

Guide for maintaining building plumbing after an extended vacancy

This guide explains water flushing strategies to restore a building's water quality after an extended vacancy and before reopening to the public.

For building owners and operators

This guide is for building owners who are responsible for ensuring water quality within their building(s) and those individuals who are responsible for maintaining the internal plumbing systems to restore water quality prior to reopening the building(s) which have reduced use.

Background

When the water use declines in a building for an extended period of time, the quality of the water standing in the plumbing pipes will deteriorate due to a decrease in disinfection residual, increased corrosion of metals and an increase in the temperature of the standing water remaining in the pipes.

These conditions result in stagnant water and can lead to increased scaling and leaching of metals such as lead and copper from the plumbing piping, fittings and fixtures (e.g., taps, shower heads and, distribution-related fittings such as valves and meters) and result in conditions favourable for regrowth of pathogens such as *Legionella* and *Mycobacterium avium* that can be harmful to human health due to reduced disinfection residual.

This guide provides risk reduction strategies that building owners can implement to restore water quality within their building(s).

It is recognized that each building is different in age of plumbing and design and different strategies will be required for actions based on individual plumbing systems, use patterns, and the characteristics of the incoming water. It is generally accepted that an adequate amount of flushing at a schedule appropriate for the building size will minimize health risks to the returning building occupants.

It is also recommended that building owners document measures taken to restore water quality and make these documents available to the occupants/tenants to provide assurance of safe water.

Using this guide

Maintaining good water quality in any building is a continuous process. After an extended vacancy, it may take up to 12 weeks to re-establish scale control and biofilm suppression when returning a building back to service. Building owners are encouraged to begin implementing the strategies recommended in this guide **as soon as possible** to protect occupants before they return to the building.

General Considerations

Regardless of the size of the building, a single flush will not re-establish good water quality. An initial flush will remove low quality water and contaminants, but a continuous flushing regimen is required to restore and maintain optimum water quality in the premise plumbing. Ongoing flushing draws particles through and out of the system and brings in disinfectant from the municipal system that can help control biological growth.

Flushing should proceed unidirectionally, that is from the service entrance to the periphery of the plumbing system (distant points). Following a full flushing, a frequency of three times per week is recommended but the individual owner may vary the flushing depending on the state of occupancy of the building; for buildings that have had partial occupancy, a reduced flushing frequency may be sufficient to maintain water quality.

Building history of water quality issues

If a building has a history of water quality issues, old plumbing as identified through corrosion control monitoring, or if *Legionella* contamination has occurred previously, owners should obtain guidance from the local Public Health Unit who will provide appropriate advice. In general, if the building has had a positive test for *Legionella*, site-specific action(s) as directed by Public Health should be undertaken and, at the minimum, alternate sources of drinking water should be provided until the building is cleared by Public Health inspectors.

Personal protective equipment

Appropriate personal protection is paramount. In general, opening water outlets (faucets, valves, etc.) slowly will minimize exposure to splashing and the creation of aerosols. Appropriate personal protection equipment (PPE) is recommended and should be worn for buildings known to have had a history of pathogen issues.

Vulnerable populations

If the building contains facilities that serve vulnerable populations, such as medical offices (medical clinic/practice, dental clinic, etc.), water supply lines servicing those parts of the building may require additional flushing and building owners should contact their local Public Health Unit for further advice.

Note: Schools and child care centres are still required to meet the flushing requirements under O. Reg. 243/07 when they open but should follow this guide upon their initial reopening. Please visit the ministry's [flushing and sampling for lead webpage](#) for more information.

Replacing filters

Consideration should be given to the replacement/conditioning of point-of-use filters in drinking water fountains, refrigerators, or in other appliances such as coffee makers. Activated carbon filters should be changed as a precautionary measure since bacterial growth can occur during periods of low usage.

Inventory diagrams of building plumbing systems

Building owners should have an inventory of the components that make up their building's plumbing system. Having a diagram of an inventory would help building owners to identify sources of potential aerosols to ensure adequate precautions are taken. Flushing should begin at the fittings that are closest to the entry of the municipal water supply and move outward.

Inventory diagrams should highlight the different fittings/fixtures connected to the hot-water and cold-water supply and should be used for creating an inventory for flushing and also for record keeping of the flushing that was carried out.

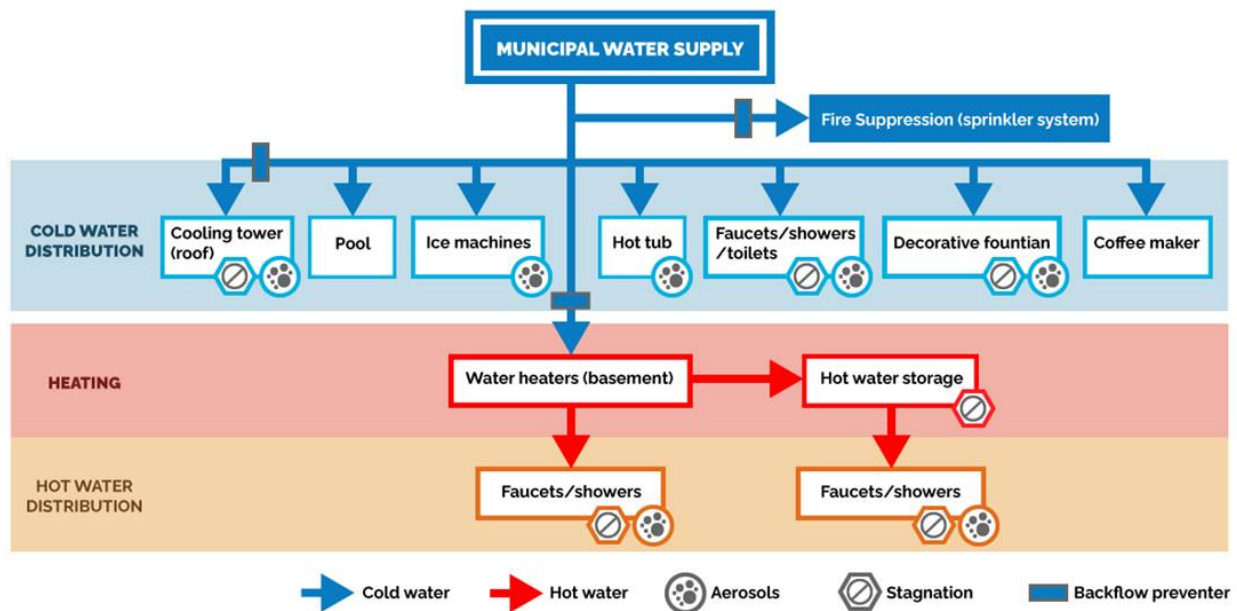


Figure 1: Potential Stagnation Sites in Plumbing System

This diagram shows parts of a building's plumbing system and identifies where water may stagnate and/or where there is a potential for aerosols, which are airborne particles or water droplets. Flushing should begin at the fittings closest to the municipal supply and move outward.

Attention must also be paid to potential sources of aerosols so that adequate precautions can be taken. The diagram shows cold water outlets that require flushing such as rooftop cooling towers, sprinkler systems, pools, ice machines, hot tubs, faucets, showerheads, toilets, decorative fountains and coffee makers. Hot water distribution outlets that require flushing include basement water heaters, hot water storage units, faucets and showerheads. Common areas where cold water stagnates in plumbing include decorative fountains, faucets, showerheads, toilets and rooftop cooling towers. Common hot water stagnation spots in plumbing include hot water storage units, faucets and showerheads. For cold water plumbing, the diagram shows aerosols could be generated from decorative fountains, faucets, showers, toilets, rooftop cooling towers, ice machines and hot tubs. For hot water plumbing, the diagram shows aerosols could be generated from faucets and showers. Backflow preventers should be properly located by building owners to prevent cross-contamination during flushing of premise plumbing.

Trap seals

In buildings that have had reduced occupancy, trap seals may have dried up. Trap seals should be inspected to ensure they have been maintained to keep sewer gases from entering the building. Water should be poured into floor drains and each sanitary fitting flushed (i.e. toilet, urinal) once a week to maintain trap seals. Back-flow preventers should be inspected and assessed for function to prevent back siphoning.

Restrictions on water use

Building owners may want to contact their municipality/water utility to determine if there are any restrictions on water use since flushing by many customers may burden the drinking water system. Owners may want to consider flushing be carried out in off-hours to reduce the burden on the drinking water/wastewater systems and for the convenience of building occupants.

Point-of-entry devices

All point-of-entry devices (systems that connect directly to the main water line for the whole building, such as water softeners) should be rinsed and cleaned as per manufacturer's recommendation prior to commencement of flushing activities. Consideration should be given to replace all point-of-use devices after flushing to avoid contamination. Automatic faucets should be cleaned as per manufacturer's recommendation in coordination with flushing activities. Building owners who lack the expertise in plumbing systems at their buildings may wish to consult a licensed plumber for assistance in establishing a flushing protocol.

Small buildings

For smaller buildings (three floors maximum), organize flushing to maximize the flow of water (e.g. opening several outlets simultaneously to flush the service line and then flushing outlets individually starting near where the water enters the structure). Run enough water through all outlets (e.g., hose bibs, faucets, ice machines, coffee makers, water fountains, showerheads, toilets, etc.), remove aerators and showerheads (if possible) and clean. Flush the cold-water lines first, and then the hot water lines.

Large buildings

Large building (four floors or more) water systems have a variety of places where water is stored. At a minimum, they should all be identified, drained, and flushed with clean cold water, after the building cold water service is properly restored. These include, but are not limited to:

hot water storage, hot water recirculating loop(s), pressure tanks, humidifiers, ice machines, coffee makers, water fountains, water coolers, and dishwashers, cooling towers, etc.

Flushing should begin with the zone that is nearest to the water supply pipe for the building. Zones are branches of a large building water system with a common source or parts of the building served by a common riser which brings in the municipal water. Flush zones progressively outward from the supply. In each zone, flush the cold water plumbing first and hot water second. Hot water tanks may require special attention beyond flushing and manufacturer guidance should be sought if the building owner has reasons to believe that additional maintenance measures are required. Flushing time with hot water depends upon the size of water heater tank as a minimum water heater temperature is required to prevent microorganisms from growing in the heater and being disseminated in aerosols.

Disinfecting a system by circulating water with high concentrations of chlorine (shock) may be required. But this is rare and need only be considered for complex systems with storage tanks or remote zones, buildings serving very vulnerable populations or buildings with a history of microbial issues. This kind of shock chlorination should be conducted by a licensed commercial plumber who will ensure that appropriate measures to protect components such as membrane and cartridge filters are taken.

Minimum water temperature requirements

For the purposes of restoring water quality, hot water temperatures must be increased to a minimum of 60°C (water heater setting) for the first flush. However, building owners should ensure that any occupants present in the building are made aware of the elevated water temperature so proper precautions are exercised when using the hot water.

Buildings with reduced occupancy returning to full occupancy

Prior to employees occupying areas that have been unoccupied, a thorough, progressive flushing of all fittings such as kitchen faucets (hot and cold), drinking fountains, washroom faucets (hot and cold), showers (hot and cold) and eye wash stations **in the unoccupied areas** must be performed:

- Obtain/consult building drawings and identify plumbing fittings commonly used for consumption. Create a flushing plan to start with main pipes and move out to the arteries.
- Remove aerators before flushing. Clean and reinstall aerators after flushing.

- It is important to open outlets slowly to avoid splashing and the creation of aerosols. Appropriate personal protective equipment (PPE) should be worn.
- A cold-water flush should precede a hot water flush.
- In the unoccupied areas, flushing should begin nearest the building water entry and continue for at least 10 to 30 minutes and proceed in a unidirectional path to the furthest outlet of the building, inclusive of all of the taps and fittings in these areas.
- In the reduced occupancy areas, flushing should begin nearest the building water entry and continue for at least 5 to 10 minutes and proceed in a unidirectional path to the furthest outlet of the building, inclusive of all taps and fittings in these areas.
- The temperature of the flushed water should be the same as the municipal supply temperature; flushing time should be increased if necessary.
- It is important to note that these steps may need to be repeated periodically until occupancy is fully restored and consistent water quality is observed.
- Reduced flushing time may be sufficient for equipment such as coffee machines, water coolers and ice machines but the order of flushing of the equipment should start closest to the water entry into the floor.

Unoccupied buildings returning to full occupancy

Prior to the full occupancy of a building that has been unoccupied for at least 1 week, a thorough progressive flushing of all fittings such as kitchen faucets (hot and cold), drinking fountains, washroom faucets (hot and cold), showers (hot and cold) and eye wash stations **throughout the building** is required:

- Obtain/consult building drawings and identify plumbing fittings commonly used for consumption. Create a flushing plan to start with main pipes and move out to the arteries. In general, greater periods of unoccupancy require more intricate flushing plans and greater effort to fully restore water quality.
- Remove aerators before flushing. Clean and disinfect before reinstalling aerators after flushing. Replace any filters after flushing.
- It is important to open outlets slowly to avoid splashing and the creation of aerosols. Appropriate personal protective equipment (PPE) should be worn.
- A cold-water flush should precede a hot water flush.
- Flush all water fittings and equipment that is directly connected to the building water system.

- Building owners may wish to use disinfectant residual testing to ensure that municipal water has been drawn in to all points in the buildings.
- The temperature of the flushed water should be the same as the municipal supply temperature; flushing time should be increased if necessary.
- It is important to note that these steps may need to be repeated periodically until occupancy is fully restored and consistent water quality is observed.
- A building that has been unoccupied for an extended period of time (weeks to months) may require flushing durations in excess of 10 to 30 minutes.
- Reduced flushing time may be sufficient for equipment such as coffee machines, water coolers and ice machines but the order of flushing of the equipment should start closest to the water entry into the floor.

Additional water system considerations

If regular maintenance activities are reduced, building water systems that are not being used (e.g., landscape irrigation, water reuse, decorative water features) should be drained to avoid stagnant water conditions. Follow start-up procedures, manufacturer recommendations and requirements when restarting these systems.

Communication to returning building occupants

Communicating to the returning occupants that the water quality in the building has been properly restored is important. This can be accomplished by posting flushing records and signage at key locations (kitchens, common lunch rooms, etc.) informing that additional flushing was conducted to ensure the continued safety of the potable water system in the building.

Occupants should be made aware that any odour and taste issues are likely short-term in nature and expected to dissipate with time. If these persist for more than a few months, occupants should notify building management.

Building water management plans

Given the effort required to ensure the water quality in building returning to full occupancy, developing a Building Water Management Plan to maintain water quality should be considered. Building owners can consult the [tool kit](#) developed by the Centers for Disease Control for guidance.

Additional Resources

<https://training.wcwc.ca/en/resources/>

<https://www.tpsgc-pwgsc.gc.ca/biens-property/legionella/chapitre-chapter-6-eng.html>

<https://cwwa.ca/covid-19-and-the-re-opening-of-buildings/#download>