Team Blowtherm®

single skin vs. insulated

true? or false

This booth will lose heat and cost me more to operate because it's not insulated!

ENERGY CONSERVATION PERFORMANCE

Team Blowtherm
Concept II Cure

Single Skin Booth Heat Loss Test

To better understand the true difference between single skin and insulated skin heat retention capabilities, we performed a test which included creating a means of collecting the heat generated from the skin of an insulated and a non-insulated booth and measuring it.

Test Tools

- Special test box created from Plexiglas to capture the heat radiating from the metal surface
- Metal surface temperature gauge
- Digital dual probe thermometer

Test Conditions

- Building room size — 18' x 30' x 45'
- Test booth size — 24' x 14' x 11'
- Plexiglas test box size — 8½" x 11" x 4"
- Room temperature — 76° F
- Test time frame — 35 minutes
- Bake cycle temperature — 140° F

Heat Loss Test

These steps were taken to conduct the test:

a) Measure room temperature (ambient).

Measure booth metal skin temperature.

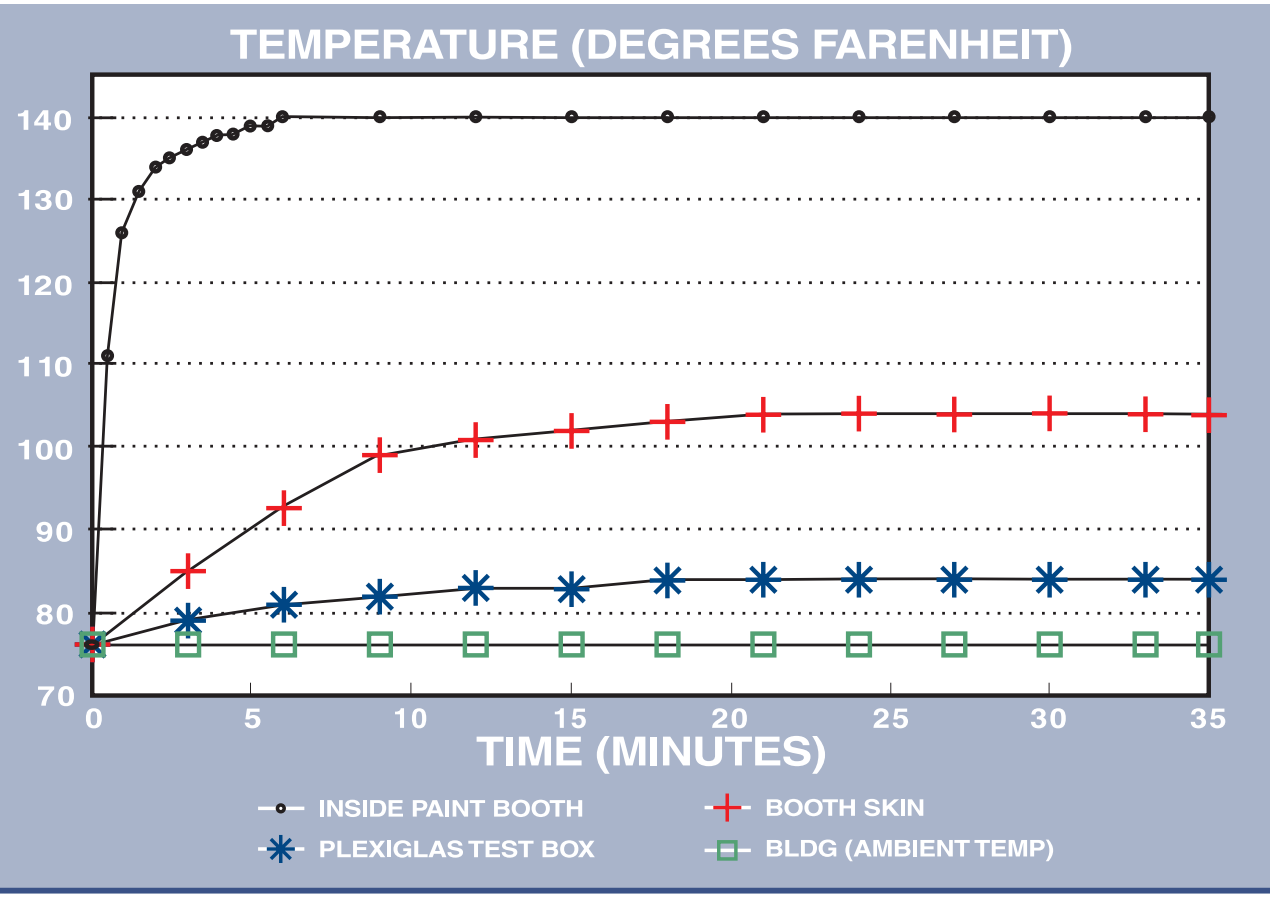
Measure booth temperature.

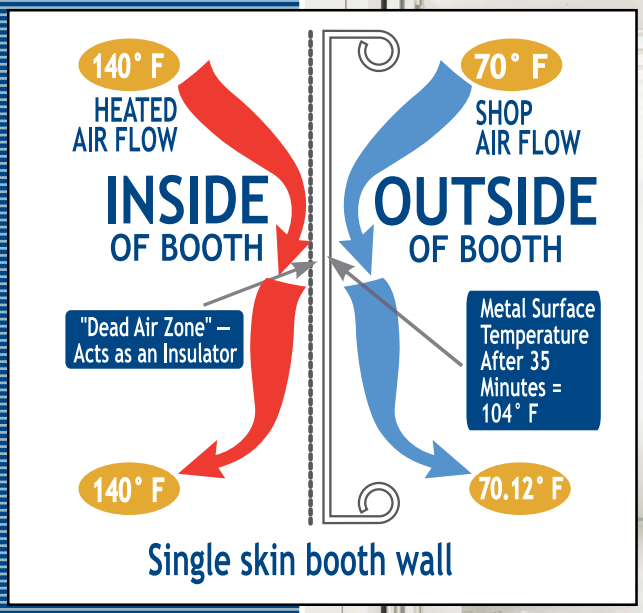
b) Place Plexiglas test box with digital thermometer on the side of the booth. Then place the metal temperature gauge on the booth skin, inside the test box.

c) Run the bake cycle of booth for 35 minutes and record the results in three-minute increments, including skin temperature, test box temperature, building temperature, and booth temperature.

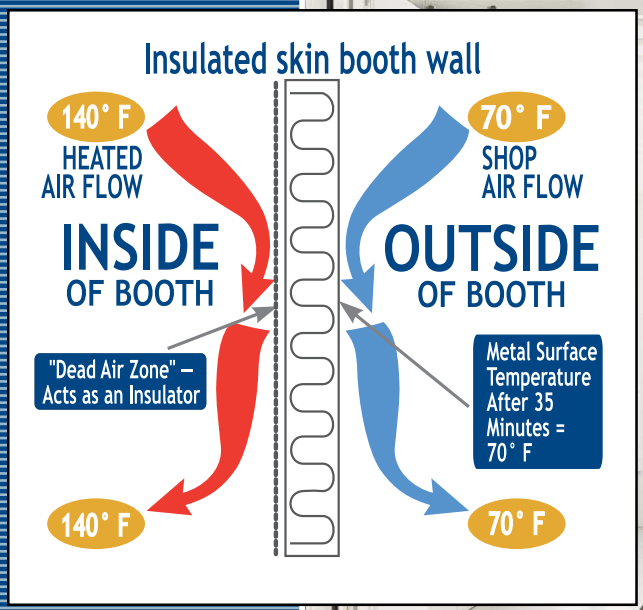
Heat Loss Test Data

The following graph shows the results of this test:





TEMPERATURE COMPARISONS



Heat Loss Calculation (Ambient temperature rise calculation)

In order to calculate the heat loss from the single skin booth, the following equation is used:

$$\Delta T_1 * V_1 / A_1 = \Delta T_2 * V_2 / A_2$$

$$\text{Test Box “}\Delta T\text{“} \quad \frac{\text{Cubic Feet of the Test Box}}{\text{Surface Area of the Paint Booth Exposed to the Box}} =$$

$$\text{Bldg. Room “}\Delta T\text{“} \quad \frac{\text{Cubic Feet of the Building Room}}{\text{Surface Area of the Entire Paint Booth}}$$

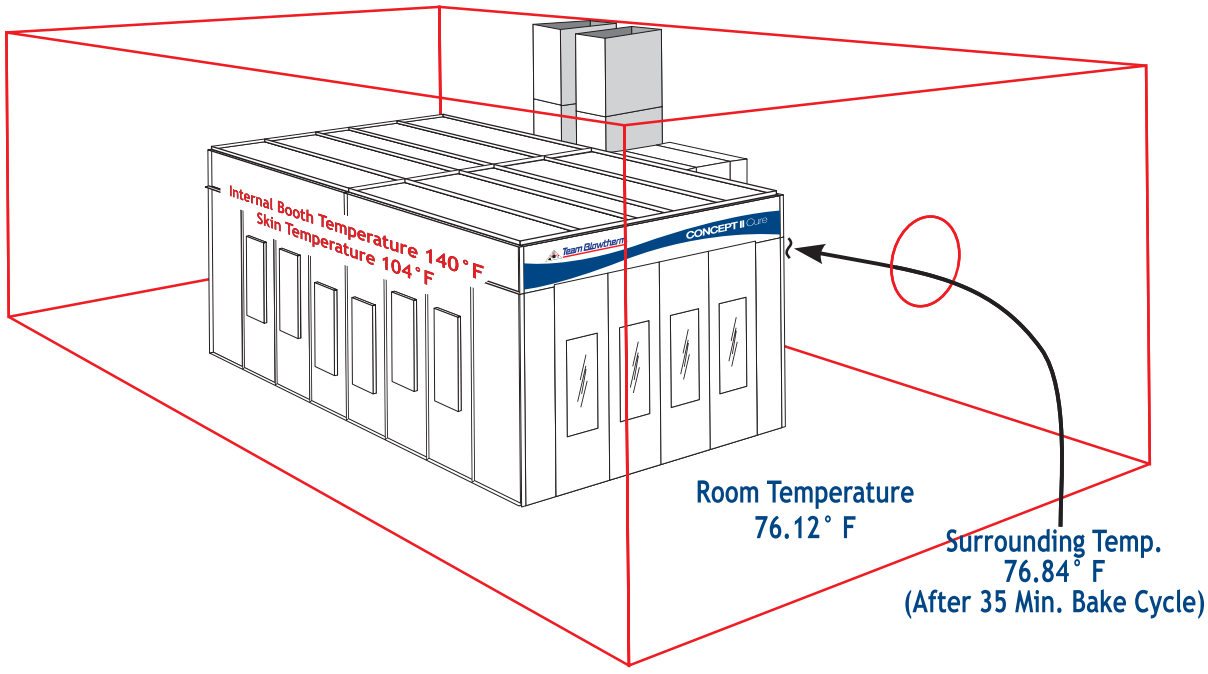
Calculation with 18' x 30' x 45' Building Room

8°F(.708' x .917' x .333') / (.708' x .917') =
ΔT°F(18' x 30' x 45') / [2(24' x 11') + (24' x 14') + 2(14' x 11')]
Building Room ΔT = .12°F (after 35 minutes)

Calculation with 24' x 14' x 11' Building Room

(Same Size as Booth)

8°F(.708' x .917' x .333') / (.708' x .917') =
ΔT°F(24' x 14' x 11') / [2(24' x 11') = (24' x 14') = 2(14' x 11')]
Building Room ΔT = .84°F (after 35 minutes)



THE TRUTH...

Single skin booth cabins, in comparison to insulated, lose less than 1°F. This heat loss is so small that the difference in cost of operation is insignificant.

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