I’m an architect and I often see plastering mix recipes that incorporate the use of perlite as an aggregate. What exactly is perlite and what function does it serve in a plaster mix? —D.S., New York

Perlite is a volcanic rock that contains a small amount of water. When the rock is crushed and heated, the crushed particles expand to form sealed glassy cells and take the shape of small beads.

Portland cement plaster consists of portland cement, water and an aggregate. The most commonly used plaster aggregate is sand, but occasionally perlite is used as a substitute for part or all of the sand in a mix. Perlite’s major advantage over sand is its reduced comparative weight—a ceiling constructed using perlite will weigh approximately 50 percent less per square inch than one constructed using sand—and its increased resistance to heat transmission.

On the other hand, many sources, the American Concrete Institute among them, will tell you that perlite aggregate plaster does not resist freeze-thaw cycles as well as sand aggregate plaster.

Perlite is also commonly mixed with gypsum plaster for use as a membrane fireproofing material.

My drywall business installs a lot of board to fire-rated floor-ceiling assemblies in apartment buildings and condos. All of a sudden I’m seeing the framing contractors using box nails instead of common nails when they frame the assemblies. What’s the difference, and is it OK to substitute one for the other? —R.C., Georgia

A box nail is most simply thought of as a skinny common nail. A 12-penny common nail and a 12-penny box nail are the same length, but the box nail will have a diameter of 0.128 inch, while the equivalent length common nail will be 0.0148 inch in diameter.

So what, you say? Well, in this instance thinner isn’t better. Professor Frank Woeste of Virginia Tech University, writing in a recent issue of the Journal of Light Construction, states “you can’t just make a one-to-one substitution of common nails specified in a plan with the same number of box nails.” Nails are rated for “lateral capacity” a rating that is based on nail diameter—the thicker the nail, the better the lateral capacity—and if the structural criteria for the construction of the assembly require a specific quantity of common nails to be used at each fastening juncture, box nails generally won’t suffice if substituted on a one-to-one basis with common nails.

In addition, if the fire test calls for a common nail, it’s a pretty safe bet that a box nail of a thinner diameter won’t perform the same in a fire and won’t satisfy the requirements of the fire test. There are tables that calculate the number of box nails required to achieve the same lateral holding capacity as a specific quantity of common nails—you generally need four or five box nails to do the work of three common nails—but we haven’t seen any calculations for the same type of substitution when the criteria involve achieving the requirements of a specific fire test.

About the Author
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