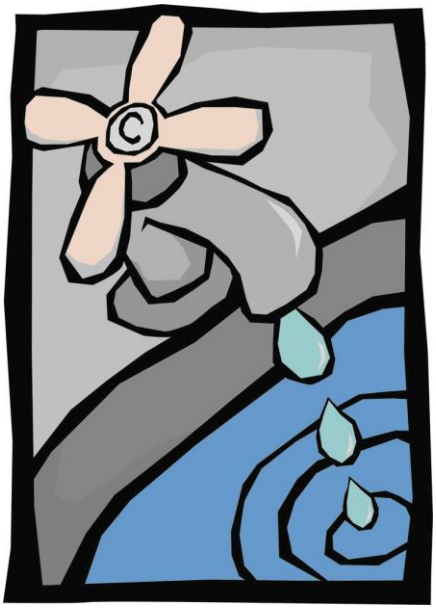
Faucet Fixtures Introduction

Residential and Non-Residential Faucet Fixtures

Flow rate maximums



In the past, faucets were not a primary focus of water efficiency advocates, given that the Energy Policy Act (EPAct) of 1992 and subsequent EPAct actions limited faucet flows to 2.2-gpm (8.3 L) (at 60 psi). In the mid-1990s, however, the U.S. model plumbing codes and standards (ANSI standard ASME A112.18.1/CSA B125.1) further reduced that maximum flow rate to 0.5-gpm (1.9 L) for public (non-residential) applications.

The 0.5 gpm standard for non-residential applications is frequently neglected as many people are simply unaware of this standard. Some believe that the maximum flow rate for faucets in non-residential applications is still the EPAct rate of 2.2 gallons per minute (8.3 L), but this is untrue. Unfortunately, this myth has taken hold and gotten serious traction among design engineers, specifiers, plumbing contractors, and building owners. For non-residential lavatory applications, the maximum faucet flow rate should be 0.5 gpm (1.9 Lpm). The result of this confusion has been and continues to be the illegal installation of non-compliant faucets in some new commercial projects.

Background and Definitions

The Energy Policy Act of 1992 and subsequent rulings by the U.S. Department of Energy (DOE) set the maximum lavatory faucet flow rate at 2.2-gallons per minute (8.3 Lpm) when measured at 60 pounds per square inch (4.2 Kg/cm) of flowing water pressure. However, the governing standard and test procedure (as established by the DOE) for faucets was and continues to be the ANSI national standard, ASME A112.18.1/CSA B125.1. In the early 1990s, this standard was changed to reflect a lower maximum flow rate of 0.5-gallons per minute (1.9 Lpm) for all "public" applications.

All of the major plumbing codes have adopted ASME A112.18.1 by reference. "Public" applications are defined in those implementing codes as all applications that are not defined as

"private". The codes (Uniform Plumbing Code, International Plumbing Code, and the National Standard Plumbing Code) each define "private" as inclusive only of fixtures in residences, hotel/motel guest rooms, and private rooms in hospitals. All other applications are deemed as within the "public" category and subject to a 0.5-gallons per minute (1.9 Lpm) maximum for lavatory faucets. This includes such applications as single-tenant and multi-tenant office buildings, schools, gymnasiums, manufacturing facilities, public buildings (including those where the general public is denied access), bars, restaurants, retail stores, and any other type of building that does not fall within the "private" definition.

Metering faucets for public applications are subject to the same codes and standards, all of which set the maximum water use at 0.25 gallons per cycle (.94 L). That is, the "on-off" cycle (or time during which the faucet is on) cannot result in a total flow in excess of 0.25 gallons (.94 L) of water.

WaterSense

Recently, the U.S. EPA's WaterSense product labeling program approved a specification for ***residential*** lavatory faucets in which the maximum flow rate is set at 1.5-gpm (5.7 L) and the minimum at 0.8-gpm (3.0 L). That specification may be accessed here:

EPA WaterSense (2007) High-Efficiency Lavatory Faucet Specification

Currently, over 750 faucets and aerators have been independently tested and found to comply with the WaterSense specification, entitling them to be labeled with the WaterSense logo. An up-to-date listing of those qualified products may be found at the EPA WaterSense website.

Do sensor-activated commercial faucets save water?

Before beginning this discussion, it is important to note that the growth of the "touchless restroom" has been in large part to the concern for hygiene and health, since fixtures do not need to be touched with the hand in order to activate flow. In the past several years, the commercial side of faucets has been a topic of much conversation, if not research. Most water efficiency practitioners readily acknowledge that sensor-operated flush valves (for commercial toilet and urinal fixtures) save no water. In fact, they would quickly say that these devices waste water by flushing more frequently than necessary! But, what about faucets?

Hillsborough County Florida

Concluding in 2009, Veritec Consulting, Inc. and Koeller and Company conducted an extensive fixture replacement study in a major commercial office building wherein manually activated faucets and flush valves were replaced with sensor-activated units. This study took place over a two-year time period, was comprised of 4 phases, and used dataloggers to determine what changes in water consumption resulted from such replacements.

After an extensive period of baseline measurement (pre-monitoring), the study analysis showed that the replacement of manually operated commercial lavatory faucets with sensor-activated

faucets resulted in a 30 percent increase in water consumption. Similarly, replacement of manual toilet flush valves with sensor-activated units saw water use increase by 54 percent. For urinals, water use dropped by a small amount.

Gauley and Koeller (2010) Sensor-Operated Plumbing Fixtures, Do They Save Water?

Millennium Dome Report on Water Efficiency-"Watercycle" (2002)

Thames Water's "Watercycle" project at the Millennium Dome in London was one of the largest in-building recycling schemes in Europe, designed to supply up to 130,000 gallons per day (491.96 m3) of reclaimed water for WC and urinal flushing. It catered to over 6 million visitors in the year 2000. Overall, 55% of the water demand at the Dome was met by reclaimed water. The Dome was also the site of one of the most comprehensive studies ever carried out of water conservation in a public environment, evaluating a range of water efficient appliances and researching visitor perceptions of reclaimed water.

Of particular interest is Figure 6 in the report which shows washroom water use for handwashing and compares infrared sensor-operated faucets with "push top" (cycling) faucets and conventional swivel top faucets. It confirms that infrared sensors on the faucets create a waste of water when compared to conventional manually operated fixtures. Another major finding of the study was the importance of a water efficient aerator on sensor faucets. When people open a conventional faucet, they very seldom turn it on all the way. The study shows that on the average, a users open the faucet to a flow rate of some 1.0 to 1.5 gallons per minute. By contrast, sensor faucets open the valve all the way. If a 2.2 gpm aerator is on the faucet , the flow will be 2.2 gallons per minute, but if a 0.5 gpm aerator is used, the flow will be only 0.5 gpm.

Hills, S. et. al. (2002) The Millenium Dome Watercycle Experiment - to Evaluate Water Efficiency

ASHRAE Field Study

Another study that compared manually operated faucets with sensor-activated faucets was published in 2002 by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.). While not the main focus of the study, titled "Field Test of a Photovoltaic Water Heater", Tables 3 and 4 provide data needed for the comparisons.

Fanney, A.H. (2002) Field Test of a Photovoltaic Water Heater

"Hands-free" Faucet Valves

Two manufacturers have introduced devices that enable the end-user (home or office) to open and close a faucet valve "hands-free". Go to these websites for more information on the pedal valve:

- http://www.pedalvalve.com/
- http://www.footfaucet.net/