



The Carpet and Rug Institute
P.O. Box 2048, Dalton, Georgia 30722 (706) 278-3176 FAX (706) 278-8835

CARPET AND HEATED FLOORS

Heated floors are becoming more practical, a result of many technological and material advances in recent years. The advantages of energy efficiency combined with a distinctly comfortable heat source have made heated floors increasingly popular in many parts of the country. These floors, often referred to as "radiant-heated" floors, have been popular in Europe for many years. In fact, one source estimates that nearly a third of the new homes in Europe are radiant heated.

Manufacturers of heated floor systems cite the following reasons for the growing popularity: the equalization, or uniformity, of heat; the many choices of heat sources (gas, oil, electricity, wood, solar, geothermal); absence of drafts, which reduces airborne dust, molds, and pollens in the home; no visible evidence of a heating system (radiators or registers). The most often mentioned advantage is the comfort afforded. The system literally "bathes" the room in even warmth. Surfaces of the room are warmed, not just the air. Because massive materials, e.g., concrete floors, are warmed, the occupant does not lose body heat. As a result, comfort is experienced at a lowered thermostat setting.

Most systems utilize heated water of about 80⁰F to 125⁰F flowing through flexible tubing installed in or beneath the floors. There seems to be a growing list of ways to install the systems, but in most new construction, the system is embedded in concrete slabs.

Because the floor works as a giant radiator, floor coverings of any kind tend to work against the efficiency of the radiant heat method. Manufacturers of the heated floor systems state that less thermally conductive floors, such as those covered with thick carpets, particularly with heavy cushions beneath, may require the use of hotter water. This may preclude the use of water-to-water geothermal heat pumps, some solar systems, and some waste heat recovery systems. Regardless, most homeowners accept some efficiency reduction so that the additional benefits offered by carpet will be enjoyed. Another benefit that should not be overlooked is that carpet tends to shorten the heating season by providing a "foot warm" floor rather than a "foot cold" floor (ceramic tile, vinyl, wood, etc.). As a result, the heating system can be turned on later in autumn and turned off earlier in spring.

Properly selected carpet and carpet cushion can keep any reduction of efficiency within reasonable limits. Most carpet manufacturers suggest using carpet and cushion with a lower combined thermal resistance rating (R-value) for better performance. With heated floors, lower pile carpet is better than higher pile carpet, and the absence of cushion is preferred. If a cushion is used, it should usually be no more than one-fourth inch in thickness. Cushions specifically designed for heated floor use are now available and should be considered.

A

Carpet Thermal Study

In 1977, an industry sponsored study of the thermal characteristics of carpet with and without cushion concluded the following:

"The test results indicate that the contribution of any component of the carpet, i.e., pile or underlayment, to the total R-value is more dependent on the thickness the component, rather than the fiber and/or yarn type."

The study conducted by Georgia Institute of Technology, School of Textile Engineering, suggested a general rule of thumb for approximating R-value as 2.6 multiplied by the total carpet thickness. R-values generally range from 1.0 to 4.0 for carpets alone or for carpet and carpet cushion combinations. R-values were found to be additive for any combination of samples. For example, a combination of carpet with a R-value of 1.3 and a prime urethane cushion (R-value equaling 1.6) will yield an overall R-value of 2.9, within a ten percent allowance for error. Since R-value represents a resistance to heat flow, carpet and carpet cushion with as low a value as practical should be chosen.

Other Carpet Considerations

Some sources caution that where carpet is used with a heated floor system, the floor covering directly under any thermostat in the home should be equivalent to the floor covering in all areas controlled by that particular thermostat.

If the floor coverings in all areas controlled by a single thermostat are not equivalent, hot and cold areas are likely to result. For example, if the floor is bare under a thermostat and is carpeted in another area controlled by that same thermostat, the heat rising from the bare floor will turn off the thermostat, although the carpeted area will feel cold. The reverse is also true. Heavy carpet on the floor under the thermostat may result in an indication that more heat is needed, but at the same time, the area with no carpet will feel very warm.

Installation Considerations

When the direct glue down method of carpet installation is used, the heat should be turned down to keep the adhesive from drying too quickly before receiving the carpet. When installing tackless strip for stretch-in installation, the fastening nails should not be driven into the tubing or cables embedded in the floor.

Most conventional carpet is suitable for use over heated floors, but before any carpet is installed, it should be established by the manufacturer that the backing is resistant to long periods of continuous heat up to 120°F and that the carpet does not produce excessive odors when heated.