ELECTRICAL INFRARED HEATING SYSTEM

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(AN ISO 9001: 2008 CERTIFIED COMPANY)
BASICS OF INFRARED

1. IR is a part of Electromagnetic Spectrum
2. Some wavelengths are Invisible
3. Travels at the speed of light
4. Can be directed
5. Can travels in Vacuum
6. No medium like Air is required to heat a substance
7. Industrial heating: wavelength begins at 0.7µ up to 10µ
# Spectral Distribution of Energy for Various of IR Sources

<table>
<thead>
<tr>
<th>Infrared Wave Types</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Wave (SW)</td>
<td>1800 – 2200 °C</td>
</tr>
<tr>
<td>Fast Medium Wave (FMW)</td>
<td>1200 – 1800 °C</td>
</tr>
<tr>
<td>Medium Wave (MW)</td>
<td>750 – 1200 °C</td>
</tr>
<tr>
<td>Long Wave (LW)</td>
<td>up to 650 °C</td>
</tr>
</tbody>
</table>

![Graph showing spectral distribution of energy for various IR sources](image_url)
BASIC LAWS OF RADIATION

WIEN'S LAW

The peak wavelength of Emission of an Infrared Heater can be calculated by Wien's Law.

\[ \lambda = \frac{C}{T} \]

Where,

\[ \lambda = \text{Wavelength in Microns} \]
\[ C = \text{Constant 2898} \]
\[ T = \text{Source Temperature} \]
STEFAN BOLTZMAN LAW

\[ W = kT^4 \]

Where,
\[ W = \text{Emitted Power} \]
\[ k = \text{Constant} \]
\[ T = \text{Source Temperature (°K)} \]
PLANK`S LAW

Blackbody Radiation By Micron Band Widths

Percent of total energy that is in 0.5 micron wide bands
For selected blackbody source temperatures

°F Temperature

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SPECTRAL CHARACTERISTICS OF INFRARED

A = Absorbed by the Object (A)
R = Reflected by the Object (R)
T = Transmission through the Object (T)
A + R + T = 100% Efficiency received.

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ABSORPTION CURVES FOR DIFFERENT PRODUCTS

- Water film thickness at 10 μm
- PVC sheet thickness at 1 mm
1. Short Wavelength Quartz Tube Emitter (T-3)

2. Medium Wavelength Quartz Emitters
TYPES OF HEATERS

3. Medium Wavelength
   Stamped Foil Type Heaters

4. Long Wavelength
   Infrared Heaters
5. Gas Infrared Heaters
APPLICATIONS

1. Infrared Pre-dryer

2. Infra-red Air and Hot Air Dryer on a Coating line
WATER OR SOLVENT BASED WET COATINGS APPLIED ON WEB ARE GENERALLY DRIED USING THREE TECHNOLOGIES

1. Conventional such as hot Air impingement or Floatation Dryer
WATER OR SOLVENT BASED WET COATINGS APPLIED ON WEB ARE GENERALLY DRIED USING THREE TECHNOLOGIES

2. Conduction- Oil or Seam Heated Drum
WATER OR SOLVENT BASED WET COATINGS APPLIED ON WEB ARE GENERALLY DRIED USING THREE TECHNOLOGIES

3. Infrared or Radiant heating
APPLICATIONS

There are numerous applications where Infrared and Infrared Air Dryers have been successfully used to enhance drying and curing capabilities of coating lines. Listed below are some of the more common and more successful applications:

1. Dry and Pre-dry Water and Solvent based pressure sensitive Adhesives.
2. Laminate form to Fabric using web Adhesives for Automotive and Furniture Industries.
5. Pre-heat films for Laminating and Embossing.
6. Dry flexo and gravure printed links.
7. Dry Silicone coatings on Fiberglass Fabrics.
8. Cure Silicone coatings on various substrates.
9. Cure PVC coatings on scrim, nonwovens and woven fabrics.
10. Dry and Cure solvent base resin coatings on Fiberglass for Printed Circuit Boards.
11. Pre-dry, Dry and cure coatings on industrial Fabrics.
12. Dry food Nutraceutical and Pharmaceutical coatings on film.
ADVANTAGES OF INFRARED DRYERS

1. High efficiency conversion of Electrical Energy into heat for Electrical Infrared.
3. Floor space savings due to smaller size.
4. Heats only the object without heating the surroundings.
5. Easy to zone for uniform heating of the product.
6. Faster response to changing process conditions.
7. Quick start-up and shut-down.
8. Easy to have cutoff zones for narrow widths.
9. Ease of Control.
10. Lower capital and installation cost.
11. Can be easily added to existing conventional Dryers to increase line speed.
12. Infrared Air Dryers suitable for Solvent based coatings.

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LIMITATIONS OF INFRARED DRYERS

1. Some coatings may not be able to take advantage of higher rate transfer and may skin and blister.
2. Difficult to work with temperature sensitive substrates.
3. Scaling up of the heaters is not always straightforward.
4. Since Infrared is basically a surface phenomenon, harder to Dry heavier coatings.
5. Almost essential to run trials in lab or on the Pilot line to confirm design.
How we can help you?

If you plan to set-up any Infrared System and are confused about its feasibly, we can help you....

Just mail us your requirements at kerone2007@yahoo.co.in or at vhpl@bom5.vsnl.net.in

we will reply with our complete techno-commercial quote within 7 to 8 working days

In case you have any query please feel free to contact us:

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THANK YOU