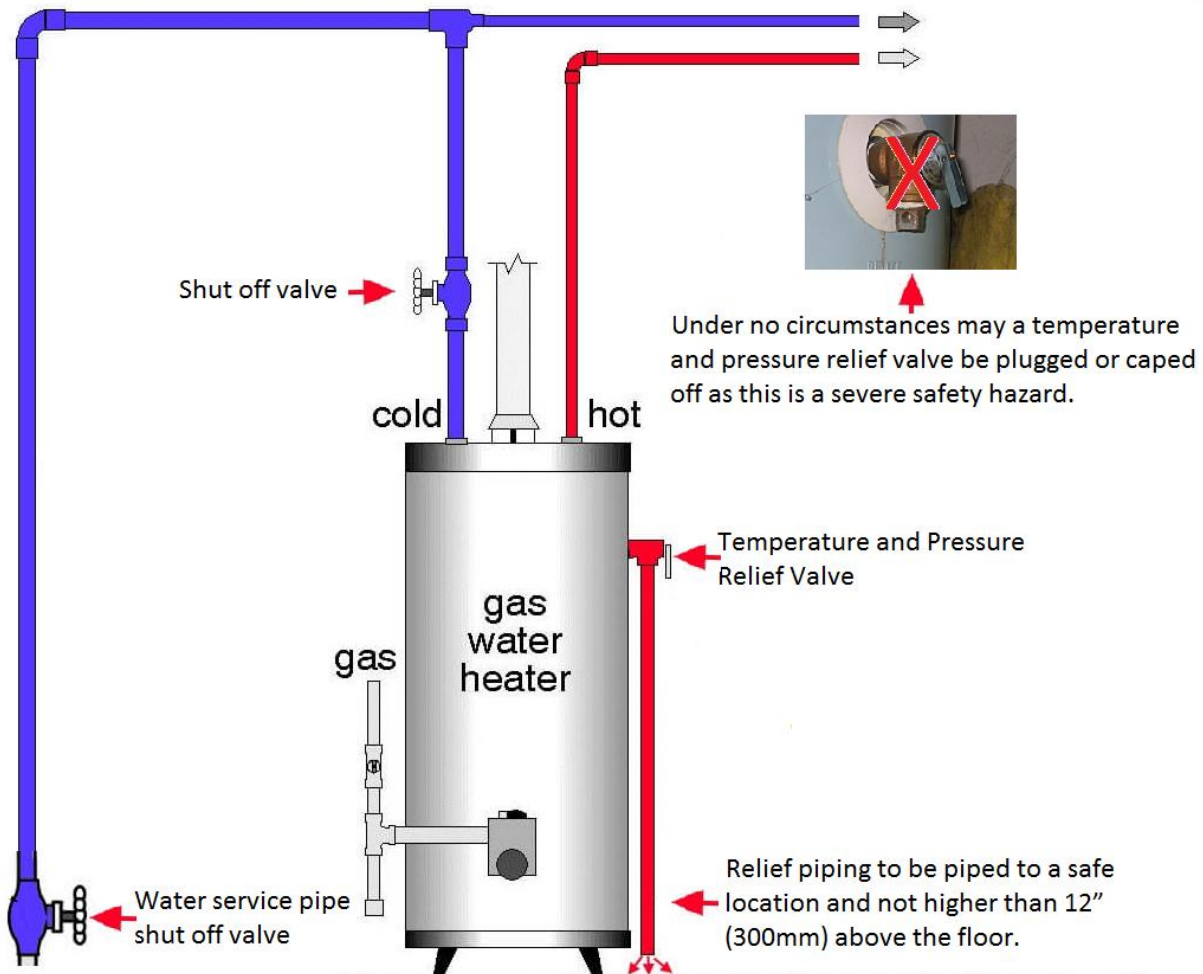
General piping requirements

- Every water service pipe requires a shut off valve where the pipe enters the premise.
- A water supply and distribution system must be installed, so that the system can be drained or blown out with air.
- When soldering copper water lines in a potable system a lead-free solder must be used.
- Every water closet must be provided with a shut off valve on the water supply.
- Bathtub and shower valves must be pressure balanced or thermostatic mixing valves conforming to CSA B125 plumbing fittings.
- Clothes washer water supply connections must have water hammer arrestors installed conforming to ANSI/ASSE 1010.
- Dishwashers supply connections require a water hammer arrestor conforming to ANSI/ASSE 1010 installed on the water supply line.

Water heaters

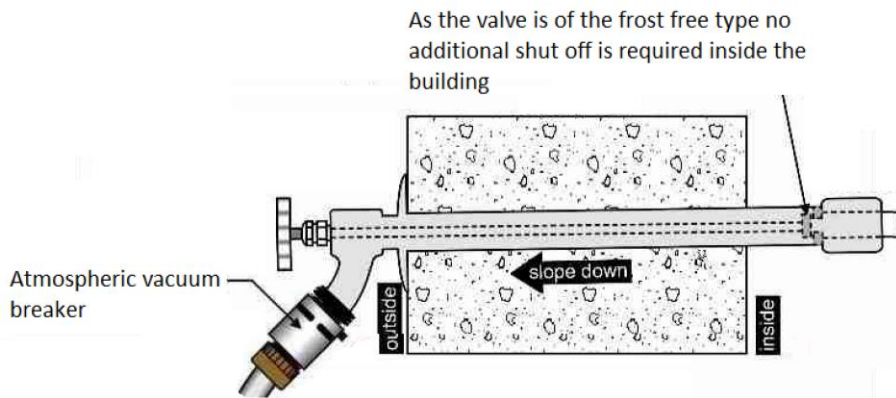
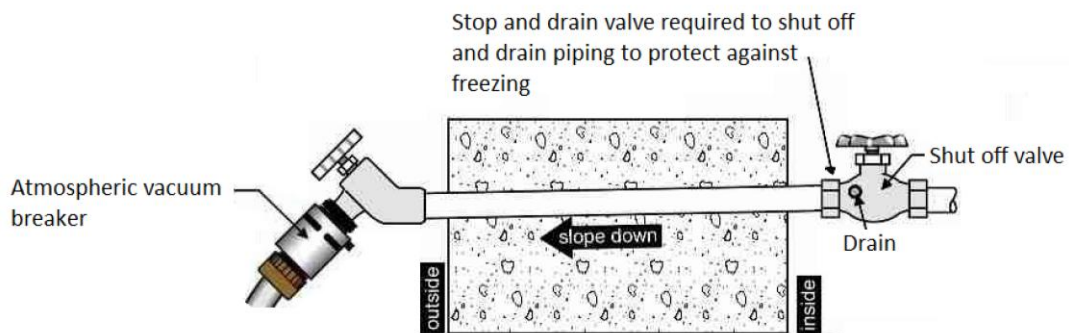
- Every water heater must have a shut off valve located on the cold supply line serving the appliance.
- Every water heater must have a temperature and pressure relief valve located within the top 6" (150 mm) of the tank.

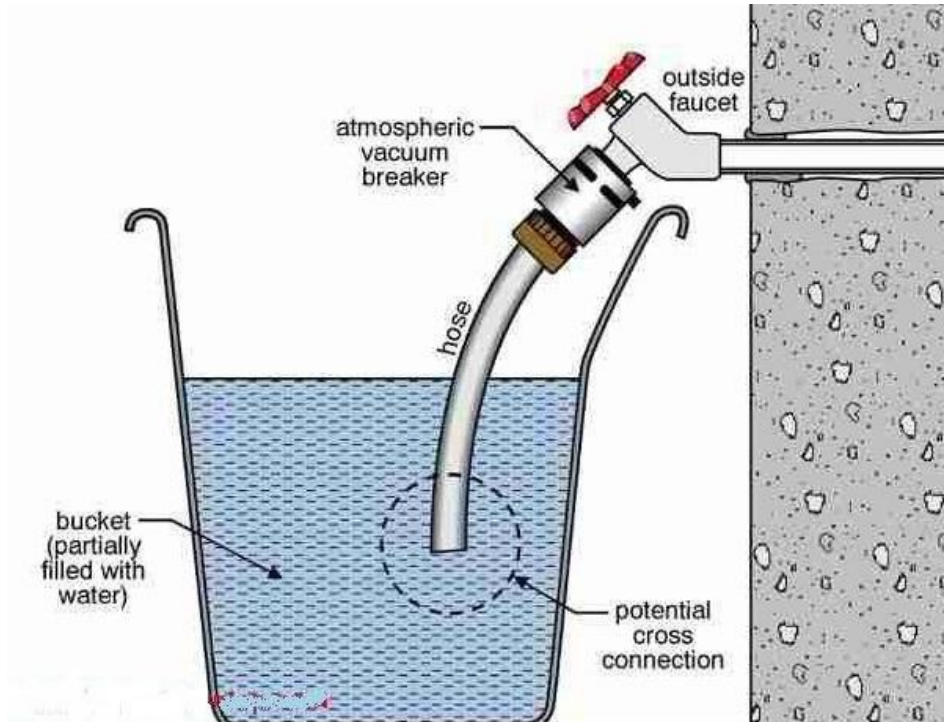
- Every temperature and pressure relief valve must be piped to a safe location and not higher than 12" (300 mm) above the floor.
- When piping a temperature and pressure relief valve to a safe location, the pipe size must be the same pipe diameter as the outlet of the valve.
- Under no circumstances may a temperature and pressure relief valve be plugged or capped off, as this is a severe safety hazard.
- Water heaters must be installed on a firm, level and non-combustible base.



Installing outside faucets/hose bibs

- Outside faucets/hose bibs must be provided with a frost-free type hose bib, or a stop and drain valve located inside the building must be installed serving the hose bib, to allow the waterline to drain and prevent freezing.
- A vacuum breaker must be installed on all outside faucets, to protect the water supply from possible cross-connection (most frost free hose bibs have integral vacuum breakers).





Irrigation systems

All irrigation systems in Calgary must be protected against cross connection; a testable device such as a double check valve assembly (DCVA) must be installed on the water supply. A plumbing permit must be obtained through The City of Calgary and an inspection from a plumbing and gas safety codes officer is required. The installation of cross connection control devices must conform to B64.10-07 Selection and installation of backflow preventers/Maintenance and field testing of backflow preventers.



For more information, visit [cross-connections for homeowners](#).

Technical Assistance Centre

The City's Technical Assistance Centre can answer many common plumbing and gas questions. [Submit an online inquiry](#) or contact 311 to speak with a safety codes officers about code requirements, to complete your project correctly and safely.

Plumbing terminology

Air admittance valve: A one-way valve designed to allow air to enter the drainage system. It must conform to ASSE1051.

Backflow: A flowing back or reversal of the normal direction of fluid flow.

Back water valve: A check-valve device installed on a drainage line, to protect fixtures from a public sewage back flow.

Clean out: A fitting that is installed on a plumbing system that has a removable plug, cap or cover to allow the cleaning of plugged piping.

Cross connection: A cross connection is a temporary or permanent link between a potable (drinking) water system and any source containing non-potable water or other substances from which backflow may occur.

Vent: The pipe that extends above any fixture in the system and terminates through the roof to open air.

Fixture: A receptacle, appliance, apparatus or other devices that discharges sewage or clear water waste, and include a floor drain.

Fixture drain: A pipe that connects a trap serving a fixture to another part of a drainage system.

Fixture outlet pipe: A pipe that connects the waste opening of a fixture to the trap serving the fixture.

Flood level rim: The top edge at which water can overflow from a fixture or device.

Kitchen island: An unattached counter in a kitchen that permits access from all sides.

Potable water: Water that is safe for human consumption.

Pressure balanced valve: A valve that compensates for a change in pressure in either the cold or hot water line, maintaining the temperature of the water.

P-trap/trap: A fitting that is designed to hold a water seal that prevents the sewer gasses from entering the house.

Shut off valve: A valve used to regulate the flow of water in a potable

Stop and drain valve: A valve that allows you to drain the lines beyond the shut off point of that valve.

Temperature and pressure relief valve: A valve that protects the water heater from excess pressures and temperatures by discharging water.

Trap arm: Portion of pipe between the trap and the vented pipe.

Vacuum breaker: A device that prevent back-siphonage.

Wet vent: A drainage waste pipe that also serves as a vent pipe and extends from the furthest downstream wet vented fixture connection to the most upstream fixture connection.

Water hammer arrestor: A device that helps to prevent water hammer, which is caused by fast closing valves that may shake the water lines. It must conform to ANSI/ASSE 1010.

Water service pipe: A pipe that transports water from a public water main to the inside of a building.