

Val-Co Tube Heat

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**Delmarva Breeder, Hatchery and Grow-Out Conference
Salisbury, MD
September 14, 2005**



What types of heating are available?



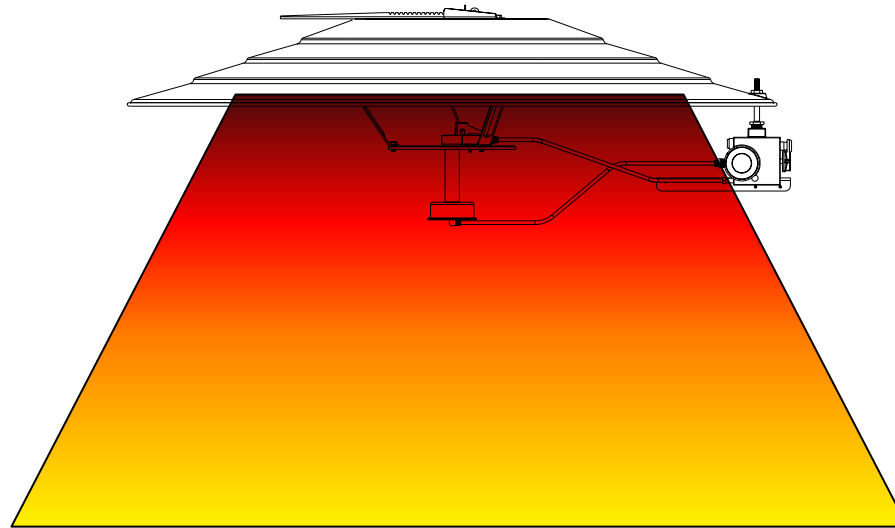
- Convection heat
 - Convection is the transfer of heat from one point to another by moving and mixing masses of fluid (air).
- Infrared heat
 - Infrared is the transmission of energy by means of electromagnetic waves (rays).



Convection heat



Heat is generated by a brooder or furnace. When the air at the heater and surrounding air mix, heat is transferred. Most of the energy is used to heat the air right at the heater. This type of heater has a drastic effect on the air close to it and lesser effect further away.

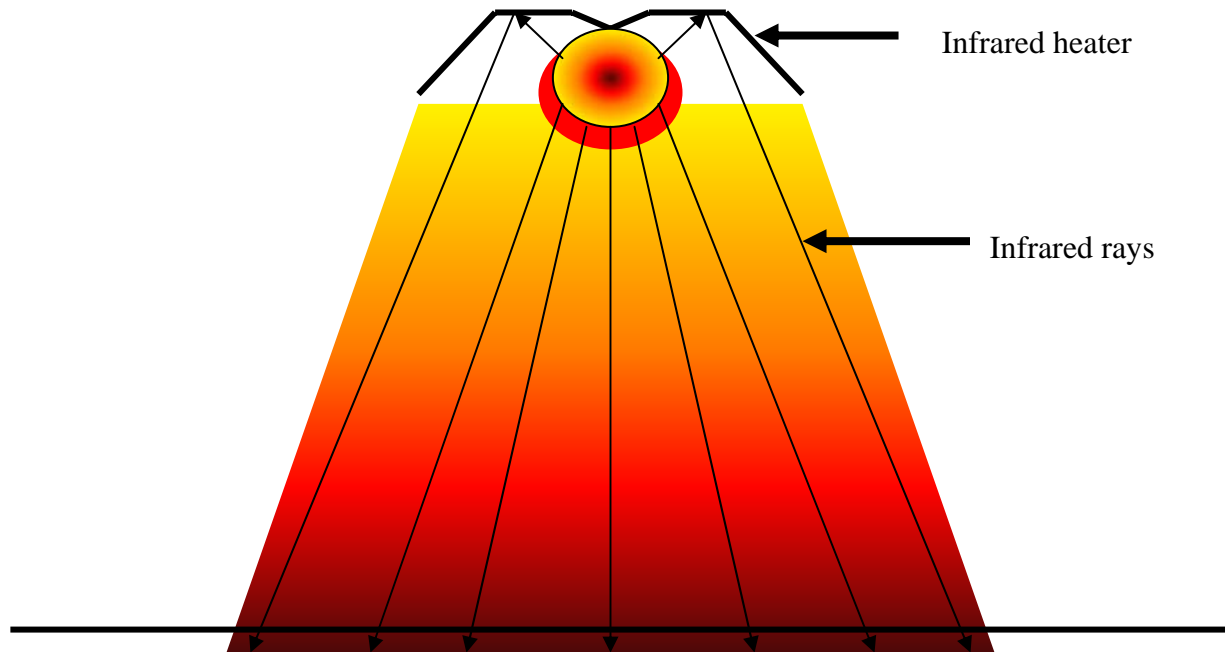




Infrared heat

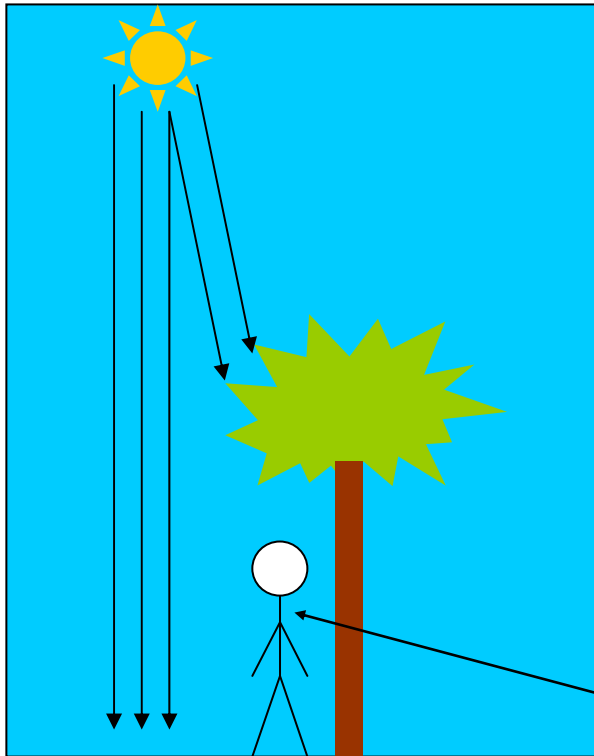


The tube when heated emits infrared rays. These rays travel through the air **without heating the air**. When these rays strike an object, they agitate the molecules of the object, generating heat. The air is then warmed by conduction and convection from the heated surfaces.





The sun uses infrared waves to heat the earth.



Even though the air temperature is very similar in the shade and out of it, you feel much cooler in the shade because the infrared rays from the sun don't reach you.

“Jay Onley”



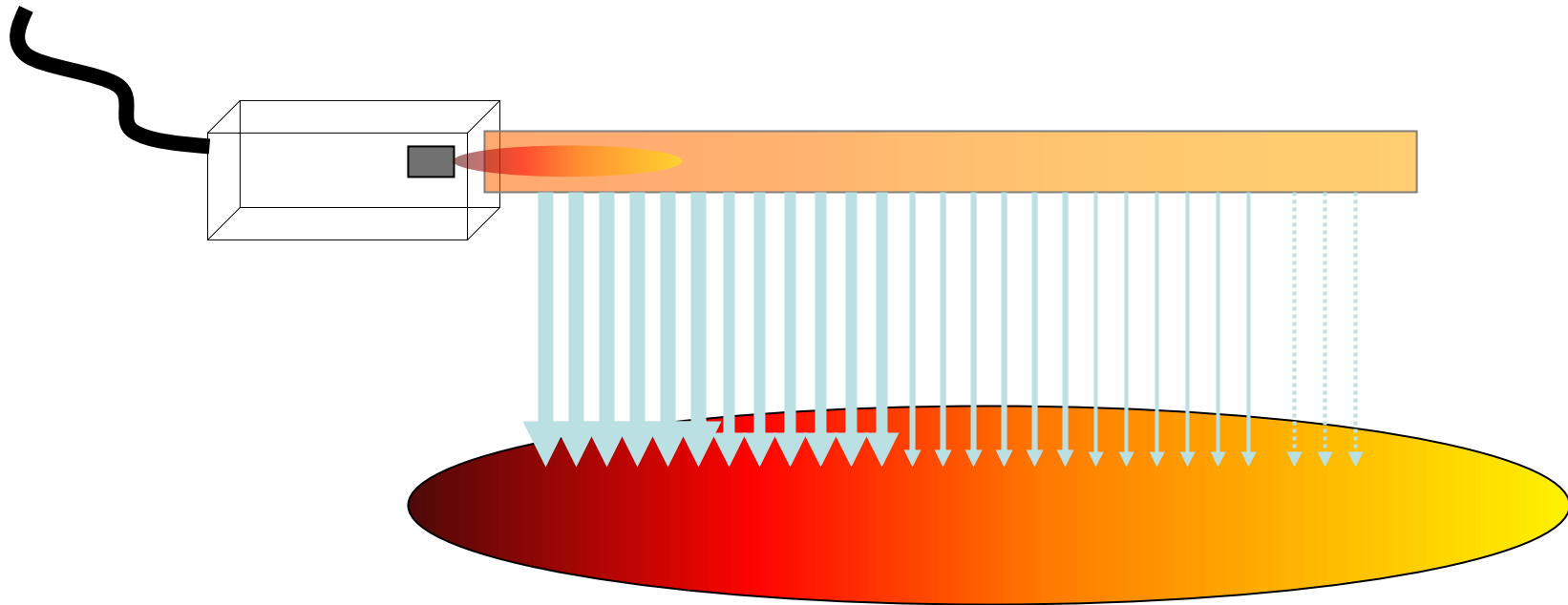
Conventional vs. Infrared



- Convection heat
 - Heats air
 - Heat effect greatly lessens with distance
 - Depends on convection and conduction to heat surfaces over periods of time
- Infrared heat
 - Heats surfaces
 - Heat effect not as limited by distance
 - Depends on conduction to heat air



How does tube heat work?



Flame burns in burner box and end of tube, heating tube to a sufficient temperature for it to emit infrared rays. Infrared rays heat objects (floor, animals) as it contacts them. Infrared energy decreases as distance from the burner box increases.



Val-Co Tube heat models

- VST Models are Single stage : when unit is on, it has a fixed output equal to the capacity of the burner.
- VM Models are Modulating-output: The output varies between 70% and 100% of the burner capacity based on actual heat need. The **air** and **gas** are both regulated to maintain combustion efficiency throughout the entire range.

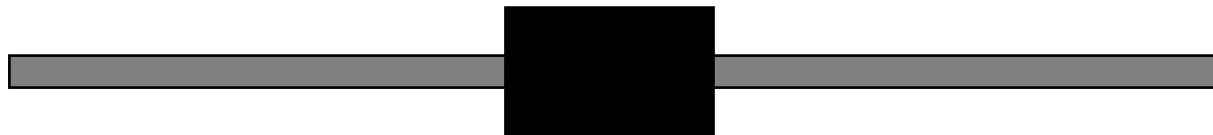


Val-Co tube heat types

- Single fire- burner box with tube extending in one direction. Available in VST and VM Models

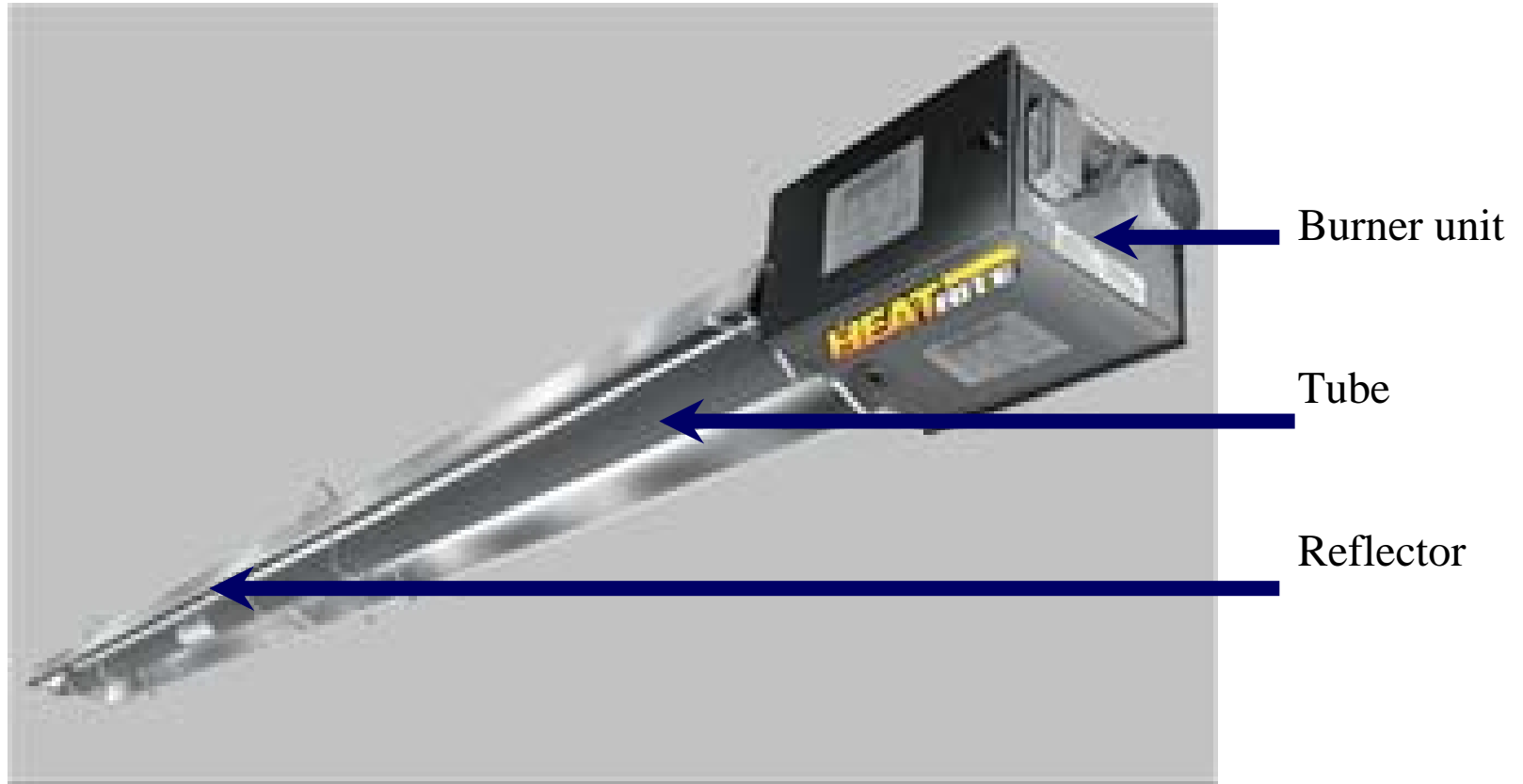


- Twin fire- burner box with tube extending in 2 directions. Models VTF



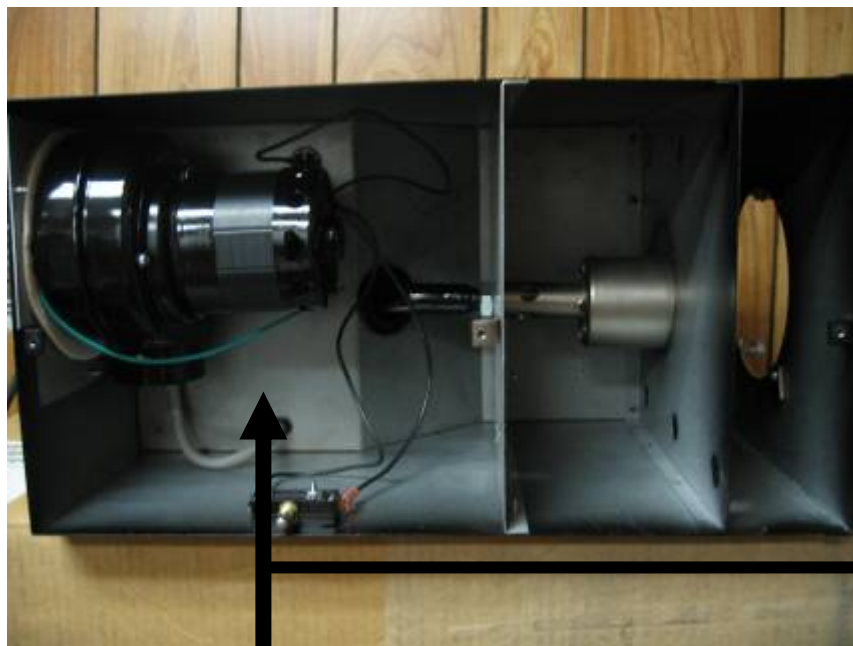


Tube Heater components

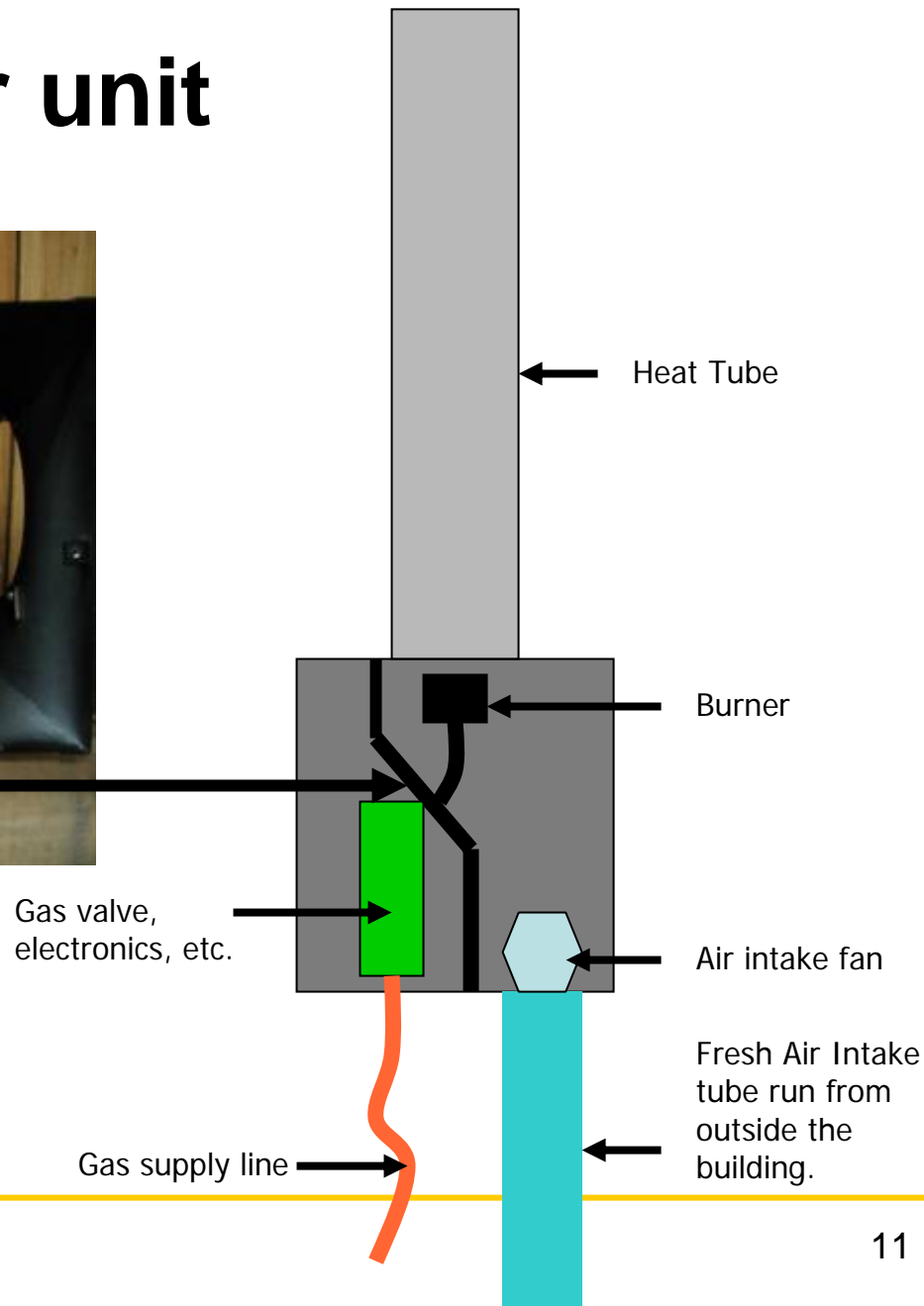




Burner unit



Divider partition separates electronic components from combustion chamber.





Val-Co Burner unit

- Electronic components are partitioned from the burner thus keeping the electronic controls cooler. Thus extending life of these components.
- Heavy duty doors with gaskets to keep out dust and moisture.
- Sight glass allows verification of the flame from the floor.



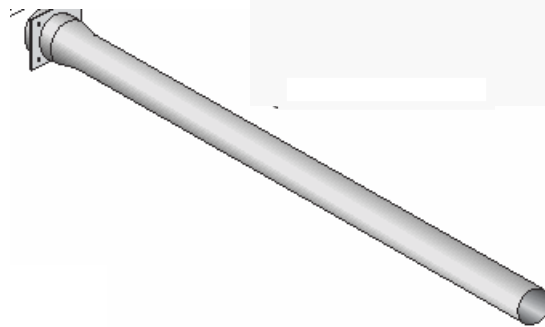
Less maintenance

- Since combustion air is being supplied from outside the house, combustion is clean thus requiring little maintenance of the burner.
- Since Valco's burner box is completely gasketed and all components are enclosed, dust does not accumulate inside . This eliminates a step in the maintenance process necessary with other types of heat.



Burner tube

Valco's burner tube is Alum-Therm® steel tubing the entire length. It was chosen for its corrosion resistance in harsh conditions. Each section after the first is heat treated.

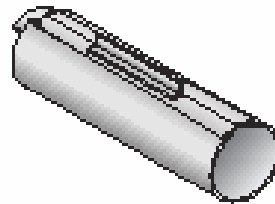


Heat Treating gives greater emissivity, or transmission of infrared rays.



Tube Coupler

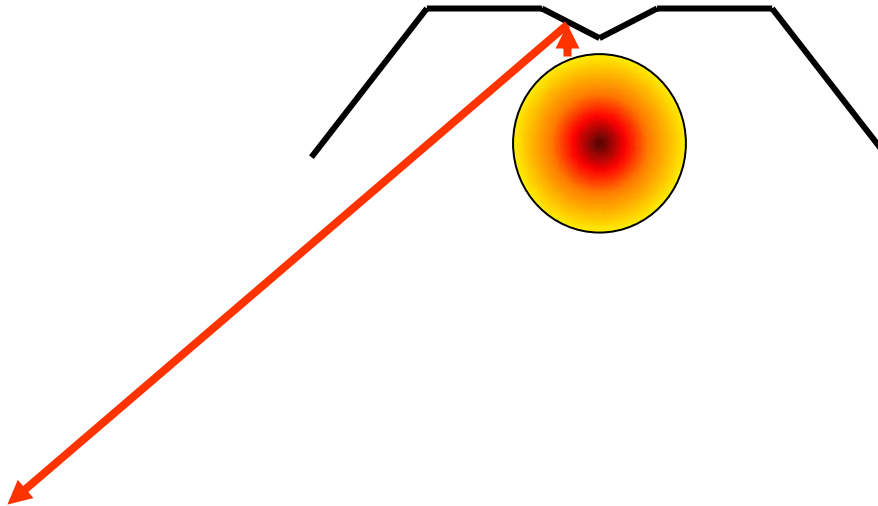
- Easy to use stainless steel tube coupler allows connection of tubes in seconds.





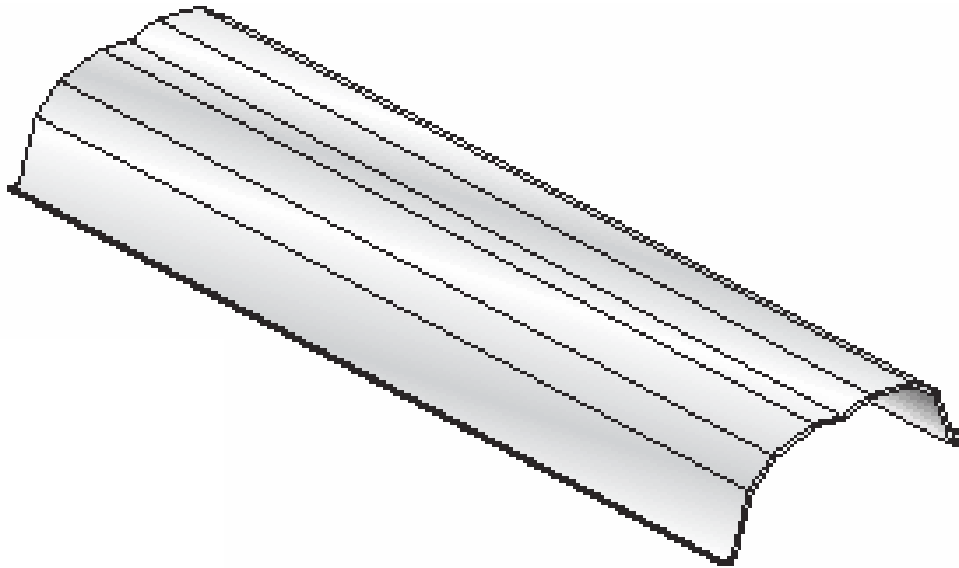
Reflector Design

- Reflector directs the infrared rays towards the floor that aren't already emitted downward.
- Reflector design is very important to make sure the maximum amount of energy is directed to the floor and **away from the heat tube.**





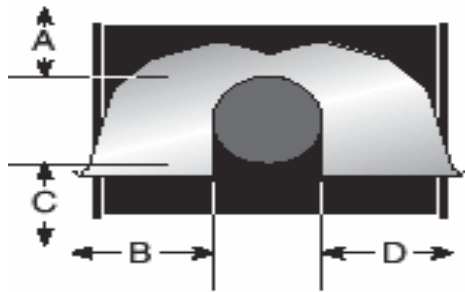
Val-Co Reflector



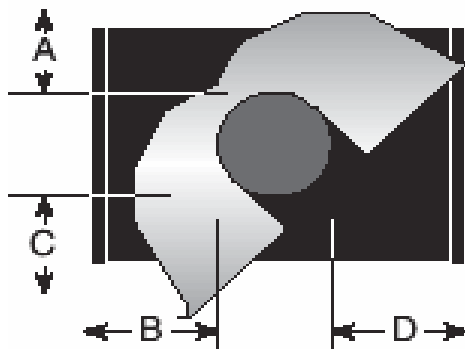
Multiple breaks in reflector ensure that infrared energy is reflected to the floor rather than back down to the tube.



Val-Co Reflector



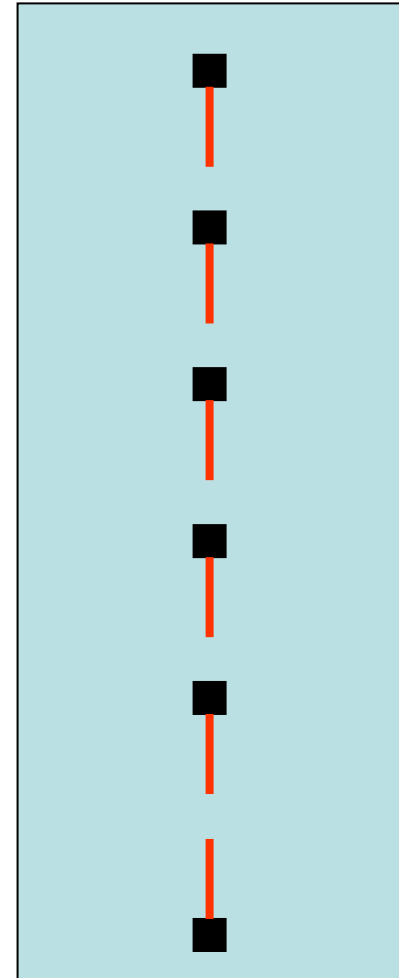
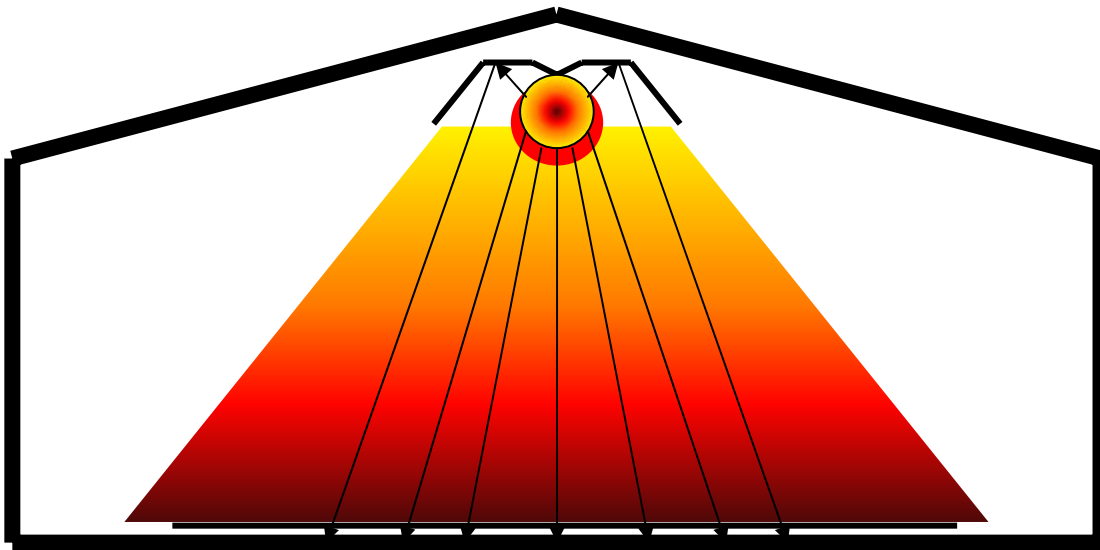
Reflector can be mounted in standard position or at a 45 degree angle for sidewall mount applications.





Typical installation in 42' house.

Units are normally mounted in the center of the building as close to the ceiling as clearance to combustibles permits. Burner ends should be mounted at traditional cold spots (i.e.-tunnel inlet, brood curtain, doors).



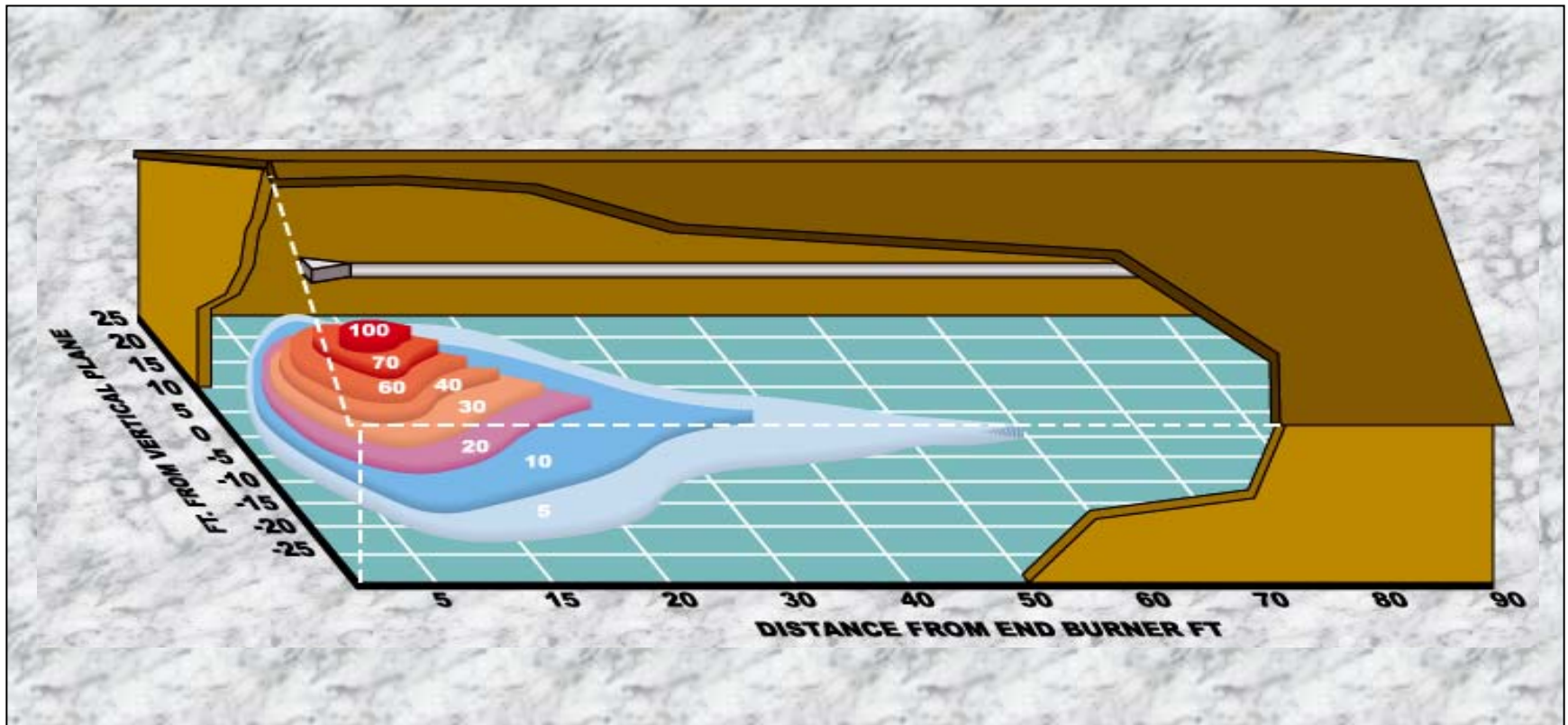


Management

- Units are typically controlled by a dedicated sensor for each unit. Placement of the sensor is approximately half way down the length of the unit at the feed line or between the feed and water lines just out of bird reach. On\off temperatures are typically 5 degrees lower than would be used with convection heat.
- Standard maintenance typically includes blowing dust from the top of the reflector between flocks with a leaf blower.

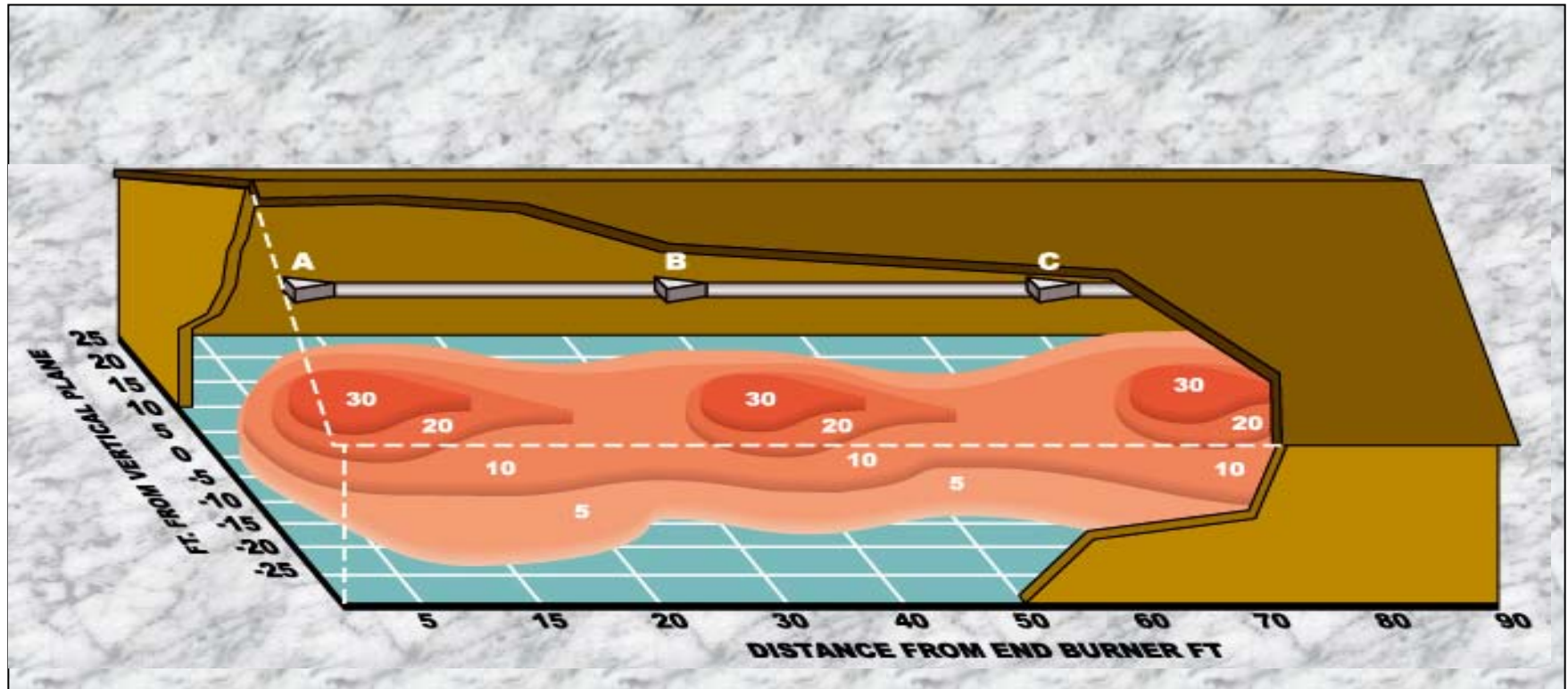


Generates this type of pattern.



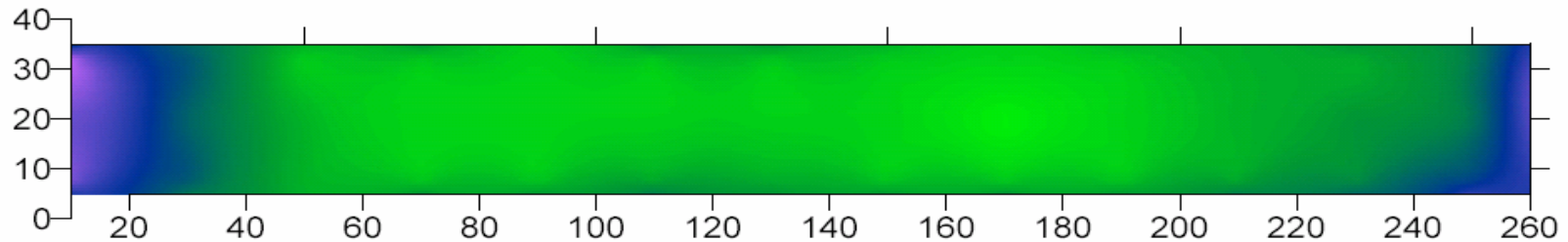


Use of multiple units spreads this differential out and allows birds to find comfortable areas.



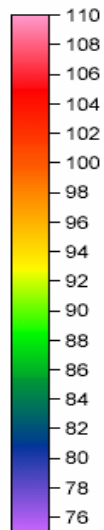


Thermographs from brood chamber of a broiler house.

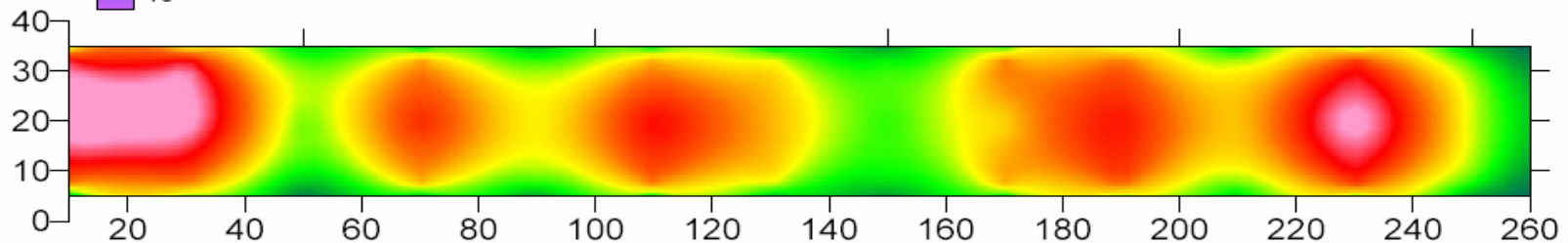


Forced Air Furnaces

Prior to Chick Placement



Radiant Tube Brooders





Observations

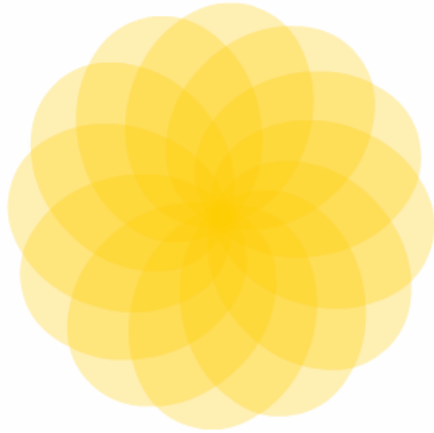
- In the forced air house, the floor temperatures are all below 90deg. F
- In the infrared house, most of the floor temperatures are above 90deg. F



What does this mean?



If we are using infrared heat, and have designed the system to give us good floor coverage, we can operate at lower air temperatures than with convective heat because birds are heated directly by infrared rays and don't depend solely on air temperature for their comfort.

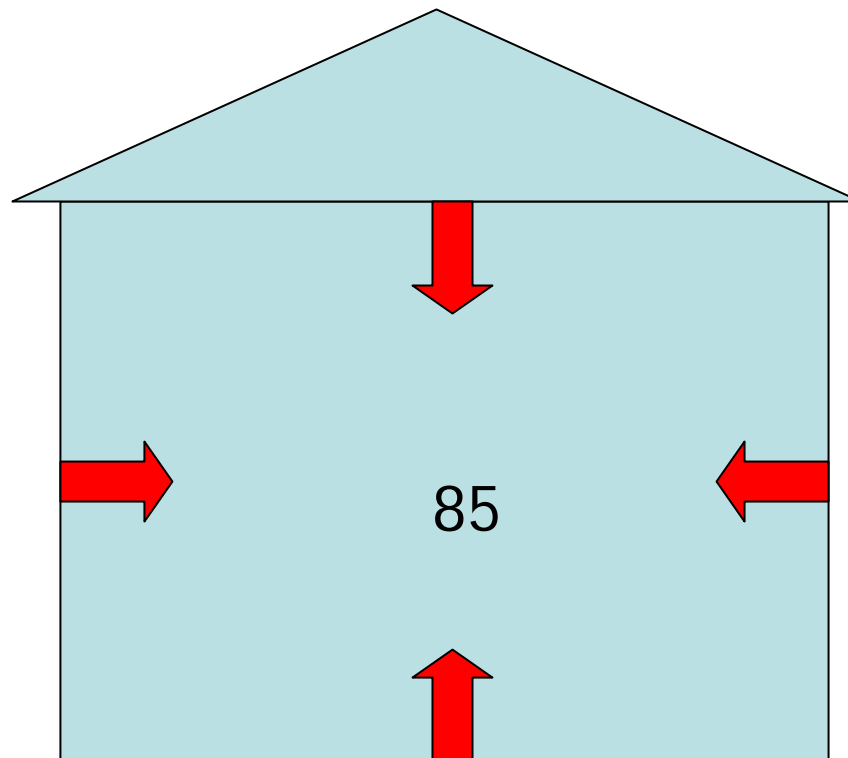


The good thing about heating surfaces is that they continue to release heat after energy is no longer being applied.

This means that once we heat the floor, it continues to release heat to the air above it, even after the heaters are turned off. If we are heating just the air, the warm air rises and is wasted.



The concept of MRT (mean radiant temperature) is a way of defining how much radiant energy is available from the surfaces which have been already been heated. It can roughly be indicated by an average of the ceiling, wall and floor temperatures.





Operative temperature



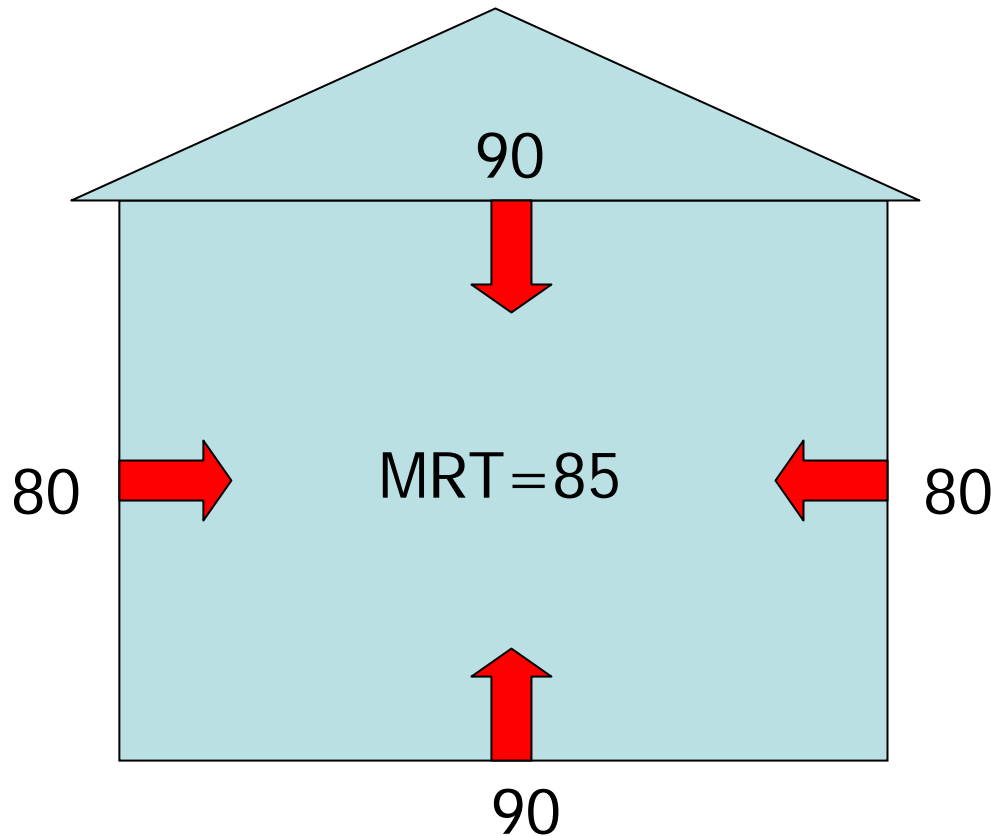
- Operative temperature is an indicator of the “effective temperature” in a room with no air movement. It is defined by the formula:

$$\text{Operative temp.} = \text{actual temp.} + \text{MRT} / 2$$

Or, more simply stated, operative temperature is the average of air temperature and the surface temperatures of a room.



So....



Assuming the surface areas of the sidewalls is equal to the surface area of the floor and ceiling, the MRT = 85deg. In a room with an air temperature of 75, the operative temperature would be 80.

$$\text{Operative temp.} = \frac{75 + 85}{2}$$



In Summary

- Infrared heat heats surfaces rather than heating the air.
- Animals are subject to the heating effect as well as floors and walls.
- Walls and floors that have been heated continue to emit heat.
- The heat emitted by the surfaces as well as the infrared effect allow us to heat with lower air temperatures.