

EPS, XPS 15-year test detailed

ACH Foam Technologies announced the completion of a 15-year test to determine water absorption characteristics of EPS (Expanded Polystyrene) and XPS (Extruded Polystyrene). The test showed a dramatic variance between the two materials in their resistance to water absorption.

The test of below grade insulation, conducted by AFM Corp. (ACH Foam Technologies marketing and technical support company) in cooperation with the Expanded Polystyrene Molders Association, has determined the water absorption of Foam-Control EPS and an extruded polystyrene (XPS) product. Samples of EPS and XPS were excavated from the exterior foundation of a building in St. Paul, Minn. The insulation was placed into service in 1993 and had 15 years of use as vertical wall insulation separating the heated building foundation from soil.

Samples were removed in the summer of 2008 and tested upon excavation for R-value. The XPS samples were immediately adjacent to the Foam-Control EPS and were also on the foundation for 15 years. Both sets of samples were subsequently conditioned in a laboratory (72° F, 50 percent RH) for four weeks to determine a conditioned R-value. In addition, the moisture content of the samples was also measured.

Todd Bergstrom, vice president of technology for AFM Corp., said the EPS insulation maintained 94 percent of its stated

R-value of 3.6 after the 15-year time period and had a moisture content of only 4.8 percent. However, the XPS retained only 52 percent of its stated R-value of 5.0. The loss in R-value for the XPS is quite dramatic and can be explained very simply by the 18.9 percent of moisture absorption over the 15 years of use. These results suggest very clearly that short-term laboratory tests of water absorption for XPS do not necessarily reflect the long term below grade performance of these materials."

Even though the ASTM C578 water absorption requirement for XPS is less than 0.5 percent, the XPS absorbed 18.9 percent of moisture during the 15-year period. According to Bergstrom, it is apparent that moisture that migrates through the soil, insulation, and foundation system is trapped in the cell structure of XPS.

In contrast to the XPS, EPS is maintaining an equilibrium condition with the adjacent soil and is not accumulating water over the life of the building.

The loss of blowing agents in the XPS also contributes to poor R-value performance. The blowing agents in XPS slowly diffuse out of the foam over time. It is much like losing the refrigerant in an air conditioner — it just does not perform as well as when originally manufactured.

For more information on ACH Foam Technologies and Foam-Control EPS below grade insulation, see achfoam.com. CM