

Q&A

Q. Does Radiant-Barrier Paint Work?

My painting subcontractor is recommending Thermo-Tek, a paint the manufacturer says is a radiant barrier. What can you tell me about products like this one — or similar coatings made with something called “ceramic microspheres” — that claim to have thermal characteristics and promise significant energy savings?

A. *Martin Holladay, editor of Energy Design Update, responds:* Thirteen years ago, *Energy Design Update* referred to the marketing of “insulating” ceramic paints as “one of the most enduring frauds in the energy-efficient products industry.” Indeed, the insulating-paint scam lives on to this day, even though researchers at Oak Ridge National Laboratory and the Florida Solar Energy Center have shown that these so-called ceramic paints perform exactly the same as ordinary white paint.

According to its maker, Thermo-Tek contains “ceramic microspheres and microfibers that bind tightly together to form a barrier against radiant, convective, and conductive heat transfer.”

By definition, radiant barriers work by reducing heat transfer by radiation across the air space between two materials. The actual amount of thermal energy radiated by a material depends on its surface temperature and a property called “emissivity” (also called “emittance”). A material’s emittance is indicated by a number between zero (0) and one (1); the lower the emissivity, the lower the emitted radiation.

But according to Ben Feinsod, a technical representative from Thermo-Tek, a surface coated with two coats of Thermo-Tek paint has an emissivity of 0.83, far higher than the legal maximum for a true radiant barrier, which is 0.10. (As it turns out, no paint on the market can meet the radiant barrier standard.) Thermo-Tek doesn’t even qualify as a “radiation-control coating,” a less stringent category that requires an emissivity rating of 0.25 or less.

In any case, the emissivity of Thermo-Tek is a moot point, since the emissivity of interior or exterior paint is basically irrelevant to the thermal performance of a typical U.S. home. A low-e coating can be effective only if there is a big temperature difference between the surface being coated and its environment. As Vermont energy consultant Andy Shapiro explains, “If a wall is cold enough in winter or hot enough in summer that emissivity is going to make a difference, the wall must be uninsulated. In that case, you should insulate the wall, because that’s where you’ll achieve your savings.”

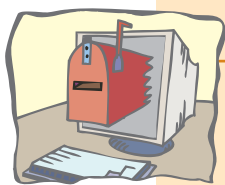
Claims that a Thermo-Tek coating offers the same insulation R-value as a 6-inch fiberglass batt and that it can deliver energy savings of up to 35 percent mirror those of another marketer of “ceramic microsphere” paint, Kryton Coatings International. This company was forced to cease its marketing efforts in 2002 when a Federal Trade Commission complaint cited its claims as “false or misleading.”

Q. Building With Logs

A design we’re bidding on has several peeled cedar logs that function as both architectural and structural elements. Are there any rules of thumb for determining their strength so that they can be safely used without redundant grade-stamp framing — and so they meet the approval of a building inspector?

A. *Peggi Clouston, associate professor of Building Materials and Wood Technology at the University of Massachusetts Amherst and a specialist in timber design, responds:* Certainly, natural whole elements of a tree can be used safely as structural members in a building. Trees are, after all, innately structural. But instead of rules of thumb, the IBC requires inspection by a certified grading agency or the engineer of record to estimate just how strong a log actually is and whether it is suitable for a particular structural application (see Section 2303.1.10, 2006 IBC).

Complex grading rules establish limits on the size and number of strength-reducing growth characteristics — knots, checks, splits, holes, and the like — allowed for any particular species and for a number of anticipated end-uses. Stress grades — as shown on grade stamps — are a



GOT A QUESTION?

Send it to Q&A, JLC, 186 Allen Brook Lane, Williston, VT 05495; or e-mail to jlc-editorial@hanleywood.com.

direct result of this grading process, and strength values derive from the stress grades. Peeled cedar logs used as round timber piles or in log buildings are covered by regulatory standards ASTM D25 and ASTM D3957.

In addition to grading issues, connections of round and nonstandard cross-section geometries are of particular concern to building inspectors. Joints of wood structural members with a non-rectangular shape are generally custom made, with design properties based on limited experimental test data. So the best approach to incorporating logs into a building is to enlist the expertise of a registered structural engineer, who can attest to the structural design and the strength of the wood element for each specific application.

Q. Vertical I-Joists?

When building a super-insulated house, one of the ways to increase insulation levels in the wall assembly is to increase the thickness of the wall. But instead of using double-wall framing, would it be okay to frame walls with I-joists?

A. *Gary Schweizer, P.E., a senior engineer with iLevel by Weyerhaeuser in Charlotte, N.C., responds:* Yes, I-joists can be used to build walls. You'll probably need engineering assistance to help with the design, since specific application guidelines and details haven't been developed by the I-joist industry or adopted by any building codes. Tall walls and high-wind or seismic locations will require engineering to ensure the lateral stability of the I-joist flanges, which under normal conditions

could be provided by exterior sheathing and interior drywall. Engineered solutions will be required when wall framing exceeds certain heights, too.

You'll also need to provide full-depth bottom and top plates to ensure even vertical loading. Since the majority of compression forces are distributed to the flanges, a 9½-inch I-joist will require 9½-inch-wide plates so that both flanges have full bearing. In addition, the bottom and top ends of the I-joist will require web stiffeners or end blocking to help with vertical load transfer and with the lateral connections with the plates. Intermediate I-joist blocking may also be required for fire stopping and installation stability.