

# actual and claimed advantages of panel heating?

by J. M. Ayres, Design Engineer, and Consultant for the Radiant Heating Institute of California, Inc.

The tremendous post-war development of panel heating has unearthed numerous "experts" who are eager to speak on the subject but lack real factual information. This is especially true when presenting the advantages of this heating method. In order to avoid confusion, a list of the advantages that are assured in all panel heating installations, regardless of the conditions surrounding the particular job, will be presented and will be followed by a list of the advantages that will be found only in certain structures and localities and cannot be generalized for all installations.

## ADVANTAGES ASSURED IN ALL PANEL HEATING INSTALLATIONS

1. *Advantage of Invisibility:* All panel heating systems maintain comfort without any evidence of a heating mechanism and, because of low surface temperatures, the panels can be decoratively treated in the same way as the unheated surfaces.

2. *Advantage of Space Requirement:* All heating surfaces are built into the walls, floors, or ceilings.

3. *Advantage of Cleanliness:* Because the panels are an integral part of the structure, there are no spaces around the heating mechanism to be cleaned nor any dust streaks to worry about.

4. *Advantage of Uniform Heating:* Because of large area, low-temperature heating surfaces, no "cold" or "hot" spots exist in the panel heated structures.

5. *Advantage of Flexibility:* When installed in office or industrial buildings, partitions and equipment may be moved with no concern for modifications of the heating system.

6. *Advantage of warmer floors:* Regardless of panel location (whether in floor, ceiling, or wall), the radiant effect from the panel is sufficient to assure a floor temperature that is higher than the air temperature. This assured prevention of cold floor drafts is very important, particularly in homes where small children play on the floors.

7. *Advantage of Reduced "Cold Wall" Effect:* Normal convective heating requires indoor air temperature above 70° F. outside temperature drops, in order to compensate for the cold infiltrated air and the reduced surface temperatures of the outside

walls. In a panel heated room, the average surface temperatures are above 70° F; therefore, the air temperature will never have to be above 70° F.

8. *Advantage of Reduced Floor-to-Ceiling Air Temperature Difference:* Panel heating systems very seldom have air temperatures which vary more than a few degrees from floor to ceiling. This advantage is reflected in comfort and heating economies, especially in rooms with high ceilings.

## CLAIMED ADVANTAGES THAT CANNOT BE ASSURED

1. *Advantage of Reduced Air Temperature:* Many of the advantages of panel heating are based upon the possible reduction of room air temperature and still maintain comfort conditions. The amount of reduction of air temperature below 70°F depends upon the thermal characteristics of the structure and the ventilation rate. For more residential structures it is not feasible to maintain air temperatures much lower than 67°F; and there is no evidence to substantiate the claims that one can sit in his shirt-sleeves and be comfortable, in an average-size living room, with windows open when the inside temperature is not greatly different from that of the outside air.

The basis for this lies in the fact that over 95 per cent of the total radiant energy emitted from a panel actually does not strike the occupant. The greater portion strikes the furniture and other room surfaces, is absorbed and later is lost to the room air by convection; consequently the room air temperature must increase if the average surface temperatures are increased, unless a fan and duct system provides large quantities of fresh air to the room. If the room air temperature is lowered sufficiently below 70°F to be noticed, the following advantages become apparent.

*Comfort and Health:* With reduced air temperatures higher relative humidities are possible within the room, reducing the drying of the mucous membranes of the nose and reduced "shock" when passing from a cold environment into the heated room. The additional "freshness" associated with lower air temperatures tends to reduce drowsiness and stimulates mental alertness.

*Reduced Dry of Furnishings.*

*Economy:* The greatest advantage of a reduced air temperature is the consequent saving in heat equipment for the house. In (Continued on page 75)

\*This, the second of a series of nine articles on panel heating, is not intended to make a qualified panel heating engineer of the plumbing and heating contractor; it is intended only to acquaint the reader with the subject. The first article, "What Is Panel Heating" appeared in the July issue; "Actual and Claimed Disadvantages" will appear next month—watch for it.

## WHAT ARE THE ACTUAL AND CLAIMED ADVANTAGES OF PANEL HEATING?

*(Continued from page 27)* large structures requiring mechanical ventilation, the ventilation load makes up a substantial portion of the total heating load.

For example, if the air temperature within a structure could be reduced  $8^{\circ}\text{F}$  in a  $30^{\circ}\text{F}$  design region, the saving in the cost to heat the ventilation air would be 20%.

This particular advantage of reduced air temperatures, while not guaranteed in all installations, is important because for average structures the room air temperature will never be above  $70^{\circ}\text{F}$ , a decided advantage over convective heating.

*2. Advantage of a 15% Reduced Operating Cost:* There is a great deal of evidence to support the belief that the operating costs of a properly designed panel heating system will usually be lower than for other