



EPS No.1016

Subject: Water Absorption

Date: October 2008

Architects, Engineers, Contractors, and Building Owners are all concerned with the performance of their insulation. The long term performance of insulation is critical to ensuring the energy savings the insulation was specified to provide.

Foam-Control EPS has been subjected to a 15 year moisture absorption study to demonstrate the performance of EPS in a below grade application. The basic premise of the study was that Foam-Control EPS be subjected to a real world application and not a short term laboratory test.

Samples of Foam-Control EPS were installed as perimeter below grade insulation on a building in St. Paul, MN. The insulation was placed below grade in 1993 (15 years of exposure as vertical wall insulation separating the heated building foundation from soil). Samples were removed from the exterior foundation of a the St. Paul, MN building in the summer of 2008 (see Figures 1 and 2).

In addition to the removal of the Foam-Control EPS samples, extruded polystyrene (XPS) samples were removed. The XPS samples were immediately adjacent to the Foam-Control EPS and were also on the foundation wall for 15 years (see Figure 3). At the time of excavation the soil in contact with the insulation was dry and no abnormal conditions were observed.

The samples were brushed clean (see Figure 4) and tested immediately upon removal from the foundation wall for R-value. The results of the R-value testing at the time of removal and after an additional 28 days of conditioning at 72F/50% RH are shown in Table 1. In addition to R-value, the water absorption of the samples was measured and are shown in Table 2.

Table 1

Thermal Resistance		
Sample	R-Value/in. upon removal	Conditioned ¹ R-Value/in.
EPS	3.4	3.7
XPS	2.6	2.8

¹Four weeks after removal and in a laboratory at 72° F, 50% RH conditioning.

Table 2

Moisture Content		
Sample	Moisture Content volume% upon removal	Conditioned ¹ Moisture Content volume%
EPS	4.8	0.7
XPS	18.9	15.7

¹Four weeks after removal and in a laboratory at 72° F, 50% RH conditioning.

The results of the independent testing are dramatic. The EPS insulation maintained 94% of its stated R-value of 3.6 after the 15 year time period and had a moisture content of 4.8%. However, the XPS retained only 52% 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% of moisture absorption over the 15 years of use.

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.

Figure 1. Excavation of insulation samples after 15 years



Figure 2. XPS and EPS below grade insulation



Figure 3. XPS and EPS were installed adjacent to each other



Figure 4. Samples cleaned and ready for testing



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