


# STUDY SUMMARY MOISTURE NO. 101


## Exterior Foundation Wall Insulation.

The impact of moisture absorption on the performance of polystyrene foam insulations used for below grade applications is an important design consideration. It has been scientifically proven that water absorption into polystyrene foam insulations will diminish R-values. Any change in R-value due to water absorption should be accounted for in the design of below grade applications.

This Study Summary provides the results of independent testing of below grade insulation consisting of R-Shield® insulation and an extruded polystyrene (XPS) product which were installed adjacent to each other. Samples of expanded polystyrene and XPS were excavated from the exterior foundation of a building in St. Paul, MN. The insulation was placed into service in 1993 and had 15 years of use as vertical wall insulation separating a heated building foundation from soil.

## Summary of Test Results

Thermal Resistance		
Sample	R-value/in. upon removal	Conditioned <sup>1</sup> R-value/in.
 R-SHIELD RIGID INSULATION	3.4	3.7
XPS	2.6	2.8

Moisture Content		
Sample	Moisture Content volume% upon removal	Conditioned <sup>1</sup> Moisture Content volume%
 R-SHIELD RIGID INSULATION	4.8	0.7
XPS	18.9	15.7

<sup>1</sup> After four weeks in a laboratory at 72° F, 50% RH.

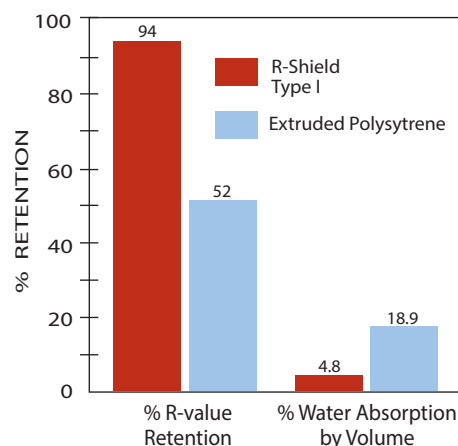
The results of the independent testing are dramatic. The expanded polystyrene insulation maintained 94% of its stated R-value of 3.6 after the 15 year time period and had a moisture content of 4.8%. However, the XPS retained only 52% of its stated R-value of 5.0.

These results suggest very clearly that short term laboratory tests of water absorption for expanded polystyrene and XPS do not necessarily reflect the long term below grade performance of these materials.



## FOAM FACTS: Below Grade Water Absorption

### WATER ABSORPTION AND R-VALUE RETENTION<sup>1</sup>



*Retained thermal resistance and water absorption of insulations subjected to 15 years below grade exposure*

<sup>1</sup> Testing was conducted by Element, an independent, accredited Third Party Laboratory.

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