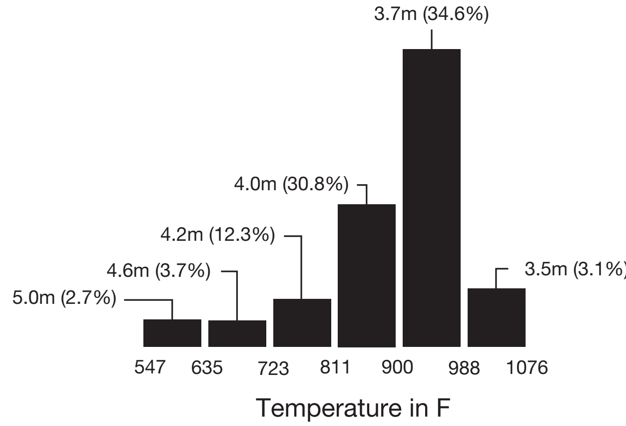
Ceramic Infrared E-Mitter Technical Data

An Example of Emissive Power

All E-Mitter ceramic infrared heaters emit infrared energy in various wavelengths depending on their surface temperature. The CRE00002 E-Mitter (bulb style, 250W, 120V, white) was tested as an example with the results shown on the right. The values associated with temperature, emitted wavelength distribution and percentages were obtained when the heater reached steady state conditions in room ambient. The value of the peak wavelength λ_{max} (3.7 microns) was calculated using Wien's displacement law for a blackbody from the peak temperature obtained in the tests. This calculation is valid since the spectral emissive power of our ceramic E-Mitter closely approximates the theoretical values in the Planck's formulation for infrared wavelength distribution.



An Example of Emissive Power

Wien's Law is expressed by the following formula:

$\lambda_{max} = 5215.6\mu m/°F \div (T + 460)$

T = Temperature °F

λ_{max} = Peak Wavelength

Example:

What is the optimum peak E-Mitter surface temperature for heating a target material that has its best absorption in the infrared wavelength range of 4.0 to 3.4 microns (μm)?

Average peak wavelength = $(4.0 + 3.4) \div 2 = 3.7\mu m$

Using Wien's law, we have:

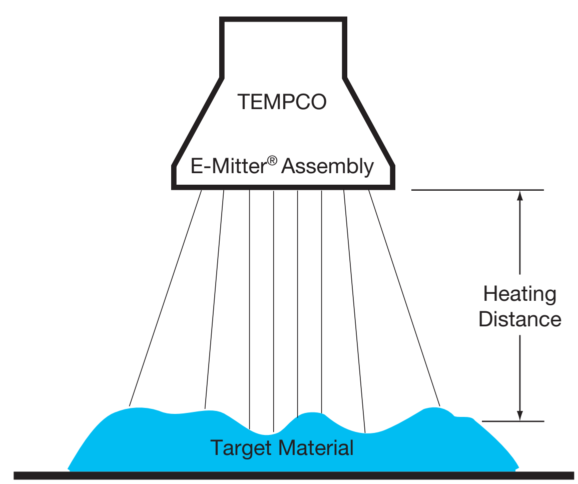
$$3.7\mu m = 5215.6 \div (°F + 460) \text{ or } °F = (5215.6 \div 3.7) - 460 = 949.6°F$$

This temperature is only a starting point and should be confirmed by testing and simulation of the exact conditions of the application. As you can see from the bar graph, this 950°F point coincides with the highest % of the radiated energy from the CRE E-Mitter that was tested. Once the heater temperature has been established, the charts included in the various individual heater sections can be used to select the proper heater wattage starting point.

Conveyor Systems

Moving heating systems generally achieve higher output per hour than is possible with static systems. The radiant heater's setpoint temperature is set higher in conveyor systems than static systems due to the limited time the product is under the heaters. Tests should be carried out to determine the optimum conveyor speed, heating distance, and E-Mitter operating temperature.

CAUTION In applications such as drying pulp paper, the higher power level required can potentially create a fire hazard if there are not safety mechanisms built into the system. If a malfunction of the conveyor system slows down or stops the conveyor completely, safety mechanisms should be triggered that would shut down power to the heaters to avoid burning the material being cured or dried.



Maximum Operating Temperature

Every heater has its maximum operating temperature printed on it. This temperature was measured with a thermocouple and with the heater facing down on a highly reflective material.

In many practical situations, however, this maximum temperature is rarely reached because most of the industrial materials absorb and transmit the heat while reflecting only a fraction of the infrared energy.