

Heating with Nanotechnology

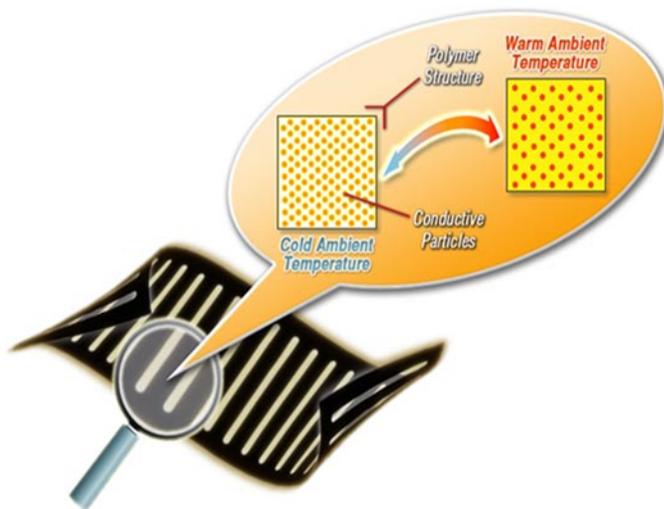
Low Voltage AC/DC

STEP® - Self-regulating Technology of Electro Plastics is a radiant heating system that was developed for well-being, safety and energy efficiency. The heating elements are capable of receiving a wide range of power quality/characteristics, including low voltages, AC or DC. Normally connected to a transformer, the system can also run on alternative energy without the use of an inverter.

STEP® is suitable for a variety of interior and exterior applications, including primary or complimentary heat, floor warming, snowmelt, de-icing and anti-icing. The systems can be used for new construction and remodeling in residential, commercial, industrial and marine applications.

Emerging Technology

The heating elements are made of thin, flexible and durable PTC (positive temperature coefficient) self-regulating Nano carbon polymers. The Nanomaterial modifies its behavior of conduction when electrically charged.



Nanoparticles heat up as isolated cells when electrically charged. These Nanoparticles are evenly embedded in a unique light conductive polymer blend. When the Nanoparticles heat up the plastic expands and reduces the conductive pathways between the isolated cells. This function restricts the flow of current feeding the cells and less current produce less heat.

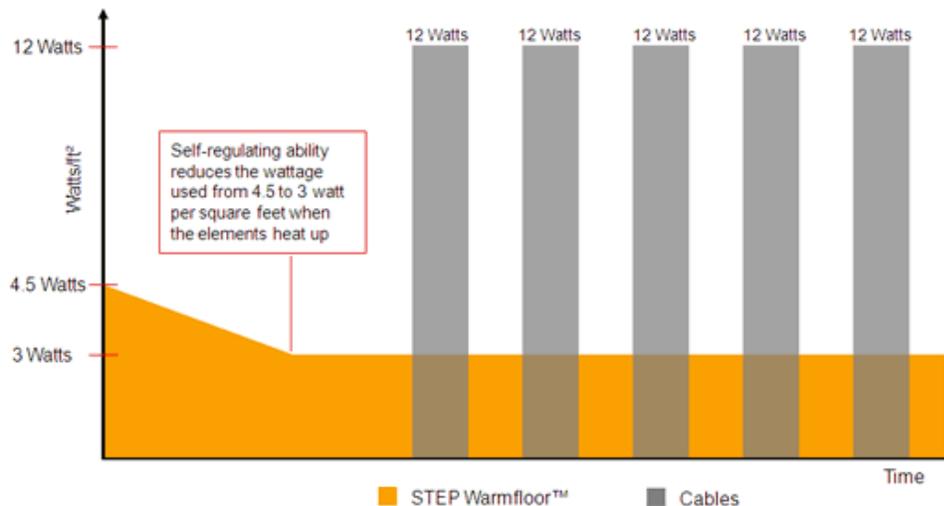
STEP® self-regulating heating elements act as a sensor, supplying more wattage when cold and less wattage as they warm up. The radiant heating elements are flat and cover a large surface, and because the material acts as a sensor it pulls less energy as it gets warm. The unique self-regulating technology allows the heating element to maintain an even temperature over the whole surface and cannot overheat.

For this reason, STEP® can be used under or over most materials, including, wood, laminate, carpet, stone and any non-conductive product. The heating elements come in a roll, in different widths and can be cut to the desired length and field-wired on site. Also due to the thinness (1,2mm) of the material, architects and designers can easily specify STEP® system in most of their projects.

Energy Efficiency

The rate of heat transfer to the surrounding air is proportional to the exposed area and to the difference between the surface temperature and the air temperature. The importance of using self-regulating heating elements can best be explained by the fact that a modulating element stays on and maintains the set temperature by just filling in the heat leakage from the structure. The thermostat is there to tune down the heating if the sun or other external sources heat up the air too fast.

Electric resistance heating cables versus STEP® self-regulating heating elements.



As shown on the above illustration, STEP® is installed with 4.5 watts per square foot, but as the element heats up the self-regulating ability reduces the wattage used to approximately 3 watts per square foot and in some instances where the structure is extremely well insulated, we have documented case studies where consumption is less than 1 watt per square foot. Cable systems rely on the on/off functionality of the thermostat to reduce the temperature. It has been proven that the constant cycling on-off-on of traditional heating systems consumes more energy than self-regulating systems, making traditional heating systems less efficient. STEP® provides an even and energy efficient heating experience.

There is no discussion that an equal amount of wattage will generate the same energy output. It is all about distribution and transmission of heat. Cables and tubing only cover a fraction of the surface, usually 2-5%; while an installation with STEP® flat heating elements will cover more than 60% of the surface.

The challenge lies in changing the thought process from an efficient heating “**component**” to an efficient heating “**system**”. Efficiency is achieved by the technology of the heating product used and a properly designed heat distribution. For efficiency, it will also be necessary to take into consideration the location and type of construction, including thermal insulation and covering materials used.

STEP® heating systems are manufactured by Electro Plastics, Inc. in Saint Louis, Missouri, with environmentally friendly and recycled materials. Their International headquarters and manufacturing facilities are LEED registered and a living laboratory proving the energy efficiency, health and comfort qualities of the heating system. If it needs heating STEP® has the solution.

