WE 3: CATCH LEAKS BY MEASURING WATER USE

New York City Plumbing Code
Proposal developed by the Water Efficiency & Building Stormwater Committee

Summary

Issue:
Leaks and equipment malfunctions waste a tremendous amount of water in New York City buildings and they can persist undetected for years. Sub-meters attached to major water-using equipment can help detect these leaks.

Recommendation:
Require sub-meters for all major water-using equipment. These sub-meters will help building managers quickly detect leaks and malfunctions.

Proposed Legislation, Rule or Study

Amendments to the New York City Plumbing Code:

1. Amend Section 608.16.2 as follows:

608.16.2 Connections to boilers. The potable supply to the boiler shall be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CAN/CSA B64.3. Where conditioning chemicals are introduced into the system, the potable water connection shall be protected by an air gap or a reduced pressure principle backflow preventer, complying with ASSE 1013, CAN/CSA B64.4 or AWWA CS11. Makeup water supplies to boilers serving buildings with more than five stories shall be equipped with a water meter from a list promulgated by the department of environmental protection along with in and outlet isolation valves.

2. Amend Section 606.5.4.1 as follows:

606.5.4.1 Water piping control and location. Water inlets to gravity house tanks shall be controlled by a ball cock or other automatic supply valve or emergency electrical cut-off so installed as to prevent the overflow of the tank in the event that the pumps filling the tanks do not shut off at the predetermined level or the street pressure rises to a point where it can fill the tank. The water inlet to a suction tank shall be controlled by a ball cock or other automatic supply valve. The inlet shall be terminated so as to provide an accepted air gap but in no case shall it be less than 4 inches (102 mm) above the top of the overflow. The outlet from a gravity tank to the distribution system shall be equipped with a strainer located at least 2 inches (51 mm) above the tank bottom to prevent solids from entering the piping system. All down-feed supplies from a tank cross-connected in any manner with distribution supply piping in a building supplied by direct street or pump pressure, shall be equipped with a check valve on the main cold water down supply to prevent backflow of water into the roof tank. All roof tanks shall be provided with a high water level alarm at or slightly below the overflow.

3. Add a new subsection 606.7 to Section 606 as follows:

606.7. Equipment and area submeters. Water submeters from a list promulgated by the department of environmental protection shall be installed on the makeup water lines for each of the following: evaporative cooling towers, boilers serving buildings with more than five stories, and commercial tenants in food and laundry related businesses, gyms, spas, and swimming pools.

Supporting Information

Issue – Expanded
Sub-meters provide building owners and managers with the necessary information to make informed decisions regarding their water consumption. With sub-meters, an owner or manager can identify changes in water consumption that may be attributed to leaks or faulty equipment, directly bill tenants for water consumption, and identify areas of excessive water use. In addition, sub-meters enable building owners to provide the City with more detailed water consumption information, which may be assist in making infrastructure decisions. It is particularly important to monitor
cooling towers, rooftop water supply tanks, and boilers given the quantity of water used and/or the potential for leaks or other waste.

In many office buildings, evaporative cooling towers use more water than domestic uses. Cooling towers work by rejecting heat from building air conditioning systems using a water spray that dissipates heat as the water evaporates into the atmosphere. The water level in a cooling tower basin is controlled by a simple float valve that turns off the supply of make up water when the basin is full. However, the float valve can fail, causing the water level to increase until it overflows into the sewer, wasting hundreds or thousands of gallons an hour.

The refill of a rooftop water supply tank operates in much the same way with the same potential for large-scale water loss. Without alarms to inform the building owner of possible leak conditions, large-scale waste may remain undetected for days or even months. Likewise, water flows into boilers to make up for evaporative or blow down losses as well as condensate leaks. Without a makeup water meter these losses will not be detected at all.

The alarms being recommended in this proposal would either make a sound or send a signal to a building management computer if the level of water in a cooling tower basin or roof tank rises above the overflow point.

Environmental & Health Benefits

Environmental benefits of efficient water use are directly related to the amount of freshwater available for human consumption. Less than 2.5% of the earth’s water is freshwater, and most of this is locked up in ice caps and glaciers.\(^1\)

This proposal was determined to have a low, positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 1.

This proposal was determined to have no significant health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1\(^{st}\) draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

For some buildings this proposal will result in no increase of capital costs and for others an increase of up to 0.03%. It was thus categorized as incurring no to a low capital cost increment. This proposal was also estimated to generate financial savings that will pay for the capital costs in three to ten years or more than ten years depending on the building type.

Precedents

Water submetering is required under the 2008 California Green Building Standards Code for both indoor and outdoor potable water outlets.\(^2\) In addition, Texas requires submetering of water use for all new construction begun after January 1, 2003.\(^3\) The New York State Energy Code already requires submetering of electricity in new or renovated construction; the addition of water submetering as a means of allowing tenants to monitor their own water consumption would be consistent with this requirement.

There are no known precedents for requiring overflow alarms on roof tanks.

LEED

For existing buildings, water metering is addressed by LEED EB-EA cr.5.1-5.3, Performance Measurement, Enhanced Metering.

For other rating systems, LEED EA credits for Measurement & Verification require the implementation of a M&V Plan consistent with the International Performance Measurement & Verification Protocol (IPMVP) Volume III, April, 2003, which concerns energy conversation measures. However, the LEED credit expands upon typical IPMVP M&V objectives, and M&V activities should not necessarily be confined to energy systems. In fact, the case study presented in the LEED NC reference manual highlights the Frito-Lay Jim Rich Service Center in Rochester, NY, which monitored water through metering, along with other systems. Therefore, this proposal could also potentially contribute to earning the following credits:

• LEED NC-EA cr.5 Measurement & Verification
• LEED CI-EA cr.3 Energy Use, Measurement & Payment Accountability
• LEED for Schools EA cr.5 Measurement & Verification

Additionally, LEED 2009 encourages building owners to include water-using systems in their Commissioning plans, as
appropriate. While ongoing metering is not a component of Commissioning, LEED cites a synergy with this process as it also verifies performance of systems.

Implementation & Market Availability
There are no known implementation issues for this proposal. Water meters and overflow alarms are readily available.

Notes
1. A Submeter is a water meter owned, maintained and operated by the building owner for the purpose of monitoring water use by a specific end use, tenant or physical portion of a building. In this case, submeters are recommended for the makeup water lines of evaporative cooling towers to monitor for efficient operation of the tower, for makeup water lines for boilers, to help detect steam condensate system losses or excess boiler blow-down, for food- and laundry-related tenants because they are usually typically high water users and for large functional or physical portions of a building as well as gyms and spas containing water using equipment such as swimming pools, hydro-therapy pools, showers and toilet facilities, etc.

2. While not a requirement, it is strongly recommended that the requisite submeter be provided with a centrally located totalizing display or connected to a Building Automation System to allow building operators to more easily view water use profiles. Further, the committee strongly recommends that the DEP make available on line or via email water meter readings for total building water use.

3. The committee intended to include a provision in subsection 606.7 that would require a meter “for any tenant with a separate tap off the base building water system serving a single or multiple floors totaling 50,000 square feet or more.” Servicing tenants for water with a dedicated tap is nonconventional practice but does occur in NYC. The committee was unable to finalize this language and appropriate costing assumptions for a nonconventional practice in time for the publication of this report. One potential source of appropriate code language for this provision is section 409 of the IAPMO Uniform Plumbing Code.

4. Mechanical Code section 908.5 requires that the Plumbing Code be followed with respect to water supply.

ENDNOTES:

