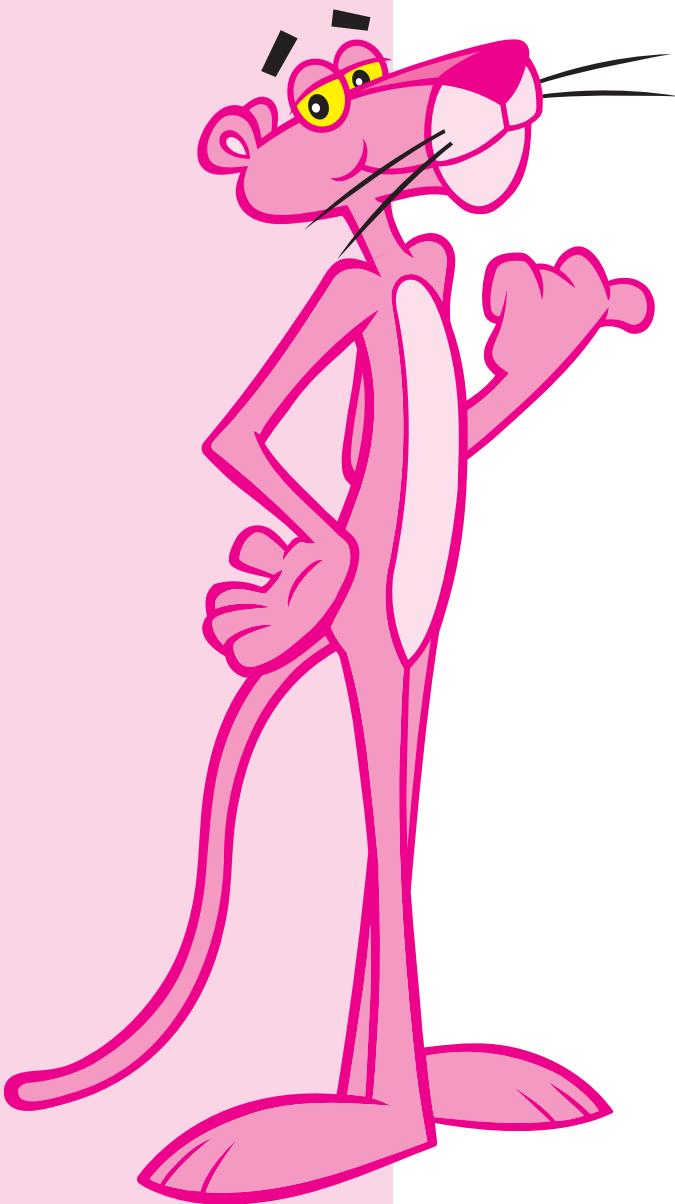




UNDER RAIN, SLEET AND SNOW – PINK FOAMULAR® INSULATION HOLDS ITS VALUE



A school construction team in Virginia recently had a rare opportunity to discover how extruded polystyrene insulation holds up under a standing seam steel roof and severe weather conditions. When the insulation in a nearly 10-year-old roofing system was tested, it retained 95 percent of its rated insulating value.

In May of 1997, builders broke ground on the construction of Monticello High School in Charlottesville. Specifications for the project included Owens Corning R-20 FOAMULAR® extruded polystyrene foam insulation in large part because the product is "hydrophobic," meaning it does not readily absorb water, and has a warranty that says it will retain 90 percent of its insulating capacity for 20 years. In early 2006, the Albemarle County School Board approved a capital improvement program

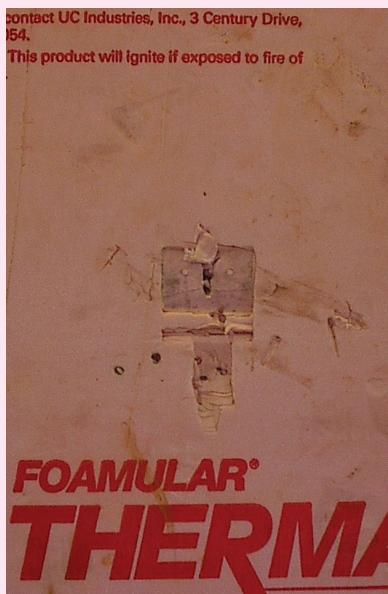


Monticello High School, Charlottesville, Virginia.

CASE STUDY



Monticello High School, Charlottesville, Virginia.



Extruded polystyrene foam insulation tested after nearly 10 years in service on a roof.

and construction began on an 850-seat auditorium addition to the high school. At the onset of construction, a sample of the **FOAMULAR** insulation used in the original buildings (now 10 years old) was removed and submitted for testing. According to Site Superintendent Paul Childers of Nielsen Builders in Charlottesville, the sample "looked brand new!"

The insulation sample was tested at the Owens Corning Science & Technology Center in Tallmadge, Ohio and found to have 95 percent of its original R-value (R-5 per inch). When compared against other ASTM C 578 Type IV specifications, the sample met or exceeded all of the property requirements. For example, when tested for Compressive Resistance, the **FOAMULAR** insulation exceeded the ASTM minimum by more than 50 percent.

Good Results in Bad Weather

These results were especially good news for the school, which is in an area of the country that experiences an average annual snowfall of 14 inches. According to the Virginia Department of Emergency Management, over the past 10 years there have been "back-to-back Nor'easters," major ice storms, freezing temperatures, and one winter in which Charlottesville recorded nearly nine inches of sleet in a single storm.

"These results show that **FOAMULAR** insulation does, indeed, deliver stable and consistent R-values over time," says Saverio Marzella, Owens Corning Field Sales Manager for foam roofing.

Marzella says there is a trend in the construction industry toward sustainable and re-usable properties in roofing materials, including insulation. "With these performance results, architects can specify **FOAMULAR** insulation with confidence, knowing it will provide stable and consistent value over time.

"Rigid insulation's compressive strength is especially important when constructing an architectural standing seam roofing system, the system specified for the high school,"

adds Marzella. "In architectural standing seam roofs, the use of rigid insulation is common and one of the critically important properties of rigid insulation is its compressive strength, which in the in-service sample has far exceeded the specification well into the life of the roof."

Jack Clark, an Architect from Rancorn Wildman Architects PLC – the firm selected for the project – added that "keeping moisture out is important in any roofing system." This is because moisture penetration can cause a permanent loss of R-value, and after repeated penetrations the insulation can become practically useless. Extruded polystyrene insulation (XPS) will not rot or decay, support fungus or mold growth, or provide sustenance for insects or vermin.

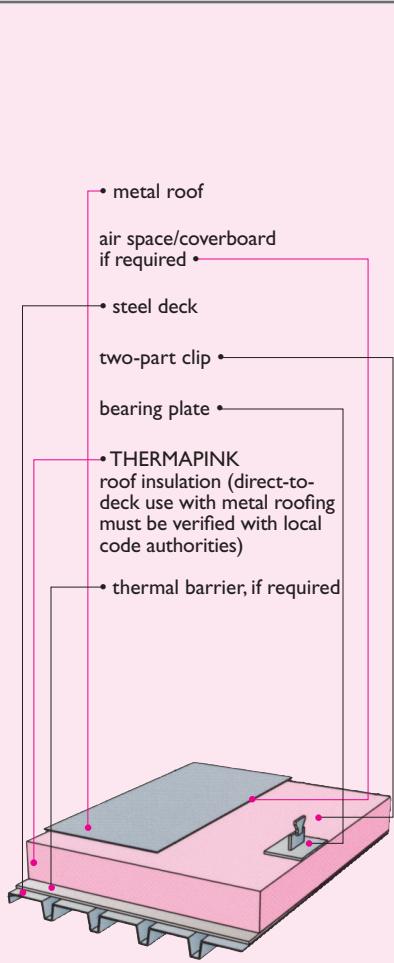
The energy cost savings is also a consideration when selecting **FOAMULAR** insulation. Extruded polystyrene insulation has a unique closed-cell structure that enables the foam to retain its exceptional long-term thermal performance year after year.

PINK and Green

Insulation products have a profound impact on the environment. A typical pound of insulation saves 12 times as much energy in its first year in place as the energy used to produce it. This means the energy consumed during manufacturing is saved during the first 4 to 5 weeks of the product's use. The insulation continues to save this amount of energy every month throughout the life of the building in which it is installed.

The performance attributes of *extruded polystyrene* – stable R-value, moisture resistance and high compressive strength – make it an excellent material choice for insulation. In a variety of harsh and unique applications, XPS is often the only product accepted by building code agencies.

Due to the thermoplastic nature of **FOAMULAR** insulation, virtually 100 percent of all in-plant scrap is recycled and reused in the primary extrusion process. In addition, the product is an excellent



Construction of an 850-seat auditorium at the high school provided an opportunity to test rigid foam insulation placed in service nearly 10 years before.

candidate for using post-consumer and post-industrial recycled and/or recovered polystyrene foam. *FOAMULAR* insulation is certified to have at least 15 percent recycled content but often contains up to 30 percent.

Owens Corning is in the process of eliminating hydrochlorofluorocarbons (HCFCs) – the blowing agents used in the manufacture of XPS – to comply with the Montreal Protocol. Several years ago, Owens Corning switched from chlorofluorocarbons (CFCs) to HCFCs, thereby reducing the emissions of concern by 90 percent. Owens Corning continues to work on viable alternatives and is committed to the elimination of all fluorocarbons with chlorine.

The increasing cost of material disposal makes the reusability of XPS an attractive option. The benefits include:

- usable insulation can be reused
- reused materials are kept out of landfills
- new replacement product resource consumption is minimized
- fossil fuel is saved in not making new insulation
- greenhouse gas emissions avoided by minimizing resource processing
- continued energy savings

According to the American Institute of Architects (AIA), buildings account for nearly half of all greenhouse gas emissions.¹ In testimony before a U.S. Senate subcommittee, AIA President R.K. Stewart said buildings are responsible for 71 percent of U.S. electricity consumption, and that buildings in the U.S. alone account for 9.8 percent of carbon dioxide (CO₂) emissions worldwide.

"The AIA believe strongly that **now** is the time to...start making significant reductions in the amount of fossil-fuel generated energy our nation consumes through its buildings," said Stewart.

Marzella points out that, "Architects, builders and owners looking for products

that are energy efficient, reduce the use of natural resources, minimize waste and reduce pollution will find that *FOAMULAR* insulation meets those objectives."

Efficient and Easy to Use

As reported earlier, extruded polystyrene insulation works very well with Standing Seam Roofing Systems.

"Extruded foam insulation is more rigid and more durable than other types of insulation, which makes it easy to work with and install," says Ronnie Life, of Life's Roofing and Remodeling in Harrisonburg, Va, the roofing contractor for the high school addition.

Because *FOAMULAR* insulation is made in a manufacturing plant, the production process and product quality can be carefully monitored and controlled for consistent performance.

Also notable, *FOAMULAR* insulation weighs considerably less than plywood, oriented strand board and other construction material, so it's easy, fast and safe to install. In addition, the product's rigidity means it can be scored and snapped, cut, or sawed with common tools.

Adding to the long-lasting and "green" aspects of the school building as a whole, the Standing Seam Roof is made with steel having a paint finish designed to last 20 years. According to the American Association of Steel Construction, "Framing systems utilizing structural steel are recycled, recyclable and reusable."

In addition, using metal roofing is "cool," according to David Taylor, of McElroy Metal. The website www.coolmetalroofing.com explains that "Cool metal roofing is a family of sustainable, energy efficient roofing products comprised of unpainted metal, prepainted metal (used in the Monticello High School addition) and granular-coated metal." The benefits of using cool metal

¹ Energy Efficient Federal Buildings, a statement by R.K. Stewart, President, American Institute of Architects, before the United States Senate, Committee on Energy and Natural Resources, Subcommittee on Energy, Feb. 12, 2007.

roofing include:

- energy efficiency
- sustainability
- durability
- low life-cycle cost
- fire and wind resistance
- lightweight
- aesthetically pleasing

"Monticello High School provided a pretty good test of insulation performance under a standing seam roof," concludes Marzella.

"It is gratifying to have proof that the FOAMULAR insulation installed there 10 years ago is still doing well."

Test Results
FOAMULAR® insulation sample from Monticello High School

	ASTM Test Method	ASTM C 578 Type IV Specification	Pass/Fail
Density, pcf	D 1622	1.55 min.	Pass
Compressive Resistance, psi	D 1621	25.0 min.	Pass
Thermal Resistance, 75°F. Mean, FT ² -HR-°F/BTU	C 518	5.0 min.	Pass
Flexural Strength, psi	C 203, Method I Procedure A	50.0 min.	Pass
Water Vapor Permeance, perm	E 96	1.1 max.	Pass
Water Absorption, vol. %	C 272	0.30 max.	Pass
Dimensional Stability, %	D 2126	2.0 max.	Pass
Oxygen Index, volume %	D 2863	24.0 min.	Pass

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