



**IMPROVE ENERGY EFFICIENCY AND MOISTURE
PERFORMANCE OF FOUNDATIONS**

BUILD VALUE AND PERFORMANCE INTO YOUR HOME



Homes have one thing in common: Their foundations must come in contact with the earth. So wherever you build, moderating the effects of soil, water, temperature and air on the foundation can impact the performance and integrity of the total structure.

Continuous foam insulation – from footing to sill plate – is an effective way to reduce foundation energy loss and protect against moisture problems. In addition to offering exceptional, long-term thermal performance, STYROFOAM™ Brand Extruded Polystyrene (XPS) Foam Insulation and polyisocyanurate insulation products from Dow:

- Enhance drainage on exterior of foundation walls (STYROFOAM™ Brand PERIMATE™ Insulation)
- Insulate the interior or exterior below-grade wall to reduce the potential for condensation on the interior
- Protect the waterproofing membrane on exterior of foundation walls
- Provide a more comfortable environment throughout the home



*Continuous insulation from footing to sill plate on basement walls can reduce the average home heating and cooling bill by hundreds of dollars per year.**

REDUCE ENERGY LOSS

Concrete is a highly heat-conductive material. In an uninsulated or poorly insulated basement, heat escapes through two paths:

- Horizontally through the wall into the earth below grade
- Vertically through the concrete wall and into the air above the grade line

Insulating the exterior or interior of the foundation wall slows both vertical and horizontal heat flow through the wall, helping to mitigate conditions that cause energy loss.

Sealing the gap between the foundation wall and the sill plate with STYROFOAM™ Brand Sill Seal Foam Gasket reduces air infiltration and moisture wicking from the concrete foundation into the wood sill plate.



Insulating basement walls with R-10 insulation from siding to footing can reduce basement heat loss by approximately 70 percent.*

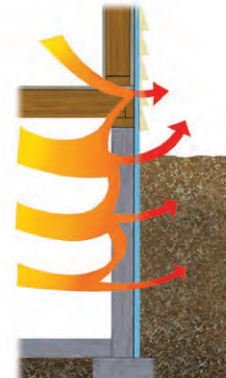
THE TYPICAL U.S. FAMILY SPENDS ABOUT \$1,900 A YEAR ON HOME UTILITY BILLS.**



Alone, concrete offers very little resistance to heat flow. For example, a 7" thick slab of poured concrete has the same R-value as a pane of glass (R-1.5).

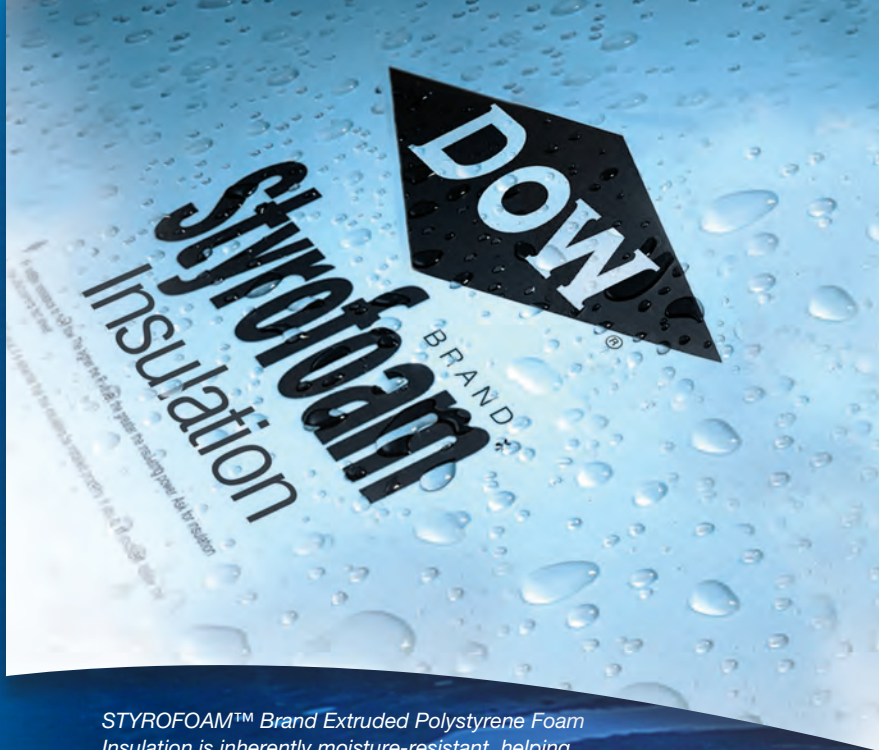


In an uninsulated concrete wall, heat flows horizontally and vertically.



Insulating with rigid foam (exterior insulation shown here) slows heat loss from both directions.

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*R means resistance to heat flow. The higher the R-value, the greater the insulating power.
Based on a heated basement with 1' exposed foundation. Source: www.inspectapedia.com
**Source: www.eere.energy.gov



STYROFOAM™ Brand Extruded Polystyrene Foam Insulation is inherently moisture-resistant, helping defend against moisture penetration.

MANAGE MOISTURE

Foundation walls exist in a typically wet environment caused by rain, melting snow or the water table. The concrete and cement block commonly used to build most foundation walls absorbs water from the soil and allows it to move through the wall.

Much of this movement is due to capillary action: Water moves from an area of high concentration to low concentration, often against gravity. Water can also pass directly through cracks in the basement wall.

EXTERIOR INSULATED BASEMENT

When building a home, adding a continuous layer of STYROFOAM™ Brand Extruded Polystyrene Foam Insulation to the exterior of basement walls is one of the most important steps you can take to protect your home from the damaging effects of moisture.

With an R-value of 5.0 per inch, moisture-resistant STYROFOAM™ Brand XPS Foam Insulation:

- Protects the waterproofing membrane from damage caused by backfill
- Keeps the wall warm, reducing the potential for condensation on the interior surface of the wall
- Resists water absorption and compression from soil loads, retaining its thermal performance

FIGURE 1:

STYROFOAM™ Brand PERIMATE™ Insulation	
R-Value*, min. (Btu/°F•ft²•h), per ASTM C518, measured at 75°F mean temperature	R-10 (for 2.13" thick product with drain channels)
Water Absorption, max. (% by vol.), per ASTM C272	0.3

STYROFOAM™ Brand PERIMATE™ Insulation is covered by a 50 year Limited Thermal Warranty (for further information see <http://building.dow.com/na/en/tools/warranty.htm>)

See ICC-ES ESR-2142 Report for verification of ASTM C578 Type IV and IRC building code compliance.



The most common problem home inspectors find in homes less than 12 years old is basement leaks.

Source: USA Today

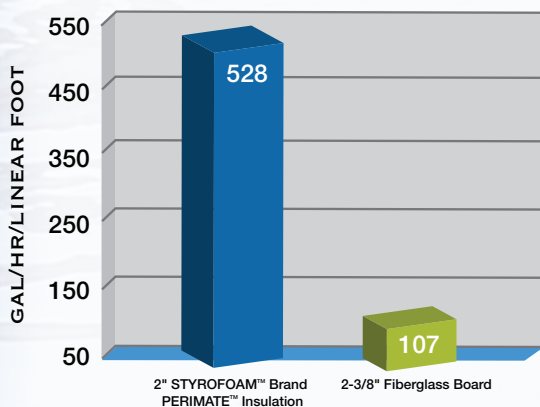
STAND UP UNDER PRESSURE

A typical basement wall is bombarded with pressure from non-moving water, and this hydrostatic pressure increases at greater depths. Without proper drainage, water can pool at the lowest point on the wall. Pressure builds up, and the water seeks a path right through cracks in the foundation.

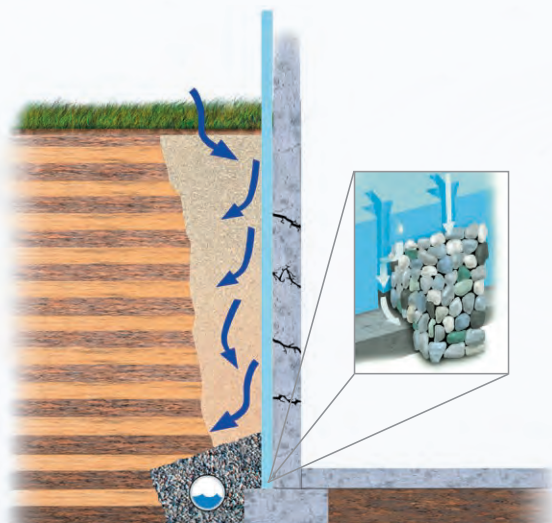
Waterproofing can resist hydrostatic pressure, but waterproofing and damp-proofing should be complemented with a means to drain water away from the foundation, such as STYROFOAM™ Brand PERIMATE™ Insulation. It has drainage grooves to direct water down to the drainage tile and away from the foundation, which reduces hydrostatic pressure against the wall (Figure 2).

FIGURE 2: STYROFOAM™ BRAND PERIMATE™ INSULATION WITHSTANDS PRESSURE

THIRD-PARTY TEST RESULTS AT 600 LBS/FT² SOIL PRESSURE



STS Consultants Ltd., located in Vernon Hills, Ill., performed lateral transmissivity tests (flow or drainage rate testing) following ASTM D4716 on various foundation drainage products. Each test used normal stresses of 200-1,200 lb/ft² in 200 lb/ft² increments and a 1.0 gradient. Gradient is the height of the water divided by length of sample, which produces a certain water pressure that forces water through the sample. Project report: *Laboratory Testing of Drainage Products* – STS Project No. 29280-C, October 6, 2003.

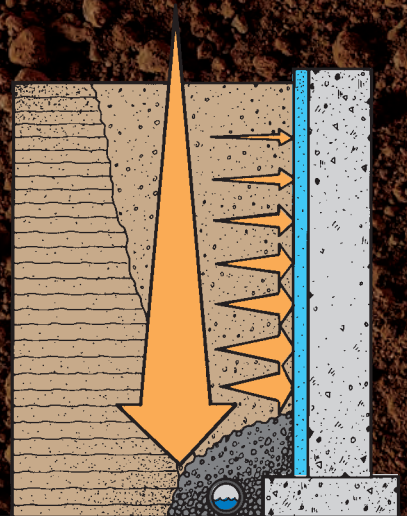


STYROFOAM™ Brand PERIMATE™ Insulation effectively directs water away from foundation walls toward the drainage tiles.

HANDLE A HEAVY LOAD

Below grade, soil exerts a great deal of pressure on a basement foundation wall. As the soil weight presses downward, it also exerts a horizontal (lateral) pressure. Insulation or drainage material without sufficient compressive strength is unable to resist this pressure and compresses, reducing R-value and drainage capability.

STYROFOAM™ Brand XPS Foam Insulation has the necessary compressive strength to fully resist soil pressures over the life of the building.



At 8' below grade, lateral soil pressure against the basement wall can be as much as 1,000 lb/ft².

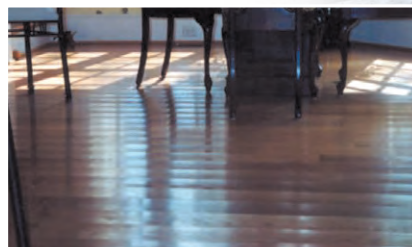
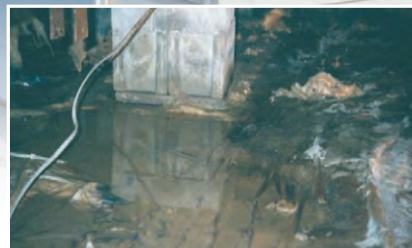
KEEP CRAWL SPACES DRIER

The practice of adding vents to crawl space walls is meant to help dry out the crawl space area. However, vents actually allow moisture to enter the crawl space, and do little to help it dry out.

Moisture that enters through these vents clings to floor joists, batt insulation, HVAC equipment and plumbing fixtures. In this moist environment, mold and mildew can quickly degrade the space's contents, as well as compromise indoor air quality. In addition, wood-eating insects, dust mites and small creatures can enter through the vents to take up residence.

A popular alternative to the vented crawl space is the unvented, properly insulated crawl space. Rigid foam insulation serves an important role in an unvented crawl space, helping keep the area dry and the home more energy efficient. THERMAX™ Sheathing polyisocyanurate insulation and STYROFOAM™ Brand XPS Foam Insulation products can be left exposed on crawl space walls as stated in ICC NER-681 and ESR-2142, respectively.

Rigid foam insulation on the interior of unvented crawl space walls keeps the crawl space warmer, reducing the potential for condensation and related moisture issues.



Photos courtesy of Jeff Tooley, owner of The Healthy Building Company

Moist air in a vented crawl space can migrate to the interior of the home, increasing indoor humidity levels. One consequence of increased humidity is wood components and furnishings absorbing moisture, which can cause warping and swelling.



SLAB-ON-GRADE

Building codes require that a foundation extend below the local frost line. In cold climates, this can mean a foundation is more than 5' below grade.

In a slab-on-grade radiant floor heating design, concrete disperses hot water heat from radiant heat tubes. Without adequate insulation, this heat can be lost as it moves toward the edges of the slab or downward to the soil. Rigid foam insulation at floor edges and under the slab helps keep heat in the house, maintaining a comfortable floor temperature while saving energy.

As part of a frost-protected shallow foundation, STYROFOAM™ Brand XPS Foam Insulation allows the construction of a much shallower foundation, which saves on building costs.* The insulation regulates heat loss around the foundation and changes the depth of frost penetration into the soil under frost-protected shallow foundations.

Note: In states with heavy termite infestation (Alabama, California, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina and Eastern Texas), rigid foam insulation in new construction is not allowed in contact with the soil on the exterior foundations of home or light construction where wood is found in the structural components of construction. Contact a Dow representative for alternative insulation methods for these areas.



INTERIOR INSULATED BASEMENT

Rigid foam insulation from Dow can be installed on the interior of masonry walls with no need for studs or a vapor barrier, providing a solid layer of moisture-resistant insulating comfort.

For example, STYROFOAM™ Brand WALLMATE™ Insulation with slotted vertical edges is installed on the interior of basement walls with furring strips and covered with gypsum board for a finished appearance. Also, THERMAX™ Sheathing with its reflective foil facers or THERMAX™ White Finish Insulation with an embossed white acrylic-coated aluminum facer can be installed on the interior of basement walls and be left exposed to the basement without a thermal barrier, for a semi-finished appearance.

ACHIEVE A TIGHT SEAL

FROTH-PAK™ Foam Insulation is a two-component, quick-cure polyurethane foam that fills cavities, such as rim or band joists, for insulation and air sealing. The Class-A rating (flame spread of 25 or less) allows its use in residential wall and crawl space applications.



Designed to fill gaps up to 3", **GREAT STUFF PRO™** Gaps & Cracks Insulating Foam Sealant forms a permanent, airtight and water-resistant bond when applied properly. Recently, Dow conducted a study of existing homes to help quantify the energy savings of **GREAT STUFF PRO™** Gaps & Cracks Insulating Foam Sealant. Application of the foam took 2 hours and 8 minutes on average. The average return on investment ranged from 145 percent to 2300 percent in one year. Results varied depending on the air leakage location, amount of air sealing and individual home characteristics.



For more information on how to build performance and value into your home, call a Dow representative today.

THE DOW CHEMICAL COMPANY • Dow Building Solutions • 200 Larkin • Midland, MI 48674

For Technical Information: 866-583-BLUE (2583) • For Sales Information: 800-232-2436

www.insulateyourhome.com

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STYROFOAM™ Brand Extruded Polystyrene Foam Insulation

CAUTION: This product is combustible. Protect from high heat sources. A protective barrier or thermal barrier may be required as specified in the appropriate building code. For more information, consult MSDS, call Dow at 866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 989-636-4400.

Dow Polyisocyanurate Insulation

CAUTION: This product is combustible and shall only be used as specified by the local building code with respect to flame spread classification and to the use of a suitable thermal barrier. For more information, consult MSDS, call Dow at 866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 989-636-4400.

WARNING: Rigid foam insulation does not constitute a working walkable surface or qualify as a fall protection product.

Dow Polyurethane Foam Insulation and Sealants

CAUTION: These products are combustible and will burn if exposed to open flame or sparks from high-energy sources. Do not expose to temperatures above 240°F. For more information, consult MSDS, call Dow at 866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 989-636-4400.

FROTH-PAK™ Polyurethane Spray Foam contains isocyanate, hydrofluorocarbon blowing agent and polyol. Read the instructions and Material Safety Data Sheets carefully before use. Wear protective clothing (including long sleeves), gloves, goggles or safety glasses, and proper respiratory protection. Supplied air or an approved air-purifying respirator equipped with an organic vapor sorbent and a P100 particulate filter may be required to maintain exposure levels below ACGIH, OSHA, WEEL or other applicable limits. Provide adequate ventilation. Contents under pressure.

GREAT STUFF PRO™ Insulating Foam Sealants contain isocyanate and a flammable blowing agent. Read the label and Material Safety Data Sheet carefully before use. Eliminate all sources of ignition before use. Wear long sleeves, gloves, and goggles or safety glasses. Provide adequate ventilation or wear proper respiratory protection. Contents under pressure.

Building and/or construction practices unrelated to building materials could greatly affect moisture and the potential for mold formation. No material supplier including Dow can give assurance that mold will not develop in any specific system.



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