

HIGH EFFICIENCY TOILETS (HETs)

What is an HET?

The plumbing industry is introducing many new technologies and toilet fixture models that reduce effective flush volumes well below the mandated 1.6-gallons per flush - gpf (6.0-liters per flush – lpf) maximum. Thus, the High Efficiency Toilet (HET) is becoming a significant part of the toilet fixture marketplace as manufacturers recognize the compelling need for water-efficient products and water authorities and municipalities incorporate them into their toilet replacement programs. Furthermore, builders participating in "green building" programs, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) and The Metropolitan Water District of Southern California's California Friendly Model Home program install HETs to accumulate water-efficiency credits or to comply with program requirements.

The HET is defined as a fixture that flushes at 20 percent below the 1.6-gpf/6.0-lpf maximum or less, equating to a maximum of 1.3-gpf/4.8-lpf. This 20 percent reduction threshold serves as a metric for water authorities and municipalities designing more aggressive toilet replacement programs and, in some cases, establishing an additional performance tier for their financial incentives (e.g., rebate and voucher programs). Previous field studies in the U.S. and Canada have demonstrated that the average flush volume of dual-flush toilets in residential applications ranges between 1.1 and 1.2 gals.¹

Fixtures currently considered as qualifying for the HET designation², as well as their MaP³ scores, are shown in the following tables. Higher MaP scores are better.

Dual-Flush Toilet Fixtures (1.6-gpf/6.0-lpf “full flush” & 0.8 to 1.1-gpf/3.0 to 4.0-lpf “short flush”)

Manufacturer	Model Name	Model Number	Waste Removal Performance Measure ³ -MaP (full 1.6-gallon/6-liter flush – in grams)
Caroma	Caravelle One-Piece	989646 (1-piece toilet)	500
	Caravelle 270 ADA	989770: 687180 tank – 609177 bowl	800
	Caravelle 305	989680: 629435 tank - 609151 bowl	650
	Caravelle 270	989760: 629435 tank – 609159 bowl	500
	Reflections 305	989750	MaP testing not performed
	Reflections 270	989720: 629530 tank – 609159 bowl	650
	Royale 305	624530 tank – 609151 bowl	600
	Royale 305 EL	629530 tank – 609130 bowl	850
	Sovereign 305	989750	MaP testing not performed
	Tasman 270	989860	550
	Vintage 270	605310 bowl - 625070 tank	MaP testing not performed
	Walvit ⁴	604118 (round front - RF)	MaP testing not performed
	Walvit ⁴	604119 (elongated – EL)	MaP testing not performed
Duravit	Happy D RF	017009 bowl, 091000-05 tank	600
	Happy D Wallmount ⁵	017109 bowl, 111-335 tank (concealed)	600

¹ Consult the CUWCC website for dual-flush savings information from 5 field studies: http://www.cuwcc.org/products_tech.lasso

² Based upon flush volumes as certified and as reported by the manufacturer. The CUWCC makes no guarantee that the listed fixtures do, in fact, perform at the flush volumes noted or certified. It is the responsibility of the reader to verify flush volumes.

³ Maximum Performance (MaP) testing by Veritec Consulting, Inc. Refer to Fifth Edition MaP report available for download from the CUWCC website shown above.

⁴ The Walvit is a wall-hung, rear-outlet bowl and works with a Water Wafer in-wall tank.

⁵ The Happy D Wallmount fixture uses an in-wall (concealed) dual flush tank.



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Dual-Flush Toilet Fixtures (continued)

Manufacturer	Model Name	Model Number	Waste Removal Performance Measure ⁶ -MaP (full 1.6-gallon/6-liter flush – in grams)
Gerber	Ultra Dual-Flush	DF-21-302 RF	1,000
	Ultra Dual-Flush	DF-21-304 RF	1,000
	Ultra Dual-Flush	DF-21-311 EL	1,000
	Ultra Dual-Flush	DF-21-312 EL	1,000
	Ultra Dual-Flush	DF-21-314 EL	1,000
	Ultra Dual-Flush	DF-21-317 ADA EL	1,000
	Ultra Dual-Flush	DF-21-318 ADA EL	1,000
	Ultra Dual-Flush	DF-21-319 ADA EL	MaP testing not performed
	Ultra Dual-Flush	DF-21-324 ADA EL	1,000
	Ultra Dual-Flush	DF-21-310 EL (back outlet)	MaP testing not performed
	Ultra Dual-Flush	DF-21-325 ADA EL (back outlet)	1,000
Kohler	Sterling Rockton	402024 RF: 402022 tank-402021 bowl	325
	Sterling Rockton	402027 EL: 402022 tank-402026 bowl	300
	Sterling Karsten	402025 RF: 402023 tank-402021 bowl	300
	Sterling Karsten	402028 EL: 402023 tank-402026 bowl	350
	Trocadero Power Lite	K-3437 (1-piece toilet)	MaP testing not performed
	San Raphael Power Lite	K-3398 (1-piece toilet)	850
Mancesa	(dual-flush)		MaP testing not performed
Mansfield⁷	Eco-Quantum TM	146-119	850
	Eco-Quantum TM	147-119	825
	Eco-Quantum TM	148-119 ADA EL	925
	Eco-Quantum TM	146-119RH RF ⁸	850
	Eco-Quantum TM	147-119RH EL ⁷	825
	Eco-Quantum TM	148-119RH ADA EL ⁷	925
	Eco-Quantum TM	149-119 (back outlet)	MaP testing not performed
Pegasus (Home Depot – Expo)	Tulip	3904-02-E ADA EL (Home Depot SKU is 477-546)	400
Toto	Aquia	CST414MP EL	800
Vitra	Dual Flush	5076-xxx-0075 – 5055-xxx-5137	475
	Dual Flush Comfort EL	5074-xxx-0075 – 5055-xxx-5137	800
Vortens	Dali	5101 - 5201	MaP testing not performed
	Vienna RF	3208 – 3420 RF	375
	Rhodas EL ADA	3123 bowl, 3433 tank	550
Western Pottery	Dual Flush	812 DF bowl, ULF 8 DF tank	400
Zurn⁷	EcoVantage	Z5562 ADA EL	MaP testing not performed
	EcoVantage	Z5572 EL	800

⁶ Maximum Performance (MaP) testing by Veritec Consulting, Inc. Refer to Fifth Edition MaP report available for download from the CUWCC website shown above. Some products were tested subsequent to publication of the Fifth Edition and will appear in the Sixth Edition to be released in January 2006.

⁷ The Gerber Ultra Dual-Flush, Mansfield Eco-Quantum, and Zurn EcoVantage models use pressure-assist technology from WDI International.

⁸ Models designated with the RH suffix use flush handles mounted on the right side of the tank and are identical in all other aspects to those models above with the same model numbers.

Gravity-Fed Single-Flush (1.28-gpf/4.8-lpf)

Manufacturer	Model Name	Model Number	Waste Removal Performance Measure ⁹ -MaP (grams)
American Standard	FloWise EL	2073.013: 4023 tank – 3018 bowl	550

Pressure-Assist Single-Flush (1.1-gpf/4.0-lpf and below)

Manufacturer	Model Name	Model Number	Waste Removal Performance Measure ⁸ -MaP (grams)
Capizzi ¹⁰	Turbo Capizzi High Profile	1578 tank – 0478 bowl EL	500
	Turbo Capizzi Low Profile	1513 tank – 0478 bowl EL	400
	Turbo Capizzi Low Profile	1513 tank – 0441 bowl ADA EL	500
Gerber ¹¹	Ultra Flush	EF-21-302 RF	1,000
	Ultra Flush	EF-21-304 RF	1,000
	Ultra Flush	EF-21-311 EL	800
	Ultra Flush	EF-21-312 EL	800
	Ultra Flush	EF-21-314 EL	800
	Ultra Flush	EF-21-317 ADA EL	800
	Ultra Flush	EF-21-318 ADA EL	800
	Ultra Flush	EF-21-319 ADA EL	MaP testing not performed
	Ultra Flush	EF-21-324 ADA EL	800
	Ultra Flush	EF-21-310 EL (back outlet)	MaP testing not performed
Ultra Flush	EF-21-325 ADA EL (back outlet)	800	
Mancesa ¹⁰	Cyclone 4	02607: 02103 bowl – 04103 tank	650
Mansfield ¹⁰	QuantumOne	146-153 RF	675
	QuantumOne	148-153 ADA EL	675
	QuantumOne	147-153 EL	525
	QuantumOne	149-154 EL (back outlet)	MaP testing not performed
Peerless Pottery ¹⁰	Predator ADA EL	1 tank – 608 bowl	500
	Predator EL	1 tank – 606 bowl	400
St. Thomas Creations ¹⁰	Mariner II	6203.420: 6203 bowl – 6203.424 tank	MaP testing not performed
Vitra ¹⁰	Arkitekt ADA EL	5065-XXX-0075 bowl– 5066-XXX-0122 tank	500
Vortens ¹⁰	Tornado	3138-3468 EL	700
Zurn ¹¹	EcoVantage	Z5561 ADA EL	Map testing not performed
	EcoVantage	Z5571 EL	800

⁹ Maximum Performance (MaP) testing by Veritec Consulting, Inc. Refer to Fifth Edition MaP report available for download from the CUWCC website shown above. Some products were tested subsequent to the publication of the Fifth Edition and will appear in the Sixth Edition to be released in January 2006.

¹⁰ Capizzi, Mancesa, Mansfield, St. Thomas Creations, Peerless, Vitra, and Vortens use Flushmate IV pressure-assist technology by Sloan.

¹¹ The Gerber Ultra Flush and the Zurn EcoVantage fixtures use pressure-assist technology by WDI International.

Note for High-Efficiency Toilets:

HETs must meet the very same flushing performance and drain line waste transport requirements as all other toilets sold in the United States and Canada. All toilets, regardless of flush volume, may experience problems when installed in locations with degraded or damaged drain line systems, e.g., root intrusion, sagging or broken lines, buildup of solids, etc., or in commercial buildings with very long drain line runs and no additional sources of wastewater near the toilet fixture. However, when installed where these conditions exist, HETs, because of their reduced flush volume, could be slightly more susceptible to problems. No field experience has yet confirmed this, however.

Two drainline studies are intended to provide some additional information on waste transport by various types of toilet fixtures, including HETs:

- Canada Mortgage and Housing Corporation, 2005: Evaluation of Low-Flush Volume Toilet Technologies to Carry Waste in Drainlines, Final Report, by Veritec Consulting, Inc., February; downloadable from http://www.cuwcc.org/products_tech.lasso
- Texas A&M University: sponsored by the American Society of Plumbing Engineers (ASPE) and the U.S. Department of Energy (study completed but not yet released for public review).

For a complete list of live web links to the manufacturers of HETs and other plumbing products, download this CUWCC document:

<http://www.cuwcc.org/Uploads/product/Plumbing-Industry-Links.pdf>

For further information on High-Efficiency Toilets:

Contact John Koeller at 714-777-2744 or koeller@earthlink.net

For information on MaP testing and to submit toilet fixtures for MaP testing:

Contact Bill Gauley at 905-696-9391, ext. 102 or bill@veritec.ca