The *Salamander* News

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The Answer- in **bold** type

A customer has requested ceramic infrared panels to dry both sides of a glass fiber material being coated with a resin material.

The facts:
Glass fiber and resin film
His speed is 308 ft. per hour= **5.12ft./min.**
The film width is 33.46 inches **Area of film per hour= (308ft)(2.8ft)**
= 862.4ft^2

The weight per square foot is: glass fiber- .0583 lbs/sq.ft.**= .000405 lbs/in^2**
resin- .088 lbs./sq.ft. **= .0006 lbs/in^2**
acid water- .0163 lbs./sq.ft= **.000114lbs/in^2**

$$\mathbf{Qglass=\frac{(.000405)(.2)(392-60)}{3.412}=.000788\ \frac{w.hr}{in.^2}}$$

$$\mathbf{Qresin=\frac{(.0006)(.46)(392-60)}{3.412}=.02686\ \frac{w.hr}{in.^2}}$$

$$\mathbf{QH_2O=\frac{(.000114)(1.0)(212-60)}{3.412}=.0111\ \frac{w.hr}{in.^2}}$$

$$\mathbf{Heat\ of\ vaporization=(965\ \frac{Btu}{lb.})(.000114\ lbs/in^2)(\frac{1}{3.412})=.0322\ \frac{w.hr}{in.^2}}$$

Total power required= .07804 $\frac{w.hr}{in.^2}$ (minimum)

Panel emmissivity=.70 (typical for custom panels, 10w for CRP panels)
Assume the emissivity of resin is .90.

Average emissivity between two parallel surfaces:

$$\mathbf{e=\frac{1}{\frac{1}{.70}+1-\frac{1}{.9}}=.65}$$

Contact either of our sales locations:

www.InfraredHeaters.com

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The final temperature is 392°F.
Ambient temperature is 65°F.
The voltage is 380V, 3 phase, 50 Hz
Exterior panel dimensions: 36” x 48”

Time in oven= $\frac{4\text{ft.}}{5.12\text{ft/min}}$ **= .7813min.**
= 46.9 seconds (use 45 seconds)

Warm up time= $\frac{.07804\ \frac{\text{w.hr}}{\text{in.}^2}}{\text{X w/in}^2}$ **X** $\frac{60\text{min}}{1\text{ hr}}$ **X** $\frac{60\text{sec}}{1\text{ hr}}$ **= 45 sec.**

$$\text{X w/in}^2 = \frac{(.07804)(60\text{min})(60\text{sec})}{45\text{sec}} = 6.24\ \text{w/in}^2$$

Need at least $\frac{6.24}{2}$**=3.12 w/in^2 absorbed from both sides of the film**

R=e αT^4= 3.12 w/in^2

3.12=(.65)(36.58072x10^{-12})(Tsource^4-381K^4)

T avg load = 226°F ⇒381K

3.12 = (2.378x10^{-11})(Tsource^4 -(381K)^4)

$$\text{Tsource} = \sqrt[4]{\frac{3.12}{2.378\times10^{-11}} + (381\text{K})^4} = 625\text{K}$$

= 665°F

Add 20% to 3.12 = 3.75 w/in^2 ⇒ 710°F emitter temperature

***Recommendation:**
24 CRP 12X12 panels 380v 3p 3.6kw per panel, with 3 LTE-1200 emitters per panel

We were disappointed in the lack of response we received for our infrared engineering **Challenge** in last month’s newsletter. We are wondering what the reasons are for this.

- ☐ Too busy?
- ☐ Not in your job description?
- ☐ My way is easier and faster.
- ☐ Too difficult?
- ☐ I would like training made available.

If many of you check the last box, we would like to put together an on site, or at your site depending on the numbers, hands-on, training seminar. Please fax this section to 616-784-7775

Name_____ Number of interested people at your location:
Company_____ _____
Contact phone # _____-_____-_____