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Fixing Fiberglass Convection Problems with Loose-Fill Cellulose

Researchers at Oak Ridge National Laboratory are exploring ways to prevent or fix the problem of air convection in low-density loose-fill attic insulation.

Previous testing at Oak Ridge showed that low-density (0.5 pounds per cubic foot [lb/ft^3]) loose-fill fiberglass suffers up to 50% loss of R-value at very cold attic temperature (-18°F) due to air convection within the insulation. However, laying fiberglass batts over the loose fill effectively stopped the convection problem. What if the low-density material was covered with higher-density loose fill instead of fiberglass batts?

To answer that question, Oak Ridge scientists tried blowing both cellulose and 0.7 lb/ft^3 fiberglass on top of low-density R-30 loose-fill fiberglass. The results were mixed: cellulose worked, fiberglass didn't.

When approximately two inches of cellulose (R-8) were added over the R-30 low-density fiberglass, the measured overall R-value remained at R-38 down to -18°F, indicating that the cellulose covering effectively prevented convection.

But the higher-density fiberglass apparently failed to stop convection at low temperatures. When an R-8 layer was added over the low-density material, it added R-8 to the overall R-value, but failed to restore the lost R-value due to convection.

What about very high-density loose-fill fiberglass?

Some loose-fill fiberglass products have installed densities even higher than the material tested in the most recent Oak Ridge tests. For example, Owens Corning's (OC) "Standard Blend" has an installed density just under 1.0 lb/ft^3.

The ability of a loose-fill insulation material to resist convection depends on its air permeability, which is strongly dependent on density (see ***EDU***, April 1993). The higher the density, the better. David Yarbrough at Tennessee Technological University (TTU) has just completed a series of permeability measurements on several types of loose-fill insulation products. (Some of Yarbrough's results are reported in the April 1993 ***EDU***.) Yarbrough told ***EDU*** that products like OC Standard Blend are most likely immune to convection.

Further testing is necessary, however, to determine whether they would work as a retrofit fix over existing low-density products.

For more information on the Oak Ridge tests, contact Ken Wilkes, Oak Ridge National Laboratory, Box 2008, Building 4508, Oak Ridge, TN 37831-6092; (615) 574-5931. For information on the TTU study, contact David Yarbrough, Department of Chemical Engineering, Tennessee Technological University, Cookeville, TN 38505; (615) 372-3494.

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