Technical Letters

Frequently Asked Ceramic Infrared Heater Questions

General Ceramic Infrared Heater Questions:

What is the optimum distance from the ceramic infrared heater source to the load?

Answer: The source should be as close as practically possible to the load. However, the source should be far enough away from the load so that the infrared radiation pattern from each emitter (in a panel) will overlap each other. Some materials are very heat sensitive and if the radiant patterns of the heat source do not overlap at the load, "striping" can occur. The distance from the source to the load is dependent on the spacing between emitters. FTE emitters that are spaced 1" apart would require a distance to the load of 8" to achieve even heating of the load.

What are the radiant emission patterns of ceramic emitters?

Answer: The question often arises about the different shapes of ceramic heaters. Salamander ceramic heaters are manufactured with three basic emitter faces: convex as in the ESE, concave as in the FTE, HTE, and LTE, and flat as in the FFE, HFE and HSE. These different shapes create three different emission patterns. Radiant energy is emitted from all objects at different levels of intensity. This energy comes off all surfaces at true right angles. The convex shape gives off a "wide area" pattern which is desired in comfort heating or other applications that require dispersed heating. A concave surface will emit a "concentrated" pattern which is highly effective when zone heating is desired as well as radiant heating in general. The flat surface will produce a "uniform" pattern for even heating at a close proximity between the emitter and the material to be heated. Examples of this are sheets of plastic or curing of surfaces. When dealing with new applications the emission pattern needed is usually easily determined, but in retrofit applications elements should not simply be replace without questioning whether there has been a change in application. See page 4 of our Technical Manual for more information.

Can ceramic infrared heaters be used to heat metals?

Answer: If you apply infrared radiation to a polished metal surface, almost all of the incident infrared radiation will be reflected from the metal surface. In this condition the metal will never come up to the temperature required. The only way to effectively heat metals using infrared radiation is to increase the emissivity of the metal surface. Painting the surface of the metal will increase its surface emissivity value to 90%. Now the paint will absorb 90% of the incident infrared radiation and will transfer this heat to the metal via conduction.

How can you tell if a Salamander ceramic infrared emitter is working?

Answer: On the front of all Salamander emitters there is a "Red Dragon" heat transfer. This heat transfer will turn black when the emitter is "on". When the emitter is "off" this heat transfer will return to its original red color.

What type of controls are required to control the temperature of the Salamander ceramic emitters?

Answer: Since the ceramic emitters are relatively slow responding (8 minute warm-up time required to achieve operating temperature) closed loop control with an inexpensive proportional control and contactor will control the heaters typically between +/-2°F. Percentage timers and SCR power controls can also be used very effectively.

What is the life expectancy of the Salamander ceramic emitter?

Answer: The Salamander ceramic emitter is guaranteed for 1 year against burnout!! Typical life expectancy is in excess of 10,000 hours.

What wavelength does the Salamander ceramic emitter emit?

Answer: Like all infrared sources the Salamander emitter does not emit one single wavelength but a range of wavelengths. The peak wavelength emitted is dictated by the surface temperature of the emitter which can easily be controlled using closed loop or open loop control. In reference to Planck's Law, a heater will emit a range of wavelengths which is only dependent on the surface temperature of the emitter.

What precautions / warnings are there with ceramic heaters?

Answer: As with any electrical heaters there are important warnings to consider:

Hazard of fire: Do not mount emitters/projectors near combustible materials or within a hazardous area.
Hazard of electrical shock: Disconnect power before servicing emitters or projectors. All electrical wiring must be done in accordance with local electrical codes by a qualified service technician.
Hazard of severe burns: Emitters and projectors operate at high temperatures.
Do not operate emitters at voltages in excess of rated voltage or at a surface temperature greater than 1292 °F (700 °C).
Do not operate SWB projectors in ambient conditions exceeding 100 °F (38 °C).

Ceramic Infrared Emitter Oven Questions

Can I use ceramic infrared heat for preheating or as a booster?

Answer: Definitely. Due to the nature of infrared heat it's very easy to have various zones within an oven. A forced air convection oven is almost impossible to zone within the same heating chamber.

How flexible are infrared ovens?

Answer: Ovens constructed with the new CRP panels allow for continuous reformation. The 12 inch by 12 inch building blocks can be rearranged, added to or deleted from to change sizes, zoned together or separately, and always on hand to meet any rising job shop need.

How much maintenance is required for a ceramic infrared oven?

Answer: A well built oven is virtually maintenance free. Due to the heat sensitive Salamander logo, elements can be visually checked to see if all are working. The corrosion resistant elements can be wiped free of any dust or impurities.

What is normal delivery for a ceramic infrared oven?

Answer: Due to the price savings and convenience of the CRP panel, custom built panels are no longer the norm. Typical delivery times for complete CRP panels is 3 weeks. Small orders may be available for immediate shipment.

General Infrared Questions

Does infrared radiation heat the air?

Answer: Water vapor and carbon dioxide particles in the air will absorb infrared radiation. Typically, however, the amount of infrared energy absorbed by the carbon dioxide and water vapor and negligible.

Does short-wavelength infrared penetrate more than medium and long-wavelength?

Answer: This can be true in some cases but not universally. It is important to know the absorption characteristics of the material being heated over the entire Infrared spectrum when selecting the most appropriate type of emitter.

Are IR ovens effective in heating only flat surfaces?

Answer: Flat surfaces are ideally suited to heating by IR radiation. They can be heated rapidly and effectively in an IR oven. However more complex, three dimensional shapes can also be heated in IR ovens. Three-dimensional parts can be rotated so that all sides are evenly exposed to radiation as they pass through the oven. The heating rate can also be varied from zone to allow sufficient soak time to heat internal regions of a part.

Is an electric infrared oven more expensive to operate than a gas fired infrared oven?

Answer: In comparing basic utility costs, an electric infrared oven will be more expensive than gas in most areas. However, the overall efficiency of an IR oven should be measured in terms of production capacity and quality. An electric infrared oven has the capability of producing 37.5 w/in² (CRP panel). A gas fired catalytic system can produce only 11.8 w/in². Therefore, an electric infrared oven can produce up to three times the amount of product than a gas fired catalytic system. Also, the flexibility and ease of controlling an electric infrared oven with unlimited zoning capabilities creates an environment continuously and consistently producing quality parts.

What are some of the criteria for evaluating infrared heaters?

Answer: The selection of heaters should be based on a variety of criteria as shown in the chart below:

	Ceramic Emitters	Metal Tubulars	Quartz Tubes
Response Time	Slow	Slow	Fast
Longevity	Excellent	Excellent	Good
Durability	Good	Excellent	Poor
Infrared Efficiency	96%	56%	61%
Controllability with Integral Thermocouple?	Yes	No	No
Maximum Operating Temperature	1292 °F (700 °C)	1400 °F (760 °C)	1600 °F (871 °C)

National Plastic Heater, Sensor and Control Inc.

sales@nphheaters.com
www.nph-processheaters.com

Toll Free: 1-877-674-9744

Tel: 905-859-8225 Fax: 905-859-4691

Terms and conditions posted below apply:

www.nph-processheaters.com