



Building Water System

Return to Service

Guidance

This guidance document is intended for building water systems which have not been utilized for a prolonged period of time resulting in stagnation of potable water. Stagnation of potable water in building plumbing may cause changes in temperature, loss of chlorine residual, biofilm/*Legionella* growth, biofilm disruption, and plumbing corrosion resulting in discolored water, odor, lead and/or copper release, and disinfection byproduct formation. If not properly managed, stagnant potable water could pose a health risk. Further, mechanical equipment such as cooling towers, boilers and pumps may not have received any routine maintenance and backflow preventers may have missed annual test cycles. Therefore, the Department of Public Health (DPH) recommends that owners of building water systems that have not been used for a prolonged period of time follow the following protocols before the building is reopened for use and occupancy. Flushing your building water lines includes flushing interior and exterior faucets, showers, water and ice dispensers, and water treatment units, as well as any other building water lines. Prior to any flushing, the building owner should contact the public water system that supplies water to the building to ensure a coordinated effort. Additionally, to maintain high quality water in a building at all times, building owners and operators should implement a water management program (WMP) that follows industry recommendations, such as ASHRAE 188 (2018) or similar to continually reduce the risk of infections due to water quality degradation. It is important to note that each building is different so flushing may need to be tailored accordingly.

Building water systems should follow the following protocols prior to reopening the building :

1. FLUSH WATER

A single flush most likely will not bring the building water system back to normal operation and re-establish good water quality. Flushing requires an initial flush to get out low quality water and contaminants and then follow-up flushes that may bring the building back to normal water quality. Ongoing flushing draws particles through and out of the system and brings in disinfectant from the municipal system that can help control biological growth. The longer service is interrupted, the more the required level of effort for restoration.

Initial Flush

- Contact the public water system that supplies water to your building for assistance. The public water supplier may be able to provide water quality information from the area near the building so that a general comparison can be made between the water quality inside the building and outside the building.



- The building water system begins at the meter where water enters the building and includes all plumbing, storage and fixtures to each distal tap.
- Calculate the water volume in the building to determine how long to flush water.
- Flushing should proceed uni-directionally, that is from the service entrance to the periphery of the plumbing system (distal points).
- Remove aerators prior to flushing faucets.
- Clean fixtures including showerheads.
- Flush zone-by-zone. Zones are branches of the building water system with a common source or parts of the building water system served by a common riser.
- The first zone to flush is the one nearest the building supply. Flush zones progressively outward from the supply.
- In each zone, flush the cold water plumbing first and hot water second.
- Flush continuously for at least 10 minutes, or based on water volume calculations, to flush pipes.
- Flush drinking fountains. Run water continuously for at least 10 minutes, or based on water volume calculations, to flush pipes.
- Flush each area in the building individually (e.g. every patient room, restroom, food service area) through to the distal ends.
- Flush all equipment with water line connections according to manufacturers' instructions.
- Inventory filters on equipment to determine if new filters are needed or need to be ordered and replaced.

Extreme care should be taken when flushing stagnant water systems as stagnant water may contain higher levels of *Legionella* and other pathogens. Personnel doing this work should be advised to open outlets slowly to avoid splashing and the creation of aerosols. Disinfecting buildings water systems with concentrated chlorine should be considered when there is a strong reason to believe the building is contaminated with pathogens like *Legionella pneumophila*, the bacterium that causes Legionnaires' disease, and/or the people who use the building are particularly susceptible to infections like Legionnaires' disease. Disinfectants (chlorine) are dangerous to handle and can cause serious damage to plumbing system components if used improperly. In most cases, flushing buildings with water that has normal amounts of chlorine (the chlorine already in the building water supply) is sufficient for cleaning the water system.

Hot Water Tanks/Boilers

To clear hot water pipes and water heaters of untreated water:

- Run hot water only at all faucets and flush until water runs cool or typically for a minimum of:
 - 15 minutes for a typical household 40 gallon hot water tank.
 - 30 minutes for a hot water tank greater than 40 gallons.
 - Consult water system professionals regarding the draining, flushing, or treatment for large capacity hot water tanks/boilers designed to deliver hot water.

Water Reservoirs & Storage Tanks

Large buildings with water-holding reservoirs:



- Consult with the building facility engineer about draining the reservoir.
- Drain, disinfect, flush, and refill water storage tanks according to your water management plan or professional consultant recommendations.

Ongoing Flushes

Ongoing flushing can repair destabilized scale and control biofilms. Re-stabilizing scale and controlling biofilms is an ongoing process. In the best case, ongoing flushing is conducted for about 12 weeks – the duration needed for protective scale to re-stabilize and for lead borne on particles to be thoroughly washed from the plumbing system as recommended in an industry standard (AWWA) on flushing related to lead.

Recommendations for ongoing flushing include:

- Make sure each point of use (POU) tap is opened at least once per day. Some POU's are used frequently during normal building operation. Others might be used less frequently and might need to be opened intentionally.
- Flush the full building once per week during ongoing flushing. Full building ongoing flushes proceed the same as the initial flush except water tanks do not need to be drained and hot water flushing times are the same as cold water flushing times. Still flush the cold and hot water systems separately – cold first and hot second.

During ongoing flushing, it is a good idea to measure the water quality of water coming into the building and at some taps in the building. Many building operators will not have the equipment or the ability to make measurements. Even if operators cannot measure water quality, they should still flush the building.

2. CHECK EQUIPMENT/DEVICES

Water Softeners

- Run water softeners through a regeneration (flush) cycle.

Water Filters

Water filters that are commonly used in refrigerators, faucets, and under the sink, etc. are not designed to remove the specific bacteria commonly present in stagnant water lines. If you ran stagnant water through your filter, the filter could be contaminated.

- Remove and discard water filters.
- Replace with a new filter following flushing.

Note: If you cannot flush or run water when filter is removed, replace with new filter after flushing. Always follow manufacturer's directions for filter replacement.

Steam Systems

Check steam system if clean steam is used for autoclaves.



- Check water quality used for steam generation
(See Association for the Advancement of Medical Instrumentation
<http://www.aami.org/productspublications/ProductDetail.aspx?ItemNumber=920>).
- Check with manufacturer for instructions to bring system back.

Ice Machines

- Clean and sanitize per manufacturer's instructions.
- Flush ice machines by following the manufacturer's instructions, including:
 - Flush the water line to the machine inlet.
 - Close the valve on the water line behind the machine.
 - Disconnect the water line from the machine inlet.
 - Open the valve and run 5 gallons of water through the valve. Dispose of this water.
 - Close the valve.
 - Reconnect the water line to the machine inlet.
 - Open the valve.
 - Replace any filters and sanitize filter holders.
 - Flush the water lines in the machine.
 - Turn on the machine.
 - Make ice for 1 hour and dispose of this ice.
 - Clean and sanitize all parts and surfaces that come in contact with water and ice per the manufacturer's instructions.

Drinking Fountains / Water Coolers

- Run drinking fountains continuously for 5 minutes to flush the system.
- Replace filter if applicable.

3. OTHER BUILDING WATER SYSTEMS

It's important to also remember all other water systems in a building, such as water reuse systems, decorative water features such as fountains, and landscape irrigation systems. Follow manufacturer recommendations for disinfecting all water systems after periods of non-use.

4. ADDITIONAL CONSIDERATIONS

Another best practice is the removal and cleaning of end-point devices such as faucet aerators and drinking fountain filters. This is particularly important if any disruption of supply pressure occurred or is suspected while the building was shut down. Pressure disruptions can dislodge particulates, including lead, which can get trapped in aerators and filters, spiking lead levels and reducing water quality.

5. WATER QUALITY MONITORING AND AT-RISK POPULATIONS

At a minimum, the water should be tested for total coliform and deemed satisfactory before consuming the water. Buildings serving high-risk populations such as nursing homes and health care facilities should consider testing for *Legionella* using a laboratory certified by the CT DPH [Environment Lab](#)



[Certification Program](https://portal.ct.gov/DPH/Epidemiology-and-Emerging-Infections/Legionnaires-Building-Owner-Info) for *Legionella* analysis at least 14 days prior to re-opening the building. Water samples for testing should be collected after taking the remedial steps recommended above. For more information please review the DPH Legionella Building Owner Information page at <https://portal.ct.gov/DPH/Epidemiology-and-Emerging-Infections/Legionnaires-Building-Owner-Info>

6. PROTECT WATER SYSTEM REHABILITATION PERSONNEL

As mentioned above, personnel that will work to rehabilitate stagnant building water systems will be at some risk and should be advised to take precautions. As such, wearing of personal protection equipment (PPE) including safety goggles, rubber gloves and NIOSH approved N95 facemasks, if available, are recommend best practices. In addition to the precautions concerning exposure to infectious agents from the water system, buildings that are being reopened after being closed and unoccupied for an extended period of time may present other hazards to workers. Extended time periods of deferred maintenance may present hazards related to electrical systems, HVAC systems, water intrusion, structural components, and other physical hazards during the period of reopening and reoccupation. Workers and building owners/operators should proceed with caution and carry a heightened awareness of these and other potential risks.