EXTRUDED POLYSTYRENE FOAM ASSOCIATION

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XPS Demonstrates Performance Superior to EPS under Extreme Environmental Cycling Conditions

XPSA Response to the EPS-IA Technical Bulletin "EPS Below-Grade Series 104, February 2014"

The ability of insulation to resist water absorption is important because any water absorbed by insulation during use will directly reduce the insulations' in-service effective R-value. Moisture resistance studies of thermal insulations can provide valuable information to help building professionals, designers and specifiers understand performance differences which they can then use to make appropriate product selection and specification decisions.

The EPS Industry Alliance (EPS-IA) recently published a Technical Bulletin entitled "Drying Potential of Polystyrene Insulations Under Extreme Environmental Cycling Conditions" (EPS Below-Grade Series 104, February 2014). This Technical Bulletin reports limited information generated using ASTM C1512 "Standard Test Method for Characterizing the Effect of Exposure to Environmental Cycling on Thermal Performance of Insulation Products." This lab test method is not intended to duplicate field exposure or provide data that reflects actual in-service performance of insulation materials in applications where moisture exposure exists. The intent of this lab test is to provide comparative ratings.

The information presented in the EPS-IA Technical Bulletin indicates:

- **EPS absorbed 2.6-5.8 times more water than XPS during the preconditioning moisture exposure phase of this lab procedure.**

- **EPS retained 2.0-3.4 times more water than XPS after the thermal cycling exposure phase of this lab procedure.**

The reported laboratory data in this EPS-IA Technical Bulletin further supports that XPS insulation provides superior moisture resistance over EPS insulation products when exposed to moisture. As the data shows, XPS insulation absorbs substantially less moisture during preconditioning and maintains less moisture after environmental cycling than EPS.

Although laboratory moisture resistance studies involving various exposures may be helpful, XPSA continues to support the use of peer-reviewed and industry published product field performance studies to help designers and specifiers with insulation selection decisions. The most comprehensive and objective review of the in-service performance of polystyrene foam insulations used in below-grade applications was conducted by the American Society of Civil Engineers ASCE 32 Committee. Based on this critical review, the ASCE 32-01 standard recommends specific in-service effective R-values for insulation used in frost-protected shallow foundation construction. These in-service R-values along with the certified R-values of XPS and EPS are shown in Figure 1.

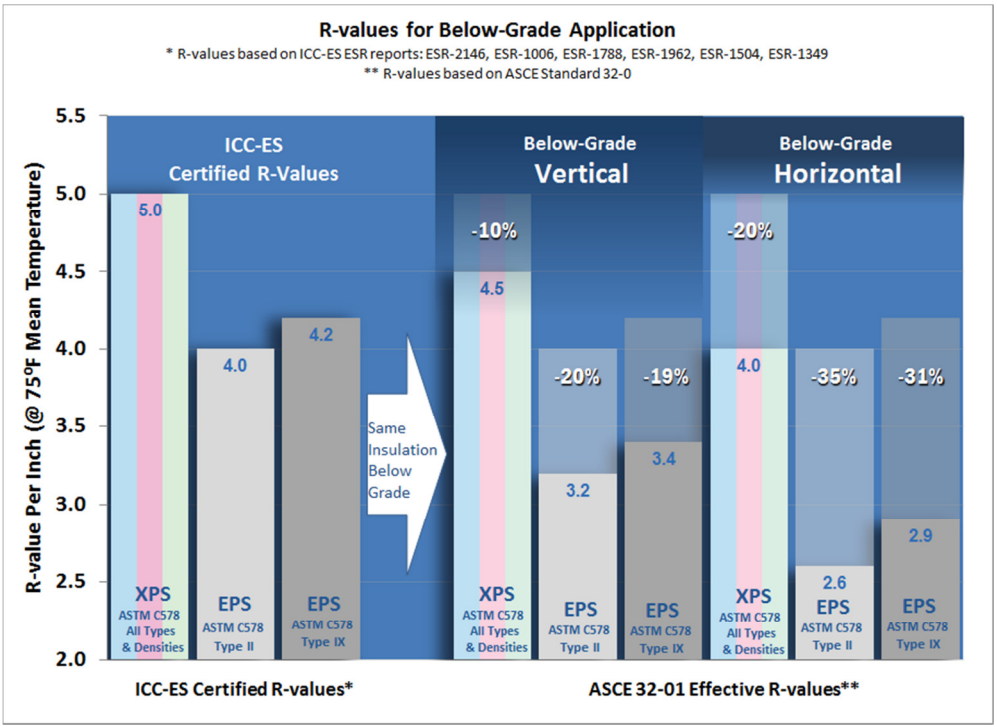

Figure 1 – Certified R-values and In-service R-values Recommended by ASCE 32

This independent ASCE industry assessment reaffirms again that XPS is able to maintain a greater percentage of the certified R-value over the long term than EPS. These R-value retention percentages are summarized in Table 1.

Table 1 – Long-Term R-value Retention Percentages for Below-Grade Insulations in ASCE 32-01

Insulation Type	Vertical Orientation Below-Grade	Horizontal Orientation Below-Grade
XPS	**90%**	**80-81%**
EPS	**80%**	**65-67%**

In summary:

- Any moisture absorbed by an insulation will reduce its in-service effective R-value.
- The EPS-IA Below-Grade Series #104 lab test result shows that XPS outperforms EPS in moisture resistance. Tests validated:
  - Even after extreme laboratory exposure conditions of ASTM C1512, XPS still absorbs less moisture than EPS during pre-conditioning and maintains a lower moisture content after environmental cycling.