High Efficiency Toilets (HETs): Why "Flushing With Confidence" Is Here to Stay

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The National Energy Policy Act of 1992 (EPAct) required plumbing fixture manufacturers to reduce toilet water consumption from 3.5 gallons per flush (gpf) to 1.6 gpf. The resulting debate is still fresh in the mind of the American consumer.

In spite of the availability of some well-performing models, reports from consumers and plumbers of poorly flushing toilets began spreading like wildfire across the country in the mid-1990s. Wimpy "low-flow" toilets became easy fodder for the media, and cries of "get the government out of our bathrooms" could be heard nationwide. Federal legislation was actually introduced to reverse the EPAct mandate for toilets and allow states the option of returning to the water-wasting 3.5-gpf models.

Today, another market transition for toilets is beginning, requiring further reductions in water consumption. Are we in for another period of plunger-slinging and bad bathroom humor? No, but read on to learn why we need to reduce toilet consumption beyond 1.6 gpf, and why the flushing problems of the past will not be repeated.

NO TURNING BACK ON CONSERVATION

According to the U.S. Environmental Protection Agency (US EPA), 36 states will experience non-drought-related water shortages in the next 10 years. These shortages are related to issues such as population growth, infrastructure repairs, salt water intrusion in coastal areas and groundwater depletion. Consequently, the industry needs to design more efficient toilets to ensure that we will have enough fresh, clean drinking water to meet the needs of our growing population. You see, the toilet is one of the biggest users of water in American homes, and meaningful reductions in consumption translate into huge savings of precious drinking water. In turn, American Standard Brands takes this responsibility seriously, and we have significantly invested in the tools needed to deliver great-performing products that will help meet the needs of North America.

As many plumbers and consumers now know, American Standard constantly designs new flushing technologies, such as the Champion 4 and Cadet 3, that are developed with new, powerful product-development tools, such as Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA). This advanced technology allows our engineers to see how water flows in a new toilet design before the first prototype is even started. In fact, independent testing proves that the Champion 4 and Cadet 3 toilets are so powerful, their flushing performances actually far exceed even the old 3.5-gpf water guzzlers of the past, using just 1.6 gpf.

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The overwhelming success of these designs in the lab and, more importantly, in the marketplace gives us confidence that saving additional water is readily achievable. Realizing that this is now possible, the US EPA – as part of the new WaterSense voluntary product-labeling program – has created a specification for "High Efficiency Toilets" (HETs).

An HET is defined as a toilet that consumes a minimum of 20 percent less water than the 1.6-gpf models mandated by EPAct, that is, a maximum of 1.28 gpf. The American Standard line of FloWise® HETs are available for any type of application.

WHAT MAKES HETS SPECIAL

So, let's break down the various attributes of a well-designed toilet and see firsthand what accounts for the difference between a clog-threat flush and an American Standard HET:

1. *It all starts in the tank:* Conventional flush toilets have only one source of energy: gravity. The water that sits in the tank contains potential energy from the force of gravity pulling down on it. The trick to a successful design is to harness as much of that potential energy as possible as the water is put into motion.

2. *The flush valve / flapper:* The flapper serves two purposes: It must stand up to chlorinated water and create a reliable, leak-proof seal; and it must also open fully, so that the stored water exits the tank with enough velocity to create a strong and effective flush in the bowl. American Standard HETs employ flush valves with large-diameter openings that allow the water to exit the tank quickly. To ensure long life and leak-free performance, our flappers are made with durable materials that resist chemical attack and aging, as compared with older, less expensive materials.

3. *The toilet-bowl rim:* The rim of the toilet bowl is hollow, allowing water to flow to the holes that are punched into the bottom of it. The use of CFD ensures that exactly the right amount of water is directed to the rim and that the rim holes are sized and located properly in order to ensure good scouring of the bowl.

4. *The well and water-surface area:* The contours of the well and the size of the water-surface area in the bowl, known as the "water spot," are important design attributes. The contour of the well will contribute to the generation of a strong siphon. Larger water spots help to keep the bowl more clean and can help reduce the frequency of using a toilet brush.

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5. *The trapway:* The most important design element of a gravity toilet is the trapway. This is where the use of the aforementioned CFD methods really pays off. The trick is to make the trapway as large as possible while still being small enough to generate a powerful siphon, using only 1.28 gallons of water. By eliminating countless trial-and-error iterations, CFD allows the toilet designers and engineers to determine the perfect shape and size of the trap.

The technology also avoids the sharp turns, or choke points, that were proven to be problematic in earlier 1.6 gpf toilets. In fact, American Standard HETs have trapway diameters as large as the 3.5-gpf toilets of old, ensuring reliable clog-free performance. The result is a toilet designed from top to bottom to be trouble-free and efficient.

Having invested in new and powerful design tools like CFD and FEA, American Standard is prepared to meet the next toilet-market transition – from 1.6-gpf toilets to the new HETs – so that North America can continue to flush with confidence.

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