

A Better Bathroom Bowl

At last, water-saving
technology that works

BY MAX ALEXANDER



THE FLAPPER ERA LIVES ON

Although most toilets still operate on the same principle they've used for more than a century, recent advances have enabled them to remove the same amount of waste with half the water. Kohler's 1920s-style Revival design encases an efficient 21st-century flushing system.

When Congress mandated, in 1994, that toilets use only 1.6 gallons per flush (gpf), the plumbing industry panicked. Back then, America's porcelain behemoths guzzled more than three gallons per flush—and didn't always work very well at that. Meeting the new low-flow law seemed impossible. How could manufacturers pack enough flush power into such a small amount of water? And could anything remotely stylish be adapted to the new law?

A decade later, toilets have been through a quiet revolution and have come out working and looking better than ever. Toilet styles today are all over the map, from traditional to Victorian to contemporary, and most don't cost a fortune. (Toilets range in price from \$100 to \$800, with most styles in the \$200 to \$400 bracket.)

But the biggest change has been “under the hood,” where manufacturers rose to the challenge and figured out how to make the 1.6 gpf mandate work. One big improvement, now standard, involved glazing the trapway, which is where waste goes after you flush. The smoother surface helps everything move more quickly. Another change was a larger flush valve, which is the hole at the bottom of the tank where fresh water enters the bowl. To increase water flow even more, manufacturers used computer programs to design trapway and bowl shapes with less resistance.

The innovations didn't happen overnight. Early models rightly earned the nickname “two-flushers” for their inability to get the job done the first time. But recent independent studies confirm what plumbers and homeowners have already noticed: Today's models



GRAVITY-FLUSH TOILETS Most manufacturers differentiate their products with unique features designed to enhance flushing power. American Standard's Champion toilet, for example, replaces the usual rubber flapper with a "flush tower" to maximize flushing force.

work very well, even if clogs still occasionally happen.

An effective flush

The first decision when buying a new toilet is choosing the type of flush mechanism—gravity, vacuum-assisted, or pressure-assisted.

Most toilets operate on the same gravity principle that's been in use since the 19th century. Pushing the lever opens a flush valve that sends stored water from the tank rushing into the rim holes (to clean the bowl sides) and through a larger hole at the bottom of the bowl called the siphon jet. Water moving through the siphon jet pushes the bowl water up over a built-in trap behind the bowl, starting a siphon effect that draws the old water into the trap and down through the drain. Once the bowl empties, air enters

the trap and breaks the siphon, allowing the bowl and tank to refill for the next flush. In essence, the weight of the water itself is what powers the flush.

Beyond gravity toilets are systems that provide some sort of boost to the flush, all but guaranteeing an end to clogs. In vacuum-assisted toilets, a vacuum chamber in the tank sucks water out of the trap to start the siphon. Pressure-assisted toilets use compressed air to force water into the bowl. Most, including American Standard's Cadet PA, work mechanically; some, like Kohler's San Raphael Power Lite, have a small electric pump, which requires a grounded outlet behind the toilet. Assisted toilets work great; they are generally the best at removing solid waste, but they tend to be louder than gravity models—in some cases much louder. They can be more diffi-



IN THIS CORNER... The triangle-shaped tank on Eljer's Patriot toilet offers a solution for tight powder rooms.

FLUSHING SYSTEMS

GRAVITY-FLUSH

Pros: Widest range of styles; least expensive (many models cost less than \$200); easy maintenance; advances in design have improved flushing ability.

Cons: Clogs do occur, despite improvements.

VACUUM-ASSISTED

Pros: More powerful flush than gravity; tank-within-a-tank prevents condensation; improvements have reduced noise level.

Cons: Very few models available; can be noisier than gravity-flush models, more expensive (\$200–\$300).

PRESSURE-ASSISTED

Pros: Most powerful flush; tank-within-a-tank prevents condensation.

Cons: Limited models available; can be quite noisy; expensive (\$300 and up); weak household water pressure can affect performance.

TOILET TECHNOLOGY

Now that they've pretty much perfected the 1.6-gallon flush, manufacturers have moved on to features that make their toilets more sanitary, more comfortable, and even stingier with water. This composite sketch, based on a typical gravity-flush toilet, illustrates some of those improvements.

Dual-flush technology allows either a 1.6-gallon flush or one that uses even less water.

Soft-closing seat eliminates slamming lids.

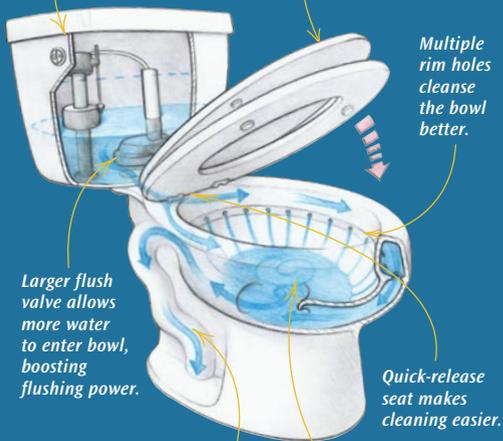
Multiple rim holes cleanse the bowl better.

Larger flush valve allows more water to enter bowl, boosting flushing power.

Quick-release seat makes cleaning easier.

Glazed, computer-designed trapway prevents clogs.

Ergonomic height requires less bending.



cult to install and maintain, and style choices are more limited.

One recent innovation, available in both gravity and assisted models, is the dual-flush toilet: press one button for a full 1.6-gallon flush, or press another button for a smaller flush (typically around a gallon) to handle liquid waste. Manufacturers say dual-flush toilets can save 6,000 gallons per year for an average family of four. In regions where water is scarce, they make a lot of sense. Dual-flush toilets are now offered by a couple of manufacturers.

Clean and comfortable

Comfort is another consideration when buying a toilet. Bowls come in two shapes—round and elongated. Round bowls are cheaper and more

common, but elongated bowls are more comfortable. Toilet seat height is also getting a lot of attention from manufacturers these days. Traditionally, toilet rims were positioned about 15 inches off the floor. But as the population ages, toilet height is on the rise. Most manufacturers now offer 17-inch toilets—the height of a standard chair. Some models are as high as 19 inches, which qualifies for handicapped access. A tall toilet, however, may be difficult for small children to use.

Toilet cleaning is high on the list of dreaded household chores, so

TALL ORDER *Most toilets are available in taller heights, a response to an aging population who'd rather not strain their knees. The American Standard toilet below has a rim height of 16½ inches.*





A NEW SPIN ON GRAVITY *The G-Max flushing system on Toto's Nexus toilet uses new technology to improve on the gravity-flush principle.*

manufacturers are making toilets more sponge-friendly. The biggest innovation is the one-piece toilet, which eliminates hard-to-reach spaces between the tank and the bowl. Bemis, the largest manufacturer of toilet seats, offers quick-release seats that simplify cleaning around hinges. Some seats are also now made of antimicrobial plastic.

OFF THE FLOOR *Wall-mounted toilets like those made by the Swiss Company Geberit are common in European homes, where bathrooms are smaller. The off-the-floor design makes cleaning easier as well.*



Toilet makers have also addressed that other seat problem—the slam. Kohler's Cachet seat closes slowly with the tap of a finger, and also features quick-release hinges that allow for easy cleaning. A version from Toto, a Japanese company, is hydraulic, using a high-viscosity liquid to dampen the hinge mechanism.

The sleek, contemporary look of European fixtures has influenced toilet design here as well, leading most manufacturers to offer some new options, although the traditional upright tank and bowl still dominate. "Consumers are looking for toilets they are comfortable with," says Pete DeMarco, director of compliance engineering for American Standard, "and usually that means a style they grew up with." It's doubtful, however, that many of us will miss the plunger. **PH**

Max Alexander writes often about home improvement.

See Resources on page 94.



FLUSHING POWER *The Kohler San Rafael Power Lite boosts its flush with an electric pump and allows the choice of flushing with 1.6 or 1.1 gallons.*