EPS Molders Association

Newsline

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EPS Radiant Floor Heat Panels

Increasing interest in energy-efficient products and ways to minimize a home's carbon footprint are on the minds of many home owners. With this growing trend, radiant floor heating continues to emerge from Europe into the U.S. housing market.

A recent survey by the National Association of Home Builders Research Center shows that almost a quarter (23 percent) of 302 home builders surveyed intend to "increase" or "greatly increase" their use of radiant floor systems. They cited

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INSULATED VINYL SIDING COMBINES TWO HIGH-PERFORMANCE MATERIALS FOR DURABILITY AND ENERGY EFFICIENCY.

Double Duty EPS

Insulated Vinyl Siding Offers Strength, High R-Values & Curb Appeal

One of the newest hybrid products to hit the market, insulated vinyl siding is catching the eye of contractors and home owners. By combining two high-performance materials to make an even better product, insulated vinyl systems inherit the durability and energy efficiency of the foam backing material and the easy care of a vinyl exterior. Mostly used in remodeling applications, the product is more impact-resistant than traditional vinyl siding and is virtually maintenance free. Plus, it offers better insulating properties than any other type of cladding.

The thermal and mechanical properties of expandable polystyrene (EPS) make it ideal for residential, commercial and industrial applications where R-value and moisture resistance are critical. EPS insulated siding marries an exterior siding panel (skin), whether metal, vinyl, composite, or other cladding material, with a shaped foam backer (core) precisely contoured to fit the siding profile at all points of contact. Insulated siding is just one of many highly engineered building products capitalizing on the inherent design flexibility, energy-efficiency and structural integrity of EPS material science.

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EPS Radiant Floor Heat Panels

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radiant heat's ability to provide even heat and cleaner air with lower operating costs as the primary factors for choosing them over competing systems.

In addition to heating residential and commercial living space, radiant floor heat is ideal for use in basements, garages and on walkways and driveways for melting snow and ice beneath the concrete slab. In most modern radiant floor heating systems, warm water circulates through plastic tubing either embedded in a floor slab or attached to the underside of subflooring. The thermal mass of the slab retains heat and radiates it slowly to the living space above. A crucial requirement for radiant floor heating systems is adequate insulation beneath the heated slab or beneath the tubing.

There are three types of radiant floor heat:

- Radiant air floors where air is the heat-carrying medium, mainly used in commercial buildings;
- Electric radiant floors; and
- Hot water (hydronic) radiant floors, usually less expensive and used most often in residential construction.

Photography courtesy of Createc Corporation.

All three types can be further subdivided by the type of installation: those that make use of the large thermal mass of a concrete slab floor or lightweight concrete over a wooden subfloor (these are called "wet installations"); and those in which the installer "sandwiches" the radiant floor tubing between two layers of plywood or attaches the tubing under the finished floor or subfloor ("dry installations").

When used as part of a radiant floor heating system expanded polystyrene (EPS) foam works as a thermal break, ensuring uniform and efficient heat distribution throughout the floor area. Expanded polystyrene is a lightweight, easy to handle, rigid thermal insulation. Its closed cell structure assures long lasting, stable thermal insulation properties and water-resistance. EPS insulation does not promote mold or mildew, has no pest nutrient value, will not decay over time and is CFC free. It is available in several compressive strengths to withstand load and backfill forces. In radiant heat applications, EPS insulation can be used with slab-on-grade or in sandwich slab applications, and its design versatility allows for customized installations.

The EPS material type (density) and thickness needed under the slab depends on the function of the heated space. Factors such as climate and occupancy will influence the required R-value. From a small bathroom to commercial garage decks with heavy vehicle loading, EPS can meet a variety of radiant heat design considerations. Some manufacturers provide EPS panels with grooves that are designed to securely hold the radiant heat tubing. This allows the tube to be "walked" into the panels, allowing for speedy installation at reduced project costs. With this type of system, the cost to purchase and install wire mesh may also be eliminated. And, if the installers do not like the layout, the EPS panels can be easily reconfigured.

Without insulation slab-on-grade radiant floor heating systems have the potential for significant heat loss into the ground, known

This innovative heating system has ancient origins — Romans built fires beneath floors to warm their villas and early Korean buildings were similarly heated by channeling flue gases beneath floors and venting up through chimneys. In more recent times, Frank Lloyd Wright piped hot water, rather than air, through the floors of many of his buildings in the 1930's. Today manufacturers have significantly streamlined the components and design of radiant floor systems.

as a heat sink. When a floor heating system is turned off, the heat escapes from the soil underneath causing the room temperature to continually increase. According to Paul Torcellini, Ph.D., P.E., of the National Renewable Energy Laboratory, even with insulation under the slab, 20% of the heat entering the slab can be lost into the ground. This reduces the overall efficiency of the radiant-slab system and offsets potential energy savings. Installed EPS insulation significantly reduces the heat sink effect and allows the system to react more efficiently and accurately to temperature shifts.

Because of its superior insulating properties EPS enables the slab to reach a desired temperature quicker; resulting in greater control of the room temperature. A Canadian study conducted by Dr. John Straube documented the amount of the energy savings from insulated, hydronically heated slabs and found that heat loss can be reduced by as much as 46% if insulated with 2" R8 EPS.

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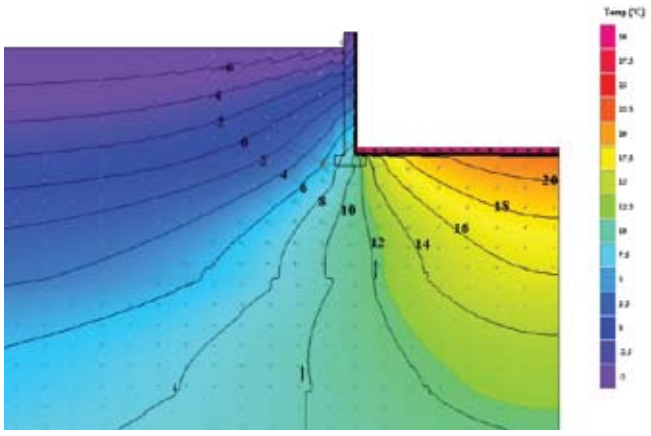
Radiant floor heating offers a number of advantages; it is more efficient than baseboard heating and usually more efficient than forced-air heating because no energy is lost through ducts. The lack of moving air can also be advantageous to people with severe allergies. Hydronic systems use little electricity, a benefit for homes off the power grid or in areas with high electricity prices. The hydronic systems can also be heated with a wide variety of energy sources, including standard gas, oil or wood-fired boilers, solar water heaters or some combination of these heat sources.

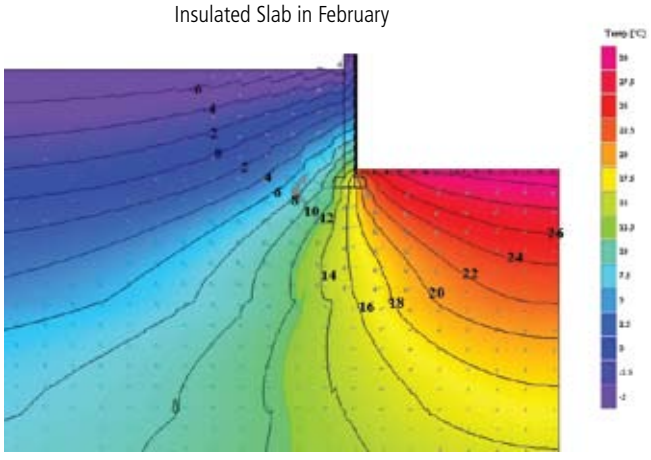
By far, the biggest selling point for radiant floor heating is comfort. The large radiant surface means that most of the heat will be delivered by radiation—heating occupants directly—rather than by convection. Warmer floor surfaces in a living space result in a higher mean radiant temperature to provide maximum comfort, typically six to eight degrees below a normal thermostat setting. EPS insulation keeps the floor warm, allowing occupants to walk around barefoot even in winter. Radiant floor heating is extremely quiet, an important feature in high-rise buildings where acoustics are an issue. And because they are "invisible" these systems allow for flexible furniture layouts. EPS insulation allows occupants to enjoy maximum comfort.

EPS Radiant Floor Heat Featured on This Old House

When the Favat family of Weston, MA outgrew their 1970's Cape Cod house but not their neighborhood, This Old House stepped in to help them build their dream home, a 3,800 sq. ft. timber-framed barn that combines rustic and modern elements. The Favat's old house was carefully deconstructed so that 85% of the materials could be salvaged for reuse; many in a nearby Habitat for Humanity project. What makes this TOH project unique is that the new home was constructed with modular panels and finished within a matter of weeks. And, it employed a number of green elements, including radiant floor heat with EPS insulation, supplemental solar power and a rain garden to protect nearby wetlands. EPSMA member Concrete Block Insulating Systems Inc. (CBIS Inc.) of West Brookfield, Massachusetts manufactured the EPS insulation for the Crete-Heat, LLC floor panel system, who donated the floor panels. Jeff Nickerson, president of CBIS, assisted with the installation of the panels alongside members of TOH.



Insulated Slab in February



Uninsulated Slab in February