Dow Building Materials

STYROFOAM Extruded Polystyrene Insulation

FOR RADIANT FLOOR/UNDER-SLAB SYSTEMS

Radiant floor heating has been used in aesthetic and energy-efficient building designs since the Romans channeled hot air under the floors of their villas centuries ago. Today, advances in materials and technology are increasing the appeal of radiant floors, offering the promise of cost-efficient comfort for commercial and residential applications.

TABLE 1

Physical Properties of STYROFOAM Square Edge, STYROFOAM Tongue and Groove, STYROFOAM Highload 40 and STYROFOAM Highload 60 Extruded Polystyrene Insulation

Property and Test Method	Value
Long-term Aged R-Value, ASTM C 518, $ft^2 \cdot h \cdot °F/BTU$	5.0
Vertical Compressive Strength, ASTM D 1621, psi	
STYROFOAM Square Edge	25
STYROFOAM Tongue and Groove	25
STYROFOAM Highload 40	40
STYROFOAM Highload 60	60
Maximum Use Temperature, °F	165
Coefficient of Linear Thermal Expansion, ASTM D 696, in/in/°F	3.5×10^{-5}
Water Absorption, ASTM C 272, % by vol., max	0.1

Advantages

Radiant floor heating directs heat upward into the room and minimizes vapor drive into the structure. To ensure effective operation of the system, particularly for under-slab floor designs, insulation is an important consideration.

Properly insulating radiant floor systems makes it possible to provide maximum comfort at minimum cost. A hot water tank can act as the boiler, enabling the system to operate at a fairly low water temperature – below 140°F. This water temperature should keep the floor-surface temperature at or below 85°F and result in a ceiling temperature in the mid-60s. Various under-slab floor designs have slightly different insulation requirements for effective operation.

Dow Building Materials† offers a number of STYROFOAM* extruded polystyrene products with high compressive strength, superior resistance to moisture and proven long-term R-value** for radiant floor applications. A selection of edge treatments, board sizes and thicknesses, and compressive strengths is available. Your Dow sales representative can help you identify the right product to meet your specifications.

Design Considerations

The slab-on-grade floor design is perhaps the most widely used when installing hydronic (water) radiant floor heating. With polymeric tubing installed in a concrete slab, the concrete becomes the conductive medium, dispersing hot water heat across the surface of the floor. Without adequate insulation, however, heat can be lost as it flows horizontally to the edges of the slab and the outside of the building, or downward to the soil beneath the slab.

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**R means resistance to heat flow. The higher the R-value, the greater the insulating power.

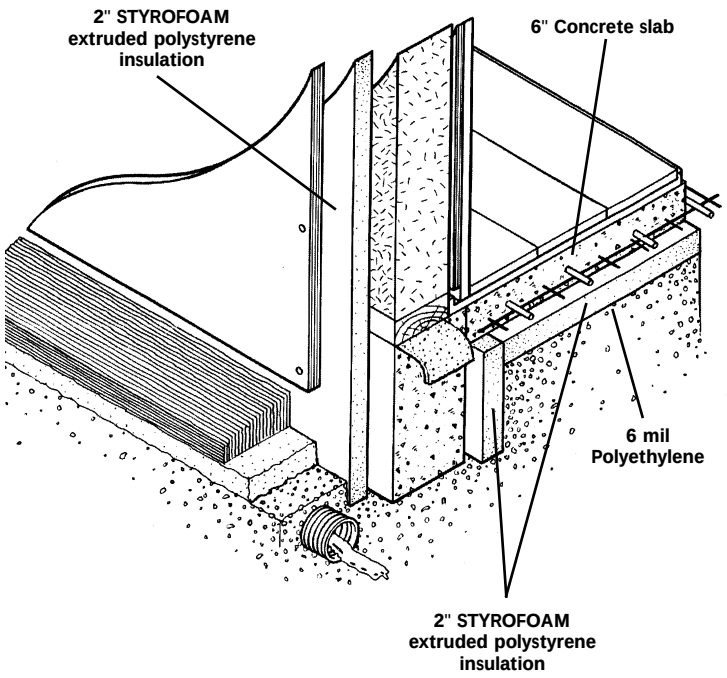

FIGURE 1: Insulating edges and under slab in a slab-on-grade radiant floor design

Rigid foam insulation, such as STYROFOAM extruded polystyrene insulation, at floor edges and under the slab keeps heat in the floor and in the building. STYROFOAM extruded polystyrene insulation helps the floor temperature stay above the dew point, eliminating any condensation on the floor surface, especially around the outside perimeters. A vapor barrier under the slab is also an important part of a slab-on-grade system.

Figure 1 shows a typical slab-on-grade radiant floor system insulated with STYROFOAM extruded polystyrene insulation.

Consult your Dow representative for additional installation information as well as for application and product information for radiant floors over the slab or subfloor.

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• **For Technical Information:** 1-866-583-BLUE (2583)
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