

The Dirt on Dishwashers

Manufacturers step up to the plate with models that meet or exceed new guidelines for energy and water usage—and provide a space for every single spoon

BY SEAN GROOM



I'm old enough to remember washing dishes by hand because it was our only option, but young enough to remember the relief when my parents finally bought our first dishwasher. A lot has changed since my green-paneled savior arrived. For one, dishwashers are pretty much de rigueur in kitchens today. More people have dishwashers than cable TV. On the performance side, rinsing and prewashing before loading is a thing of the past; improved insulation and motor design have made the best dishwashers nearly silent; and any dishwasher worth its salt uses less energy and water than washing dishes by hand.

If you haven't shopped for a dishwasher in a while, the number of features to choose from might surprise you. They include flexible storage racks, steam cleaning, hidden controls, half-load wash options, and dishwasher drawers. They're also more efficient: The Department of Energy just upped the ante for Energy Star dishwashers, requiring they use less electricity and—for the first time—imposing restrictions on water usage. In addition, the



Better cleaning



Slimmer designs

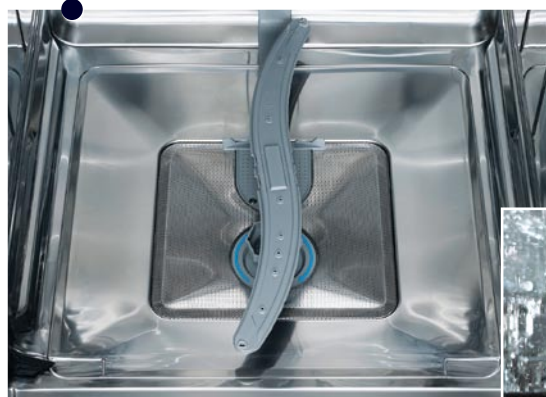


Bigger loads



Cleaner looks, cleaner dishes

Fully integrated. Panel-front inserts and door-top controls camouflage this Miele dishwasher (\$1250) so well that you'll have to tell guests where to put the dirty dishes.



Efficiency saves more than watts. You can't see the concealed inline heating element in this Bosch model, but it warms water more efficiently than an exposed element. Inline heat also adds a few more inches in the tub for tall items and eliminates the need to restrict heat-sensitive items to the upper rack. (Prices on Bosch models range from \$470 to \$2000.)



Pressure washer. Fixed nozzles on the tub walls turn one corner of the bottom rack into a dedicated pot-scrubbing zone in this Whirlpool dishwasher (models priced from \$600 to \$900).

required minimum efficiency for all dishwashers will be raised in 2010 (see "Everyone's getting tough on efficiency," p. 56).

Dishwasher prices run from \$200 to \$2000. For comparison purposes, this article lists street price, the retail price you'd expect to pay on most models. You can find models that clean fairly well for about \$350 but don't have a lot of bells and whistles. At \$500 and above, you'll find quieter machines, higher efficiency (in some cases), soil-sensing wash programs, stainless-steel tubs, and some convenience features. Once you cross the \$900 threshold, you've entered the bling zone. Here's where you find the most efficient machines with specialized cycles for everything from plastic containers to crystal, more flexible rack configurations, and a host of aesthetic embellishments.

Bling aside, you don't want your dishwasher to be a conversation stopper. If quietness is a priority, look for a dishwasher with separate motors for washing and draining and plenty of insulation around the tub and in the door. To compare noise levels, look at the dishwasher's dBA rating. It's similar to a decibel rating, but accounts for frequencies having the greatest effect on the human ear. Quiet dishwashers have dBA values from 40 to the low 50s; lower is better. If the dBA rating is not in the product literature, it's too high to brag about.

Efficient washing takes time and heat

Depending on the age of your dishwasher, the first thing you'll notice about the latest crop is that wash cycles are much longer. A regular cycle might last over an hour and a half, and some heavy-duty cycles stop the clock at three-and-a-half hours (including drying). It may seem counterintuitive, but lengthening the cycle dramatically reduces energy and water consumption while improving cleaning.

A full wash cycle consists of three cleaning segments, each requiring at least one fill of fresh water. The cycle starts by blasting the load with hot water to loosen or remove food. After this flushing, the dishwasher drains, and a new fill mixed with detergent takes place. This is the washing period. (Either segment might use additional batches of clean water if the load is very dirty.) Once the dishes are clean and the wash segment done, the final fresh-water fill rinses the load.

All wash segments use hot water, typically 135°F or higher. Most household water heaters are set to about 120°F, and water coming into the dishwasher usually has been sitting in the pipes for a while. Raising the temperature of this incoming water is the most energy-intensive part of the dishwasher cycle.

In most American dishwashers, a heating element in the bottom of the tub heats the water as it splashes around before the sump pulls it into the spray arms for recirculating. Several manufacturers (such as Bosch, Gaggenau, and Miele) use an inline heating element: The water passes through a contained heating element connected to the supply before it's sprayed in the tub, like a miniature tankless water heater. The inline method is more efficient, heating all the water to the same temperature quickly, which accounts for the fact that Bosch and Gaggenau have the lowest energy usage rating at 180 kWh/yr.

Passive drying saves energy

Most dishwashers use an exposed heating element because it pulls double duty as the heat

Machines for small loads and tight spaces

If you have a small kitchen, pricey dish drawers (\$800 and up) aren't your only option. Compact 18-in.-wide dishwashers (\$650, photo right) save 6 in. of cabinet space and still hold eight full place settings. Under-the-sink units (\$750, bottom left) fit underneath a 6-in.-deep sink and take advantage of often-wasted cabinet space. If your budget allows, dishwasher drawers (below right) handle small loads efficiently and offer installation flexibility. A pair of stacked drawers mimics the capacity of a traditional dishwasher and is ideal if you run small loads frequently or keep kosher. Single-drawer washers mounted under the counter are wheelchair accessible and a real back saver if bending over is difficult.



Dishwasher on a diet. Compact dishwashers, including this model from GE, save space in small kitchens and are ideal in households where it takes a week or more to fill a standard-size dishwasher.



Saving space. This GE under-the-sink dishwasher makes use of cabinets that aren't practical for storage. A stepped profile with a half-depth upper rack accommodates the sink plumbing and claims a 12-place-setting capacity.



Cabinet or appliance? Dishwasher drawers, like these from Fisher & Paykel, clean small loads efficiently and can put an end to unloading the dishwasher. Store dishes in one washer, and when they're soiled, put them in the other one.

Everyone's getting tough on efficiency

Dishwashers have become remarkably more efficient in the past decade. Today's GE dishwasher uses 32% less energy and 43% less water than 2001 models. If you're washing dishes by hand to conserve energy and water, you're fooling yourself. The Department of Energy estimates that hand-washing uses 5000 more gallons of water a year and consumes twice the

energy of running a full dishwasher. And last August, the Energy Star program raised the bar with new qualifying criteria for dishwashers. Based on the assumption of 215 "normal cycle" loads a year, an efficient dishwasher can use a maximum of 324 kwh/yr (including standby power when not running). For the first time, Energy Star takes water use into account, limiting a normal cycle to 5.8 gal.

It's important to recognize that these figures are for normal cycles; heavy-

duty wash cycles can use significantly more water and energy. For example, Bosch's \$500 dishwasher uses 2.4 gal. for a normal cycle and 6.8 gal for a pots-and-pans cycle. GE's \$1500 machine uses 5 gal. in a normal cycle and 10 gal. in pots-and-pans mode.

There's also a wide range of efficiency among Energy Star dishwashers. To earn the badge, models must perform 41% more efficiently than the federal minimum standard. However, Asko, Bosch, Gaggenau, Miele, and Viking all make models that perform more than 100% better. Bosch and Gaggenau take the top prize, using an estimated 180 kwh/yr—some 167% better than the federal minimum. This type of efficiency comes at a price: more than \$2000. You can purchase a model that uses 234 kwh/yr (100% better performance than the federal minimum) for less than \$1000.

Efficiency will continue to improve. The Energy Security and Independence Act of 2007 raises the minimum efficiency standard for all dishwashers on Jan. 1, 2010. Energy Star standards tighten again in 2011.

source in the drying cycle, which relies on convection. When you select the heated-dry option, the heating element turns on, and a fan draws air through the dishwasher tub.

Bosch's approach is different. There are no electrical or mechanical parts. Instead, Bosch relies on condensation. The final rinse uses 160°F water, raising the temperature of the dishes and glasses higher than that of the stainless-steel tub. As a result, moisture is drawn away from the dishes and condenses on the tub. Miele adds a small fan to draw in cool air at the bottom of the door and pump it through channels between the insulation and the outside of the tub. Cooling the tub increases the temperature differential between the tub surface and the dishes and glasses, speeding condensation. Drying this way takes longer than convection drying, but if you don't need your dishes bone-dry at the end of the cycle, the energy savings is significant and you're not actively venting hot, humid air into the kitchen.

Conserving water also saves energy

Regardless of the type of heating element, manufacturers use two methods to limit electricity used for heating water. The first is to chop a few degrees off the temperature during the wash and to run the cycle a bit longer. The second is to use (and therefore heat) less water. Both of these factors add up to the longer cycle times of Energy Star dishwashers. There's a limit to how far temperature can be reduced because detergents work best at temperatures about 130°F. So engineers of efficient machines look to reduce the amount of water used, and to match the length of each segment within a cycle to the specific load so that the cycle doesn't last any longer than absolutely necessary.

Many models have a feature with a name like SensiClean or CleanSensor that varies the amount of water used during a cycle depending on how soiled the dishes are, how full the racks are, and what type of items are in the load. Here's how this feature works:

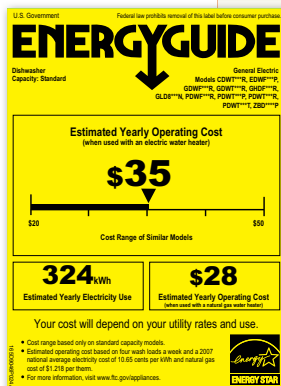
During any segment of a wash cycle, the dishwasher uses an allotted amount of water several times. Water collects in a sump at the bottom of the tub, and after being filtered (so that food particles don't get pasted back on the dishes), it's returned to the spray arms. As the water collects, a light beam measures turbidity—the volume of particles in the water and the water's opaqueness—and uses that information to determine if the wash segment should be shorter or longer.

On some dishwashers, sensors also measure the temperature and volume of the returning water, allowing the appliance's computer to calculate the load size and the types of items in the racks. For example, if it's a full load, less water returns to the bottom because more water clings to the pieces. If the water is cooler when it reaches the sump, the load is probably mostly china, which absorbs heat. If the racks are full of glassware, the return water will be closer to its initial temperature. This information is used to adjust the cycle time and temperature.

GE models with SmartDispense go a step further. A reservoir in the dishwasher door holds a full bottle of detergent, and the turbidity sensors trigger the machine to dispense the proper amount to each load.

Options for tailored wash cycles

By now, most of us have heard that it's most efficient to run a dishwasher only when you have a full load, but this isn't always convenient. To save energy and water on smaller loads, some dishwashers have half-load cycles. Bosch, for example, lets you run a half-load



Comparison shopping. All dishwashers must be sold with this estimated energy consumption label. Your usage patterns may differ from the assumptions used to calculate these figures, but it's an effective way to compare machines' relative efficiencies.

Feedback

For tips on how to maximize the performance of your existing dishwasher, see p. 104.

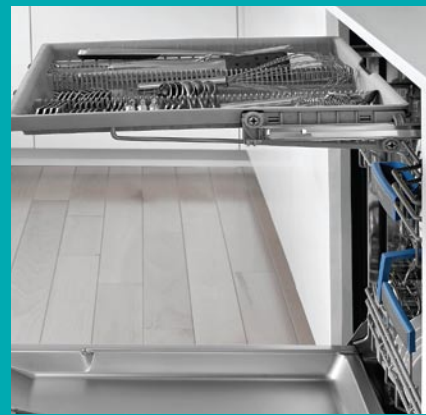
Maximizing space for bigger loads



Capacity and flexibility are key when choosing a dishwasher. Manufacturers have maximized space by combining smaller motors and pumps in what is called the “tall tub” (top right, from Asko; \$1700). On a tall tub, the door is hinged at the bottom of the machine, rather than above both the toe kick and a fixed plate as on traditional machines. Racks have also become more versatile, accommodating larger items.

Some models offer upper racks that shift down, creating upper-rack space for plates. In a variation offered by GE, Electrolux, and Miele (at left; \$1150), the rack can be adjusted diagonally so that tall items can be loaded on one side of both the upper and lower racks.

Folding parts—tines, stemware holders, and cup shelves—add flexibility, as do shallow third racks for utensils and cutlery (from Bosch, right; \$1900). Improved silverware baskets can be relocated or divided to squeeze in where space allows.



program with items on the upper and lower racks and reduces the volume of water and the cycle time accordingly. Other brands, like GE, require that you load all the items on the upper rack, and the dishwasher uses only the spray arms for that rack. Dishwashers with the ability to control wash arms separately can be programmed for a heavy-duty cycle on the bottom rack and a delicate cycle on the upper rack, allowing you to wash both pots and crystal glasses at the same time.

Manufacturers have engineered a variety of additional cleaning cycles and features in their attempts to improve dishwashers' ability to clean both your dirtiest cookware and your most delicate glassware. Because a dishwasher can't be “test-driven” on the showroom floor, designers fret over the location, shape, and appearance of wash arms, nozzles, jet holes, and anything else that will give buyers the sense that their dishwasher is tough on dirty dishes.

Several companies (LG, Kenmore, and GE among them) have introduced steam to help clean dishes. The idea is that rising waves of steam in a dishwasher loosen difficult food and stains effectively. While some other manufacturers question steam's effectiveness with regard to heavy-duty cleaning, it has proved to be a popular option for cleaning delicate items such as stemware.

KitchenAid and Kenmore are among brands that have dedicated deep-cleaning zones—areas of the rack where hard-to-clean casserole dishes, pots, and pans get a direct hit from special wall-mounted high-pressure nozzles. A more common cleaning enhancement is two or three wash arms (one under each main rack and sometimes an additional one aimed down from the top) rather than a tower that rises out of the lower wash arm to spray the upper rack. With a dedicated water supply plumbed to each arm and better spray coverage, this is a more efficacious method than a tower wash system.

Extensive testing by organizations like Consumers Union shows that if you skip the “builders' special” models at the very bottom of the price range, most dishwashers clean very well. Almost 70% of the roughly 950 dishwasher models on the market are Energy Star qualified, and they are represented at every price point. Your purchasing strategy should be to buy the most efficient model you can afford and pay only for the rack and programming features that you need. □

Contributing editor Sean Groom will never again take the dishwasher for granted and may start using it for pots and pans. Photos courtesy of the manufacturers.

SOURCES

Asko www.askousa.com • **Bosch** www.bosch-home.com • **Fisher & Paykel** www.fisherpaykel.com • **Gaggenau** www.gaggenau.com
GE www.geappliances.com • **Kenmore** www.kenmore.com • **KitchenAid** www.kitchenaid.com • **Maytag** www.maytag.com
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