

# Choosing & Using the Right Electric Heater



## Choosing & Using the Right Electric Heater

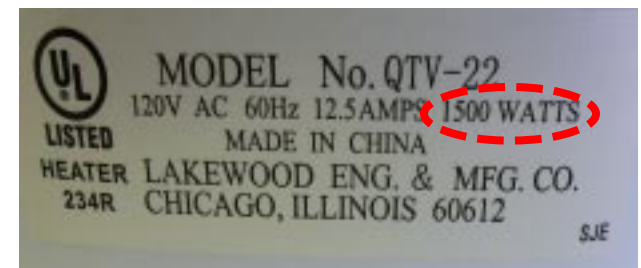
Portable heaters can be very handy for getting a temporary source of heat where you need it, or to add warmth to areas where the main heating system needs some help. But if you don't understand how to match the right style of heater to your specific needs, you could end up being disappointed.

This pamphlet explains the differences between electric heaters by dividing them into three main design categories. This simplifies the process of determining which type is best suited to a given application. The section explaining efficiency will also help you see through the marketing claims of a few heater advertisers, who tout their "space-age design" that is supposed to out-perform other electric heaters. Some even boast they can "save big money" on your energy bills. Being an informed consumer will allow you to see what electric heaters *can* and *can't* do for you when trying to cut costs and stay comfortable.

### Every Electric Heater Has The Same Efficiency – 100%

All electric heaters use the same method to change electricity into heat. Called "electric resistance heating" this simply means that current is sent through a material that is "resistant" to the flow of electricity. It's the same process used in your toaster, hair dryer, electric water heater and stove-top cooking elements. Unlike copper and similar metals with low resistance to electricity's flow, these materials glow red as all the electric current is converted into heat.

Because every electric heater uses this same process, they *all* have the same efficiency -- **100%**. There are no losses. Whatever the heater's shape, size or marketing claims, the amount of heat coming out is determined by the amount of electricity going in. This is listed in watts on the nameplate. Therefore, any two

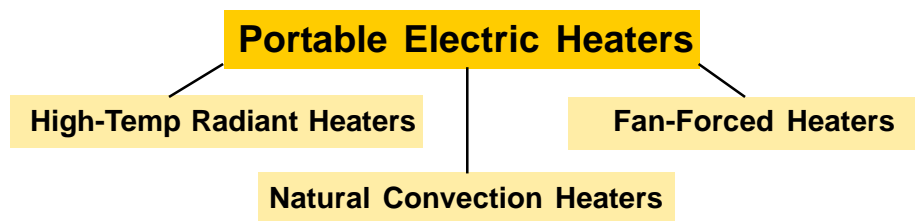


heaters with a rating of 1,500 watts on the nameplate will deliver the same amount of heat, no matter what they look like. (A minor amount of energy may be used to power a small fan, but this is insignificant for portable-size heaters).

What *is* different is how the heat is transferred from the glowing coils to the person or objects to be warmed. Some designs use a fan to blow air across the heating elements and into the room, while others radiate their warmth directly to the user. Even though all electric heaters are 100% efficient at turning electricity into heat, one of the three types described below may be better suited to a particular application in a home or work area.

### Describing The Three Main Heater Designs

All portable heaters can be grouped into one of three categories, as shown in this illustration. Dividing heaters into these general groups helps explain how each delivers its heat to the user.



**First Group** — Starting at the left of the chart is the “**High-Temperature Radiant**” style. They are characterized by easily visible heating elements, with a shiny reflector behind them. The glowing elements can be either metal coils, wires or a quartz material. Radiant heaters don’t attempt to heat the air, but rely on “beaming” their warmth directly to people or objects in front of them. This heat transfer method is actually taking place between objects all around us; we only notice it when we stand near very warm objects (camp fires, heat lamps, etc.). Just like the sun’s warmth, it can be a very pleasing form of heat.

Radiant heaters can be a good choice, but only if you understand their strong points and their limitations. Unlike space heaters which must warm the surrounding air before you feel comfortable, a radiant heater delivers heat instantly to objects in its path. But remember, if the room temperature is cold, only the objects in the path of these radiant waves of energy will feel warm. Much like a fan won’t keep you cool unless you are standing in its airflow path, a radiant heater won’t do you much good if you’re not within reach of its warming rays.

For example, a radiant heater works well for those sitting at an office desk or lounge chair, where the distance between you and the heater will not change. But if you will be moving about, a radiant heater can’t keep you warm if you are beyond its reach. Once the distance exceeds four to five feet for a 1,500 watt unit, the heat will dissipate into the room and you will be at the mercy of the surrounding air temperature.

Radiant heaters can be an economical choice in farm shops, garages, machinery sheds, and in the form of heat lamps. Their instant heat is particularly handy in these situations, because a central furnace may not be needed (nor economical) in large buildings that are seldom occupied.



Keep in mind that an upright heater with vertical coils offers better “coverage” to more of your body, whereas a smaller box heater will just warm your ankles. Although there are a few wall-mounted plug-in heater designs that put warming rays on your shoulders, they are not as portable.

**Second Group** — The second category, after the radiant group, is the “**Natural Convection**” style, which transfers its heat differently. Often seen in a long slender baseboard design, these heaters are warm to the touch but not hot enough to burn you. The major differ-

ence is, these heaters use the flow of air over their surface (natural convection) to transfer warmth from the heater to the air. Instead of using glowing coils like radiant heaters, convective heaters rely on a much larger surface area in contact with the air. As the air becomes heated, it rises and is replaced by cooler air from the room, creating a cycle of air flow.

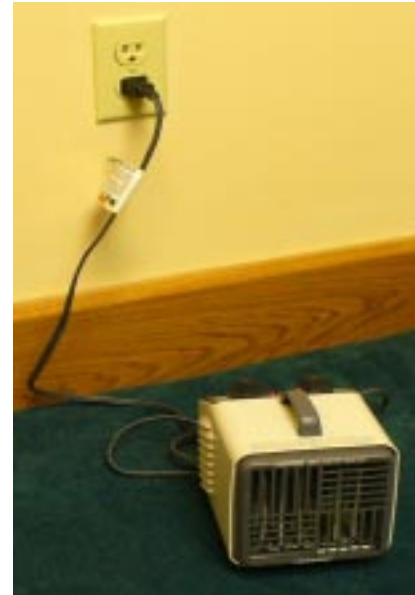


Some convective heaters are shaped like old-fashioned cast iron radiators, as found in historic buildings. They contain a fluid which transfers heat to the full surface of the unit, allowing greater contact with air passing over the heater. On a watt-for-watt equivalent, natural convection heaters put out just as much warmth, but you don't feel the intense heat as from a radiant design.

The lower surface temperature of convective heaters is an advantage for many applications. The heater can be placed in a room with small children without the fear of accidental burns. This also allows it to be located closer to furniture or near window curtains without the hazard of fire. Convective heaters are also quiet, compared to our next category.

**Third Group** — The third and final design of heaters can be grouped into a category known as “**Fan-Forced Heaters**”. This style is characterized by the use of a fan to push air over the heating coils and into the room. They operate in much the same way as a home's central furnace. But these “mini furnaces” are commonly rated at 1,500 watts, so they can only warm a modest size room.

Unlike the natural convection heaters mentioned above, this design doesn't rely on a large surface area to transfer its heat to the air. That is why fan-forced heaters are often smaller in size than the other



designs. This can be an advantage if the heater will be moved frequently.

Fan-forced heaters can deliver a constant flow of hot air, but consider how the fan's noise will affect your application. If used near an office desk, it could be distracting, and interfere with phone conversations. In the TV room, the background noise from the blower will compete with the television.

A clarification about fans — some other styles of heaters (like radiant) sometimes use a small fan inside to circulate the air. Don't let the presence of this small fan fool you; if most of the heat is transferred by radiant energy from the visible coils, it's a radiant heater.

### **Safety Features To Consider**

For all three types of heaters, safety features are an important purchase consideration. This is particularly true when used in a garage or outbuilding where combustibles are nearby. A tip-over switch, that automatically cuts power is a must, especially on taller upright heaters that might tip more easily. Also, look for sturdy screens or grills that cover the heating elements and keep objects out.

Avoid using an extension cord with an electric heater. If the wire size on an extension cord is smaller than the circuit wires in the wall, this creates a hazard. The smaller cord conductors are not protected by the fuse or circuit breaker in the wall, so they could become overloaded and create a fire.

## Zonal Heating To Save Energy

Any of the three portable heater types described here can be used in a home to allow room-by-room variation in temperature. Known as zonal heating, this method can save energy, but only if you lower the setting on the home's central heating thermostat. Then in the occupied room(s), a space heater is used to boost the temperature to a comfortable level. Unused areas of a home must remain at a lower temperature (at least 68 ° F. or less) to achieve any savings.

The success of this strategy is often dependant on the home's floor plan. For a home having a very open floor plan (few dividing walls), zonal heating can be a challenge. This is because the open floor plan prevents rooms from being closed off, so a large percentage of the home will still need to be kept at the warmer temperature. In this case, savings will be minimal.

If using zonal heating to keep bedrooms at a lower temperature, consider the time needed before bedtime to boost the temperature back to a comfortable level. Of the three styles described above, fan-forced heaters will have the shortest "recovery time" to add heat back to the room. Even so, it will take at least an hour to warm the room and all its contents; even more if the room is large and the temperature was lowered several degrees.

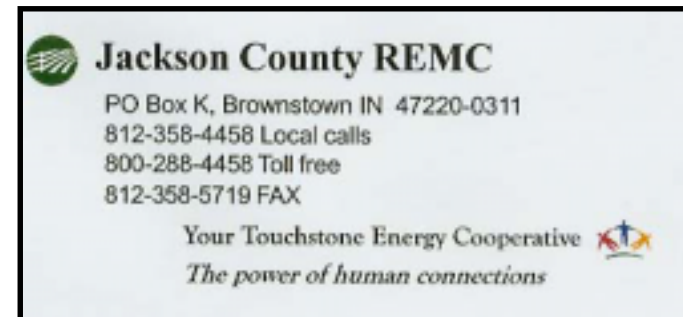
## Decide if You're Buying Furniture or a Heater

As a final consideration, there are a select few heaters that are available in an attractive hardwood cabinet. This fan-forced style sits on the floor and can serve also as a lamp stand or coffee table. They are much more expensive than standard space heaters, and offer no advantage in efficiency. Therefore the consumer must decide if they are shopping for a piece of furniture that will remain in place year-around, or simply for a portable heat source. This also applies to heaters in the form of a fireplace. If the buyer is looking for a heater that will match other furniture in the home, be prepared to pay more.

**In summary:** Using a portable electric heater to add warmth in your home or work area can do wonders to increase comfort. Before buying, use this brochure to become familiar with the limitations and advantages of each style of heater. These differences are not about efficiency, but about the method used to transfer warmth to the user. All electric heaters have the same efficiency — 100%. There are no losses in the process known as electric resistance heating. This should help consumers sort through the advertising hype of a few manufacturers.

The important comparison to make is the heat transfer method used (radiant, convective or fan-forced), which determines if the heater will be a good match for your application. A radiant-style heater may suit the needs of one application over a natural convection heater, even though both are rated at 1,500 watts and both are 100% efficient.

The sturdier heaters or those with more settings and safety features may not be the ones found in local stores. Check with commercial equipment suppliers or on-line sources to get the best heater for your money. Settling for a light duty heater may leave you unhappy with its durability, noise level or controllability. When making the final selection, use the factors outlined here to match your intended use with a compatible style.



## Produced with support from your electric power supplier

No part of this material may be reproduced without prior written permission. This and other items on energy use and efficiency are available from the **Rural Electricity Resource Council**, P. O. Box 309, Wilmington, Ohio 45177. Call (937) 383-0001 or visit our Website at [www.erc.org](http://www.erc.org).