



Molders Association

INFORMATION RESOURCE

EXPANDED POLYSTYRENE & MOISTURE

Bulletin 95-03

Q: Is EPS moisture resistant?

A: EPS is non-hygroscopic and does not readily absorb moisture from the atmosphere. Its closed-cell structure reduces the absorption and/or migration of moisture into the insulation material. Although EPS provides a high level of moisture resistance and breathability, recommended design practices for walls and foundations should be followed in the selection of vapor and moisture barriers for severe exposures.

Q: How does EPS rate in terms of moisture resistance?

A: A study by the Energy Materials Testing Laboratories (EMTL)¹ has shown that EPS insulation installed in well-constructed roofs does not absorb appreciable moisture, well under conditions characteristic of prolonged, cold, damp winters. The same amount of moisture absorbed (an average of 0.2% by weight) has little or no effect on its compressive or flexural strength, and the EPS insulation retains between 95% and 97% of its thermal efficiency.

Q: Does moisture affect the thermal performance of EPS insulation?

A: The widespread use of EPS insulation products has been proven over the past 30 years in both commercial and residential buildings, in a variety of applications. Extensive industry testing has confirmed that even small quantities of moisture absorption have a minimal effect on the thermal performance of EPS insulation.

For example, the Energy Division of the Minnesota Department of Public Service found that seven year old samples of EPS used in exterior foundation insulation showed moisture levels of only 0.13%. It also concluded that the EPS insulation retained between 95 and 97 percent of its thermal efficiency and that there was no effect on its compressive or flexural strength properties.

Moisture typically allows for an increase in heat transfer or conductivity. Proper design, construction techniques and choice of insulation reduce the opportunity for moisture to either leak or be driven into the insulation cavity where the thermal performance of the system may be effected.

Q: Can EPS act as a vapor barrier?

A: No, although EPS has a low water vapor transmission rate, EPS is not a vapor barrier. Rather it "breathes", and therefore does not require costly venting as do other insulation materials, which could otherwise trap moisture within walls and roof assemblies.

Q: What conditions influence the choice of a vapor barrier?

A: Each roofing application should be studied to determine the need for a vapor retardant to control internal condensation. Based on studies sponsored by the National Roofing Contractors Association and Midwest Roofing Contractors Association, vapor retardant placement for EPS insulated roof systems is less critical than for either roof insulations.²

Q: How does EPS withstand temperature cycling?

A: EPS withstands *in situ* freeze-thaw cycling without loss of structural integrity or other physical properties. Testing by Dynatech Research and Development Company of Cambridge, Massachusetts examined core specimens of EPS recovered from existing freezer walls, some as old as 16 years, prove that EPS is able to withstand the abuse of temperature cycling.

Q: In what applications does EPS have advantages over extruded foams?

A: Since density, thickness and the dimensions of EPS can be easily customized to meet individual building specifications, EPS insulation provides specifiers with increased flexibility in the design of the following applications:

- Tapered roof insulation
- EIFS architectural profiles
- Sheathing
- Below grade applications
- Geotechnical
- Structural insulated panels
- Soil stabilization

Notes:

¹ "Development of Experimental Data on Expanded Polystyrene Roofing Insulation Under Simulated Winter Exposure Conditions," R.P. Tye and C.F. Baker, The Energy Materials Testing Laboratory, 1984.

² This research project was completed by Structural Research, Inc., in August 1984, guided by a joint task force of representatives from the Midwest Roofing Contractors Association, the National Roofing Contractors Association and the Society of the Plastics Industry.