

# High Efficiency Toilets [HETs]

[STRATEGY]

## BRIEF DESCRIPTION

Physically resembling industry standard toilets, high efficiency toilets (HETs) assist in reducing water usage. These toilets average anywhere from 0.8 to 1.28 gallons of water per flush, using at least 20 percent less water than mandated by the U.S. Energy Policy Act of 1992. HETs certified under the Environmental Protection Agency's (EPA) WaterSense program must use no more than an average flush volume of 1.1 gallons. Recent advances in flushing technology allow HETs to remove waste with less water by increasing water velocity.

## Applications Locker Rooms, Restrooms

- For use in all locker rooms and restrooms where toilets are utilized.



(a)



(b)

(a) High-Efficiency Toilet (Source: <http://www.americanstandard-us.com/innovations/innovationDetail.aspx?f=2> )

(b) Commercial HET with automatic flush valve (Source: [http://www.us.kohler.com/onlinecatalog/newproducts\\_detail.jsp?section=2&prod=Kingston%20Toilet%20-%20KBIS%202009](http://www.us.kohler.com/onlinecatalog/newproducts_detail.jsp?section=2&prod=Kingston%20Toilet%20-%20KBIS%202009) )

- HETs are designed to replace any industry standard toilet in any location.
- Dual flush valves and automatic sensors can be incorporated with HETs to enhance water efficiency strategies.

## Design Notes User Education

- HETs cannot accommodate extraneous waste materials.
- New models have larger trap sizes and eliminate choke points to ensure clog free operation.

## Related Technologies HETs can be combined with dual flush valves or automatic sensors.

### References/Useful Resources:

[1] EPA WaterSense. Accessed August 2010 at <http://www.epa.gov/watersense/index.html>

[2] Toolbase Services. Accessed August 2010 at <http://www.toolbase.org/Technology-Inventory/Plumbing/high-efficiency-toilet>

[3] Alliance for Water Efficiency. Accessed August 2010 at [http://allianceforwaterefficiency.org/toilet\\_fixtures.aspx](http://allianceforwaterefficiency.org/toilet_fixtures.aspx)

# High-Efficiency Toilets (HETs)

[ENERGY AND ENVIRONMENT]

## Environmental Impacts

### Water Efficiency

- Contributes to a decrease in water usage and water cost, which in turn promotes a more sustainable environment. Using water more efficiently helps maintain reservoirs and groundwater levels.

## Guiding Principles<sup>1</sup>

### Water Use Reduction (Water Efficiency)

- Employ strategies that in aggregate use 20 percent less water than the water use baseline calculated for the building.
- Specify EPA's WaterSense-labeled products or other water conserving products, where available.

## Associated LEED Credits (NC 2009)<sup>2</sup>

### WEc3: Water Use Reduction (2-4 points)

- Reduce total building water use by a minimum of 20 percent from baseline calculation. The baseline value for residential and commercial toilets is 1.6 gallons per flush (gpf).

Fixture	Water Use Baseline	Water Efficient Target	Units
Water closet	1.6	1.1 - 1.28	Gallons per flush
Commercial lavatory faucets	0.5	0.5	Gallons per minute
Residential lavatory faucets	2.2	0.5 - 1	Gallons per minute
Commercial prerinse spray val	1.6	TBD	Gallons per minute
Residential kitchen faucet	2.2	1.5 - 2.2	Gallons per minute
Residential showerheads	2.5	1.5	Gallons per minute

<sup>1</sup> Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings [www.wbdg.org/pdfs/hpsb\\_guidance.pdf](http://www.wbdg.org/pdfs/hpsb_guidance.pdf)

<sup>2</sup> USGBC LEED Reference Guide for Green Building Design and Construction, 2009 Edition

# High Efficiency Toilets [HETs]

## [PRODUCT AND ECONOMICS]

### Product Images



(Source: Kohler<sup>3</sup>)



(Source: American Standard<sup>4</sup>)



(Source: American Standard<sup>5</sup>)

### Components

**Toilet, Flush Valve (when applicable), Toilet Seat (when applicable)**

### Cost Range

Components	Cost	Unit
High Efficiency Toilet	\$200 – \$800 <sup>6</sup>	per toilet
Flush Valve (manual)	\$150 – \$250	per valve
Flush Valve (automatic)	\$450 – \$550	per valve
Toilet Seat	\$50	per seat

### Product Types

#### Gravity Flow Flush

- The force of gravity is utilized to pull or siphon water and waste out of the toilet.
- Water stored in the tank is released when the flush lever is activated.

#### Pressure Assisted Flush

- Either water line pressure or a device in the tank is utilized to create additional force from air pressure to flush the toilet.
- Instead of falling by the force of gravity, water is forced out of the tank with the added pressure from compressed air, creating a pressurized stream of water that clears the waste.
- More expensive but potentially more effective.

### Vendors

**American Standard Cadet® 3 FloWise™ Round Front Toilet**

<http://www.americanstandard-us.com/toilets/cadet-3-flowise-round-front-toilet/>

<sup>3</sup> [http://www.us.kohler.com/onlinecatalog/detail.jsp?from=thumb&frm=&module=WaterSense&item=14641202&prod\\_n um=11844&section=2&category=13&resultPage=0-1356581259](http://www.us.kohler.com/onlinecatalog/detail.jsp?from=thumb&frm=&module=WaterSense&item=14641202&prod_n um=11844&section=2&category=13&resultPage=0-1356581259)

<sup>4</sup> <http://www.americanstandard-us.com/products/productDetail.aspx?id=1951>

<sup>5</sup> <http://www.americanstandard-us.com/products/productDetail.aspx?id=2087>

<sup>6</sup> Price varies by brand. The 0.8 GPF model usually costs more than the 1.28 GPF model.

## High Efficiency Toilets [HETs]

[PRODUCT AND ECONOMICS]

**Kohler Wellworth®** 1.28 gpf round-front toilet with Class Five® flushing technology and left-hand trip lever- K-3577

[http://www.us.kohler.com/onlinecatalog/detail.jsp?from=thumb&frm=&module=Toilets&item=13570502&prod\\_num=3577&section=2&category=13](http://www.us.kohler.com/onlinecatalog/detail.jsp?from=thumb&frm=&module=Toilets&item=13570502&prod_num=3577&section=2&category=13)

**Mansfield EcoQuantum™** Model 146-119

<http://www.mansfieldplumbing.com/v3/pdf/146-119R2-04.pdf>

### Warranty Info

**Varies, depending on brand.**

### Code Restrictions

**None**

## High Efficiency Toilets [HETs]

### [SPECIFICATIONS]

#### GENERAL<sup>7</sup>

Products included:

- Water closets
- Accessories

#### WATER CLOSETS

Water flow and consumption rates for plumbing fixtures:

- A. Comply with requirements in Public Law 102-486, Energy Policy Act.
- B. WaterSense labeled products for High-Efficiency Toilets - Tank-Type Single Flush.

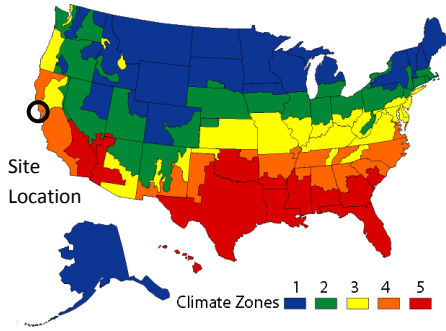
Water closets: WaterSense labeled high-efficiency toilet with maximum effective flush volume of 1.1 gallons. For dual flush toilets, the effective flush volume is the composite, average flush volume of two reduced flushes and one full flush per ASME A112.19.2 and ASME 112.19.14. [Note: This Specification addresses toilets typically found in homes, and in light commercial settings, such as hotels and restaurants. It does not address valve-type commercial toilets typically found in public restrooms (e.g., airports, theaters, arenas, schools) or composting toilets, both of which have different designs, patterns of use, and performance requirements.]

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<sup>7</sup> Specification language modified from the Whole Building Design Guide's *Federal Green Construction Guide for Specifiers*, Section 22 40 00 (15400) Plumbing Fixtures. Accessed August 2010 at [http://www.wbdg.org/ccb/browse\\_org.php?o=84](http://www.wbdg.org/ccb/browse_org.php?o=84) (last updated January 2010).

# High Efficiency Toilets [HETs] [CASE STUDY]

## Parc 55 Union Square Hotel San Francisco, California



### Facility

- The Parc 55 Union Square Hotel houses over 1000 guest rooms, making it one of the largest hotels in San Francisco.
- All guest rooms were outfitted with 3.5 gallons per flush (gpf) gravity fed toilet fixtures at the time of construction in 1984.

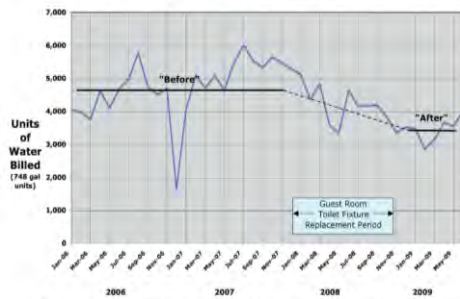
### Approach

- Beginning in 2007 and continuing through 2008, the hotel replaced all 3.5 gpf toilet fixtures with 1.0 gpf pressure-assist HETs at a rate of about 100 replacements per month.

### Results

- Water consumption by hotel toilet fixtures reduced by over 25 percent per month.
- Maintenance calls regarding toilet fixtures issues decreased by over 50 percent

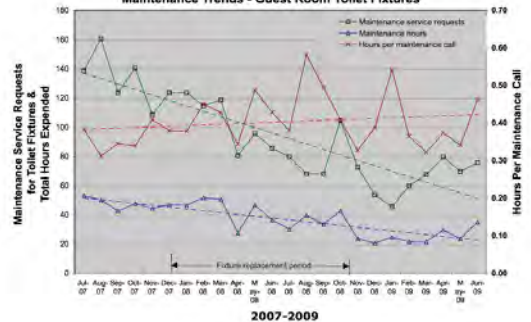
Fig. 1 - Parc 55 Union Square Hotel - San Francisco  
Monthly Water Consumption



Note: Variations in monthly water consumption are attributable primarily to varying room occupancy rates, utility billing cycles, and variations in other water uses within the hotel.

(Source: Koeller and Company and Veritec Consulting Inc.<sup>8</sup>)

Fig. 2 - Parc 55 Union Square Hotel - San Francisco  
Maintenance Trends - Guest Room Toilet Fixtures



<sup>8</sup> Koeller and Company and Veritec Consulting Inc. 2009. Evaluation of Water Use Reduction Achieved through Hotel Guest Room Toilet Fixture Replacement. Available at [http://allianceforwaterefficiency.org/uploadedFiles/Resource\\_Center/Library/residential/toilets/Parc-55-Hotel-Fixture-Replacements-0909.pdf](http://allianceforwaterefficiency.org/uploadedFiles/Resource_Center/Library/residential/toilets/Parc-55-Hotel-Fixture-Replacements-0909.pdf)