

This is a guidance document with sample specification language intended to be inserted into project specifications on this subject as appropriate to the agency's environmental goals. Certain provisions, where indicated, are required for U.S. federal agency projects. Sample specification language is numbered to clearly distinguish it from advisory or discussion material. Each sample is preceded by identification of the typical location in a specification section where it would appear using the SectionFormat™ of the Construction Specifications Institute; the six digit section number cited is per CSI Masterformat™ 2004 and the five digit section number cited parenthetically is per CSI Masterformat™ 1995.

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SECTION 22 40 00 (SECTION 15400) – PLUMBING FIXTURES

SPECIFIER NOTE:

resource management: The systems specified for water use in a building can dramatically impact both the quantity of water resources used and the quality. Water use in the United States has more than doubled in the past half-century—from about 180 billion gallons (680 billion liters) a day in 1950 to more than 400 billion gallons (1.5 trillion liters) a day in 1995. Federal agencies collectively spend more than \$500 million annually on water and sewer costs.

Zero water use fixtures such as waterless urinals and composting toilets are available. Composting reduces water usage and creates soil amendment. Vacuum toilet systems, traditionally associated with water conservation in marine, air and railroad transports are also available for application in commercial/residential buildings. Vacuum toilets not only reduce water consumption, but they reduce piping and can eliminate need for toilet vent pipes, allowing for flexibility in design layout.

toxicity/IEQ: Water quality for most buildings is largely determined by the municipal water treatment facility. Most water treatment facilities rely upon chemicals, including chlorine, to combat pathogens. Chlorine is highly reactive and readily forms chlorinated compounds, many of which are considered to be dangerous. Chlorinated hydrocarbons, such as DDT, have been and are used as pesticides.

Similarly, chemicals are often used for routine maintenance and cleaning of facility plumbing. By installing mechanical access to piping, mechanical means can be utilized for routine maintenance.

Composting is the biological reduction of organic wastes to humus. It is a natural process that is critical for support of all terrestrial life. Although composting manure is a traditional and extremely valuable process, manure (especially from carnivorous animals) can promote unwanted bacteria and diseases if handled improperly. The statutory definition of 'lead free' includes up to 8 percent lead. There are different requirements depending on where in the plumbing system something is installed. Refer to <http://www.epa.gov/safewater/standard/plumbing.html>

performance: When low flow fixtures were first developed, many were deemed unsatisfactory because they could not deliver the pressure Americans enjoyed. More recent models generally do not have this problem, except for extremely high pressure demands in some high use areas. The standards established for water consumption by the Energy Policy Act restrict showerheads to 2.5 gallons (9.5 liters) per minute at 80 psi, urinals to 1 gallon (3.8 liters) per flush, faucets to 2.2 gallons (8.3 liters) per minute at 60 psi (410 kPa), and toilets to 1.6 gallons (6 liters) per flush at 80 psi (550 kPa). Toilets account for almost half of a typical building's water consumption. Americans flush about 4.8 billion gallons (18.2 billion liters) of water down toilets each day, according to the U.S. Environmental Protection Agency.

Automated controls for faucets, toilets, and urinals help address occupants' concerns about disease transmission via contact with bathroom surfaces and fixtures—they can also reduce water consumption.

Refer to "Greening Federal Facilities: An Energy, Environmental, and Economic Resource Guide for Federal Facility Managers and Designers" <http://www.eere.energy.gov/femp/pdfs/29267-0.pdf>

Designers and building owners should be aware that low flow and zero flow fixtures and accessories (such as waterless urinals, composting toilets, and sensor operators) may require special training. Because the green items may be different from the systems and materials with which the owner's personnel are familiar, education about the environmental qualities as well as the operation and maintenance requirements may be necessary. Refer to Section 01821.

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Faucets and aerators.
 2. Water closets.
 3. Urinals.
 4. Showerheads.
 5. Accessories.

1.2 SUBMITTALS

- A. Product data. Unless otherwise indicated, submit the following for each type of product provided under work of this Section:

SPECIFIER NOTE:

Specifying local materials may help minimize transportation impacts; however it may not have a significant impact on reducing the overall embodied energy of a building material because of efficiencies of scale in some modes of transportation.

Green building rating systems frequently include credit for local materials. Transportation impacts include: fossil fuel consumption, air pollution, and labor.

USGBC-LEED™ v3 includes credits for materials extracted/harvested and manufactured within a 500 mile radius from the project site. Green Globes US also provides points for materials that are locally manufactured.

1. Local/Regional Materials:
 - a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 - d. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

SPECIFIER NOTE:

USGBC-LEED™ v3 includes credit for water efficient landscaping and for water use reduction. Limiting or eliminating the use of potable water for landscape irrigation can earn LEED credit. Reducing the aggregate water use of the facility by minimum 20 percent from baseline (not including irrigation) calculated as per the Energy Policy Act of 1992 fixture performance requirements contributes to LEED credit.

2. Water efficiency: Indicate water consumption rates in gallons per day (gpd) per unit for the following:
 - a. Plumbing fixtures.

- B. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.

1.3 QUALITY ASSURANCE

- A. Water flow and consumption rates for plumbing fixtures:
1. Comply with requirements in Public Law 102-486, Energy Policy Act.

SPECIFIER NOTE:

The EPA WaterSense partnership program develops criteria for water efficient products and services. Products bearing the [WaterSense label](#) are generally 20 percent more water-efficient than similar products in the marketplace. Independent, third-party licensed certifying bodies certify that products meet EPA criteria for water efficiency and performance by following testing and certification protocols specific to each product category. Products that are certified to meet EPA specifications are allowed to bear the WaterSense label.

As of November 1, 2009, WaterSense labels are available for faucets, toilets, and flush urinals. Draft criteria is under development for pre-rinse spray valves, irrigation controls, and showerheads.

2. Provide WaterSense labeled products for:
- High-Efficiency Lavatory Faucets.
 - High-Efficiency Toilets - Tank-Type Single Flush.
 - High-Efficiency Toilets - Tank-Type Dual Flush.
 - Flushing Urinals.

PART 2 PRODUCTS

SPECIFIER NOTE:

EO 13423 directs Federal Agencies "... beginning in FY 2008, reduce water consumption intensity, relative to the baseline of ... year 2007 ... by 2 percent annually through the end of fiscal year 2015 or 16 percent by the end of fiscal year 2015"

Specifically, under the Sustainable Building requirements per Guiding Principle #3 Protect and Conserve Water, EO 13423 directs Federal agencies to "Employ strategies that in aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building, after meeting the Energy Policy Act of 1992 fixture performance requirements."

Executive Order 13514; *Federal Leadership in Environmental, Energy, and Economic Performance*; was signed on October 5, 2009. <http://www.ofee.gov/execorders.asp> It expands upon the environmental performance requirements of EO 13423. http://www1.eere.energy.gov/femp/regulations/printable_versions/eo13423.html

EO 13514 sets numerous federal requirements in several areas, including sustainable buildings and communities. Federal agencies must implement high performance sustainable federal building design, construction, operation and management, maintenance, and deconstruction, including:

- Ensuring all new Federal buildings, entering the design phase in 2020 or later, are designed to achieve zero net energy by 2030.
- Ensuring all new construction, major renovations, or repair or alteration of Federal buildings comply with the Guiding Principles of Federal Leadership in High Performance and Sustainable Buildings <http://www1.eere.energy.gov/femp/pdfs/mouhighperfsustainfedfacs.pdf>
- Ensuring at least 15% of existing agency buildings and leases (above 5,000 gross square feet) meet the Guiding Principles by fiscal year 2015 and that the agency makes annual progress towards 100% compliance across its building inventory.

2.1 MATERIALS

A. Fixtures:

1. Water management: Provide low flow fixtures and automatic, sensor operated faucets and flush valves. Provide automatic, sensor operated faucets and flush valves to comply with ASSE 1037 and UL1951.
 - a. Faucets and aerators: WaterSense labeled. Maximum 1.5 gal/min when measured at a flowing water pressure of 60 pounds per square inch; and, minimum flow rate shall not be less than 0.8 gpm (3.0 L/min) at a pressure of 20 psi at the inlet, when water is flowing.
 - b. Water closets: WaterSense labeled high-efficiency toilet with maximum effective flush volume of 1.28 gallons. For single flush toilets, the effective flush volume is the average flush volume per ASME A112.19.2. For dual flush toilets, the effective flush volume is the composite, average flush volume of two reduced flushes and one full flush per ASME A112.19.2 and ASME 112.19.14. **[Gravity tank type water closets not allowed.]**
 - c. Urinals: **[WaterSense labeled flushing urinal with maximum 0.5 gallons/flush.] [Waterless operation; provide with urine trap and 100 percent biodegradable sealant liquid as approved by manufacturer.]**
 - d. Showerheads: 2.2 gal/min when measured at a flowing water pressure of 80 pounds per square inch.
2. Toxicity/IEQ:
 - a. Traps: Provide traps with removable access panels for easy clean-out at sinks and lavatories.
 - b. Water filter systems: Provide filters for chlorine at sinks, lavatories, and showerheads.

SPECIFIER NOTE:

Low corrosion flux for copper pipe can help reduce potentially toxic releases from soldered copper pipe.

- c. Low corrosion flux for copper pipe: Comply with ASTM B813.

2.2 ACCESSORIES

SPECIFIER NOTE:

Labeling of components is an inexpensive and effective method for helping building occupants properly operate the systems and for helping facilities personnel properly maintain the systems. The labels should be easy to read when standing next to the equipment, and durable to match the life of the equipment to which they are attached.

- A. Labels: Provide labels for sensor operators at flush valves and faucets. Include the following information on each label:
 1. The identification of the sensor and its operation with **[graphic] [written] [Braille]** description.
 2. Range of sensor.
 3. For battery operated units, the battery replacement schedule.

PART 3 - EXECUTION

3.X SITE ENVIRONMENTAL PROCEDURES

A. Resource Management:

1. Water Efficiency: Verify equipment is properly installed, connected, and adjusted. Verify that equipment is operating as specified.
 - a. Adjust automatic sensor operated faucets and valves in accordance with manufacturer's instructions. Comply with ASHRAE 90.1 for energy efficiency.

END OF SECTION