



5 Things You Need To Know About Infrared Heat



At HeatStorm.com we've discovered that plain answers to common questions about Infrared Heating on the Internet, or elsewhere, is very difficult to find. Simultaneously, extraordinary claims about Infrared Heaters made by many marketing companies selling infrared heaters are rampant, especially on the Internet. This document is an effort to provide straight forward answers to the most commonly asked questions about Infrared Heaters, while also debunking various marketing myths.

Why are Heat Storm heaters are more efficient than other electric space heaters?

The Science

While infrared heaters cannot defy the laws of physics there are real and viable reasons they do perform better than traditional heaters. Unfortunately, the explanation does not fit into a clever marketing tagline. But, the reality is that there are significant performance differences between traditional space heaters and a quality Infrared Heater. This is true not only because of the laws of physics, but can also be true when there is great design. At Heat Storm we have gone to great lengths to make sure that all of those elements are employed to their fullest.

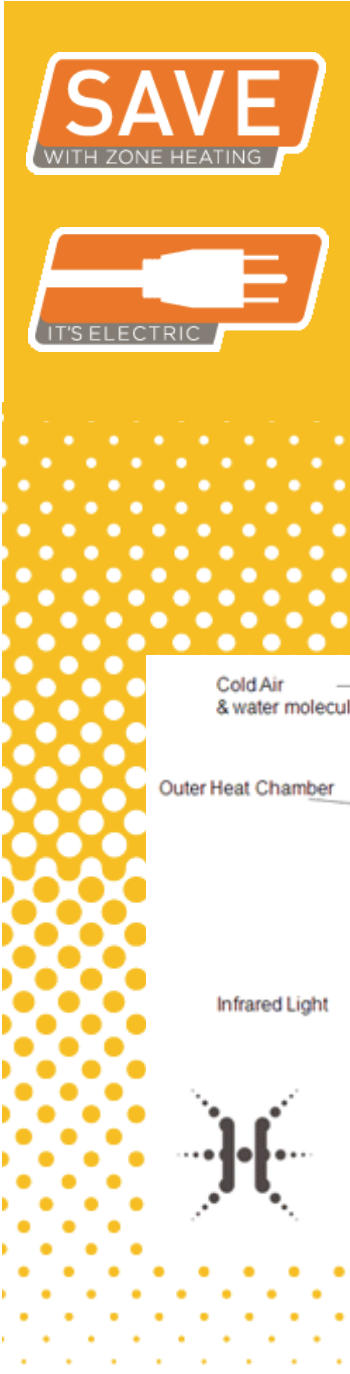
When discussing electric heating, the engineering types are quick to point out there is a law of physics (Joules First Law) that states that any given amount of electricity can only create an equivalent amount of heat. Therefore they reason, it doesn't matter what type of space heater you buy they will create the same amount of heat.

However, there is an often forgotten law of physics known as the Stefan-Boltzmann Law, which states that the higher the temperature [of the emitter], the greater the output of infrared energy and more efficient the source. So, the temperature of the heat source is tied to not only the amount of infrared created, but also to its energy efficiency. This is a critical insight when creating a heater. This will be discussed more fully in this document.

The Heating Element

Traditional Heating Element – Most space heaters push electrical current into various types of alloy. As the alloy naturally resists the electrical current the energy is converted to heat. The most common alloy is Nichrome. Nichrome is highly resistive and has a melting point at around 500 degrees F. For most space heaters the resistive wire element is the only heat exchanging system. Some heaters embed their resistive wire in ceramic. But, the vast majority of space heaters do not attempt to retain or capture the heat in any other way. Also, dust and lint build up inside of traditional space heaters. When lint comes into direct contact with the element there is significant risk of fire (we'll talk more about safety later).

Quartz Infrared Elements – In order to emit significant amounts of infrared light (enough to be considered an infrared heater), an element must be heated to 1600+ degrees Fahrenheit. Nichrome, the material used in most heaters, would melt at those temperatures. Heat Storm infrared elements are made of Tungsten or Carbon Fiber. Tungsten and Carbon Fiber can withstand extreme heat for very long periods. As for safety, in order to keep air and water molecules, as well as dust, lint, and other particulates from coming into direct contact with our elements, an air tight seal is formed inside the quartz tube with ceramic ends. The air tight seal is also critical to the longevity of the Tungsten or Carbon Fiber element.



Heat Exchanger

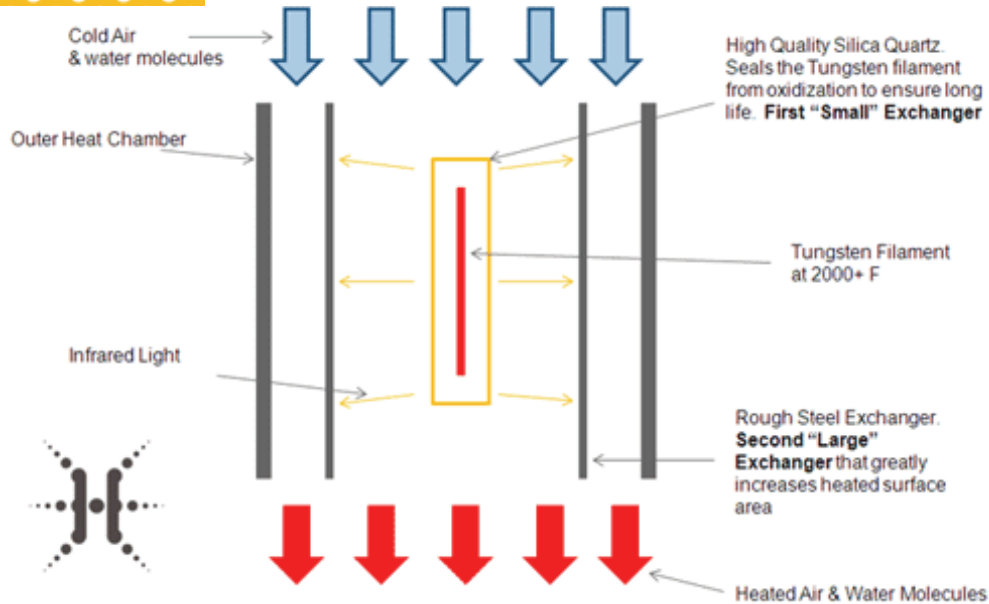
Traditional Space Heater Heat Exchangers - Traditional space heaters generally do not have a separate heat exchanger beyond their heating element.

Heat Storm's Heat Exchanger - The biggest difference between traditional space heaters and infrared heaters is that infrared heaters have two exchangers.

(The 1st Exchanger) The Tungsten or Carbon Fiber element combined with the quartz tube serves as the first heat exchanger. So, in Heat Storm heaters the Tungsten or Carbon Fiber element are heated to 2000+ degrees F, resulting in the quartz tube at 500+ degrees F. These two combined significantly enhances the amount of heated surface area that passing air and water molecules can come into contact with.

But, since the quartz tube is translucent it allows infrared rays to pass out onto the second exchanger. Remember that with greater heat a greater amount of infrared rays are emitted and as the temperature increases so does the efficiency. So, the key to understanding the second exchanger is to recognize that infrared rays are a secondary form of energy that can be captured, that other traditional heat emitters simply do not produce.

(The 2nd Exchanger) The second exchanger should be very good at absorbing infrared light and it should be understood that the more surface area heated the more air and water molecules will be able to come into contact. First, the right material should be selected, a material that is not only good at



absorbing infrared rays, but is also good at converting those rays into heat. Please reference chart X to view how well various materials absorb infrared light. Heat Storm infrared heaters use a rough galvanized steel as the 2nd exchanger. The second exchanger selected based on the type of infrared rays is positioned near the infrared elements. As air and water molecules pass through the heating chamber they are exposed to not only the heating elements with ceramic ends, but to the 2nd exchanger as well. Depending on the

shape of the heat exchanger greater amounts of air and water molecules come in contact with the surface. So, the airflow moves over the heated element with ceramic ends as well as over the heat exchanger. Furthermore, Heat Storm infrared heaters have a thermostat checking room temperature that shut off the heating elements once the desired room temperature is reached. Yet the air and water molecules continue to be blown over the heat exchanger until the elements and exchanger have cooled. In other words, the heat continues after the electricity is shut off to the heating elements. The result is a comfortable moist heat with the same amount of oxygen exiting the heater that entered. The airflow implies the third critical element of our heaters.

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Because of the intensely heated elements and rough steel exchanger, a greater amount of airflow can pass through and exit much hotter than with traditional space heaters. If the amount of airflow that passes through a Portable Quartz Infrared heater were to pass through a traditional space heater the air would be cool.

Fan & Airflow

Traditional Space Heater Fans – Many traditional space heaters have no fan at all and depend entirely on convection. But, the ones that do have fans almost always have an Axial Fan as seen to the right. These types of fans are generally noisier because the manufacturers cut corners with a low quality friction reduction system. This means the fan will be loud and squeaky sooner.



Infrared Heater Fan – Some of the lower quality infrared heaters have axial fans found in traditional space heaters in order to keep the expense low. In Heat Storm Indoor Infrared heaters, a Crossflow fan is used as is shown in figure to the left. A Crossflow fan has the same design as is used in home central heating systems for a reason, because the Crossflow fan is better at pushing air through ducting. Likewise, our Crossflow fan pushes air through our exchanger path with less electricity. Using an Axial Fan to push air through Heat Storm's heat exchanging system would be less effective. Our Crossflow fan is quieter as well, with a high quality friction reduction design. The result is far more heated air flowing through the room heating a greater space in less time.

Thermostat

Traditional Space Heater – Most traditional space heaters do not have thermostats, if they do generally they are the old fashioned analog thermostats, which are inaccurate at best.

Heat Storm Control Module (Thermostat) – Some infrared heaters do not have thermostats. Other low quality infrared heaters only offer mechanical thermostats for reaching a desired room temperature. Mechanical Thermostats are inaccurate, sometimes up to 5 degrees Fahrenheit. The most efficient Indoor infrared heaters have a digital thermostat accurate to ± 1 degree Fahrenheit such as is found in Heat Storm infrared heaters. This is yet another aspect that allows Infrared heaters to be more efficient than a typical low cost space heater. By turning off once a temperature is reached then back on when the temperature drops, Heat Storm Infrared Heater behave more like a central heating system.



Because the thermostat is such a critical contributor to the efficiency of Infrared Heaters, the Heat Storm infrared heaters include additional unique features. First, the room temperature, not the set temperature is displayed (except when adjusting temperature). Furthermore, Heat Storm infrared heaters automate whether full or half power should be used dynamically based on the ambient temperature. Lastly, Heat Storm infrared heaters can slow the fan up to 8 different speeds to allow for the air to be in the exchanger longer. This allows Heat Storm infrared heaters to raise the temperature in a space from as cold as freezing (32F) up to a desired temperature. So, our control module isn't just a thermostat, it is a lot more.



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Why Heat Storm is more comfortable than other forms of heat?

Understanding why Infrared Heat is so comfortable is more difficult to quantify, as comfort is subject to the human senses. But, millions of consumers who have experienced infrared heat know that they enjoy greater comfort.

In part, the satisfaction with Portable Infrared Heaters for the North American consumer can only be understood when considering what the consumer expects from their heating system. For example, when a central heating system turns on, it will likely blow cold air before warm air begins to enter the room. In some larger homes it can take minutes before warm air is felt. Instead cold air is blown into an already cold space. Likewise, consumers are accustomed to traditional space heaters using 1500 watts raising the electrical bill substantially while heating very little space (usually 50 to 100 square feet). This is what consumers came to expect before infrared heaters began entering the market.

So, when a consumer buys an Infrared Heater, brings it home, plugs it in and immediately experiences a moist even heat filling the room there is an obvious perception of comfort and satisfaction. Then the Infrared Heater automatically turns off once the desired temperature in that zone is reached, naturally the consumer is very satisfied. They realize "this is not a traditional space heater."

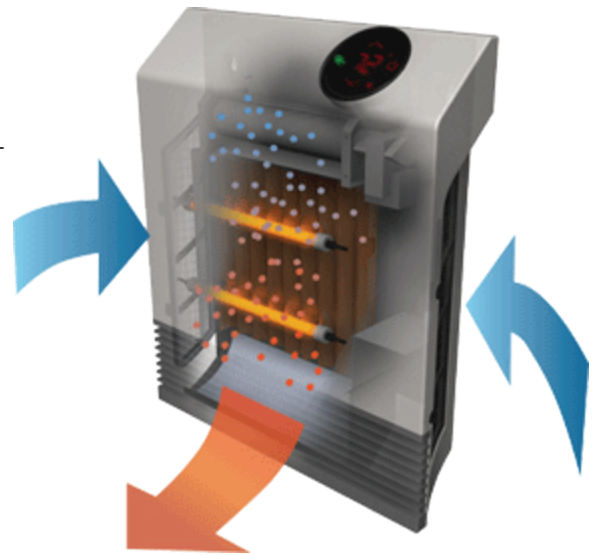
But, in terms of answering why there is an overall satisfaction and feeling of comfort, there are two primary reasons. The thorough warming of air and water molecules results in comfortable even moist heat filling the room from floor to ceiling. Secondly, a quiet yet effective fan moving enough soft heat very quickly into as much as a 1,000 square feet space is a significant performance improvement. Customers report of having warm noses, fingers, and toes because of their infrared heater. Customers report being able to heat the room where they spend the majority of their time to a temperature they simply couldn't afford with the central heating system alone. Customers report not having to deal with dried out nasal passages and dry skin. All of these variables contribute to a sense of increased comfort and satisfaction.

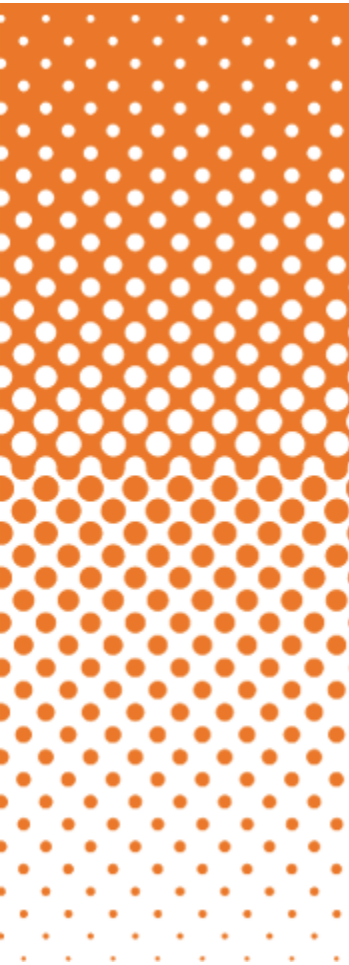
If you really want to know if Infrared Heaters create more comfort, just ask a friend who has one and you'll hear for yourself why they love their heater so much.

Why Heat Storm heaters are so safe?

Unfortunately traditional space heaters don't have a great safety record. The U.S. Consumer Product Safety Commission estimates:

"...more than 25,000 residential fires every year are associated with the use of space heaters, causing more than 300 deaths. An estimated 6,000 persons receive hospital emergency room care for burn injuries associated with contacting hot surfaces of space heaters."





These alarming statistics are true because traditional space heaters have elements heated above flash point exposed in such a way that the build-up of lint and dust can eventually catch fire. Also, since the elements are exposed the element can come into direct contact with curtains, towels, or paper resulting in risk of flashpoint. Since the element is often directly exposed, children and others can be burnt directly by the heater resulting in various kinds of skin burns.

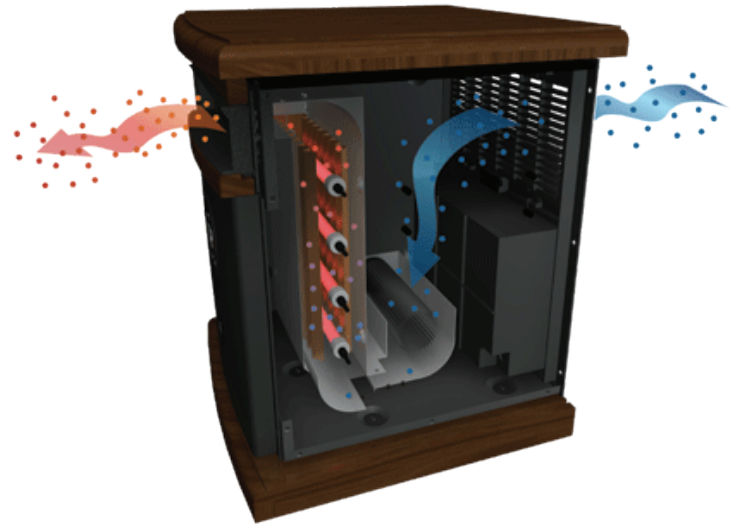
Portable Infrared Heater elements on the other hand are enclosed inside of a steel heating chamber, and then the steel chamber is inside of an outer steel, plastic, or wood cabinet. Furthermore, such as is true with the Heat Storm infrared heaters, the opening where the air exits the infrared heater has a flocked grill virtually eliminating of any risk of skin burns.

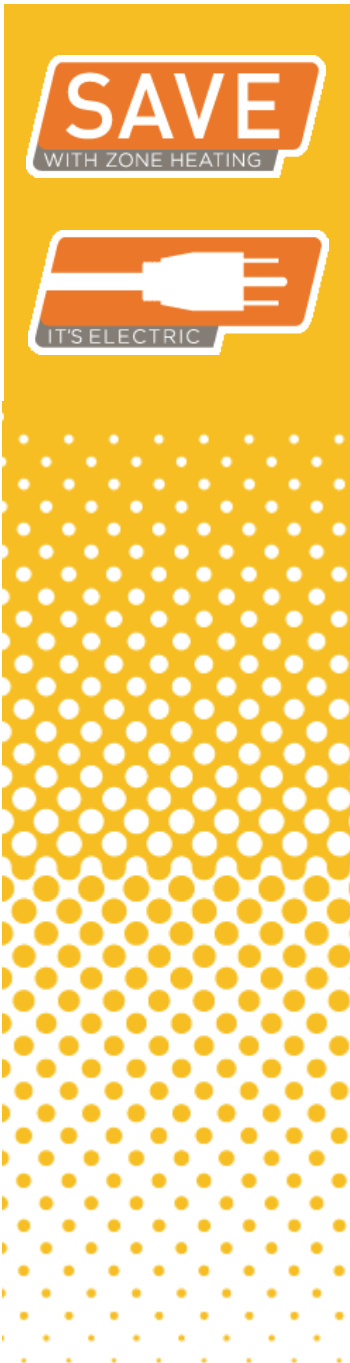
Because infrared heaters do not use fossil fuels such as kerosene or propane, these heaters don't emit pollutants such as carbon monoxide, and will not cause fires and explosions due to a flammable fuel source. Because infrared heating elements are sealed inside of a quartz tube they can even be used by persons dependent on oxygen for medical reasons.

Why Heat Storm heaters are healthy

The greatest health benefit from Portable Infrared Heating is the fact that oxygen and water molecules are not reduced within the home. Many studies have shown that air quality in homes during the winter can be very poor, in no small part because of heating systems. Higher levels of oxygen and clean air are critical, in particular for infants and the elderly. Furthermore, nasal passages and skin no longer dry out in the winters thanks to infrared heaters.

Infrared heaters do not emit harmful gasses as is the case with kerosene, heating oils, and other fossil fuel based heaters. Even professionally plumbed propane and natural gas heating systems can develop slow leaks that emit harmful gases. In addition, the internal temperatures of infrared heaters can destroy air-borne bacteria, viruses, mold, and fungus. Likewise, infrared heat helps dry damp walls and prevents condensation on windows without drying out the air, or causing static electricity.





What is the difference between Heat Storm's indoor and outdoor infrared heaters?

Most outdoor infrared focus their infrared light at a space needing heat. This type of infrared heater is sometimes called "line of sight" heating as it heats objects in the path of the infrared light waves exactly in the same way as the sun. Outdoor Infrared Heaters are not enclosed inside of a steel chamber and do not depend on a heat exchanger or fan. The Outdoor Infrared Heater heats objects instead of the air. These types of Infrared Heaters, known primarily as "outdoor" heaters, are made specifically for the outdoors, drafty spaces, shops, or large warehouses that need targeted spot heating.

With outdoor infrared heaters, consumers no longer find themselves trying to heat an entire warehouse or shop, rather point your Outdoor Infrared Heater directly at a space needing heat, such as a person's work-space. In addition, for those working with cold tools such as wrenches or welders, infrared heaters can be directed toward the tools for a few minutes. Once the tools are warm, workers can step into the warmth provided by outdoor infrared heat and work in comfort.



Outdoor infrared heaters can be attached to a stand, or mounted on a wall, then pointed at chilly workspaces, a hot tub, or patio table to enjoy immediate warmth. Some higher quality outdoor infrared heaters are weatherproof and can withstand all forms of weather such as rain, snow, or even dust storms. Quality outdoor heaters also should be made of durable, weatherproof materials, and should have water tight construction.

One annoying aspect of many of these types of infrared heaters is that they emit red light. Some Heat Storm Outdoor Infrared models provide the same level of heat, but emit 95% less red light. This is critical for applications where the user needs to face the heater, such as on patios or workspaces.

Heat Storm Outdoor Infrared Heaters are weatherproof, made of the best rust proof materials, and we offer models with the low red feature. Outdoor Infrared Heaters provide heating solutions in places previously thought to be impossible to heat.

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Heat Storm's Infrared Mythbusting

Myth: All resistive wire filaments are infrared emitters. **Fact:** Many products claim to emit Infrared because there is a growing awareness and demand among North American consumers for infrared. However, infrared light is emitted in very small negligible amounts unless the element reaches extreme temperatures above 2500 degrees Fahrenheit.

Myth: Some manufacturers claim their copper has been subjected to a special curing process involving high heating, i.e. "cured copper" that somehow gives it "special properties." **Fact:** The reason copper is used as the heat exchanger is because of the well known property of distributing heat evenly (for example, bottoms of cooking pots and pans) thereby providing a consistent surface area temperature to contact air and water molecules. However, due to the small size of exchangers found in infrared heaters copper is not needed to distribute heat. Furthermore, steel absorbs and then emits infrared heat better than does copper.

Myth: Indoor infrared heaters emit infrared rays into the room heating objects instead of the air. **Fact:** Portable Indoor Infrared Heaters that enclose their heating elements inside of a steel chamber for safety prevents the majority of infrared light from exiting the chamber. Outdoor Infrared Heaters, on the other hand do



indeed project infrared light directly onto objects, heating them. This is ideal for outdoor use or for use in drafty areas for heating a specific space. We will discuss Outdoor Infrared Heaters as part of the 5th thing you must know about infrared heat.

Myth: Some manufactures claim their portable Infrared Heaters create or enhance ionization, suggesting health benefits. The claim is that when infrared light is emitted at the right frequency towards the copper exchanger, there is a production of negative ions which aid in the rapid heat transfer of the infrared waves. Some manufacturers furthermore claim that this process aids in the production of ionized water molecules. **Fact:** Ionization is the physical process of converting an atom or molecule into an ion by adding or removing charged particles such as electrons or other ions. Infrared Light waves (at any frequency) simply cannot create enough energy for ionization to occur.