



Operations and Maintenance

School Water Plumbing Re-Opening Following Extended Closures Guidance

331-677 • Updated 1/28/2022

The focus of this guidance is to reduce microbial pathogen growth, including *Legionella*, and metal corrosion concerns that occur in school plumbing systems when schools have been closed or only partially occupied for long periods of time. The guidance focuses on potable water plumbing systems inside schools and on school campuses, and the information is general in nature. Each school building is different and requires different actions based on its plumbing systems, use patterns, and source of water supply. This guidance was developed primarily for use in Washington State where water systems typically use free chlorine for disinfection (not chloramines) and rarely have lead service lines.

Please see the department's [Guidance for Shutting Down and Reopening Water Recreation Facilities 333-247](#) for information about how to maintain and treat swimming pools and therapy pools. More information about cooling towers and HVAC systems can be found on the [New York State's Department of Health webpage](#).

The department has two guidance documents pertaining to building water systems that provide additional information and are referenced in this guide: [Legionella and Building Water System Closures 331-658](#) and [Shock Chlorination Guidance for Building Water Systems 331-659](#).

What is the problem and who does it apply to?

Many school buildings close or have significantly reduced occupancy during summer vacations or other extended school breaks. The resulting drop in building water use increases the risk for the formation of biofilm, which supports the growth of microbial organisms including *Legionella* in building plumbing and associated equipment like cooling towers, pools, decorative fountains, hot tubs and other equipment. To prevent *Legionella* growth, **these systems must be actively managed and maintained**. While *Legionella* is a primary risk, other opportunistic pathogens (*Mycobacterium avium*) and metal corrosion concerns (lead scale release) are increased by closure or reduced use situations.

School closures and reduced occupancy affect all environmental systems operating inside buildings including 1) potable and non-potable water systems, 2) cooling towers and 3) heating, ventilation and air conditioning (HVAC) that regulate interior relative humidity and control mold. These systems must be actively managed and maintained to protect the health of building users. In addition to managing systems during shutdown periods, school building owners and operators need to implement well-thought-out start-up protocols to ensure public health protection of their students. By implementing procedures now, you can protect staff and students and minimize the steps needed to safely reopen closed or partially closed facilities.

Recommended Monitoring and Management of School Water Plumbing Systems

Monitoring building water quality parameters Cl₂ and Temperature

Because temperature and chlorine residual are primary factors affecting opportunistic pathogen and *Legionella* presence in building plumbing, DOH strongly recommends accurately measuring temperature and chlorine residuals used to manage building water age. All building water systems should have an accurate digital chlorine residual test kit that uses an EPA-approved test method for use in drinking water compliance. Test strips and color wheels are not accurate and not recommended testing methods for water systems. Thermometers should be accurate to within +/- 1°C. Building managers should measure daily chlorine residual and temperature of water entering the facility from the water utility supplier. Chlorine concentrations in building plumbing will be less than or equal to utility concentrations. Building cold water temperatures will be equal to or higher than utility temperatures.

Maintaining water plumbing systems under low use conditions

The best means of ensuring good water quality throughout your school is to ensure fresh water is maintained throughout the school plumbing.

1. Flush cold water systems to maintain temperature and chlorine residuals. The frequency and duration of flushing depends upon occupancy, water use and your specific water and plumbing characteristics.
2. Monitor and maintain temperatures in hot water systems at the farthest (distal) fixtures. Or turn off the heating system, drain and flush the hot water tank, and refill with cold water. Then flush the hot water system with the cold water supply to maintain temperature and chlorine residual similar to the cold water system.
3. Measure and record temperature and chlorine residual of supply water from the utility every day. Use these values, not time, as your optimum target for flushing at your distal measurement sites. Individual buildings have too much plumbing variability for time to be a useful flushing parameter.
4. Maintain cold water distribution free chlorine residuals at or above 0.2 mg/L (mg/L is the same as parts per million (ppm) at low concentrations). Measure chlorine residuals with an approved device. The supplying utility's chlorine levels may limit your ability to maintain this minimum plumbing distribution residual. **Contact your utility to better understand their operating parameters.**
5. Ensure that the building p-traps do not dry out. You can do this by periodically flushing waterdown all drains to prevent sewer gas intrusion into the building.
6. Document all measurements and maintenance actions in a daily log.

Starting up school water plumbing systems after closures and sustained low use periods

You should give yourself two to three weeks lead time to start up your water plumbing system to make sure that you have time for testing and possible disinfection if needed. To ensure you and your employee's safety from both chemical and biological exposure while disinfecting and flushing the building plumbing, conduct appropriate training and use PPE. You can find guidance on worker safety for *Legionella* control and prevention on the [OSHA website](#).

1. Flush the entire water system plumbing to replace all water. Use an approved chlorine testing device to measure residual chlorine, flush until measured levels are equal to or slightly less than the supplying utility's chlorine residuals. Some flushing considerations are listed below. Additional flushing guidance is set forth in Environmental Science, Policy, and Research Institute (ESPRI) [Coronavirus Building Flushing Guidance 2020](#)
2. Create a list of all plumbing fixtures that need to be flushed including ice machines, dish washers, locker and health room showers, emergency eye washes and showers, therapy pools, and point of use (POU) treatment devices to ensure that no fixture is overlooked.
3. Verify that testing for back flow assemblies is up to date prior to flushing.
4. Some school facilities receive their water from their water supplier through large diameter water mains frequently associated with needed fire flows. These large diameter water mains must be flushed before building plumbing is flushed. Refer to the flushing guidance referenced above for special concerns for large diameter pipe flushing.
5. Make sure fixture drains are functioning and can handle expected flows without overflowing.
6. Remove all aerator screens before flushing. Clean or replace aerator screens to get rid of scale deposits that may contain harmful metals (lead) or microbial biofilms. Disinfect, heat sterilize, or replace shower heads—especially if immune compromised students have access to the showers.
7. Remove all point-of-use filters before flushing, and install new filters when flushing is complete.
8. During flushing operate all valves in the fully open position so that any particulate matter can be flushed through. Pay close attention to float-operated or other restrictive valves that need to be manually opened to clear particulates and prevent fouling of the valves.
9. Pay attention to water bottle filling stations and remember to replace any filters after flushing.
10. Some complex water use devices such as ice machines and dish washers may need additional cleaning and sanitizing steps once building flushing is complete. Follow the manufacturer's or local health jurisdiction's instructions for sanitizing following a water outage or contamination event.
11. Adjust valves back to normal operating positions to ensure that the system is rebalanced.
12. Return hot water systems to normal operating temperatures.
13. Document all start up actions in the daily maintenance log.

Plumbing water quality monitoring to verify startup effectiveness

The best means of ensuring good water quality throughout your school is to ensure fresh water is maintained throughout the school plumbing. To ensure that water in the school has been turned over, monitor the free chlorine and temperature at critical fixtures. Compare the values at these locations to the values of incoming water as described above. (Critical fixtures are water fixtures that reflect the most difficult locations for maintaining adequate chlorine residuals and temperatures, or that serve vulnerable students).

Coliform sampling to verify school plumbing start up effectiveness is not recommended because this organism is not similar to plumbing pathogens. The only way to evaluate your startup procedures relative to Legionella is to test for Legionella using an approved culture method or one cited by the National Academies of Science for testing of Legionella in water. Refer to our [Legionella and Building Water System Closures 331-658](#) for additional information regarding sampling, evaluating results, and appropriate follow up actions.

Lead and copper concerns originate from different plumbing materials found in plumbing pipes and fixtures like copper pipe, solder, flexible connectors, valves, or brass fixtures. The corrosion of these metals increases during stagnation. Flushing the fixtures reduces the levels of lead and copper. Schools should sample for lead in consumption fixtures at least every five years in accordance with the EPA [3Ts for Reducing Lead in Drinkingwater in Schools: Revised Technical Guidance](#). Additional information on lead in school drinking water can be found on our [Lead in Schools webpage](#).

References

[Building Water Quality and Coronavirus: Flushing Guidance for Periods of Low or No Use, Environmental Science Policy and Research Institute](#)

[Legionella and Building Water System Closures 331-658](#)

[Shock Chlorination Guidance for Building Water Systems 331-659](#)

For more information

Our publications are online at doh.wa.gov/drinkingwater.

Contact our nearest regional office from 8 AM to 5 PM, Monday through Friday. If you have an after-hours emergency, call 877-481-4901.

[Eastern Region](#), Spokane Valley 509-329-2100.

[Northwest Region](#), Kent 253-395-6750.

[Southwest Region](#), Tumwater 360-236-3030.



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