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Commercial Restroom Design: Sanitary, Accessible, Durable, & Water-Efficient



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Commercial Restroom Design: Sanitary, Accessible, Durable, & Water-Efficient

Presented by: Kohler Co.

444 Highland Drive
Kohler, WI 53044

Description: Provides an overview of the commercial restroom and its particular fixture requirements to ensure sanitation, vandalism resistance, durability, accessibility, and water efficiency.

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Purpose and Learning Objectives

Purpose: Provides an overview of the commercial restroom and its particular fixture requirements to ensure sanitation, vandalism resistance, durability, accessibility, and water efficiency.

Learning Objectives:

At the end of this program, participants will be able to:

- summarize the differences between commercial and residential fixtures
- discuss the advantages of the types of commercial toilets, urinals, faucets, and touchless technologies available
- describe how commercial fixtures address the need for sanitary, durable, and water-efficient restrooms, and
- explain how commercial restrooms can be made accessible and follow universal design principles that meet the needs of all users.



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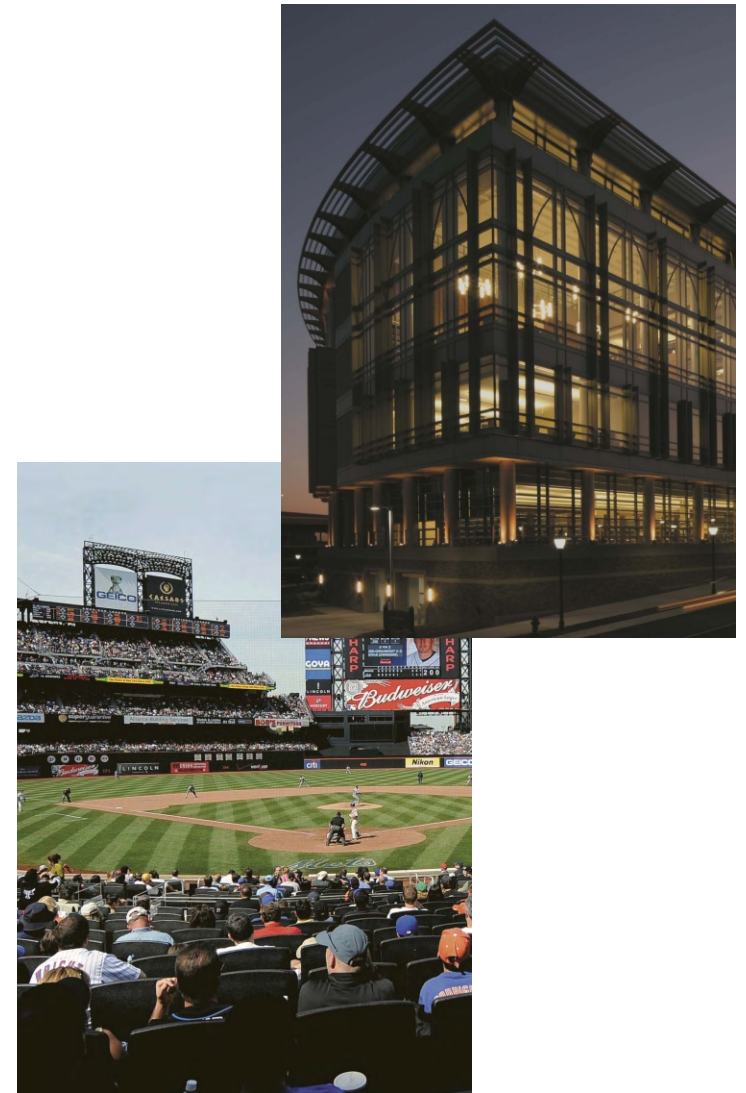


Overview of Commercial Restrooms

Introduction

Commercial restrooms are used in a wide range of applications. From ballparks to airports, movie theaters to malls, office buildings to schools to hospitals, each commercial restroom has unique demands in terms of materials and design. However, they all have the same essential requirements of meeting the needs of various users all while maintaining sanitation, durability, and water efficiency.

Commercial restrooms are different from residential bathrooms as they typically require more fixtures, have a higher number of users, and have different water supply requirements. Therefore, the finish plumbing selection should be designed to reflect these differences.



Commercial vs. Residential

Simply by virtue of the greater use and sometime misuse which they are subjected to, commercial fixtures must be long-lasting and durable.

Tank-type toilets are common in residential and light commercial applications. In contrast, flushometer-valve toilets are used in higher traffic, commercial applications. Although commercial and residential toilets can use the same amount of water, their operation and mechanisms differ.



Commercial vs. Residential

Flushometer-valve toilets, commonly found in high-traffic commercial restrooms, operate in a way where water enters the toilet from the building's supply at a higher flow and pressure than in a residential toilet. The design of the flushometer-valve toilet puts these higher flows and pressures to use to thoroughly clean the bowl, have a strong flush, and quickly reset the system for the next user.

A residential toilet typically relies on gravity, using the force of water coming from the tank. In addition, it takes more time to refill the tank than to reset a flushometer valve.

Commercial vs. Residential

Flushometer-valve toilets can be either wall- or floor-mounted. They are available with the water inlet, known as a spud, at the top of the toilet, or at the rear. In terms of spud options, a top spud toilet is more common because it is less expensive and easier to install and service. A rear spud is more vandalism resistant and easier to clean, and is used more often in hospitals, detention centers, or correctional facilities; a toilet with no exposed piping is preferred where residents are at risk of self-harm.



Floor-Mounted Rear Spud



Wall-Mounted Rear Spud



Wall-Mounted Top Spud

Commercial Restroom Needs

The needs of a commercial restroom can be addressed in four essential areas:

Sanitation: Restrooms and their fixtures must be sanitary not only for the sake of public health, but for the positive image of the commercial setting.

Accessibility: Public restrooms are required by law to have accessible fixtures. Additionally, consideration of universal design guidelines can ensure that restrooms are usable by people of all ages, sizes, and abilities.

Durability: Commercial restrooms need heavy-duty fixtures that can stand up to high-volume use. Resistance to vandalism and misuse are necessary for long-lasting products.

Water Efficiency: Water-efficient fixtures are required by some codes and green building programs. They also save money and contribute to the positive public image of an organization as environmentally responsible.

Commercial Fixtures Meet These Needs

Today's commercial fixture and faucet selections can meet sanitary, accessibility, durability, and water-efficiency needs and still have design options to fit various styles without looking institutional.

Throughout the rest of this course, we will look at some of these options for commercial restroom toilets, urinals, sinks, and faucets.





Sanitation

Sanitation Considerations

With public health issues frequently in the news, building occupants are more aware than ever of the perils of unsanitary conditions.

A study published in the *Journal of Environmental Health* found that 95% of people don't wash their hands properly after using a public restroom. The Centers for Disease Control urge that handwashing is the most effective way to reduce the spread of infectious disease. If proper hygiene is not occurring, facilities face an uphill battle to keep fixture surfaces from becoming hot spots for bacteria. The types of bacteria potentially present in restrooms make up an invisible yet frightening array of organisms: staphylococci, streptococci, E-coli, campylobacter, salmonella, enterococcus, rotavirus, mold, and fungi.

Poor restroom hygiene is visible in overflowing trash cans, dirty floors, wet counters, and clogged toilets. Seeing poorly kept restrooms makes users want to avoid flushing and washing out of concern for cross-contamination, so the problem becomes worse. Restrooms that look clean can reinforce good hygiene in users and reinforce a positive public image for the facility.

Sanitation: Touchless Technology

Touchless technology is one innovation that can help combat poor hygiene habits. Touch-free fixtures let restroom users go from toilet, to lavatory, then out of the restroom while touching almost no surfaces.

An automatic flush mechanism is doubly beneficial because it ensures flushing after each use, and its touch-free operation limits cross-contamination. A distance-measuring sensor with preset activation zones or flushing activated by a hand wave are two types of touchless technology.



Sanitation: Flushing Performance

In the early 1990s, water-savings requirements were implemented in a short time period and manufacturers were not given ample time to redesign products. As a result, consumers were not satisfied with product performance.

In response, water utility industry organizations formed a test protocol to measure and motivate improvement in flush performance. The test protocol is known as MaP (Maximum Performance) Testing. MaP Testing tests bulk waste performance where a bulk flush rate of 250 grams is considered biologically realistic.

Both flushometer-valve toilets and tank-type toilets can be MaP tested, and the information is publically available at <http://www.map-testing.com/>. (Accessed December 2015.)

Sanitation: Urinals

Some urinals do not use water at every use to flush the liquid waste. Apart from the water-saving benefits, waterless urinals can also offer sanitation benefits. Water in urinals provides the moist environment mold, mildew, bacteria, and viruses need to grow. Waterless urinals are inhospitable to these organisms because the bowl dries out between uses.



Sanitation: Toilets

Wall-mounted toilets are a smart option for high-traffic venues that may need more frequent cleaning. With the base of the toilet raised, cleaning is easier and more effective.

IAPMO's (International Association of Plumbing and Mechanical Officials) Uniform Plumbing Code and the ICC's International Plumbing Code require open-front toilet seats in public restrooms to help reduce contamination.

In hospital applications, a bedpan washer (lower image) can provide convenient sanitation at a lower cost than a centralized washing unit.



Sanitation: Faucets and Sinks

Non-porous vitreous china or enameled cast iron sinks provide an easy-to-clean surface. Sanitation is also enhanced with touchless faucets that limit the spread of germs.





Accessibility

Accessibility Considerations

The U.S. Census Bureau found that in 2010, more than 50 million people (nearly one in five) face some type of disability. That number is expected to increase significantly in the next 30 years as the baby-boom cohort ages. It is important to design commercial restrooms that meet the needs of the whole population now and into the future.

The Americans with Disabilities Act, first signed into law in 1990, is a federal civil rights law that sets the minimum accessibility requirements for state and local government, public, and commercial facilities. The requirements ensure that at least one of each type of fixture is usable by those with disabilities.

While the *2010 ADA Standards for Accessible Design* specifically consider the needs of people with disabilities, a universal design approach seeks to benefit **all** users.

Universal Design

Universal design is defined as the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. Following are the seven Principles of Universal Design.

Equitable Use: The design is useful and marketable to people with diverse abilities.

Flexibility in Use: The design accommodates a wide range of individual preferences and abilities.

Simple and Intuitive Use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Perceptible Information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Low Physical Effort: The design can be used efficiently and comfortably and with a minimum of fatigue.

Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.

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Commercial Restrooms for All Users

Facilities built to ADA standards offer functionality that often overlaps with universal design concepts and meets the needs of everyone, no matter their age, size, experience, health, and cognitive, perceptual, or physical abilities.

Generally, ADA standards focus on the issues of:

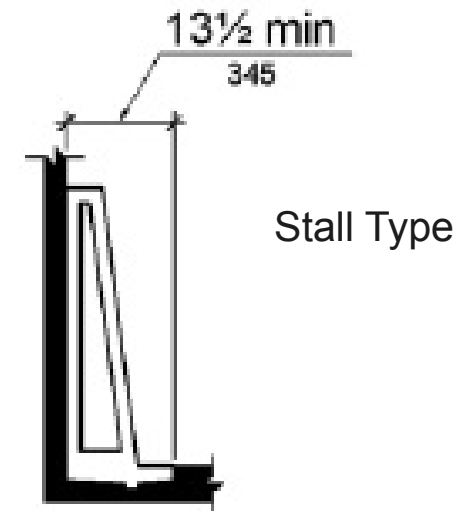
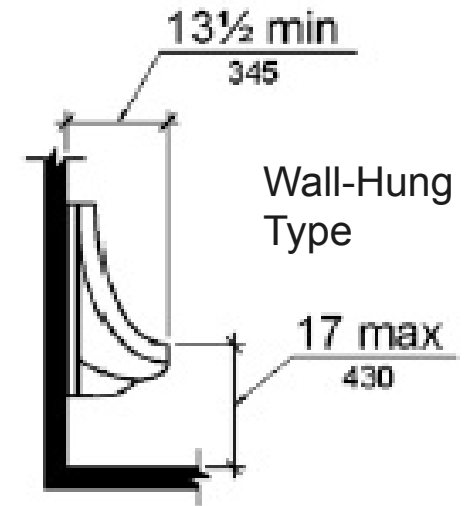
- space for a wheelchair or ambulatory aid (crutches, cane, walker)
- knee and toe clearance as well as reach range for those in wheelchairs
- protrusion of objects from the wall that may not be detected by a vision-impaired person using a cane, and
- operable parts that must be workable with one hand and cannot require tight grasping, pinching, or twisting, or more than 5 pounds of force to operate.

Accessibility: 2010 ADA Requirements for Urinals

Because of the vast diversity of heights among users, it is difficult to universally design wall-hung urinal installations. Stall-type urinals provide greater accessibility for a broader range of users, including people of short stature. ADA requirements are for the rim to be 17" (430 mm) maximum above the finish floor, and 13.5" (345 mm) deep from the back wall. (Verify all measurements with local codes, as those may be more strict than Federal ADA requirements and may supersede them.)

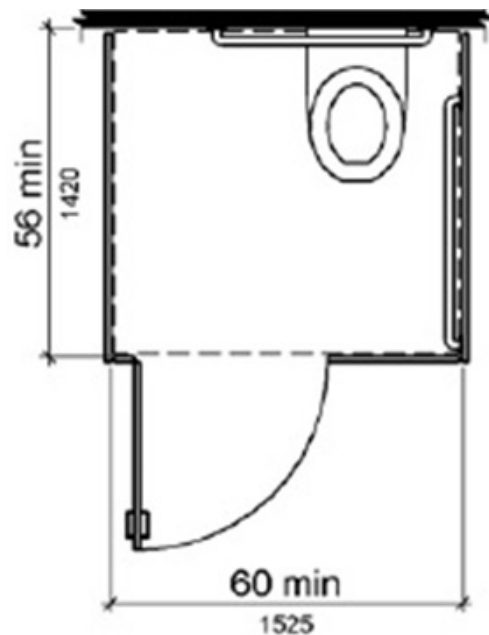
Automatic or motion-activated flushing meets the ADA requirements for operable parts as well as universal design guidelines for intuitive and simple use.

Clear space in front of the urinal must measure 30" wide and 48" deep (760 mm x 1220 mm) to allow forward wheelchair approach.

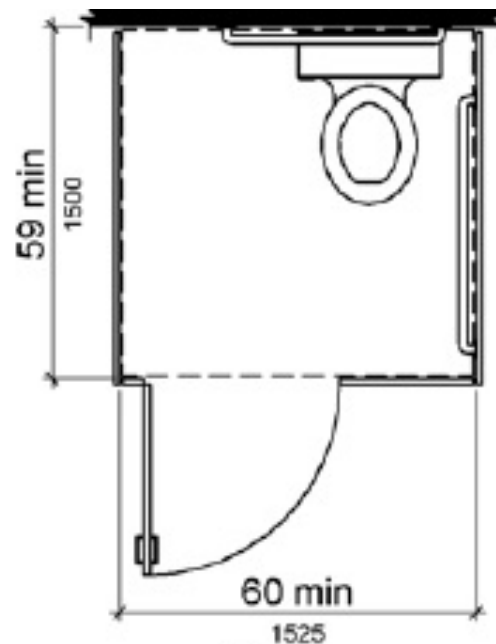


Accessibility: 2010 ADA Requirements for Toilets

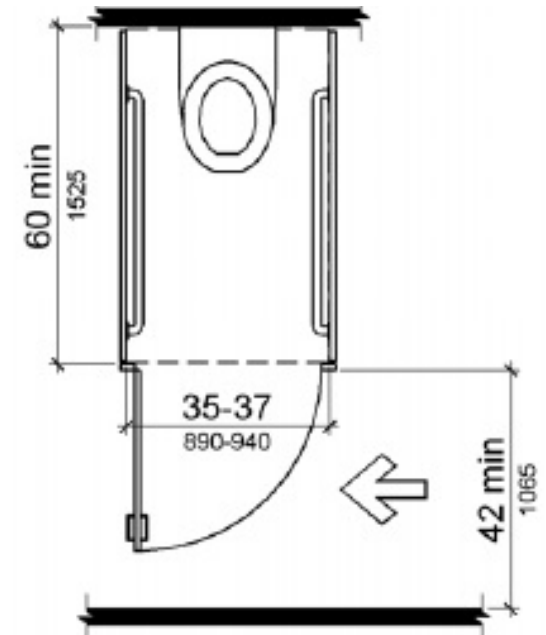
Clearance around the toilet in a wheelchair accessible stall must be 60" (1525 mm) minimum from the side wall; for wall-mounted toilets, clearance is 56" (1420 mm) from the rear wall, and for floor-mounted it is 59" (1500 mm). An elongated ambulatory accessible stall is 35" to 37" (890 to 940 mm) wide and 60" (1525 mm) deep.



Wheelchair Accessible,
Wall-Mounted



Wheelchair Accessible,
Floor-Mounted



Ambulatory Accessible

Other Considerations for Toilets

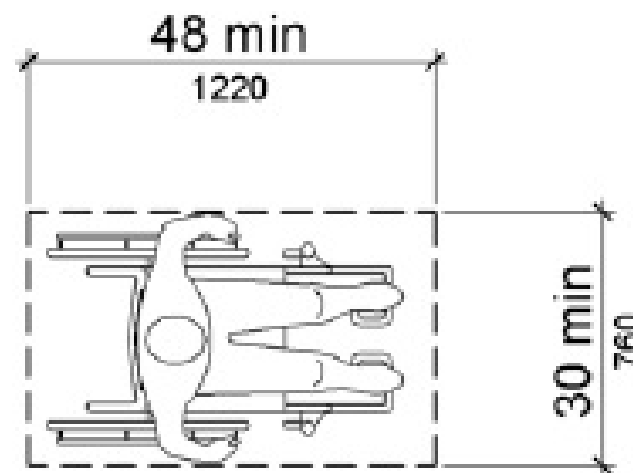
As obesity levels are on the rise nationwide, hospitals must take design for bariatric care into consideration. Bariatric patients are defined as those with a body mass index of 40 or more, or 100 pounds or more over their ideal weight. While bariatric considerations are not a part of ADA requirements, it is becoming increasingly important to design hospital restrooms with the needs of this patient population in mind.

Wall-mounted toilets may not meet the needs of the bariatric population. “Planning and Design Guidelines for Bariatric Healthcare Facilities” in *The Academy Journal* of the AIA’s Academy of Architecture for Healthcare recommends that floor-mounted toilets should be rated for at least 700 pounds to accommodate an impact factor of 1.4 for a 500-lb patient. (As a point of comparison, a standard wall-mounted toilet is required to be able to support a 500-lb static load, not the same as the dynamic load of a 500-lb moving person.) A seat height of 17”–19” can aid patients in rising. Accessible stalls can be designed so that they are also suitable for bariatric users.

Accessibility: 2010 ADA Requirements for Faucets and Sinks

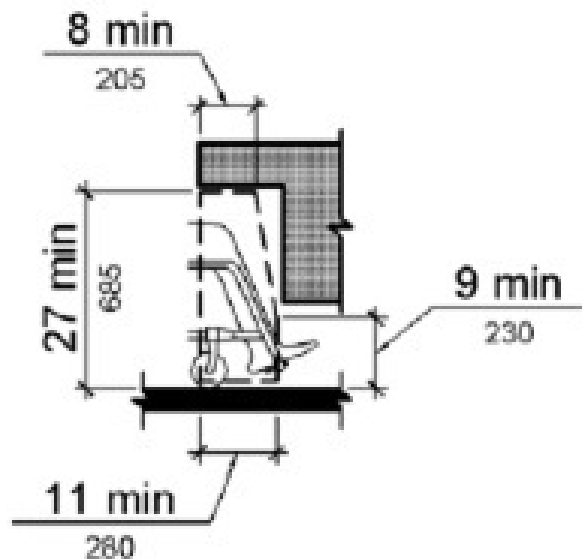
The clear floor area in front of a sink must be a minimum 30" x 48" (760 mm x 1220 mm).

The sink rim or counter surface, whichever is higher, must be 34" (865 mm) maximum above the finish floor or ground.

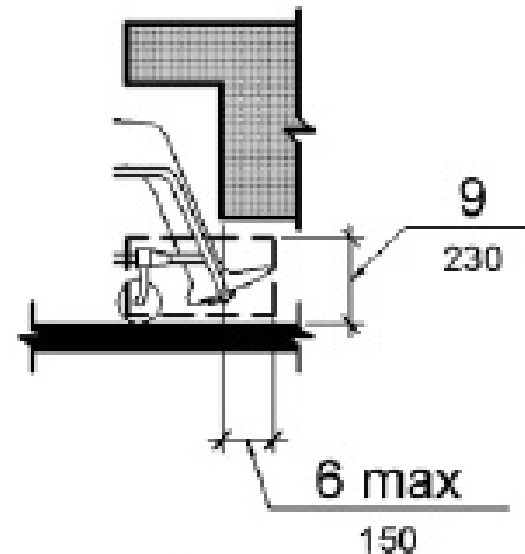


Accessibility: 2010 ADA Requirements for Faucets and Sinks

Knee and toe clearances are important for wheelchair access to the sink. Knee clearance shall be 11" (280 mm) deep minimum at 9" (230 mm) above the finish floor or ground, and 8" (205 mm) deep minimum at 27" (685 mm) above the finish floor or ground. Toe clearance extends 17" to 25" deep, and 9" minimum height.



Knee Clearance



Toe Clearance

Other Considerations for Faucets and Sinks

As with touch-free flushing, touchless faucets are ideal for accessible applications. From a universal design standpoint, touch-free devices benefit all users by limiting the spread of germs.

The ASME A112.19.2/CSA B45.1 standard for wall-mounted sinks is a vertical load of 250 pounds applied to the top surface of the rim. For bariatric care settings, *The Academy Journal* article recommends a rating of 300 pounds with extra support to allow for leaning and placed far enough away from the toilet so it cannot be used for lift support.





Durability

Durability Considerations

Settings that see near-constant foot traffic require products that feature high quality and durability. Durability is a cost concern, since more durable fixtures require less maintenance and repair and need to be replaced less frequently.

Fixtures that look well-maintained because they can stand up to use and abuse will present a positive image of the facility.



Durability: Vandalism Prevention

An unfortunate reality is that commercial restrooms can be subject to vandalism. Selecting products designed to resist vandalism as well as those with few moving parts are strategies to help ensure durability.

- Look for a secure faucet aerator that cannot be easily removed.
- Carrier arms can provide additional support for wall-mounted sinks.
- Touchless faucets and metered showers prevent water loss and overflows.
- Automatically flushing toilets may help prevent clogging by not allowing excess paper to build up from multiple users.
- Waterless urinals have few moving parts.



Vandalism-Resistant Aerators

Durability: Materials

Faucets with durable ceramic disc valves and forged brass bodies meet the demands of public spaces.

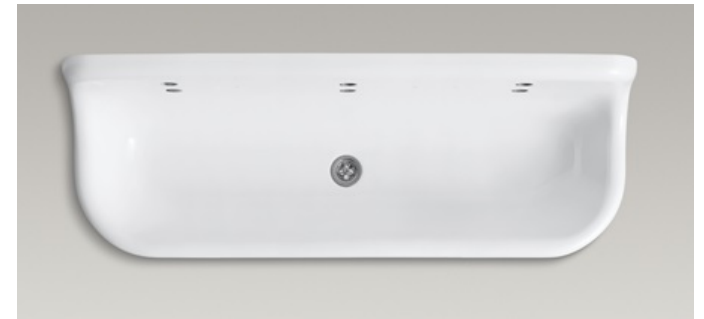
Faucet finishes must stand the test of time and resist corrosion and wear.



Durability: Materials

Enameled cast iron (shown here) is a highly durable material. The enamel is a powder coating applied to an iron casting. When exposed to high temperatures, the coating melts and fuses to the casting, creating a glass-like surface. A thick enamel provides outstanding protection against chipping and scratching while offering deep color integrity.

Vitreous china is made from a clay base that is coated with a glaze and then fired at an intense heat to fuse the clay and glaze. The ceramic materials of vitreous china offer a smooth, durable, non-porous surface that will not rust, fade, or discolor. Glazing protects the exposed surfaces so the sink maintains its polished shine and remains non-porous through its lifetime.



Durability: Flush Technology

Flushometer-valve technology uses one of two types of valves: piston or diaphragm. Each has an upper control chamber and a lower chamber connected by a bypass the size of a pinhole. A diaphragm valve uses a flexible rubber disk to separate the chambers, while a piston valve separates the two with a molded cup.

Diaphragm valves need good water quality and stable water pressure to work well. Piston valve technology can be more robust than diaphragm valves in systems with variable pressures and water quality.



Manual Flush Valve Cutaway

Durability: Flush Technology

Rubber components vary in how resistant they are to chloramine. They can get stiff and brittle over time. Pistons have less rubber material in contact with water than diaphragms. Look for a manufacturer who uses chloramine-resistant materials.

A self-cleaning piston screen extends the service cycle by keeping debris out of the mechanism.



Self-Cleaning Screen Filter

Durability: Flush Technology

In an effort to avoid touching the toilet handle, people may use their feet to kick or push the flush lever, increasing the chance of breakage and need for maintenance. The potential damage from users is reduced when toilets and urinals use touchless sensors to activate flushing.

Oxygen and moisture can cause zinc to leach from a brass alloy and weaken it, a process known as dezincification. A forged DZR (dezincification-resistant) brass valve provides the durability and vandal resistance needed in public environments.



Durability: Faucet and Flush Energy

Sensors need to work dependably without frequent battery changes or maintenance.

Sensor-activated energy options include three power sources:

- 30-year hybrid energy system
- AC power adapter
- DC power pack with batteries



Hybrid Energy System

Durability: Faucet and Flush Energy

A new technology provides an energy source that is a hybrid system of a sensor, capacitor, and long-life lithium cell. The capacitor prevents high-current draws from the main battery, significantly increasing energy cell life. The system is engineered to perform with very low self-discharge and stores energy significantly longer than a traditional battery.

One hybrid energy cell will power a flushometer or faucet for at least 875,000 cycles with no maintenance required. That's about once every 20 minutes, 24 hours a day, 365 days a year for 30 years.

At the end of its life, energy cells can be returned to the manufacturer for recycling.





Water Efficiency

Benefits of Water Efficiency

The World Health Organization found that in 2007, four out of ten people worldwide were affected by water scarcity (annual water supplies below 1,000 m³ per person). The U.N. predicts that by 2025, two-thirds of the world population could be under water stress conditions (annual water supplies below 1,700 m³ per person). In 2014, the U.S. Government Accountability Office found 40 of 50 state water managers expected shortages in some portions of their state under average conditions in the next 10 years.

The American Water Works Association concludes that commercial and institutional buildings account for 17% of the municipal water demand in the United States. Water-saving fixtures can make an important contribution to water efficiency, without sacrificing design or performance. These fixtures can save both water and energy throughout the water use cycle. Water utilities won't need to treat and pump as much water, so less energy is used. Less wastewater is generated, so less waste treatment is required.

Benefits of Water Efficiency

Shown here is a scenario to give a sense of the significant impact water-saving products can have on the bottom line.

This project is based on:

- 200 male plus 200 female employees working 250 days per year
- LEED® assumptions for uses per person per day, and
- a combined water and sewer rate of \$7.50 per 1,000 gallons (may vary widely based on location and business).

Office Building Savings	
Toilets	1.28 gpf (Replaces 3.5 gpf)
Initial Investment (Material & Labor per Toilet)	\$200
Flushes per Person per Day	3 per female; 1 per male
Water Savings	444,000 gallons
Annual Savings	\$3,330
Faucets	0.5 gpm (Replaces 1.5 gpm)
Initial Investment (Material & Labor per Faucet)	\$65
Faucet Use per Person per Day	3 x 15 seconds = 45 seconds
Water Savings	75,000 gallons
Annual Savings	\$563
Urinals	0.125 gpf (Replaces 1.0 gpf)
Initial Investment (Material & Labor per Urinal)	\$200
Flushes per Male per Day	2
Water Savings	87,500 gallons
Annual Savings	\$656

Benefits of Water Efficiency

Here are the totals from the project on the prior slide. Note how quickly this type of improvement can bring a return on the investment, with savings to continue for years to come.

Office Building Savings	
Totals	
Material Investment	\$6,650
Annual Water Cost Savings	\$4,549
Payback Period	1.5 years



Sensors and Water Efficiency

Today's sensors are much more accurate and “intelligent” than those of prior generations.

Some faucets can have adaptive infrared sensors which analyze the surroundings once installed. They can calibrate the settings to accommodate for low lighting or highly reflective surfaces.



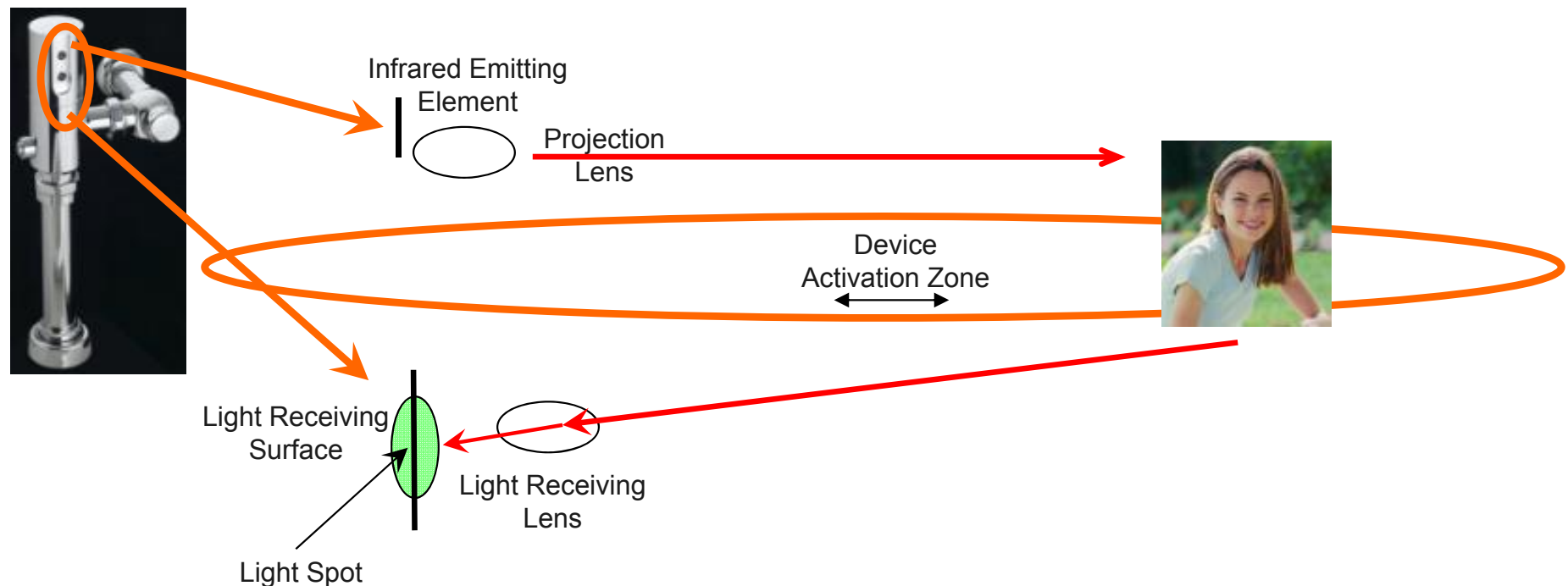
Sensors and Water Efficiency

In hospital settings where patients often need assistance, traditional sensors might activate simply because two people are in the range. A person's unsteady movements might also cause flushing. Sensor flushing technology that responds only when a hand is waved directly over the valve helps save water by removing false actuations.



Sensors and Water Efficiency

Another flushing activation type features a highly accurate distance-measuring sensor, similar to an autofocus camera. This technology can sense the true distance of an object by measuring the angle, not the amount of light reflected. Therefore, it is less affected by inconsistencies in color, lighting, reflections or even distant movement, which are all circumstances that compromise traditional infrared sensors.



Waterless Urinals

The ultimate example of a water-efficient fixture is one that uses no water at all. Waterless urinals work with a proprietary sealant liquid, composed primarily of natural, biodegradable oils that are lighter than water. Urine passes through this liquid and down the drain, while the lighter sealant liquid remains in place to contain odors and vapors.

The sealant liquid is contained in the drain trap. Some waterless urinals use a drain trap that is a removable and recyclable cartridge. The cartridge also acts as a strainer to keep out unwanted materials such as cigarette butts. Other waterless urinals do not use cartridges and instead integrate the trap into the design. This type requires occasional flushing out with water as part of regular maintenance and to help maintain sewer pipe health.

Waterless urinals perform best when used in applications that have trained and reliable staff to ensure they are cleaned and maintained on a regular basis.



EPAct

Uniform water conservation standards were first enacted with the federal Energy Policy Act of 1992, known as EPAct. The standards were updated again in 2005.

EPAct commercial restroom water use limits are as follows:

- Commercial toilets: ≤ 1.6 gpf, **except for** blowout types (most aggressive flush that displaces the entire amount of liquid each time): ≤ 3.5 gpf
- Commercial urinals: ≤ 1.0 gpf
- Commercial faucets:
 - ANSI Standard for private (single-user) faucets: ≤ 2.2 gpm @ 60 psi
 - Metering (auto shut-off) faucets: ≤ 0.25 gpc
 - All others: ≤ 0.5 gpm @ 60 psi



WaterSense®

The EPA's WaterSense program promotes water-efficient products, programs, and practices throughout the U.S. WaterSense seeks to protect the future of our nation's water supply by labeling water-efficient products that do not diminish performance.

To earn the WaterSense label, products must offer equivalent or superior performance to non-labeled fixtures with at least 20% greater water efficiency than standard models. Measurable results are independently certified.

Although WaterSense is a voluntary program, many regions are adopting the criteria into local plumbing codes.



WaterSense®

WaterSense-labeled fixtures that may be applicable to commercial applications are listed below.

Fixture	WaterSense Specification
Tank-Type Toilets	≤ 1.28 gpf (use 2:1 ratio to calculate flow rate for dual-flush); 350 g bulk waste removal
Flushometer Toilets	≤ 1.28 gpf maximum and a 1.0 gpf minimum for dual- and single-flush flushometer toilets; 350 g bulk waste removal
Urinals, Flushing Only	< 0.5 gpf
Faucets	Applicable to private lavatories (e.g., hotel room bathrooms) 1.5 gpm at 60 psi (no less than 0.8 gpm at 20 psi)
Showerheads	≤ 2.0 gpm

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Overview: LEED® Certification

The U.S. Green Building Council (USGBC) is a 501(c)(3) non profit organization composed of leaders from every sector of the building industry working to promote buildings and communities that are environmentally responsible, profitable and healthy places to live and work. USGBC developed the LEED (Leadership in Energy and Environmental Design) green building certification program, the nationally accepted benchmark for the design, construction, and operation of high performance green buildings.

LEED credit requirements cover the performance of materials in aggregate, not the performance of individual products or brands. Therefore, products that meet the LEED performance criteria can only contribute toward earning points needed for LEED certification; they cannot earn points individually toward LEED certification.

For detailed information about the council, their principles and programs, please visit www.usgbc.org.



LEED v4 and Water Efficiency (WE)

WaterSense-labeled products can help buildings earn points toward LEED certification. The LEED Water Efficiency category prerequisite is that all newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled, certifying that the product uses 20% less water than the baseline (see chart) required by law, without sacrificing performance.

Waterless urinals and public lavatory faucets are not labeled by WaterSense. These products must comply with usage-based calculations using the indoor water use calculator provided by USGBC to show that, in aggregate, the fixtures comply with prerequisite requirements.

Fixture	Baseline
Toilets (water closets)	1.6 gpf
Urinals	1.0 gpf
Public lavatory (restroom) faucets	0.5 gpm at 60 psi, all others except private applications
Private lavatory faucets	2.2 gpm at 60 psi
Kitchen faucets (excluding faucets used exclusively for filling operations)	2.2 gpm at 60 psi
Showerheads	2.5 gpm at 80 psi per shower stall

To earn credits, products must further reduce water use from the calculated baseline.

LEED v4: BD+C and ID+C

When pursuing certification in:

- LEED v4 Building Design and Construction (BD+C) or
- LEED v4 Interior Design and Construction (ID+C),

water conserving fixtures may be applicable to the following prerequisite and credit:

- WE Prerequisite: Indoor Water Use Reduction
 - Reduce aggregate water consumption by 20% from the baseline fixture performance requirements.
- WE Credit: Indoor Water Use Reduction
 - Further reduce aggregate water consumption by 25 to 50% from the baseline fixture performance requirements.

LEED v4: O+M

When pursuing certification in:

- LEED v4 Building Operations and Maintenance (O+M)

water conserving fixtures may be applicable to the following prerequisite and credit:

- WE Prerequisite: Indoor Water Use Reduction
 - Reduce water consumption to or below the LEED v4 for Existing Buildings baseline depending on the year of building's occupancy. The baseline may also be established by metering fixtures and fittings for one year.
- WE Credit: Indoor Water Use Reduction
 - Further reduce aggregate water consumption by 10 to 30% from the baseline fixture performance requirements, or a 1 to 20% reduction from the baseline year of meter data.



Summary and Resources

Summary

The unique concerns faced by commercial restrooms require heavy-duty, water-efficient fixtures that are easy to clean and maintain. Touchless technology limits cross-contamination and can encourage good hygiene without false actuations that waste water. Heavy-duty materials and low-maintenance energy systems keep up both the appearance and smooth operation of the restroom fixtures.

The public nature of restrooms also requires them to be functional for different types of users of varying ages, sizes, health, and abilities. Many features of an accessible restroom also meet universal design guidelines, allowing the restroom to work for all of us through the stages of life.

Commercial products help designers and architects create restrooms that incorporate advanced technologies, appealing finishes, and user-friendly fixtures. Water-saving features can help cut utility costs and earn points on green building projects without sacrificing performance, providing economic and environmental benefits for years to come.

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Conclusion

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