

HIGH EFFICIENCY TOILETS (HETs) – U.S. AND CANADA

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 1.28-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

For further details from the U.S. Environmental Protection Agency on HETs, visit their website: <http://www.epa.gov/watersense/pubs/het.htm>

Fixtures currently considered as qualifying for the HET designation², as well as their MaP³ scores, are shown in these tables. Higher MaP scores reflect higher amounts of solid waste removal in a single flush. **NOTE: Not all fixture models are available in all parts of the U.S. or Canada.**

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)
Aquadis	CT-A1200	CT-A1200	300
Caroma	Adelaide 270 EL Cube	814790 tank – 834000 bowl	700
	Adelaide 270 EL Standard	814328 tank – 834000 bowl	700
	Caravelle EH One-Piece	989670 (1-piece toilet)	800
	Caravelle One-Piece	989646 (1-piece toilet)	500
	Caravelle 270 RF ADA	687180 tank – 609177 bowl	800
	Caravelle 270 EL ADA	629435 tank – 609120 bowl	800
	Caravelle 305 RF	629435 tank - 609151 bowl	650
	Caravelle 305 EL	629435 tank – 609130 bowl	500
	Caravelle 270 RF	629435 tank – 609159 bowl	500
	Caravelle 270 EL	629435 tank – 609100 bowl	MaP testing not yet performed
	Colonial 270	625070 tank – 605310 bowl	600
	Reflections 305 RF	629530 tank – 609151 bowl	600
	Reflections 305 EL	629530 tank – 609130 bowl	Map testing not yet performed
	Reflections 270 RF ADA	629530 tank – 609177 bowl	Map testing not yet performed
	Reflections 270 EL ADA	629530 tank – 609120 bowl	Map testing not yet performed
	Reflections 270 RF	629530 tank – 609159 bowl	650
	Reflections 270 EL	629530 tank – 609100 bowl	500
	Royale 270 EL	624530 tank – 609100 bowl	Map testing not yet performed
	Royale 270 RF	624530 tank – 609159 bowl	600
	Royale 270 EL ADA	624530 tank – 609120 bowl	850
	Royale 305 RF	624530 tank – 609151 bowl	600
	Royale 305 EL	629530 tank – 609130 bowl	850
	Royale 270 RF ADA	624530 tank – 609177 bowl	Map testing not yet performed
	Sydney 270 EL ADA	622320 tank – 609120 bowl	1,000

¹ Consult the CUWCC website for dual-flush savings information from 5 field studies: http://www.cuwcc.org/toilet_fixtures.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 Eighth Edition MaP report available for download from <http://www.cuwcc.org/maptesting.lasso>



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Dual-Flush Toilet Fixtures (continued)

Manufacturer	Model Name	Model Number	Waste Removal Performance Measure ⁴ -MaP (full 1.6-gallon/6-liter flush – in grams)
Caroma (continued)	Sydney 305 EL	622320 tank – 609130 bowl	350
	Sydney 305 EL Standard	622320 tank – 609151 bowl	500
	Tasman 270	800032 tank – 609169 bowl	550
	Walvit ⁵ RF	604118	MaP testing not yet performed
	Walvit ⁴ EL	604119	MaP testing not yet performed
Duravit	Happy D RF	017009 bowl, 091000-05 tank	600
	Happy D Wallmount ⁶	017109 bowl, 111-335 tank (concealed)	600
Foremost	Pegasus Dual-Flush (for Home Depot)	Home Depot SKU 131-926	800
	Gemini Dual-Flush	TL-2005-WL	800
Gerber	Ultra Dual-Flush RF	DF-21-302	1,000
	Ultra Dual-Flush RF	DF-21-304	1,000
	Ultra Dual-Flush EL	DF-21-312	1,000
	Ultra Dual-Flush EL	DF-21-314	1,000
	Ultra Dual-Flush ADA EL	DF-21-318	1,000
	Ultra Dual-Flush ADA EL	DF-21-319 (identical to 318, but with bedpan lugs)	1,000
	Ultra Dual-Flush ADA EL	DF-21-324	1,000
	Ultra Dual-Flush EL (back outlet)	DF-21-310	MaP testing not yet performed
	Ultra Dual-Flush ADA EL (back outlet)	DF-21-325	1,000
HCG	No model name - EL	CS9001DF: C9001 bowl, S9002DF tank	400
	No model name - RF	CS9002DF: C9002 bowl, S9002DF tank	350
Kohler	Sterling Rockton RF	402024: 402022 tank - 402021 bowl	325
	Sterling Rockton EL	402027: 402022 tank - 402026 bowl	300
	Sterling Karsten RF	402025: 402023 tank - 402021 bowl	800
	Sterling Karsten EL	402028: 402023 tank - 402026 bowl	350
	Trocadero Power Lite	K-3437 (1-piece toilet)	MaP testing not yet performed
	San Raphael Power Lite EL ADA	K-3393 (1 piece toilet)	1,000
	San Raphael Power Lite EL-discontinued-replaced by K-3393	K-3398 (1-piece toilet)	850
Mancesa	(dual-flush)		MaP testing not yet performed
Mansfield ⁷	Eco-Quantum™	146-119	850
	Eco-Quantum™	147-119	825
	Eco-Quantum™ ADA EL	148-119	925
	Eco-Quantum™ (back outlet)	149-119	MaP testing not yet performed
Pegasus (Home Depot – Expo)	Pegasus Dual-Flush	Home Depot SKU 131-926	800
	Tulip ADA EL	3904-02-E: 3107 bowl, 3427 tank (HD SKU 477-546)	400
RAK Ceramics	Venice EL	VN03 bowl, VN10 tank	500
Toto	Aquia EL	414: 413 tank – 414 bowl	800
Vitra	Dual Flush	5076 bowl - 5055 tank	475
	Corina Dual Flush Comfort EL	5074 bowl - 5055 tank	800
Vortens	Dali EL	5928 (both tank and bowl)	MaP testing not yet performed
	Vienna RF DF	3208 bowl – 3420 tank	375
	Rhodas EL ADA	3123 bowl – 3436 OR 3433 tank	550
Western Pottery	Dual Flush	812 DF bowl, ULF 8 DF tank	400
Zurn ⁷	EcoVantage ADA EL	Z5562	1,000
	EcoVantage EL	Z5572	800

⁴ Maximum Performance (MaP) testing by Veritec Consulting, Inc. Refer to Eighth Edition MaP report available for download from <http://www.cuwcc.org/maptesting.lasso>

⁵ The Walvit is a wall-hung, rear-outlet bowl and works with a Water Wafer in-wall (concealed) tank.

⁶ The Happy D Wallmount fixture uses an in-wall (concealed) dual flush tank.

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

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

Manufacturer	Model Name	Model Number	Waste Removal Performance Measure ⁸ -MaP (grams)
American Standard	FloWise EL	2073.013: 4023 tank – 3018 bowl	550
Kohler	Cimarron Eco-Smart EL ADA	K-3496-HE: 4634-HE tank – 4286 bowl	350

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 ⁹	Turbo Capizzi High Profile EL	1578 tank – 0478 bowl	500
	Turbo Capizzi Low Profile EL	1513 tank – 0478 bowl	400
	Turbo Capizzi Low Profile ADA EL	1513 tank – 0441 bowl	500
	Turbo Capizzi EL	1278 tank – 0778 bowl	475
Eljer	Power 1-G EL	091-7625: 131-7625 bowl; 141-7600 tank	800
	Power 1-G EL ADA	091-7675: 131-7675 bowl; 141-7600 tank	800
Gerber ¹⁰	Ultra Flush RF	EF-21-302	1,000
	Ultra Flush RF	EF-21-304	1,000
	Ultra Flush EL	EF-21-312	800
	Ultra Flush EL	EF-21-314	800
	Ultra Flush ADA EL	EF-21-318	800
	Ultra Flush ADA EL	EF-21-319 (identical to 318 but with bedpan lugs)	800
	Ultra Flush ADA EL	EF-21-324	800
	Ultra Flush EL (back outlet)	EF-21-310	MaP testing not yet performed
	Ultra Flush ADA EL (back outlet)	EF-21-325	800
Kohler	Highline Pressure Lite ADA EL	K-3519	1,000
	Wellworth Pressure Lite EL	K-3531	1,000
Mancesa ¹⁰	Cyclone 4 EL	02282 bowl – 02281 tank	650
Mansfield ¹⁰	QuantumOne RF	146-153	675
	QuantumOne ADA EL	148-153	675
	QuantumOne EL	147-153	525
	QuantumOne EL (back outlet)	149-154	MaP testing not yet performed
	QuantumOne EL (1 piece)	710	Map testing not yet 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 yet performed
Vitra ¹⁰	Arkitekt ADA EL	5065 bowl – 5066 tank	500
Vortens ¹⁰	Tornado EL	3138-3468	700
	Tornado ADA EL	3134-3468	MaP testing not yet performed
Zurn ¹¹	EcoVantage ADA EL	Z5561	1,000
	EcoVantage EL	Z5571	800

Flushometer Valve Single-Flush Combinations (1.28-gpf/4.8-lpf)

Manufacturer	Flushometer Bowl	Flushometer Valve	Waste Removal Performance Measure ⁹ -MaP (grams)
Kohler	K-4405 Highline	K-10956	MaP testing not yet performed
	K-4406 Wellworth	K-10956	MaP testing not yet performed

⁸ Maximum Performance (MaP) testing by Veritec Consulting, Inc. Refer to Eighth Edition MaP report available for download from <http://www.cuwcc.org/maptesting.lasso>

⁹ Capizzi, Eljer, Mancesa, Mansfield, St. Thomas Creations, Peerless, Vitra, and Vortens use Flushmate IV pressure-assist technology by Sloan Flushmate.

¹⁰ The Gerber Ultra Flush and the Zurn EcoVantage fixtures use pressure-assist technology by WDI International.

Key: RF – Round-front toilet bowl
EF – Elongated-front toilet bowl
ADA – Meets bowl-height requirements for compliance with Americans with Disabilities Act

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 recent drainline studies provide 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/toilet_fixtures.lasso
- Texas A&M University, Energy Systems Lab, 2005: *Waste Transport in Piping Systems Served by Low-Flow Water Closets*, study sponsored by the U.S. Department of Energy; downloadable from http://www.cuwcc.org/toilet_fixtures.lasso

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_05-11-04.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