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SUBJECT: 15-Year Performance of Below-Grade Insulation – EPS & XPS

Stork Twin City Testing, an accredited independent testing laboratory, has performed an evaluation of below-grade foundation insulation after being in-service for 15 years. The insulations used were a nominal 1.6pcf density extruded polystyrene (XPS) and Type I expanded polystyrene (EPS). Tests were completed in order to directly compare the two products in an actual foundation insulation application. The insulations were evaluated for both R-value and water absorption. The following are the results:

	15 Yr. In-situ Test Results			
	Results Upon Extraction		Results after 30 days @ 72° F & 50% RH	
	EPS	XPS	EPS	XPS
R-Value/inch	3.4	2.6	3.7	2.8
Moisture Content (Volume %)	4.8	18.9	0.7	15.7

Observations:

- In a side-by-side comparison in an actual below-grade application, the Type I EPS out performed XPS on both R-value retention and water absorption.
- The in-service R-value of 2.6/inch for the XPS is 48% less than what is typically published for this product and nearly 24% less than the in-service R-value of the Type I EPS.
- The in-service moisture content of 18.9% for the XPS is significantly more than what is typically published for this product and 61% more than the in-service moisture content of the Type I EPS.
- Unlike the Type I EPS, when exposed to dry conditions for 4 weeks, the XPS did not approach values expected per ASTM 578 *Standard Specification for Rigid Polystyrene Cellular Polystyrene Thermal Insulation*.
- This study, as well as other in-service testing, has demonstrated that short term total-immersion testing is not a good indicator of how insulations will perform in actual construction applications.

History

The long term exposure of the insulations started in 1993 with the removal of existing insulation and the placement of 2” of both the XPS and EPS insulations on the concrete foundation of a building located in St. Paul, Minnesota. The samples were placed against the foundation wall with no additional adhesives and back filled with native soils. The foundation area extended to a depth of eight feet where conditioned space existed on the interior of the structure. These insulations were allowed to remain in place for approximately 15 years. The area near the building was subjected to normal St. Paul, Minnesota conditions where the annual precipitation is 29.41 in (74.7 cm) per year and the native soils supported typical grass growth with out additional water.

After the lengthy exposure the native soils were excavated away from the foundation walls and the laboratory sample took two 12” square samples of both the XPS and EPS from a depth of approximately six feet. Samples were immediately taken to the laboratory where they were brush-cleaned, weighed, measured and tested for R-values. Once the R-values were calculated all samples were allowed to dry 4 weeks in a conditioned environment of 72° F and 50% RH. After the 4-week drying time samples were weighed and R-values were again tested and recorded. The laboratory then placed the samples in a drying oven until the samples were completely dry and the dry-weights of were tested and recorded.

If you have more questions pertaining to Insulfoam EPS products, contact the Insulfoam Technical Center at 800-469-8870.