DESIGN GUIDELINE 220010
PLUMBING SPECIALTIES

Scope

Water hammer arrestors, back flow preventers, pressure reducing stations, city water meters, mixing valves (hand washing), floor drains, trap primers, eye washes, small RO systems to improve drinking water.

Related Sections

U-M Master Specification Sections:
221119 Domestic Water Piping Specialties
224200 Plumbing Fixtures

U-M Standard Details:
15300001 - Fire Service System Detail
15411001- Domestic Water Service System Detail

Design and Installation Requirements

Water Hammer Arrestors

Water hammer arrestors shall be elastic chamber type in stainless steel casings certified to PDI standard WH 201, as specified in U-M Master Specification 221119.

Install ball valves for isolating water hammer arrestors for service.

Backflow Prevention

Utilize the U-M details indicated above. These details are intended to reflect both City of Ann Arbor and U-M requirements, but shall be revised as required to make project specific (e.g. to reflect parallel backflow preventers for those projects using such an arrangement). For reduced pressure zone type back flow preventers, indicate where the preventer drain is to be routed to.

Type of Back Flow Prevention Device Required:

The type of backflow prevention device *at the building entrance* must be approved by the City of Ann Arbor. The following reflects what is typically acceptable to the City, projects should therefore initially propose (with explanation) the following backflow prevention devices for City approval. *In all cases, correspondence with the City shall be made through the U-M Design Manager.*

Domestic Water At Building Entrance:

All building types except hospital and medical buildings, and high chemical hazard buildings:

Buildings without pressure booster pumps and a single feed from the city main: No back flow prevention required at entrance. Protect individual backflow hazards within the building with the type of backflow prevention device required by code, located at the hazard.

Buildings with two or more feeds from the city main, or with pressure booster pumps: Testable UL approved double check valve assembly on each feed from the city main. Protect individual backflow hazards within the building with the type of backflow prevention device required by code, located at the hazard.

Hospital or medical buildings, and high chemical hazard buildings:

Provide UL approved reduced pressure zone (RPZ) backflow preventer (BFP) type. Normally provide two RPZ assemblies each sized for 50% of the total required flow rate, piped in parallel, to allow one RPZ to be repaired while the other remains in service. Note that the City does not consider most lab buildings as high chemical hazard buildings. Protect individual backflow hazards within the building with the type of backflow prevention device required by code, located at the hazard.

Fire Service At Building Entrance, All Building Types:

Normally a testable double detector check valve assembly approved for fire service is acceptable. Protect individual backflow hazards within the building, e.g. a glycol zone at a loading dock, a small dry pipe zone chemically protected against microbiologically induced corrosion (MIC), with an RPZ BFP device located at the hazard. For buildings where extensive portions of the fire protection system are chemically treated to avoid MIC or for other purposes, provide a RPZ BFP device at the building entrance. Normally provide two RPZ assemblies each sized for 50% of the total required flow rate, piped in parallel, to allow one RPZ to be repaired while the other remains in service.

Back Flow Prevention and City Water Meters Located in Vaults:

Contact City of Ann Arbor through the U-M Design Manager for specific requirements regarding vault construction.

Individual Hazards Within Buildings:

Install backflow preventers within building as required to isolate hazards from distribution piping. Typical locations are make-up to chilled and heating water systems and cooling towers, and equipment connections, such as lab and vivarium equipment. When cost effective, aggregate such connections onto a non-potable water circuit to reduce the number of BFP assemblies, in particular RPZ type. When RPZ type BFPs protect systems that produce rapid pressure fluctuations downstream of the RPZ, provided a soft seated non-slam check valve immediately downstream of the RPZ. This prevents spitting out the RPZ drain port. Examples are systems with fast closing valves or rapidly cycling pumps (RO machines).

Pressure Reducing Valve (PRV) Stations

The A/E should separate the potable water distribution risers in high-rise buildings with only the upper floors served by booster pumps to preclude the need to add PRVs to the lower floor piping.

The PRV shall be sized for 25 percent reserve capacity at a 250 psi working pressure.

As appropriate, PRVs should be equipped with a smaller auxiliary regulator to handle low demands. The valve should include a full compliment of gauges and accessories.

Cold Water PRV set points shall be coordinated with hot water system pressure and/or hot water PRV set points, in particular when using the Campus hot water system, to prevent significant pressure imbalance between the two systems.

City Water Meters

Each building shall contain a water meter.

Provide calculations demonstrating the expected range of city water flow rate at the building entrance, for City of Ann Arbor review. For new buildings as well as major renovations in existing buildings, the size of the meter will be negotiated with the City. The City may request that existing meters be replaced. *In all cases, correspondence with the City shall be made through the U-M Design Manager.*

A separate city water meter is required for the following:

- Domestic water (building entrance)
- Cooling tower make up water
- Cooling tower blow down
- Irrigation system
- Other significant uses which do not ultimately discharge to the city sewer

Route cooling tower overflow drains through the cooling tower blow-down meter.

As indicated on U-M's Fire Service System Detail, for fire service to a building, the City will provide a FM and/or UL approved bypass meter for the testable double detector check valve assembly.

Coordinate meter installation with the University Design Manager. The meters shall be purchased by the University (include cost in project budget) from the City of Ann Arbor. Installation shall be performed by the contractor.

City magnetic flow meters require 120VAC power with a lockable disconnect located at the meter.

City meters require a remote read-out device (a small, wall mounted box) hard-wired to the City meter. This allows the City to read the meter remotely with wireless technology. The City

system has good range and typically can read the device even when mounted on a high building roof. The remote read-out device must be mounted above grade and normally should be located on an outside building wall. However, the device usually works when mounted inside the building on an outside wall, which may be preferable when the distance between the meter and an accessible outside wall location is excessively long. Devices that don't work will require relocation. Meters located outside (e.g. on a roof near a cooling tower) can have the read-out device mounted at a convenient, appropriate location near the meter. In all cases the device must be mounted at a location accessible (no ladders required) to a City meter technician; inside locations should typically be mechanical rooms.

Thermostatic Mixing Valves for Hand Washing Facilities

The Michigan Plumbing Code section 607.1 (2) (h) has been modified by local rule as follows:

> An ASSE 1070 mixing valve (water temperature limiting device) is permitted to control up to 5 accessible plumbing fixtures within the same room. The ASSE 1070 mixing valve shall be certified for a minimum flow rate of 0.5 gpm or less.

Therefore accessible plumbing fixtures at U-M do not require dedicated mixing valves for the conditions stated above. This modification is incorporated into the U-M Plumbing Fixture Specification 224200.

Floor Drains

Generally, floor drains shall not be installed in laboratory areas or below emergency showers. Consult with the U-M Design Manager and building users for possible exceptions. Consider need for installing floor drains at high traffic building entrances (e.g. below walk-off mats).

Trap Primers

Trap primers are not required at the University of Michigan, regardless of Michigan Plumbing Code dictates, except for high hazard circumstances, (eg., BSL3 and BSL4 labs), and applications where a dried trap might pose an undetected IAQ problem, (eg., floor drains located inside air handling units), or where it is difficult to re-prime a trap, e.g. below walk-off mats. Therefore trap primers should not be specified for toilet room, mechanical room, safety shower, and similar low hazard floor drains. The Designer shall identify high hazard or other circumstances as mentioned above and include trap primers for such drains. For drains requiring trap primers, the use of multi-trap primers, including electrically operated types, is permitted. Multi-trap primers should conform to ASSE 1018 or ASSE 1044, but do not have to be specifically listed as conforming to those standards, provided their design incorporates an ASSE approved back flow prevention device.

Emergency Eyewashes and Showers

Freestanding eyewashes shall be designed to drench both eyes simultaneously and have a waste line connected to the building sanitary waste system.

Water supplies to eye washes and showers shall be tempered.

Small RO Systems to Improve Drinking Water

Small RO systems (often located below sinks) used to improve the quality of water for drinking, coffee brewers, etc., are to be avoided due to water waste during operation and on-going maintenance, back-flow and sanitation issues.