



Warm Waves heat film is a cost effective, high quality heating solution for any structure or situation.

Warm Waves radiant heating system costs 31 - 63% less to operate than traditional heating methods, and is healthier for you and your family.

Easily installed under any type of flooring, Warm Waves is completely ductless, completely zonable and completely maintenance free.

This far-infrared heating technology is highly efficient and effective. It does not waste energy heating the air in a room, but directly heats the objects in the room, including you.

How Warm Waves Works

Warm Waves generates heat through an electric current, creating natural far-infrared heat rays that distribute heat safely and evenly.

Warm Waves provides a healthier breathing atmosphere by not circulating dust or air pollutants. With no moving parts, Warm Waves is a permanent, maintenance-free heating solution.

Installed under flooring and completely concealed, Warm Waves does not waste valuable wall space with unattractive heating equipment or ductwork, and eliminates any exposure to hot or sharp surfaces that can be dangerous or unsightly.

Warm Waves Is Efficient

Warm Waves heats the space the same way the sun heats the Earth – the objects in the room absorb the heat. By not unnecessarily heating the air in the room, Warm Waves dramatically reduces wasted power. It allows for lower thermostat settings than traditional heating methods require while providing the same comfort level. Ceiling height does not affect the heating performance; the living space will be warm and comfortable even in rooms with high or vaulted ceilings.

Create Warm Wave Zones

Warm Waves is controlled with any line-load thermostat, allowing for complete zonability. By installing multiple thermostats for different rooms, or for different areas within the same room, Warm Waves creates heat only where it is needed. During the day, a bedroom could remain at 50° F while a home office is kept at 72° F without

closing vents or readjusting dampers. In an office setting, each cubicle could have its own thermostat, providing the perfect work environment for every individual.

Warm Waves Creates Healthy Environments

Warm Waves is a ductless heating system so it does not circulate dust or air pollutants and is completely silent. The far-infrared rays naturally and safely prevent bacteria growth as well as eliminate mold and odors.

Warm Waves is completely concealed, providing even heat and removing unsafe or unsightly heating elements. Warm Waves uses extremely low electrical amperage and is water resistant, making it the safest electrical heating system on the market.

Warm Waves Is Easy to Install

Installing Warm Waves is easier and less expensive than any other radiant heating system. Measure the room; cut and place the Warm Waves material; connect the electrical wires. Since there are no expensive boilers or ductwork necessary, Warm Waves cuts installation time up to 90% when compared with traditional heating systems.

Warm Waves Is Durable

Warm Waves is extremely thin and durable. Unlike other electric infloor heating products, Warm Waves fibers will not easily break during installation, and are sealed in their own moisture-protected barrier. Warm Waves solid-state technology has no moving parts to wear out – it is completely maintenance free. Manufactured under ISO 9001 Certified processes, Warm Waves ensures consistent quality in every roll.

What type of flooring can be installed over Warm Waves?

Any type of floating floor can be installed over Warm Waves, including engineered hardwood, laminates, vinyl, tile and carpeting. Of the most common flooring types in use today, the only non-suitable type is nail-down hardwood flooring due to the risk of nails penetrating the film's surface. If Sleepers are used that can protect from nail penetration, Warm Waves is the solution.

How does Warm Waves compare to a standard forced-air furnace system?

Standard furnace systems use ductwork and forced air to transmit heat. Warm Waves is a much more efficient system. Since hot air rises, forced air systems need to create a convection current throughout a room in order to move the hot air from where it wants to go (the ceiling) to where you want it to be (heating you). This convection current means that the hot air travels in a circular pattern around the walls, ceilings and floors of an area, which leads to tremendous inefficiencies overall, particularly in rooms or spaces with higher than normal ceilings.

Warm Waves works more efficiently by heating the objects in the room, not the air. By the time the heat reaches the ceiling of your room, you are already done using it.

Additionally, forced air systems' reliance on ductwork creates both energy and health concerns. Conventional heating systems on average lose between 25-40% of their efficiency in the duct work, so even a 94% efficient furnace may be part of an overall system that is only 56-70% efficient. Along with heated air, forced air systems also blow dust, molds, and other allergens lurking inside your ductwork. Warm Waves is the healthier, more energy efficient solution.

How does Warm Waves compare to hydronic (water-based) radiant heating systems?

Warm Waves is much easier to install than hydronic systems, has no moving parts that require maintenance, and doesn't require expensive boiler systems. Warm Waves provides a much more consistent heat, and significantly reduces the number of hot and cold spots in the floor after installation. For whole house installations of Warm Waves and hydronic systems, the yearly operating costs are similar, but the Warm Waves installation does not have any expensive maintenance costs. Warm Waves systems also have a longer expected lifespan than most hydronic systems.

How does Warm Waves compare to wire-based radiant heating systems?

Warm Waves is more durable, easier to install, more powerful, less expensive, and has fewer hot and cold spots than wire-based radiant heating systems. Warm Waves also provides the ability to easily direct the heating rays upward with the use of a radiant heat barrier, which means that you are not paying for heat that you are not using.

How does Warm Waves compare to wire heating systems?

The heating wires used by many under floor heating systems can create many problems. The wires can be nicked or cut during installation and handling. For this reason, many wired systems require you to purchase an "alarm system" to detect cut wires, which adds to the expense to install the system. Also, wired heating systems degrade over time due to their resistance. Wires rely on the conduction of heat through thin set and tile under which they are installed. Many tile types do not conduct heat well and the result is a noticeable variation in temperature on the floor being heated

Warm Waves film will not degrade over time. The design of the film allows for distributed heat across the entire floor surface eliminating hot and cold areas.

How powerful is Warm Waves?

Warm Waves is the most powerful under floor heating system allowed by the National Electric Code at 150 watts per square meter (14 watts per square foot). The more

powerful the heater, the quicker the flooring surface warms and the less time the power needs to be supplied to the film.

Can I use Warm Waves for heating my whole house, or should I just install it in areas that need extra heat?

The simple answer is both. Warm Waves is powerful enough to be used to heat an entire home, and flexible enough to be installed in any area where supplemental heat is desired.

How warm does the floor get when heated with Warm Waves?

When fully powered and allowed to reach its maximum temperature, Warm Waves reaches approximately 104° F. In practice, however, the thermostat attached to the Warm Waves will limit the temperature to your preferred setting and simply cycle the film off and on to maintain your desired temperature. Even though lower maximum heat values lead to a much more energy efficient system, this principle has not been used in conventional heating systems due to the power necessary to start the system.

How fast does Warm Waves heat up?

Warm Waves heat film reaches its maximum temperature within minutes. Because there are no moving parts in the heating system, there is no ramp-up time required. How fast the top of the finished flooring will heat up is a function of the density of the flooring material as well as the properties of the insulating material installed with Warm Waves.

Is Warm Waves zonable?

Warm Waves is the most zonable heating product on the market today. You could separate zones into 1.4 square feet sections if you chose to with no special concerns – the only thing that would be different from a standard installation would be the number of thermostats. Because of this inherent flexibility, Warm Waves allows heating solutions never possible before, such as having each member of your office able to set the desired temperature in his or her office cubicle.

Tell me about the thermostat.

A Warm Waves installation uses a Dual Input Thermostat, which provides control from both a floor sensor and from the ambient air temperature.

- Floor temperature can be limited in this fashion
- Room temperature can be controlled at a comfortable setting
- “A/F Mode” controls the floor and room temperature together.

Will I get hot and cold spots with Warm Waves like I will with other kinds of radiant heat?

Unlike other radiant heating systems, Warm Waves' creates a consistent heating temperature across the surface. The density of the finish flooring will also play a part in the overall surface temperature – the denser the material, the more heat it will absorb and the more even your heating will be.

My HVAC professional told me that I should plan on having about 10 Watts per square foot of heating in my house. Can Warm Waves do this?

Absolutely. The rule of thumb is to multiply the square footage of the area by 0.75. Since Warm Waves provides 14 Watts per square foot where installed, it provides 10.5 Watts per square foot over the entirety of the area ($14.87 * 0.75 = 10.5$).

How does Warm Waves work with non-rigid flooring types (e.g. carpeting, vinyl floors, etc)? Won't it get crushed?

Installation of Warm Waves under non-rigid flooring is as simple as installing a rigid surface between the Warm Waves and the flooring itself in order to spread the weight on the floor evenly. Plywood, high-density fiberboard (Hardboard) or a similar product can be used.

Is there anything special I should think about before installing Warm Waves under carpet?

For carpet installations, you will need a rigid surface between the carpet pad and your Warm Waves (see non-rigid FAQ entry). In addition, the efficiency of your Warm Waves system will be greatly enhanced by selecting carpeting and carpet padding designed for radiant heat systems, since those types of floor coverings are designed to allow heat to pass through them without trapping the heat with the carpet or the pad.

How do I install Warm Waves under ceramic tile?

There are a few different ways to install Warm Waves under standard ceramic tile flooring. You can install the cement board first, then Warm Waves, then proceed with a standard tile installation. Another option is to install the underlayment and Warm Waves, and then cover with a self-leveling masonry product which will provide a solid surface for your tile installation. For specific details review the installation manual.

What is the maximum area that Warm Waves can be installed in?

When properly installed, there is no limit to the area suitable for Warm Waves installation. For large areas, the thermostats' supply power and configuration will be the only limiting factor for the size of the area. For a basic understanding you can install up to 240 sf. on a 220 circuit, and 120 sf. on a 110 circuit. On a single thermostat you can install 2400 sf on 220 circuit based on a modified configuration. For specific details please review the installation manual.

How much Warm Waves will I need?

The amount of Warm Waves you will need to install depends on the goal of the system. When used as a standalone heat source, the rule of thumb is the number of square feet in an area multiplied by 0.75. For example, in a 20 ft x 10 ft family room, you should plan on installing 150 square feet of Warm Waves ($20 \times 10 \times 0.75 = 150$). Warm Waves should not be installed under permanent fixtures, such as cabinets; as such installation could lead to a localized high-temperature area.

Can anyone install the film?

Due to the complexity of the interactions between the necessary components of any heating system, we recommend that a qualified professional perform all Warm Waves installations to ensure that your heating system is properly sized and installed for your environment.

How long does it take to install Warm Waves?

Since every building is different, installation time varies from project to project. However, we have found that on average, an experienced installer can install between 1000 - 1500 square feet easily in one day.

Is it possible to install Warm Waves over existing flooring?

If you treat your old floor the same way you would treat a standard subfloor material, you can install Warm Waves over existing flooring. Install the underlayment over the top of the old floor and then continuing installation as normal, finishing the installation with your new flooring material.

Is it possible to install Warm Waves anywhere other than the floor?

In addition to standard under-floor installations, Warm Waves can be installed under walls, above ceilings, and even inside poured concrete.

What if I find a new place or method for installing Warm Waves that is not included in the installation instructions?

Please tell us about it. We will perform extensive testing of your method or place to ensure that it meets our strict quality standards, and if possible, add it to the installation instructions to inform other customers. In order to maintain the quality reputation of Warm Waves, we do need to conduct the testing prior to qualifying the installation for the warranty. Warm Waves is flexible enough to meet all kinds of heating needs, and we believe in your creativity.

How does Warm Waves work?

Electrical current is passed from your main electrical box into a thermostat controller unit that monitors either ambient or floor (or both) temperature. If the temperature is less than the temperature setting on the thermostat, power is supplied to the Warm Waves installation, where the electricity is passed into the copper bus bars on the

sides of the film. From the bus bars, the electricity passes over the heating element, generating far infrared rays, which we feel as heat.

Is Warm Waves safe?

Warm Waves is one of the safest overall heating systems on the market. Due to its low maximum temperature output, there is no danger of burning yourself on any part of the system. Its design and installation method, emphasis on maintaining steady heat with low amperage, and its inherent moisture resistance prevent most common electrical concerns. Manufactured under strict ISO 9001 quality controls and inspected quarterly by third parties, all Warm Waves products have human safety and comfort as their number one priority.

What if Warm Waves is exposed to water? Will it still work?

Unlike some other electrical heating products, water does not affect Warm Waves. The heating elements in Warm Waves are all sealed inside a polyethylene film, which is impervious to water penetration. When installed properly, both ends of the copper bus bars are also sealed to make them waterproof, resulting in a completely water-resistant system.

Can Warm Waves be powered by solar panels?

Warm Waves can be powered by solar panels as easily as the rest of the electrical equipment in your home. Simply attach the Warm Waves system leads to a circuit powered by your solar panels and enjoy warmth with no costs and no fossil fuels. As always, please consult a qualified electrician for details.

Do I have the right kind of electrical system for Warm Waves?

Warm Waves is available for both 120V and 240V electrical systems, and the number of circuit breakers needed will be determined by the total installed area of Warm Waves. As with any electrical system, please consult a qualified electrician for advice on your specific situation.

How thin is Warm Waves?

Warm Waves is paper thin at 0.3 mm, eliminating any issues that may arise from raised flooring.

What are Far Infrared Rays?

Infrared light is part of the Sun's invisible spectrum and since it can't be seen, it is experienced as heat. One of Far Infrared light's characteristics is the ability to easily penetrate your skin, giving you that wonderful natural warmth. When this happens, it creates a natural resonance, which has many beneficial properties including muscle relaxation and increased circulation. Far Infrared heat is completely healthy and safe for all living things.

What should I do if I damage the film?

If you damage a part of the film, for example by nailing through it, you should immediately inspect the damaged portion. If your installation can still function properly by removing just the damaged section and electrically connecting the two undamaged sides, you simply need to remove the damaged portion by cutting it on both sides along the cut lines. If the removal of the offending section would cause improper functioning, the entire panel set of Warm Waves will need to be replaced. **Under no circumstances should you try to patch a section of Warm Waves.**

What if my cable installer drills through my Warm Waves installation when running cables through the floor?

Warm Waves is installed at least 6 inches away from any wall, leaving plenty of area available for future remodeling projects.

How will I cool my house without ductwork? Won't I have to install ducts anyway?

We recommend pairing Warm Waves with a ductless air conditioning system, which have greatly matured in the past few years. Due to their high efficiency ratings and ductless technology leading to a healthier lifestyle, they are an excellent complement to a Warm Waves heating system.

Does Warm Waves offer a warranty?

Warm Waves offers a 10-year limited warranty for installations performed in accordance with the installation instructions. For all intents and purposes, however, once Warm Waves is working in your home, you shouldn't need to worry about any maintenance or replacement costs for many, many years.

What is the structure of Warm Waves?

Far infrared heat is generated from fiber mats that are attached to contact bus bars connected to copper electrical strips. The copper provides superior electrical current transmission while preventing arcing at contact points.

The components are then completely sealed between two plastic sheets of PET film. Similar to soda bottle material, the film is thin, transparent and very durable.

Part	Function	Material	Production Standard
Insulating	Base Film	PET	Insulation and Moisture Barrier
	Laminating Film		
Heating	Conduction	Proprietary	Maintaining resistance, even print surface
Conductive	Bus Bar	Copper	Maintaining conductivity and adhesion
	connecting	copper	

Electrical Specifications of Warm Waves

240 volt, 14 watt: Draws less than .061 amps per square foot and delivers 14 watts of heat per square foot

120 volt, 14 watt: Draws less than .125 amps per square foot and delivers 14 watts of heat per square foot

Dimensions of Warm Waves

1025 square feet per roll

W: 100 cm (40 in)

L: 100 m (328 ft)

0.3 mm Thick

Applications for Warm Waves

Warm Waves is very versatile and has been used in multiple applications in homes, commercial buildings, vacation homes / cabins, trailers, and outbuildings.

Under Flooring: Warm Waves installed under floating floors provides even, silent and efficient heat throughout the room.

Furniture: Warm Waves has been used in all types of furniture, from therapeutic massage tables to outdoor benches and even in beds.

Greenhouses: Warm Waves provides the perfect warm climate for your plants while promoting plant growth with Biogenetic rays.

Pet Beds: Warming a pet's bed or habitat with Warm Waves will keep pets happy and comfortable.

Countertops: Countertops become warming plates when Warm Waves is installed underneath.

Concrete: Garages and warehouses can be cozy and comfortable when Warm Waves is installed directly in the concrete for almost any concrete application.

Recreational Vehicles/ Trailers: Warm Waves is the only real solution for heating an RV or trailer. Nothing can compare to its efficiency and comfort.

How does Warm Waves compare to other heating methods?

The charts below compare Warm Waves electric radiant heating system to other heating methods for a 2000 square foot residential home. All calculations are based on average heating season temperatures, for Chicago Ill.

Performance of Warm Waves Far-infrared Heating vs. Other Systems

Every object emits Infrared energy; when an object has a higher temperature than its surroundings, the infrared light it emits will warm nearby objects. This is also called "indirect" heating.

Far-infrared is the most efficient and healthy way to heat people and objects. As with the sun, Warm Waves film heats surfaces, which in turn heat floors, walls and the objects contained within a space. It uses only safe and known healthy "invisible light" at wavelengths in the 7,500 to 10,000 nm (7.5 to 10 micrometer) region; this region in the spectrum is also called "Far- or Therapeutic infrared."

Besides the immediate effect of warming the people in the space, Warm Waves far-infrared operates at a part of the spectrum that allows it to travel through the floor and heat other surfaces. So when doors or windows are open, the warmth does not escape, but stays in the floor and objects. Within seconds or minutes of closing the

door or window, the space becomes warm again. Unlike with traditional heating, there are no transportation or “duct losses”; no conversion losses or air-flow losses. All stored energy can be used.

Since Warm Waves is able to store heat energy at night (and other times when the rates are lower) and release this energy during the day, it’s a very energy efficient and cost-effective solution.

BTU to KW

1 KW of electrical energy produces 3412 BTUs. Warm Waves, like any electric heater, converts 100% of the energy into heat, but with less heat loss.

A baseboard heater, for instance, converts a 100% of the energy into heat, but is only 30-40% efficient (60-70% convection losses), and the coils or elements burn out every 3-5 years from heavy use.

A forced air system has a starting efficiency of approximately 60-95% depending on the type of heater (straight transfer of hot gasses or secondary heat exchanger). Even a 95% efficient heater suffers from duct loss and ventilation requirements, and results in typically 35% efficiency because it only heats the air and not the objects or people in the space. In addition, unless the floor is warm, people are still cold when the room is 75 or 80 degrees.

A good “hydronic” (in-floor) system can approach the efficiency of Warm Waves if it is geothermal, but geothermal is very expensive and won’t work at all temperatures. A fuel based hydronic system will not compete in efficiency; in many cases it needs our panels as a supplement.

Warm Waves has an efficiency of approximately 70%, meaning that 70% of the energy supplied is converted into usable heat. As with all other types of heating or heating products, energy may still be lost as a result of heat loss through doors, poor windows, or connecting slabs, etc.

Forced Air	Loss	Efficiency	Net Total
Best Furnace		97%	0.97
Best blower		93%	0.90
Duct losses at best	18%	82%	0.74
Air rising to the ceiling and escaping through doors when opened	35%	65%	0.48
System efficiency at identical building heat losses			48.08%
Infloor Warm Waves heat		70.00%	0.70
Savings Warm Waves floor		Advantage	31.31

Forced Air	Loss	Efficiency	Net Total
Standard Furnace		78%	0.78
Modern blower		90%	0.70
Duct losses modern ducting	22%	78%	0.55
Air rising to the ceiling and escaping through doors when opened	35%	65%	0.36
System efficiency at identical building heat losses			35.59%
Infloor Warm Waves Heat		70.00%	0.70
Savings Warm Waves floor		Advantage	49.16

Forced Air	Loss	Efficiency	Net Total
Older Furnace		58%	0.58
Average blower		88%	0.51
Duct losses average	50%	50%	0.26
Air rising to the ceiling and escaping through doors when opened	35%	65%	0.17
System efficiency at identical building heat losses			16.59%
Infloor Warm Waves Heat		70.00%	0.70
Savings Warm Waves floor		Advantage	76.30

Hydronic Base	Loss	Efficiency	Net Total
Fuel Boiler		90%	0.90
Pumps		90%	0.81
Hose run loss	15%	85%	0.69
Air rising to the ceiling and escaping through doors when opened	25%	75%	0.52
System efficiency at identical building heat losses			51.64%
Infloor Warm Waves Heat		70.00%	0.70
Savings Warm Waves floor		Advantage	26.23

Electric	Loss	Efficiency	Net Total
Baseboard		100%	1.00
Surround		99%	0.99
Convection Losses	60%	40%	0.40
Air rising to the ceiling and escaping through doors when opened	35%	65%	0.26
System efficiency at identical building heat losses			25.74%
Infloor Warm Waves Heat		70.00%	0.70
Savings Warm Waves floor		Advantage	63.23