

Tech Solutions 511.0

DuPont™ Styrofoam™ Brand Extruded Polystyrene Foam Insulation for Foundations

Advantages

Exterior

- Block or concrete walls insulated on the exterior surface are not subjected to large temperature differences and so will not act as a thermal bridge.
- Foundation walls with exterior insulation take advantage of the thermal mass effect, providing energy savings.
- Insulating exterior walls also helps maximize interior usable space.

Interior

- Insulating interior walls is an effective way to save energy, manage moisture and enhance indoor comfort.
- Moisture-resistant DuPont™ Styrofoam™ Brand XPS Insulation can often be installed directly against masonry walls, without need of a vapor barrier.

Note: Insulation will not prevent bulk water entry, so any necessary wall repairs should be completed before installation.

Under Slab

Insulating slabs helps protect the wearing surface (floor) from frost heave and cracking, and prevents heat loss through the floor.

DuPont™ Styrofoam™ Brand Extruded Polystyrene (XPS)

Insulation products can outperform many other products in exterior foundation applications.

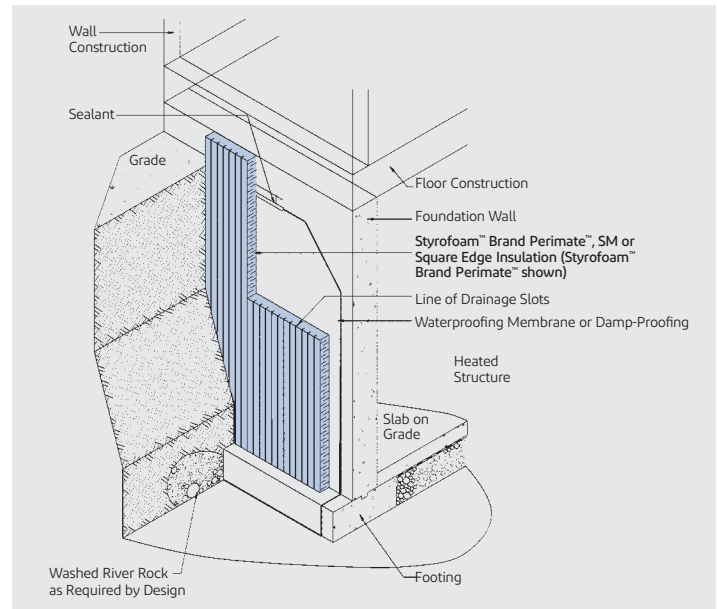


Figure 1

Table 1: Typical Physical Properties of Styrofoam™ Brand Extruded Polystyrene Insulation for Foundation Applications

Property and Test Method	Value
Thermal Resistance per in. (25 mm), ASTM C518, C177, ft ² ·h·°F/Btu (m ² ·°C/W), R-value (RSI) ⁽¹⁾ , min.	
@75°F (24°C) mean temp.	5.0 (.87)
@40°F (4°C) mean temp.	5.4 (.95)
@25°F (-4°C) mean temp.	5.6 (.99)
Compressive Strength ⁽²⁾ , ASTM D1621, psi (kPa), min.	
Styrofoam™ Brand Perimate™	30 (210)
Styrofoam™ Brand SM (Canada)	30 (210)
Styrofoam™ Brand Square Edge (U.S.)	25 (170)
Styrofoam™ Brand Highload 40	40 (275)
Styrofoam™ Brand Highload 60	60 (420)
Styrofoam™ Brand Highload 100	100 (690)
Water Absorption, ASTM C272, % by volume, max.	0.1
Water Absorption, ASTM D2842, % by volume, max.	0.7
Maximum Use Temperature, °F (°C)	165 (74)
Coefficient of Linear Thermal Expansion, ASTM D696, in/in·°F (mm/m·°C)	3.5 x 10 ⁻⁵ (6.3 x 10 ⁻²)

⁽¹⁾ Values are consistent with criteria of ASTM C578. RSI (R-value Système International) is the metric equivalent of R-value.

⁽²⁾ Vertical compressive strength is measured at 10 percent deformation or at yield, whichever comes first. Since Styrofoam™ Brand Extruded Polystyrene Insulation is a visco-elastic material, adequate design safety factors should be used to prevent long-term creep and fatigue deformation. For static loads, 3:1 is suggested. For dynamic loads, 5:1 is suggested.

Design Considerations

Insulation:

Recommended products: **DuPont™ Styrofoam™ Brand XPS Insulation** meeting ASTM C578 Type IV or CAN/ULC S701 Type 4

- **DuPont™ Styrofoam™ Brand Perimate™ Insulation**
- **DuPont™ Styrofoam™ Brand SM Insulation (Canada)**
- **DuPont™ Styrofoam™ Brand Square Edge Insulation (U.S.)**

DuPont™ Styrofoam™ Brand Square Edge or **Styrofoam™ Brand SM Insulation** is recommended for many interior and exterior foundation applications.

Where additional drainage is required, **DuPont™ Styrofoam™ Brand Perimate™ Insulation** should be considered as the exterior foundation wall insulation.

The insulation boards are applied vertically to the wall (horizontally for slab on grade or shallow foundation applications) and are secured at the top with a compatible adhesive or by nailing to the wall. Backfilling against the insulation will hold the lower portion of the boards in place. The insulation should extend from the top of the foundation wall to the top of the footing.

DuPont™ Styrofoam™ Brand Perimate™ Insulation is a CCMC Class A Type 2 drainage layer.

Waterproofing and Damp-proofing:

Waterproofing and dampproofing materials should not be used for adhering the insulation. The insulation should be installed once the damp-proofing has cured sufficiently, as the solvents in some of these materials may attack polystyrene insulation.

Protective Covering:

Protect the above-grade portion of **DuPont™ Styrofoam™ Brand XPS Insulation** from physical damage and direct exposure to sunlight (i.e., ultraviolet degradation). Depending on the extent of protection needed, options include a cementitious or thin stucco coating, application of a fiberglass reinforced plastic or vinyl sheet, or a metallic covering. Flashing should be installed over the top edge of the insulation and protective covering.

Slab on Grade

Insulation:

Recommended products:

- **DuPont™ Styrofoam™ Brand SM Insulation (Canada)**
- **DuPont™ Styrofoam™ Brand Square Edge Insulation (U.S.)**

The insulation boards are applied horizontally to the interior of the foundation wall and are initially secured at the top with an adhesive compatible with polystyrene insulation based on CGSB specification #71-GP-24M. Backfilling against the insulation will hold the boards firmly in place.

The insulation should extend from the bottom of the floor slab to the top of the footing.

Under Slab

Insulation:

Recommended products:

Typical under slab

- **DuPont™ Styrofoam™ Brand SM Insulation (Canada)**
- **DuPont™ Styrofoam™ Brand Square Edge Insulation (U.S.)**

Expected high loads (from mechanical equipment, etc.)

- **DuPont™ Styrofoam™ Brand HIGHLOAD 40, 60 or 100 Insulation**

The insulation boards should be placed snugly around the perimeter of the foundation wall and laid directly over the well-compacted porous fill. The insulation is laid loose with the edges butted tightly together. However, if wind uplift may be a problem before the concrete slab is poured, secure the insulation boards to the ground with 1/4" (6 mm) diameter wood skewers, which should be at least 3" (75 mm) longer than the thickness of the **DuPont™ Styrofoam™ Brand XPS Insulation**.

Vapor Barrier:

The vapor barrier, if used, is laid over the top of the insulation and under the entire floor slab area.

Weepers:

Weepers should be included on the inner face of the foundation wall if the soil conditions do not provide sufficient drainage.

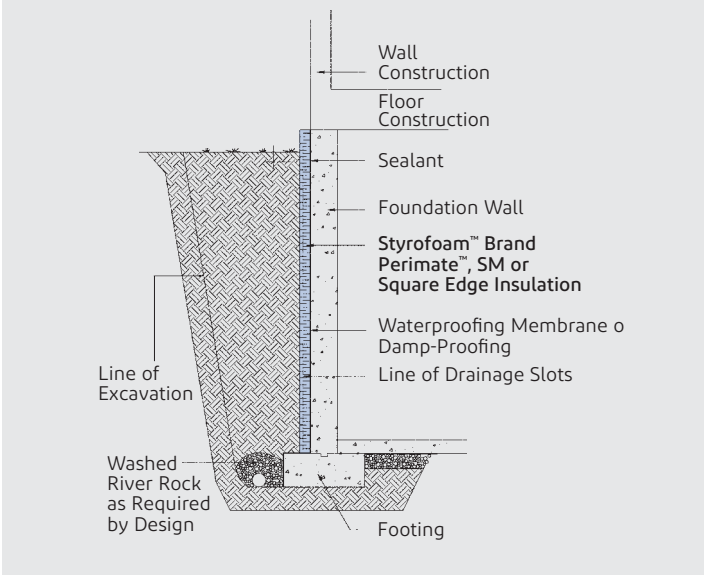


Figure 2: Typical Exterior Foundation Wall Insulation

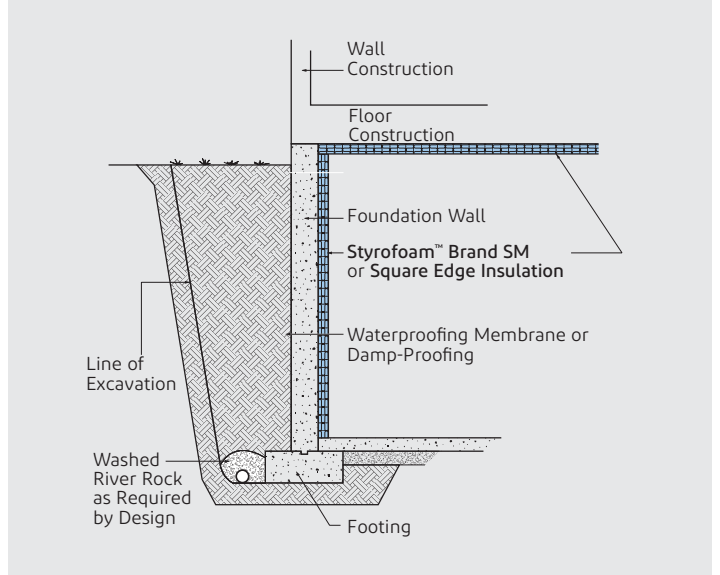


Figure 3: Typical Interior Foundation Wall Insulation

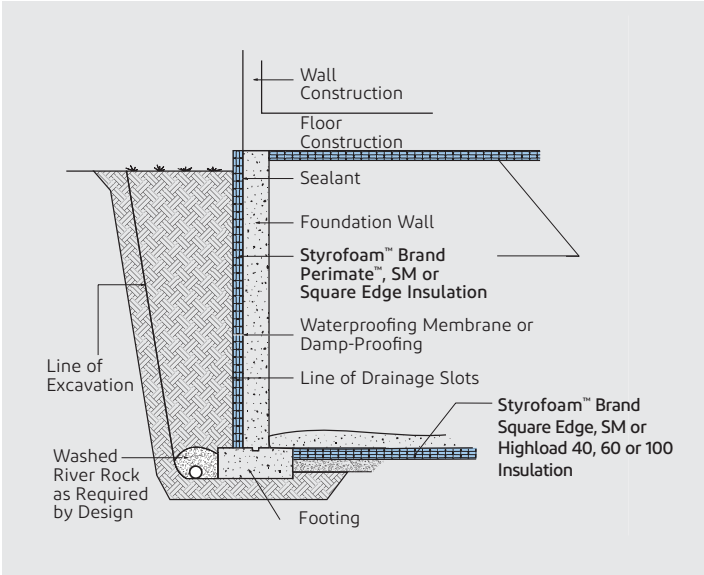


Figure 4: Typical Under Slab Foundation Insulation



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