



Burner Basics

If you think the choice is as simple as gas vs. electric, you could end up with a great-looking stove that takes forever to boil water and even longer to clean

BY ROE A. OSBORN

Despite what you might think after looking at the kitchens in this and in all the other kitchen magazines, some people actually buy a stove because they want to cook on it. If you're one of those people, read on.

Regardless of whether a cooktop is part of a range or dropped into a counter with no oven below; regardless of whether it's enamel, stainless steel or cast iron; 30 in., 36 in. or 48 in. wide; white, green, black or polka-dotted, it's the burners that do the cooking. And like a car buyer popping the hood to check the engine, anyone shopping seriously for a stove or cooktop needs to know about burners. Here's the short course.

Gas offers speed and control

Ask any group of serious cooks what type of stove burners they prefer, and hands down, they'll choose gas over electric. Their reason-

ing can be summed up in two words: speed and control.

With a gas burner, the heat is instant. Turn the knob, a flame appears, and you're ready to cook. Immediate high heat sears food, cooking it quickly and sealing in juices, something a gourmet cook considers essential. When you turn off a gas burner, the heat disappears just as quickly, which stops the cooking. The cooking temperature changes just as quickly when the size of the flame is changed.

Control comes from being able to change the flame as you turn the knob. And most gas burners are infinitely adjustable between the burner's highest and lowest capacities.

Sealed burners mean easier cleaning

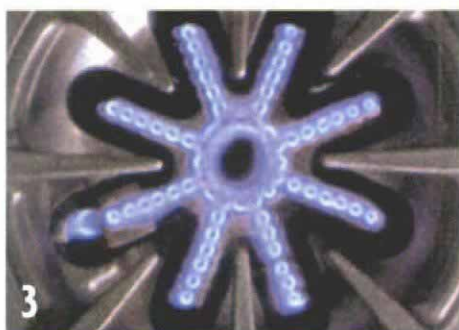
The biggest trend today is professional-style stoves for the home. And the burners on these stoves boast the largest British thermal unit (Btu) ratings. Among them, Wolf, Gar-

land, Viking, Five Star and Thermador all rate their regular burners at around 15,000 Btus (Wolf's burner is rated at 16,000 Btus). For a chef, that's serious horsepower.

By the way, if you're going to run a stove on propane rather than natural gas, it's a good idea to ask if there's any power loss due to conversion. For instance, Five Star rates its burners at 14,000 Btus for natural gas but at 12,000 Btus for propane, a reduction of almost 15%. Garland, however, rates its burners the same for either fuel. Some of Viking's burners have a reduced propane rating, and other Viking burners have the same rating.

Gas burners can be either open or sealed. In an open gas burner, such as you'll find in most true restaurant stoves, the stovetop area around the burners is open, and spills and boil-overs go through the burners and land on a tray that can be removed for cleaning (bottom photo, p. 92).

A RANGE OF BURNERS



1. Electric coils: tortoise or hare? Coil burners don't respond as quickly, but they can boil a large pot of water faster than most gas burners. **2. Rings of fire.** Most gas burners distribute their flames in a ring, concentrating the flame in a small area of the pot. **3. Star of the show.** Gas burners in the shape of a star such as Garland's open burner distribute their flames more evenly on the bottom of the pot. **4. Only the burner gets hot.** With a glass cooking surface, only the area above the burner gets hot. The butter above this hot burner melted, while the rest of the stick stayed cool. By the way, a glass cooktop should not be cooked on directly.

But when these professional-style stoves started finding their way into homes, owners complained about the difficulty of keeping open burners clean. So stove companies responded by making sealed burners for their stoves (top photo, p. 92). Most sealed burners have a recessed pan under the burners. This pan is designed to collect spills and food that fall into the burner. Dacor's sealed burners can hold up to a liter of spills. Their pan also is pitched to the outside so that most spills go to the outskirts of the pan away from the burner, where they can be mopped up with a damp sponge without burning.

The most common gas burner is a ring with the gas jets exiting the sides (photo 2, above). Sealed burners usually have a removable top covering the ring that prevents food from getting into the actual burner. The disadvantage of ring-shaped burners is that the flame also comes out in a ring shape, which

puts the heat on the edge of the pan. With heat not evenly distributed across the bottom of the pan, cooking tasks such as boiling a large pot of water for pasta can take a surprisingly long time.

Some open burners, however, such as Garland's Starfire burner (photo 3, above), have different configurations that distribute the flame over a larger area of the cooking pot for more efficient cooking. Thermador's sealed star burners combine the cleanup convenience of a sealed burner with the heat distribution of a star-shaped burner.

Burners are also measured by how low they can go

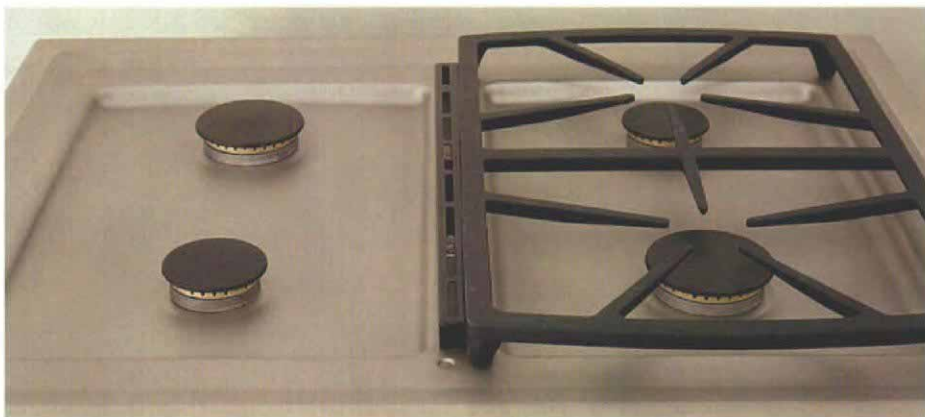
Right after a chef tells you how important a large hot flame is for expert cooking, the next priority mentioned will be simmering. When you look at the power rating for burners, pay equal attention to the minimum rat-

ing. That 15,000-Btu burner might be great for searing a chicken breast, but when you need to keep a delicate sauce at a slow simmer, even the lowest flame might end up ruining your dinner plans.

To make a burner that cranks out high Btus, the holes that the flames shoot from have to be quite large. When the gas is turned down for a simmer, the holes are too large to maintain combustion, and the flame goes out. Stove manufacturers have come up with a few different strategies to deal with this dilemma.

The first and most obvious choice is to offer smaller burners that work alongside the big workhorses. This option is the choice of most of the manufacturers, especially the standard household-appliance companies that have upgraded their lines by adding more professional-looking equipment. They can offer a choice of a higher-powered burn-

GAS BURNERS: SEALED VS. OPEN



Sealed burners (above) are designed to collect and contain stovetop spills. The Dacor system shown here holds up to 1 liter of liquid. Viking's open burner (below) allows spills that aren't caught in the ring under the burner to flow to a pullout tray below. An enamel disk covers the burner.



er for faster cooking in addition to their standard fare, usually better for simmering.

Some companies, such as Viking and Five Star, have developed high-powered burners that also simmer. Five Star's Vari-flame burner is actually two burners in one, a 14,000-Btu outer burner and a small inner burner that produces as little as 400 Btus. Wolf's Gourmet series also has a burner-within-a-burner system that ranges from 16,000 Btus to 500 Btus (top photo, facing page).

Viking claims that its VariSimmer system is so gentle that a sheet of paper placed on the burner while at its lowest setting will barely turn brown after 10 min. (bottom photo, facing page). Viking's system uses an open-burner design along with a large distance between the burner and the grate to allow air to circulate under the pan (or paper) to keep it from overheating.

According to Joe Edelman of Edelman Kitchen & Bath in Bethel, Connecticut, Thermador attacked the simmer problem by creating their Extra Low burner that cycles on and off at a low flame. At its lowest setting, the burner turns on a low flame for 5 seconds and then is off for 55 seconds. If you are driven crazy by the clicking noise a gas burner makes when it ignites, Thermador's on-again-off-again simmer function might put you over the edge.

But with all gas has going for it, why doesn't everyone use it? Many people still fear dealing with combustible gases in the home. However, today's gas stoves with electronic ignition are much safer than their older counterparts, which relied on a pilot light or had to be lighted with a match.

If natural gas isn't available in your area and you want to cook with gas, a propane tank has to be set up at your house. These tanks come either as bottle-shaped vertical tanks, usually mounted on the side of the house, or as larger horizontal tanks that look like small submarines set up a short distance away. Neither qualifies as a lawn ornament.

Also, gas may not be an option for people with environmental sensitivities who might get sick from the combustion byproducts of natural gas or propane.

Electric coils win the pasta race

According to AHAM (Association of Home Appliance Manufacturers; 202-872-5955), in 1970, more Americans owned gas stoves (57.7%) than owned electric (40.6%). By 1996, almost three decades later, owners of electric stoves outnumbered gas-stove owners almost 2:1. One of the reasons for this change has been a steady improvement in electric-burner technology.

The most recognizable names in American residential appliances, such as General Electric, Frigidaire, Amana, Sears (Kenmore) and Whirlpool, all make electric stoves with either coil or cast elements (photo 1, p. 91), close cousins of the coil elements that were on my mother's stove. When you turn on these burners, electrical resistance causes the elements to heat up.

The biggest problem with coil burners is that they're basically slow. They heat up slowly and change temperature slowly. And unlike gas, where the cooking stops as soon as the flame disappears, a coil element cools slowly and will continue to cook food for several minutes after the burner is turned off, unless the pot is removed from the burner.

While gas burners are measured in Btus, electric burners are measured in watts. The higher the wattage, the hotter the burner. For conversion, 1 watt equals 4 Btus. But this conversion factor is a bit misleading because coil burners are actually more efficient at transferring heat to a pan. A 2,400w coil burner delivers about the equivalent cooking heat of a 15,000-Btu gas burner.

With a gas burner, the pan sits on a grate with the flame coming through to heat the pan. With a coil burner, the pan sits on the element with the heat transferred directly to the pan. In fact, in its August 1999 issue, *Consumer Reports* said that "a coil burner ... still holds the record for bringing a large pot of water to a near boil." The large coil burners that they tested were 2,100w to 2,500w, while the gas burners tested were all in the 15,000-Btu range.

Electrons under glass

But even though resistance coils are the most popular electric burner, burners under ceramic-glass cooking surfaces are rapidly gaining popularity. Ceramic glass is sleek looking and easy to clean. Many companies make stoves with gas burners that sit over a glass top. Cleanup is easier, but you still have to maneuver around the burners. With electric stoves, the burners are entirely under the glass, and the continuous surface is a breeze to keep clean (photo 4, p. 91).

Until about four years ago, the elements used under the glass tops were similar to coil-type burners. At that time, radiant-ribbon burners were introduced. The radiant-ribbon material, which looks a lot like ribbon candy, has the same mass as a conventional electric burner but with much more surface area. The increased surface area makes radiant-ribbon burners faster and more efficient than their predecessors. As a result, they heat up quickly, coming to full temperature in less

than 5 seconds. If you can't wait 5 seconds for a burner, your life is probably too hectic.

Unlike a typical coil burner, where heat is conducted through direct contact, heat from a burner under glass radiates upward to the pan. Only the glass directly above the burner element gets hot while the rest of the glass-top surface stays relatively cool (photo 4, p. 91). Radiant-ribbon burners deliver the heat even faster.

Enter the age of the microprocessor

As mentioned earlier, the two key advantages of gas burners over electric burners are speed and control. Radiant-ribbon technol-

ogy has gone a long way to close the speed gap between gas and electric, but control is another story.

Electric burners have never been able to duplicate the control over heat output that gas burners have, and the reason is simple. Electric burners—both coil and ribbon—have always depended on bimetal switches for heat control. Instead of working like a dimmer switch that reduces the amount of electricity going to a burner, bimetal switches turn heat on and off in the burner to maintain an average temperature.

For example, at a low setting, the burner may be on full blast for 6 seconds to 10 sec-

SIMMERING WITH GAS



Many gas burners, such as Wolf's (above), have a small inner burner that allows for low simmering heat. Viking's VariSimmer system (right) uses an open burner design and large distance between burner and grate to produce a low flame that won't burn paper left on top for ten minutes.



onds and then off for 50 seconds to 90 seconds. Food subjected to these high temperatures, even for short 5-second bursts, will scorch or burn.

To make matters worse, the simmer setting on a burner might not be consistent from use to use, and identical burners with identical controls might exhibit different simmer tendencies. The same setting that cooked a wonderful sauce today might burn the same sauce tomorrow.

But here on the threshold of the 21st century, Caldera, a stovetop manufacturer in Vermont, has incorporated microprocessors into its burner controls. Caldera calls its system "microcycling," which allows the burner to cycle on and off in milliseconds, keeping the heat even steadier than a gas flame. Caldera boasts that a microcycling burner can melt an ounce of chocolate and keep it melted without burning for hours (top photo, facing page).

General Electric has introduced similar technology with the digital cooktops in its Monogram series. General Electric's digital burners cycle 120 times per second to provide steady, even heat to food. Microprocessors in the cooktop give cooking the convenience of electric burners along with the speed and control of gas.

21st-century stove controls

I've always tried to avoid cleaning the kitchen stove. You can chase a sponge around the burners and knobs—a cat's lick and a promise, as my wife calls it—but a thorough cleaning demands much more time and energy.

The worst part is pulling off the control knobs to clean underneath. I never seem to be able to get all the grease and grime from around the metal posts that hold the knobs and the screw heads that hold the switches in place. And I'm guaranteed to bloody at

least one of my knuckles on those posts in the process.

Cheaper electric stoves and the vast majority of gas stoves on the market still have this problem. But glass-top electric stoves with electronic touch controls make cleanup quick and easy. These cooking surfaces are flat and uninterrupted by dials.

George Becker of Madison, Virginia, has owned his Dacor electric cooktop for 2½ years. He traded in an older glass cooktop from another company in large part because cleanup around the controls was such a pain. The secret to Dacor's seamless cooktop and similar cooktops made by a host of other companies is touch controls (photo below).

These controls are not touch pads where pushing a button or area through a plastic membrane activates a switch. Instead, touch-sensitive controls sense your finger's presence. Moving your finger over certain areas chooses the burner and sets the heat level.



Burners under glass. Smooth ceramic-glass cooking surfaces with touch controls are easy to keep clean and with radiant-ribbon cooking elements heat quickly and efficiently. Burners with dual elements heat different-size pots.

Most touch-sensitive controls have a lock-out setting, so burners cannot be turned on by incidental contact with the control area. Positive contact with the control surface is also required to change settings so that brushing over the controls with your hand won't accidentally turn a burner too high. George Becker claims that in 2½ years of intensive use, he's never had any problems with the touch-sensitive controls.

Another advantage to touch-sensitive controls is ergonomics. Although most of us take for granted the dexterity needed to grab a stove knob and turn it, that simple task is problematic for millions of people with arthritis or other afflictions that limit hand mobility. Touch-sensitive switching makes kitchen time a little easier for those folks.

Different burner configurations

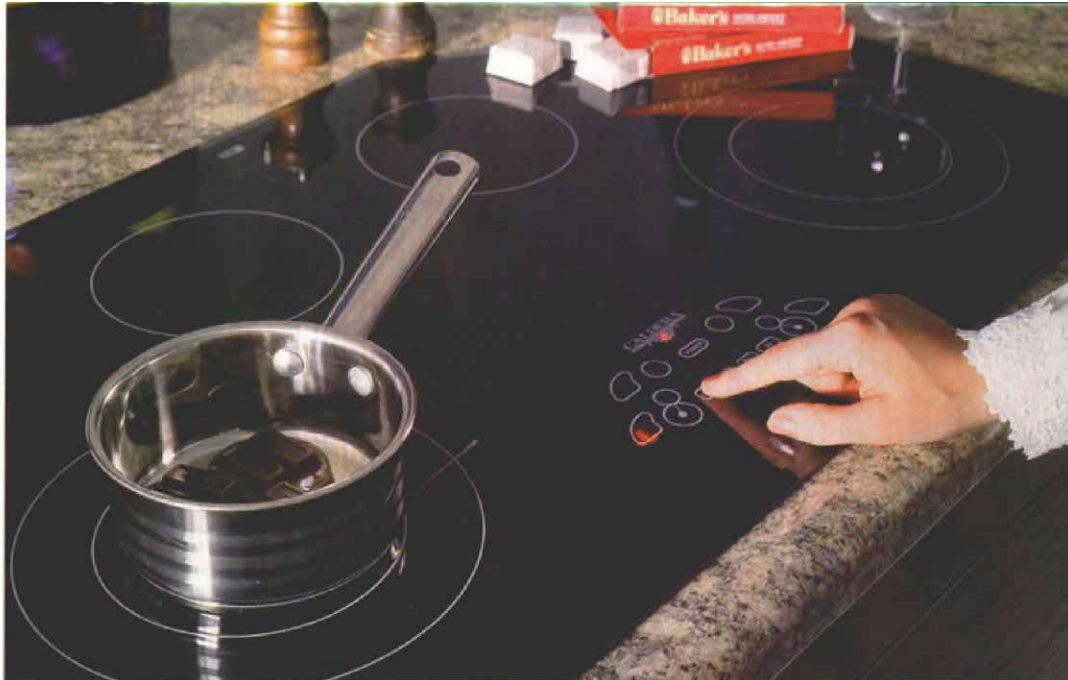
Just as gas burners come in many different sizes, so too do electric burners. Most stoves with coil-resistance burners have small as well as large burners. Basically, small burners are for small pots while large burners are for large pots. The diameters and output of the burners as well as the ratio of large burners to small depend on the company and the stove model.

Radiant-ribbon burners also come in different diameters with different outputs. But most companies offer a dual-element option (photo facing page), which lets you turn on just the inside circle if the size of your pot does not call for a large-diameter burner.

General Electric, Thermador and Viking all offer a radiant-ribbon option that joins two adjacent burners to form a large oval or rectangular cooking area (bottom photo). This feature is particularly handy if you're preparing food in an odd-shape pan, such as a roasting pan, or if you're heating up a large rectangular griddle.

Speaking of pans, don't let gas-stove salespeople scare you if they say that you'll need to buy new

cookware to go with your smooth-top cooking surface. It's true that radiant-ribbon



The chocolate test. It's difficult to melt chocolate over a direct heat source without burning it. Caldera's microcycling radiant-ribbon burners can hold melted chocolate for hours without burning it.

cooking systems function best with flat-bottom cookware, but because they radiate heat

upward, they will also work almost as well with cookware that isn't absolutely flat. According to Caldera's Christa Shute, that round-bottom saute pan works fine on their glass-top cooking surface.

Companies such as Jenn-Air and Gaggenau let you mix and match modules on your cooktop. So if you want the best of both worlds, you can have a radiant-ribbon module that can be used in combination with any of their other modules, including a gas-burner module. Caldera's gas cooktop offers the option of a microcycle simmer burner alongside gas burners.

Writing the check

Asking how much stoves cost is like asking how much a car costs: It depends. A professional-style range can cost over \$5,000, whereas you can get a good-quality range without the professional

look for a tenth of that price. The price of cooktops can vary greatly as well. A glass



Round isn't the only choice. Several stove companies join two round burners with an intermediate burner to form a cooking area for irregularly shaped pots or rectangular griddles.

cooktop can cost from about \$500 for most conventional tops to just under \$1,200 for Caldera's cooktop with microprocessor controls. Electric-coil cooktops can be picked up for as little as \$200, and gas models can cost from \$300 to \$1,000 or even more for some of the professional models.

Electric coils that unplug or hinge up are the cheapest and easiest to replace. But gas burners are usually cheaper to operate than electric burners (propane usually costs slightly more than natural gas). And before you get that smooth-top electric cooktop or range, check the warranty and the repair recommendations. Some require that the entire unit be replaced if the glass breaks or if a burner burns out. □

Roe A. Osborn is a senior editor at *Fine Homebuilding*. Photos by the author, except where noted.

Stove manufacturers

These stove manufacturers are mentioned in this article.

Amana; (800) 343-0304
amana.com

Caldera; (802) 244-3000
calderacorp.com

Dacor; (800) 772-7778
dacorappl.com

Five Star; (800) 553-7704
fivestarrange.com

Frigidaire; (800) 944-9Q44
frigidaire.com

Gaggenau; (800) 828-9165
gaggenau.com

Garland; (800) 424-2411
garland-group.com

General Electric; (800) 626-2000
ge.com

Jenn-Air; (800) 536-6247
jennair.com

Sears; (800) 349-4358
sears.com

Thermador; (800) 656-9226
thermador.com

Viking; (888) 845-4641
vikingrange.com

Whirlpool; (800) 253-1301
whirlpool.com

Wolf; (877) 867-6836
wolfrange.com