



United States

R E S I D E N T I A L



# Styrofoam

Your residing solution  
in wet environments.

STYROFOAM EXTRUDED POLYSTYRENE INSULATION

Residing offers an opportunity to increase a home's value by adding energy-saving insulation. And when insulating sheathing is being considered, water absorption is an important matter. That's because moisture can compromise an insulation's effectiveness, and it can cause damage to the underlying structure.

STYROFOAM\* extruded polystyrene insulation from Dow Building Materials† offers superior resistance to moisture for long-term insulation effectiveness in environments where exposure to water, water vapor or freeze-thaw cycles is common, like behind vinyl siding.

For your next residing job, choose the professional contractors' high-value insulation choice: STYROFOAM extruded polystyrene insulation.



\*Trademark of The Dow Chemical Company  
†A business unit of The Dow Chemical Company and its subsidiaries  
\*\*R-value means resistance to heat flow. The higher the R-value, the greater the insulating power.

## Better Insulation – Based on Building Science

Moisture absorbed by any insulation decreases its R-value\*\*. Likewise, moisture present in the cells of any cellular foam insulation decreases thermal resistance. That can lead to higher heating and cooling costs and even structural damage to the foam from freeze-thaw cycling. STYROFOAM extruded polystyrene insulation resists moisture penetration, maintaining consistent R-value over the long term. In addition, STYROFOAM extruded polystyrene insulation behind new siding can help reduce water penetration into walls, offering further protection against the elements.

A number of studies show that STYROFOAM extruded polystyrene insulation is the energy-conservation winner over expanded polystyrene insulation (EPS). According to the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), the R-value for Type 1 expanded polystyrene is 3.85 per inch thickness, while the R-value for extruded

polystyrene is 5.0 per inch thickness (per ASTM C 578). These R-values apply to dry product. Consider the performance of EPS when it is exposed to a water vapor drive, one of the worst enemies of insulation efficiency (Figure 1).

Additional documented test results demonstrate STYROFOAM extruded polystyrene insulation's long-term moisture-absorption resistance. Such reports include:

- "Insulation Performance Beneath Roads and Airfields in Alaska," by D.C. Esch, 1986, found that extruded polystyrene insulation shows superior performance and longevity after as much as 15 years of service. EPS products were less resistant to moisture absorption and must be installed at thicknesses 30 percent to 50 percent greater than extruded polystyrene.

- "Freeze-Thaw Durability of Common Roof Insulation," by the U.S. Army Cold Regions Research and Engineering Laboratory, 1997, concluded that freeze-thaw cycles deteriorate expanded bead polystyrene. The study also showed that only extruded polystyrene insulation is suitable in wet environments where vapor drives and freeze-thaw cycles occur.

R-VALUE RETENTION IN WATER VAPOR DIFFUSION TEST (28 DAYS)

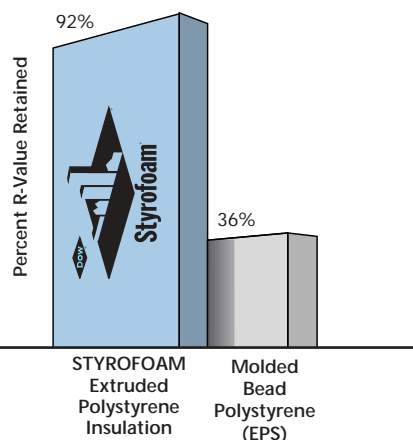


Figure 1

*This standard European water vapor diffusion test subjects insulating foam materials to temperature and vapor-pressure gradients during a 28-day exposure. This is one of the most common, yet least recognized, modes of moisture absorption.*



R-value = 5.0 per 1"  
(Nominal cross-section thickness = 0.55")  
Average R-value of foam = 2.8



R-value = 3.85 per 1"  
(Nominal cross-section thickness = 0.64")  
Average R-value of foam = 2.5

Figure 2

*When adjusted for average foam thickness, the R-value of contoured EPS foam is less than the R-value of STYROFOAM extruded polystyrene insulation.*

## Know the Real R-value

Moisture isn't the only factor that can reduce an insulation's R-value. Compression and shaping can also affect insulating value.

R-value claims can be misleading. Some vinyl siding products have a piece of foam attached to the back of vinyl siding. This foam is shaped to fit the contours of the siding, so it is thick in some places and thin in others. The R-value of such products should be based on average foam thickness, not the greatest foam thickness.

Figure 2 shows how the average foam thickness and R-value may be much less than what is claimed. A contoured foam thickness may be claimed as 1" when the average thickness is actually only 0.64" (or about 5/8"). This means the R-value of the foam would be just R-2.5 instead of R-3.85 (per the ASHRAE spec) or the even higher R-values claimed for contoured EPS foam products.

Because of its consistent thickness and higher R-value, 1/2" STYROFOAM Residing Board extruded polystyrene insulation delivers an effective R-value of 2.8. The R-value for 3/4" STYROFOAM Tongue and Groove extruded polystyrene insulation is 3.8 – and for 1" STYROFOAM Tongue and Groove insulation, it is a high-

value R-5.0. This insulating value isn't possible with contoured EPS foam.

## Get Better Protection Against Moisture

The air space between vinyl siding and STYROFOAM extruded polystyrene insulation serves as a vent channel to help dissipate accumulated moisture. Weep holes exist in most vinyl siding panels to help vent and drain moisture that gets behind the vinyl siding. Also, unlike contoured EPS, STYROFOAM extruded polystyrene insulation can serve as a wall system's secondary drainage plane. When water gets between

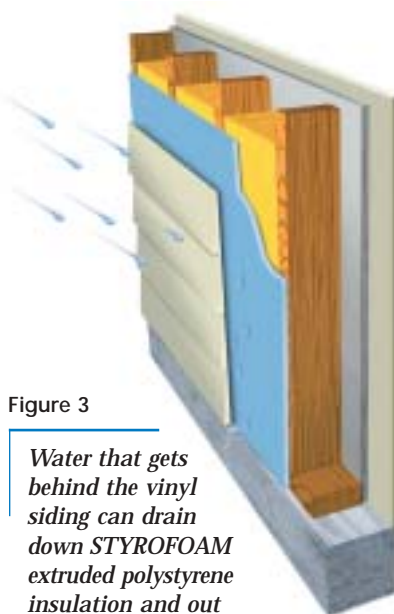


Figure 3

*Water that gets behind the vinyl siding can drain down STYROFOAM extruded polystyrene insulation and out of the wall assembly.*

## Extruded Polystyrene

- Closed-cell foam
- Low moisture-absorption rate (due to closed-cell structure)
- High retained R-value after freeze-thaw cycles (due to low moisture-absorption rate)

## Expanded Polystyrene (EPS)

- Voids in foam
- High moisture absorption rate (due to voids)
- Low retained R-value after freeze-thaw cycles (due to high moisture-absorption rate)

vinyl siding and STYROFOAM extruded polystyrene insulation, it can drain down the insulating sheathing and exit the wall structure (Figure 3). However, water that gets behind the vinyl/contoured-foam system cannot easily drain and is more likely to find its way into the wall, potentially causing a variety of problems.

STYROFOAM extruded polystyrene insulation can also serve as a building's air barrier, eliminating the need for a separate housewrap.

## Get More From Your Insulation

STYROFOAM extruded polystyrene insulation under vinyl siding provides superior performance compared to EPS, offering insulation, moisture resistance and air-barrier properties. This combination results in greater energy efficiency – and value. In addition, STYROFOAM extruded polystyrene insulation provides a flat, level surface for hanging the new siding, helping reduce time and labor at the work site.

Avoid shortcuts. Depend on the proven track record of STYROFOAM extruded polystyrene insulation products on your next residing project.



***Add value to your residing projects.  
Call your Dow representative for more information.***

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THE DOW CHEMICAL COMPANY • Building Materials • 200 Larkin • Midland, MI 48674  
FOR TECHNICAL INFORMATION: 1-866-583-BLUE (2583) • FOR SALES INFORMATION: 1-800-232-2436  
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