Michigan Department of Environment, Great Lakes and Energy (EGLE) Guidance for Flushing School Plumbing (High Velocity Method)

Introduction

This protocol provides guidelines to execute flushing for school facilities to reduce exposure to contaminants associated with sediment and water age such as bacteria, lead, and copper. Flushing is a method intended to systematically remove both aged water and particulates from the system. This method is based on maintaining a flushing water velocity of at least 3 feet per second (ft/sec) in the building's service line once to twice per year (suggested times are after school dismisses for summer break and before the start of the next school year, June and August, respectively). By following this procedure, the school facility administrator can reduce the risk of elevated drinking water pollutants associated with stagnant water conditions, which are created during periods of stagnation such as weekends and summer or winter breaks.

Scope

The scope of this protocol is for typical school facilities having common water fixtures such as sink faucets, toilets, urinals, and water fountains.

Procedure

1. Flushing should be a planned event. Make sure that anyone with access to the building is notified of the flushing plans well ahead of time, and it is encouraged to put out signs for those unaware.
2. Have a school layout drawing to help identify the anticipated flushing zones and the required flushing order based on their proximity to the service line entering the building (see the *EGLE Pre-Flushing Event Guidance for School Plumbing – How to Determine Flushing Zones* document).
3. Make sure you have coordinated enough people to participate in operating and monitoring flushing activities simultaneously, keeping in mind those fixtures that require constant activation during flushing like toilets, urinals, or sensor operated devices (see pre-flushing event guidance).
4. Based on the flushing plan, make sure to have access to all areas of the building.
5. Determine the size of the service line entering the building. Use Table 1 (below) to locate the minimum flow required to achieve an average water velocity of at least 3 ft/sec during flushing.

   TABLE 1. Minimum required water flows by size of service line entering the building for achieving desired water velocity.

Copper Pipe Size	Flow Rate (ft^3/min) [1] (cubic feet per minute or cf/min)	Flow Rate (gal/min) [1] (gallons per minute or gal/min)
2	3.766	28
2-1/2	5.818	44
3	8.292	62
3-1/2	11.243	84
4	14.598	109
5	22.655	169
6	32.341	242

1. Based on a water velocity of 3 ft/sec.

6. Have maintenance personnel start flushing through the hot water tanks at the utility room before beginning to open the fixtures in Zone 1 as indicated in Step 7 below. Flushing of the tanks is done by emptying the hot water tanks while the influent water valve to the water heater(s) and tanks remains open. Essentially, you are emptying and filling the tanks all at once. These tanks should be flushed until the water coming out of the bottom of the tanks is cold. It is recommended to shut off non-boiler heaters until flushing activities are completed.

7. While flushing the hot water tanks, begin zone flushing by instructing crew members to open all cold-water fixtures and begin systematically flushing all toilets in the first zone.
8. Use the readings from the water meter to estimate the water flow through the meter. Follow the procedure below using Figures 1-a and 1-b (see bottom of Page 2):
    a. Record initial reading at the meter. (Refer to Figure 1-a.)
    b. Time one minute and record a second reading. (Refer to Figure 1-b.)
    c. Subtract the second reading from the first reading to estimate the actual flow per minute. Below is a sample calculation using the readings in Figure 1.

$$Flow\ rate = \frac{(final\ reading - initial\ Reading)cf}{1\ minute} = \text{cf/min}$$

Ex. Fig1: $Flow\ rate = \frac{(10.13-0.13)cf}{1\ minute} = 10$ cf/min

9. Check the calculated flow rate with Table 1.
    a. If the calculated flow rate equals the corresponding number in Table 1, then go to Step 10.
    b. If the calculated flow rate is less than the corresponding number in Table 1, then expand your flushing zone to include more fixtures.
    c. If the calculated flow rate is greater than the corresponding number in Table 1, then decrease your flushing zone.
10. Start a timer. Keep fixtures open and flushing for at least 15 minutes. Be sure to make frequent rounds to monitor the water levels in the sinks and toilets during the 15-minute flushing period to ensure they are not overflowing.
11. Repeat Step 9 at least three times during the flushing of each zone. Make sure that the flow during flushing remains at or slightly above the corresponding flow rate in Table 1.
12. After flushing the zone for at least 15 minutes, close all fixtures and move to the next zone.
13. Repeat Steps 7 through 12 for additional zones (no need to flush hot water tank again).
14. Keep a record of the calculated flow rates obtained during the flushing process for each zone, the time of zone flushing, any problems noted with individual fixtures (i.e. low pressure, leaks, etc.) or problematic drains that back up.

FIGURE 1. Initial and timed water meter readings to demonstrate how to calculate flow per minute.

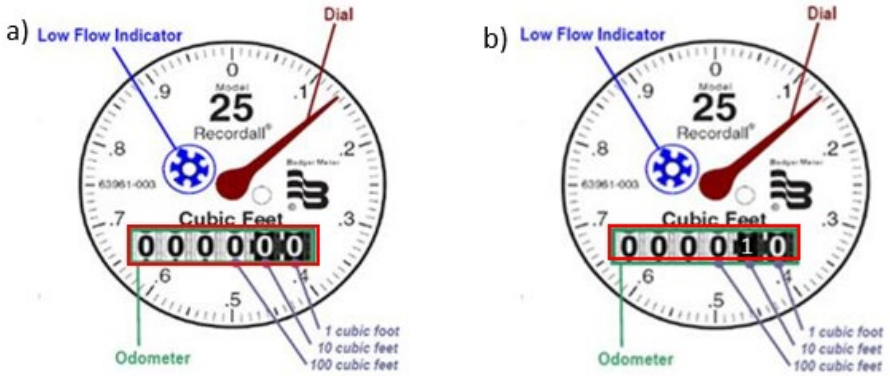

Figure 1. Common water meter with readings in cubic feet at the odometer and 10th of a cubic foot at the dial. Typically, water meters include a rotating piece (blue wheel) to indicate low flow associated with leaks. This figure also includes two reading displays a) meter displaying an initial reading of 0.13 cf, and b) meter displaying a reading of 10.13 cf.