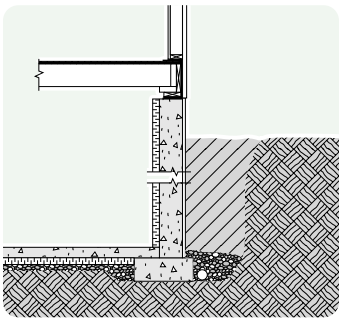
Plasti-Fab™ EPS PRODUCT SOLUTIONS

PlastiSpan™ Insulation

Foundation Insulation:
Selection, Application and Specification

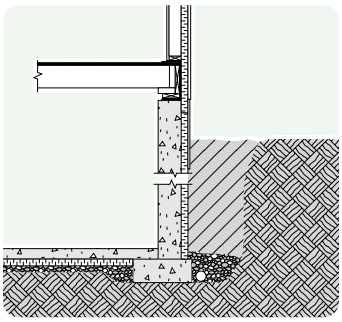
This brochure provides design notes, application instructions and specifications applicable to PlastiSpan building insulation for foundation applications. The required installation method varies dependent upon the membrane to be applied above the insulation. The selection chart below indicates additional brochures, which should be reviewed for complete information on the use of PlastiSpan insulation for foundation applications.

Interior Wall Insulation



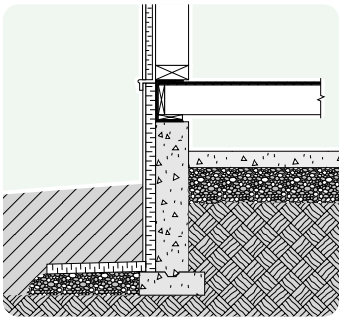
- Exposed interior surface covered with a thermal barrier
- Monolithic thermal blanket eliminates thermal shorts

Exterior Wall Insulation



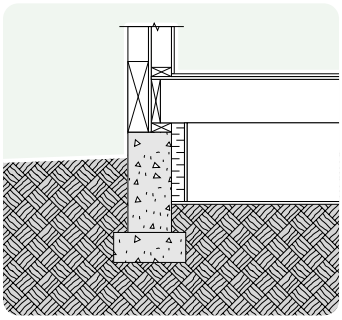
- Attached directly to the foundation wall surface
- Provides the advantage of a fully insulated warm wall
- Isolates the foundation wall from outdoor temperature fluctuations

Frost Protected Shallow Foundations



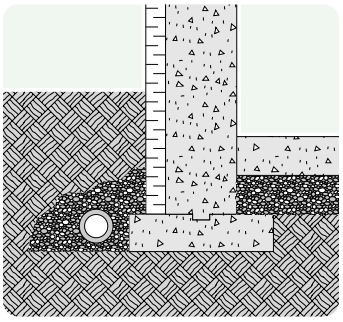
- Allows footing construction above expected frost penetration
- Prevents frost heaving of foundations

Perimeter Foundation Insulation



- Can be used on interior or exterior of foundation wall
- Use of wall and floor insulation decreases heat loss at perimeter

GeoDrain® Foundation Insulation



- Provides both insulation drainage capability
- Continuously insulated wall

Design Notes

Topics discussed in these design notes include the insulation of foundations. Plasti-Fab PlastiSpan expanded polystyrene (EPS) insulation is suitable for all of these applications.

Energy conservation studies have identified that substantial heat losses occur from the foundations of buildings. When considering the viability of foundation insulation, the cost of energy has to be considered along with the comfort requirements of the building occupants. Another factor that is often ignored is the added durability of a properly insulated structure as a result of avoiding condensation and freeze-thaw conditions.

The application of insulation externally to a building foundation provides several beneficial effects. It allows for a monolithic insulation layer. As well, the mass of the foundation wall is inside the insulation, which reduces temperature fluctuation inside the building, condensation and freeze-thaw conditions. The insulation is required to be in contact with the soil and must be capable of retaining its insulation properties in this service.

PlastiSpan insulation products are suitable and recommended for use in contact with the ground. They are lightweight, easy to handle rigid thermal insulation materials. Their closed cell structure assures long lasting thermal insulation properties. PlastiSpan insulation is inert to a wide range of chemicals, has no food value and will not support the growth of insects, parasites, animal or plant life.

PlastiSpan insulation has been used successfully for over 30 years in contact with the soil. Perhaps a more striking demonstration of PlastiSpan successful service is it's use as a buoyancy block under rafts and docks that have remained in use for over 20 years.

The table on the back cover of this brochure provides material properties for the three standard Plasti-Fab PlastiSpan insulation products.

National Building Code

The National Building Code 1995 permits the use of PlastiSpan insulation for any of the insulation applications highlighted in this brochure. When used below-grade, PlastiSpan insulation is one component in a system whose purpose is to minimize heat loss and, in turn, the energy consumption in that portion of the building envelope. As with any product, the successful use of PlastiSpan insulation depends upon its correct installation in accordance good building practice.

The effect of moisture on the below-grade portion of the building structure will be highlighted throughout the paper. Moisture is an important consideration not only from the point of view of its effect on the thermal resistance of insulation, but also from the point of view that inadequately drained moisture may penetrate the building envelope resulting in damage to other components of the structure. Therefore, the importance of including adequate provision for drainage of free moisture is stressed in order to ensure successful use of PlastiSpan insulation in below-grade applications.

Adhesives

Adhesives can be used to bond the insulation in place on a concrete or concrete block wall and may also be used to provide an air or vapour barrier for the wall system. PlastiSpan insulation will deteriorate when in contact with petroleum solvents used to formulate many adhesives. Therefore, any adhesive used in contact with PlastiSpan insulation must be recommended by the adhesive manufacturer for use with foam plastic insulation.

Fasteners

A number of patented fasteners can be used to fasten insulation. Typically, the fasteners require a pilot hole to be drilled through the insulation and substrate with a fastener screwed or hammered into the hole.

When a fastener is used to hold the insulation in place it is used with a 25 mm (1") outside diameter prepunched fibre washer under the head to provide a larger bearing surface for the fastener.

Concrete Fasteners

Concrete fasteners are also suitable for many applications. Concrete fasteners are designed to fasten a nailer, strap, or bracket onto concrete or masonry walls. A close tolerance carbide drill bit is used with a hammer drill to make a pilot hole into the concrete or masonry. The concrete fastener is driven into the pilot hole with a hammer to provide quick and easy attachment. Minimum embedment of 25 mm (1") is recommended.

Thermal Resistance of Foundation Walls

The thermal resistance required for the foundation walls of a building depends on the climatic conditions in the area in which the building is constructed. The thermal resistance required for buildings is discussed in PlastiSpan Technical Bulletin "Recommended Thermal Resistances for Canadian Buildings." The calculation methods provided in this bulletin are based upon the requirements of the Model National Energy Code for Houses (MNECH) and Model National Energy Code for Buildings (MNECB). These documents establish a standard of construction for those features of small residential buildings that affect their energy efficiency.

Application

PREPARATION

Concrete Walls

Surfaces to be level, straight and clean. Remove fins or projections left after stripping concrete forms. If surfaces are not straight make good with mortar.

Masonry

Surfaces are plumb and straight with mortar joints cut flush with masonry.

Fill

Well compacted and level. Use 50 mm to 150 mm (2" to 6") of sand or fine gravel over fill to level to grade as shown on plans.

Vapour Barrier

If required place over substrate before insulation is placed.

APPLICATION

Insulation Laid Dry

Butt boards together tightly with staggered joints. Cut to fit around projections so as to provide a complete blanket of insulation.

Insulation – Bonded With Adhesive to Provide Temporary Placement

Adhere insulation to wall by placing 38 mm (1-1/2") spots of adhesive on insulation at edges and pressing insulation into place with a slight sliding motion.

Insulation - Bonded With Adhesive for Permanent Placement

Adhere insulation to wall by placing 25 mm (1") spots of adhesive on the insulation at 300 mm (12") o.c. each way and pressing insulation into place with a slight sliding motion.

Insulation - When Mechanical Fastening is Required

Use concrete fasteners with 25 mm (1") fibre washers. Drill pilot hole into substrate to provide a minimum of 125 mm (1") of embedment. Drive concrete fastener into hole with a hammer.

Specifications

Part 1 – General

(See Note 1)

Related Work Specified Elsewhere

(See Note 2)

Qualifications

Insulation shall be installed by mechanics skilled in this work in strict accordance with manufacturer's printed instructions.

Submittals

Submit samples and manufacturer's literature for approval before ordering materials and proceeding with the work.

Delivery, Storage and Handling

Deliver and store materials undamaged in original taped bundles.

Protect plastic foam insulation from prolonged exposure and sunlight (over four summer days). Store under light coloured tarpaulins. If surface becomes yellow and degraded, broom surface back to original colour.

Protection

Provide adequate protection of materials and work of this trade from damage by weather, traffic and other causes.

Protect work of other trades from damage resulting from work of this trade. Make good such damage at own expense to satisfaction of owner's representative.

Part 2 – Products

MATERIALS

Insulation

(See Note 3)

PlastiSpan expanded polystyrene insulation manufactured by Plasti-Fab, conforming to CAN/ULC-S701-M, Type 2; to provide (specify RSI/R-Value required). (See Note 4)

PlastiSpan HD expanded polystyrene insulation manufactured by Plasti-Fab, conforming to CAN/ULC-S701-M, Type 2 to provide (specify RSI/R-Value required). (See Note 4)

PlastiSpan expanded polystyrene insulation manufactured by Plasti-Fab, conforming to CAN/ULC-S701-M, Type 3; to provide (specify RSI/R-Value required). (See Note 4)

Adhesive

Asphalt mastic - only as recommended by manufacturer for use with expanded polystyrene insulation at room temperatures. (See Note 5)

Sheathing Membrane

At least one layer of approved sheathing membrane (e.g. building paper) lapped at joints.

Fasteners

Large head nails. Common nails with 25 mm (1") prepunched fibre washers.

Part 3 – Execution

Inspection

Check that:

Concrete surfaces are level, straight and clean and that fins or projections left after stripping of concrete forms have been removed.

Masonry surfaces are plumb level, straight and clean with mortar joints struck flush with masonry.

Portland cement plaster has been applied, where necessary to straighten surfaces.

Application

Workmanship shall be the best standard practice for this type of work and shall be done in accordance with instructions contained in the following PlastiSpan Foundation Insulation brochures:
(See Note 6)

- Exterior and Interior Foundation Walls
- Exterior Perimeter Foundation Insulation Systems
- Frost Protected Shallow Foundation
- GeoDrain Foundation Insulation Board

Finish Materials (See Note 5)

Clean-Up

Promptly as the work proceeds and on completion, clean up and remove from the site all debris and surplus materials resulting from the work of this trade.

Specifications Notes

1. This specification is basic and must be adapted to suit the requirements of individual projects. It is written in accordance with the Construction Specifications Canada three-part format and should be included in a separate section under Division 7 - THERMAL AND MOISTURE PROTECTION.
2. Insert list of other Divisions or other sections of this division where related or allied work is specified.
3. Delete insulation not required. See Design Notes; Page 2 of this brochure for recommendations.
4. Select thickness according to location of construction. Model National Energy Code for Houses (MNECH) and Model National Energy Code for Buildings (MNECB) establish recommended effective thermal resistance values for building elements in various locations across Canada.
5. Use only adhesives recommended for use in contact with foam plastic insulation.
6. Application may be specified by reference to the appropriate Plasti-Fab foundation insulation system brochure.
7. Specify finish materials under the appropriate section of Division 9 - FINISHES.

PlastiSpan Insulation Properties

MATERIAL PROPERTIES	TEST METHOD	METRIC (SI) UNITS	CAN/ULC-S701			IMPERIAL UNITS	CAN/ULC-S701		
			TYPE 1	TYPE 2	TYPE 3		TYPE 1	TYPE 2	TYPE 3
Thermal Resistance [1] Minimum	ASTM C 518	$\frac{m^2 \cdot °C}{W}$	0.65	0.70	0.74	$\frac{ft^2 \cdot hr \cdot °F}{BTU}$	3.75	4.04	4.27
Compressive Resistance Minimum @ 10% Deformation	ASTM D 1621	kPa	70	110	140	psi	10	16	20
Flexural Strength Minimum	ASTM C 203 Procedure B	kPa	170	240	300	psi	25	35	44
Water Vapour Permanence [2] Maximum	ASTM E 96	$\frac{ng}{Pa \cdot s \cdot m^2}$	300	200	130	perms	5.2	3.5	2.3
Dimensional Stability Maximum	ASTM D 2126 7 days @ 70 ± 2° C	% linear change	1.5	1.5	1.5	% linear change	1.5	1.5	1.5
Water Absorption Maximum	ASTM D 2842	% by volume	6.0	4.0	2.0	% by volume	6.0	4.0	2.0
Limiting Oxygen Index [3] Minimum	ASTM D 2863	%	24	24	24	%	24	24	24

NOTES:
1. Thermal resistance measured at mean temperature of 24°C (75°F) for 25 mm (1 inch) thick material.
2. Values quoted are maximum for 25 mm (1 inch) thick material. Lower values will result for thicker materials.
3. PlastiSpan insulation board has a maximum Flame Spread Rating of 290 and a Smoke Developed Rating greater than 500 for minimum thickness of 25 mm classified in accordance with CAN/ULC–S102.2M.

FSAS – 0406

ECP-Certified Insulation