

## INTRODUCTION

Radiant ceiling systems are an energy and cost saving heating method that provides comfortable, draft free temperature control. Product is based on the Frenger design. Frenger ceiling panels were the first to be certified and tested in Europe over 40 years ago.

Radiant ceiling systems provide warmth much the same way as the sun warms the earth. This radiant ceiling design is clean, draftless and allows essential wall space free for other uses besides cooling or heating units.

Utilizing water, the panels provide a wide range of heat outputs. The result is a comfortable heating system with design flexibility, low installation costs and ease of maintenance. Sterling's products have been installed in

hundreds of commercial and institutional applications throughout Canada and the U.S.A. Because of the many advantages of ceiling installations, you will find them in hospitals, nursing homes, museums, schools, recreational and institutional facilities as well as the latest condominium and commercial designs. Where required, special security panels are available for a system that is virtually vandal-proof. Radiant panels are shipped assembled. Full design and layout capabilities are available to assist you in the layout and installation of your system.

## SYSTEM DESIGN

Radiant panel system design is fundamentally similar to that of other perimeter heating systems. The design procedure is as follows.

1. Perimeter heat losses for the space are calculated using standard ASHRAE methods and good engineering practice.
2. Water temperature drop across panel system is calculated based on flow rate, hot water supply temperature and required heat output:

$$\Delta T = \frac{\text{BTU}}{\text{GPM} \times 500}$$

Where:  $\Delta T$  is in °F

Heat loss is in BTU's

Flow rate is in GPM

3. Mean water temperature is determined by subtracting half of the temperature drop from the hot water supply temperature:  
 $t = \text{hot water temp.} - (0.5 \times \Delta T)$
4. Use the mean water temperature value (t) found in step 3 and the appropriate rating table to determine the heat output of the panel in BTU's per lineal foot.
5. Determine the required panel width based on the output per panel found in step 4.
6. Determine panel configuration to suit the room floorplan. The following rules of thumb should be considered:
  - try to supply 50% of the total perimeter heat required (as calculated in step 1) within 3' of the perimeter wall.
  - design piping configuration such that the hottest water is always supplied closest to the perimeter wall.

### 7. Circuit Design Piping

Circuit layout depends on several factors, such as building layout, supply and return piping location, number of panels in a given area, and desired piping pressure drop.

Using the tables in the specification section of style panel selected and desired circuit flow in GPM (typical flow through any circuit would be limited to a maximum of 3 GPM), it is possible to calculate the BTU load and number of panels on a circuit based on engineer's maximum allowable pressure drop (typically 2' to 7').

For example, for a linear panel project with a desired 2 GPM circuit flow rate, a 20°  $\Delta T$ , and a maximum pressure drop of 5' per circuit, we can see that either 70' of tubing/max per circuit or:

$$\text{BTU} = \frac{500 \times \Delta T}{\text{GPM}} = \frac{10,000}{2} = 5,000 \text{ BTU}$$

Max. BTUH = 5,000 BTU/circuit

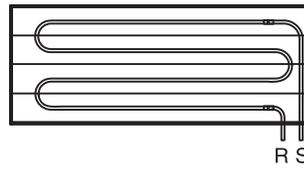
If a room contains 18" panels @ 180° AWT with 30' of panels in two 15' panels:

≈ Max. 23' of 18" panel (340 BTU/lin. ft. and 3' of tube per lin. ft of panel)

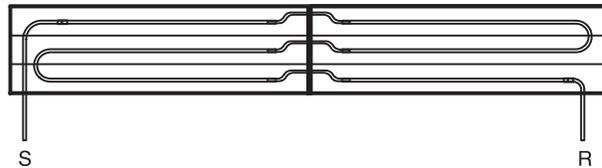
Therefore, each 15' panel contains 45' of tube and 30' of panel (90' ft of tube) implies two circuits. Or, each 15' panel covers 15 x 340 = 5100 BTUs and is good for one circuit.



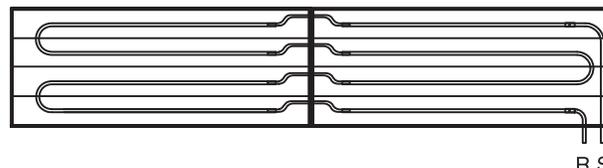
ODD PASS CIRCUITRY



EVEN PASS CIRCUITRY



MULTIPLE PANEL CIRCUITRY ODD PASS



MULTIPLE PANEL CIRCUITRY EVEN PASS

We provide design assistance. For assistance with complex applications or for in-depth information regarding radiant panel system design please contact our technical services department. Job project drawings showing panel layouts and piping are available for each individual project.