

## INSTALLATION PROCEDURES FOR THERMAX™ OR STYROFOAM™ BRAND RIGID INSULATION

# CLOSED CRAWL SPACE

The closed crawl space is gaining popularity for its effectiveness in reducing energy loss and minimizing the potential for moisture problems. Dow offers the following guidelines for constructing a closed crawl space with an insulation system that includes THERMAX™ or STYROFOAM™ brand rigid insulation on interior crawl space walls, a continuous poly vapor barrier to prevent evaporation of ground moisture into the crawl space, and a means to condition the crawl space to keep the relative humidity below 70 percent to mitigate mold and mildew growth. (See Figure 1.)

### ABOUT THERMAX™ RIGID INSULATION

THERMAX™ rigid insulation boards have a glass-fiber-reinforced polyisocyanurate foam core, with special laminated aluminum facers that enhance moisture and damage resistance. This reinforcement is chemically modified to provide improved fire performance. THERMAX rigid insulation boards can be left exposed in crawl spaces per National Evaluation Services report NER-681. THERMAX rigid insulation boards are also Factory Mutual approved as a "Wall-Ceiling Construction, FM Approvals Standard FM 4880, Metal-Faced – Class 1 Fire Rated to a max, 30 ft. high." Consult the local building codes in your area before starting construction.

### ABOUT STYROFOAM™ BRAND RIGID INSULATION

STYROFOAM™ brand rigid insulation boards are made from extruded polystyrene foam insulation and have exceptional water resistance, long-term thermal performance and high compressive strength. ASTM C578 Type X and ASTM C578 Type IV STYROFOAM Brand Extruded Polystyrene Foam Insulation boards, with a maximum nominal thickness of 2 inches (51mm), may be installed on surfaces (wall, ceiling) of a crawl space with no coverings (no thermal or ignition barrier) applied to the crawl space side of the foam plastic insulation per International Code Council Evaluation Service (ICC-ES) Evaluation Report ESR-2142.

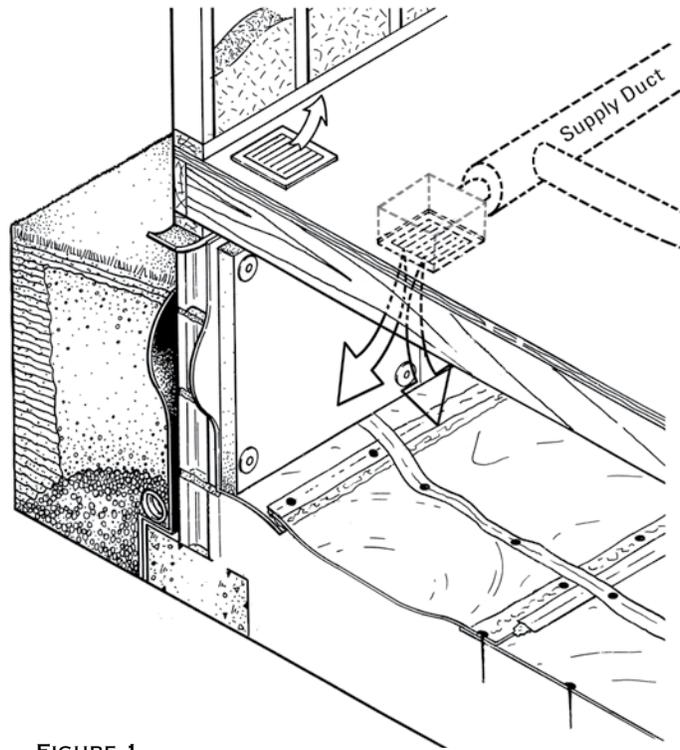


FIGURE 1

*Please note that closed crawl spaces may include components not shown, such as other ventilation options, floor drains, radon mitigation, etc.*

## BEFORE YOU BEGIN

Before installing THERMAX™ or STYROFOAM™ brand rigid insulation boards on the interior crawl space wall, remove anything that will interfere with installation. Best results are achieved when waterproofing or damp-proofing is applied from footer to grade on the exterior of the crawl space wall. Install foundation drainage per code requirement.

The crawl space may contain utilities including, but not limited to, mechanical equipment, electrical wiring, fans, plumbing, gas or electric hot water heaters, and gas or electric furnaces. When THERMAX or STYROFOAM brand insulation boards are used as stated above in the crawl space, the following conditions must be met:

1. Under-floor (crawl space) ventilation is provided in accordance with IBC Section 1203.3 or IRC Section R408.1, as applicable; or unvented crawl spaces are permitted under the conditions prescribed in IRC Section 408.3.
2. Combustion air is provided in accordance with IMC (International Mechanical Code) Section 701 and 703, or IRC Section M1701 and M1703.

Installation on the interior of the crawl space wall should comply with 2009 IRC Section R408, 2009 IECC Section 402.2.9, Dow's ESR 2142 report and all other applicable code requirements. Additional useful information on closed crawl space systems can be found at [www.crawlspaces.org](http://www.crawlspaces.org). Consult the local building codes in your area before beginning construction.

### MATERIALS CHECKLIST

To insulate closed crawl spaces, you will need:

- THERMAX™ or STYROFOAM™ brand rigid insulation boards – select from any of the following:
  - STYROFOAM Brand Square Edge (25psi) Insulation
  - STYROFOAM Brand Scoreboard (25psi) Insulation
  - STYROFOAM Brand Tongue and Groove (25psi) Insulation
  - THERMAX Sheathing (with foil facing)
  - THERMAX White Finish Insulation
- Utility knife or small handsaw
- Straight edge
- Measuring tape
- Pencil
- Safety glasses
- Water-based adhesive mastic
- 6-mil poly liner
- Duct tape
- WEATHERMATE™ Construction Tape (optional)
- Spray urethane foam such as GREAT STUFF PRO™ Gaps & Cracks Insulating Foam Sealant (optional)
- FROTH-PAK™ Foam Insulation kit (optional)
- 6" galvanized nails
- 1" nailing tins

### CUTTING THE BOARDS

THERMAX™ or STYROFOAM™ brand rigid insulation boards may be cut with a straight edge and utility knife or with a small handsaw. (See Figures 2a and 2b.)

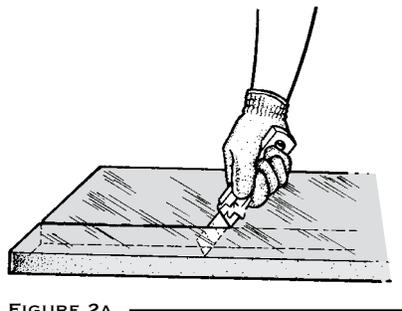


FIGURE 2A

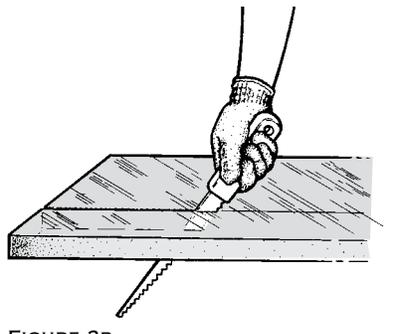


FIGURE 2B

### INSTALLATION

1. Attach a Type 1 Vapor Retarder such as a 6-mil poly liner to the interior stem wall with water-based adhesive mastic. The edges of the vapor retarder should extend at least 6 inches up the stem wall. Extend the wall poly liner onto the ground about 1 to 2 feet from the wall. (See Figure 3.)

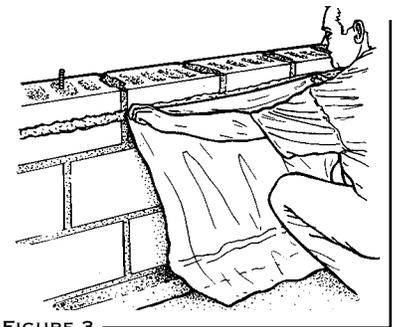


FIGURE 3

2. Fasten the THERMAX™ or STYROFOAM™ brand insulation boards to the interior of the crawl space wall using power-driven masonry nails with 1-inch washers or caps. The boards shall be permanently fastened to the interior of the stem wall and extend downward from the top of the stem wall to the exterior finished grade level and then vertically and/or horizontally for at least 24 inches. In some situations, an inspection strip may be appropriate. An inspection strip is a 2-inch to 3-inch strip around the top of the stem wall without insulation, which allows inspection for termites. (Check with your local code officials and pest control operators regarding this option.) Space fasteners approximately 2 feet on center vertically and 4 feet on center horizontally. (See Figure 4a.)

Note: If the distance between the exterior grade level and the crawl space floor is greater than 24 inches, the rigid insulation board on the wall should extend at least 24 inches below the exterior grade. (See Figure 4b). If the

distance between the exterior grade level and the crawl space floor is less than 24 inches, the board on the wall should extend to the crawl space floor and then horizontally on the floor so the total board length below exterior grade (both vertically and horizontally) equals at least 24 inches. (See Figure 4c.)

3. Insulate the rim joist and sill plate. There are three options for this step:

a. Option 1: Use FROTH-PAK™ Foam Insulation kits up to 2 inches in thickness. (See Figure 5a.)

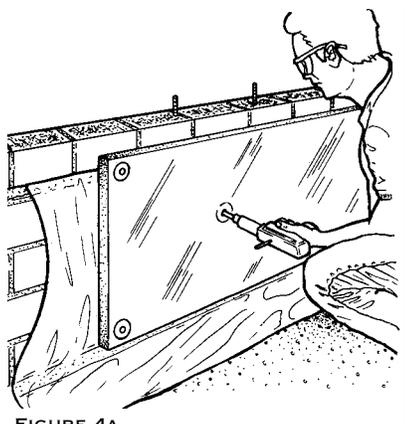


FIGURE 4A

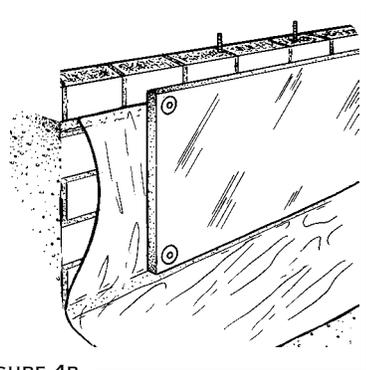


FIGURE 4B

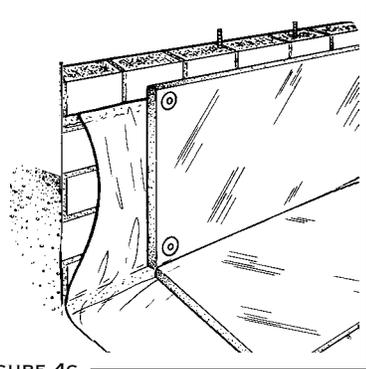


FIGURE 4C

b. Option 2: Use STYROFOAM™ brand rigid insulation boards up to 2 inches in thickness, cut to fit between the floor joists, and seal the edges of the foam with GREAT STUFF PRO™ Gaps & Cracks. (See Figure 5b.)

c. Option 3: Use THERMAX™ rigid insulation boards up to 4 inches in thickness, cut to fit between the floor joists, and seal the edges of the foam with GREAT STUFF PRO™ Gaps & Cracks. (See Figure 5b.)



FIGURE 5A



FIGURE 5B

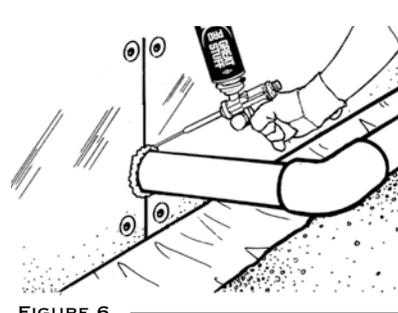


FIGURE 6

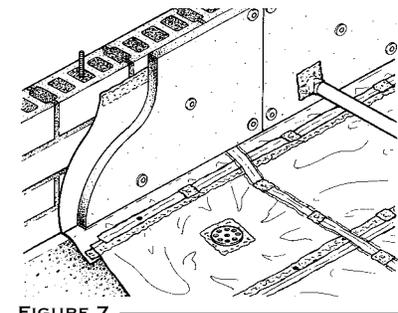


FIGURE 7

4. Seal all penetrations through the crawl space wall with spray urethane foam such as GREAT STUFF PRO Gaps & Cracks. (See Figure 6.) Joints between boards of insulation may also be taped with WEATHERMATE™ Construction Tape, if desired.

5. Install a temporary “construction” poly liner as soon as the house is “dried in” (i.e., tar paper is on the roof). Cover the floor area with poly, but leave seams unsealed. This will temporarily prevent moisture from the soil from evaporating into the crawl space.

6. Before installing the permanent poly ground cover, temporary installation of a small dehumidifier will help dry out the moisture that already exists in the crawl space. Set the drain tube to discharge outside of the crawl space.

7. When the house is near completion, remove the temporary “construction” poly and discard.

8. Roll out and install a permanent Type I Vapor Retarder such as a 6-mil poly liner. The vapor retarder sheets should overlap each other by at least 6 inches. Carefully seal the seams at the wall poly liner with duct tape and mastic. Also seal all joints and penetrations in the field. (See Figure 7.) Secure each joint with duct tape, then brush on a layer of mastic. Mastic should extend at least 1 inch beyond the tape on each side.

9. Secure vapor retarder to the ground with a 6-inch galvanized spike through 1-inch diameter nailing tins. For reinforcement and a tight seal, apply duct tape and mastic over spikes and tins.

The steps outlined here are intended to make the crawl space clean, dry, well-insulated, airtight and vapor tight. There are other important components in a closed crawl space system. Consult IRC Section 408 or [www.crawlspaces.org](http://www.crawlspaces.org) for other components such as ventilation options.

## ADDITIONAL RECOMMENDATIONS

- Builders may wish to install a humidity sensor in the crawl space, wired to a digital readout and alarm upstairs, to help homeowners monitor relative humidity.
- To minimize damage to the poly liner, install carpet runners from the access door to the water heater, furnace and other appliances as a path for service technicians.
- The homeowner should be informed that a closed crawl space should be treated as part of the main house and must not be used for storage of lawn equipment, pesticides, fuel, etc.

## SAFETY AND CONDITIONS OF USE

### FROTH-PAK™ Foam Insulation

- Read the instructions and Material Safety Data Sheets carefully before use.
- FROTH-PAK™ Polyurethane Spray Foam contains isocyanate, hydrofluorocarbon blowing agent

and polyol. Do not breathe vapor or mist. Use only in well-ventilated areas or with proper respiratory protection. Supplied air or an approved air-purifying respirator equipped with an organic vapor sorbent and a particle filter may be required to maintain exposure levels below ACGIH, OSHA, WEEL or other applicable limits. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure, air-supplying respirator (air line or self-contained breathing apparatus).

- Isocyanate is irritating to the eyes, skin and respiratory system, and may cause sensitization by inhalation or skin contact.
- FROTH-PAK™ Foam will adhere to most surfaces and skin. Do not get foam on skin. Wear gloves, goggles or safety glasses, and protective clothing. Cured foam must be mechanically removed or allowed to wear off in time.
- The contents are under pressure.

### GREAT STUFF PRO™ Gaps & Cracks Insulating Foam Sealant

- Read the label and Material Safety Data Sheet carefully before use.
- GREAT STUFF PRO™ Gaps & Cracks contains isocyanate and a flammable blowing agent. Vapor may travel to other rooms. Ensure adequate ventilation. Shut off all pilot lights and extinguish open flames; eliminate all sources of ignition before use. Do not smoke or use lighters or matches while dispensing foam.
- Do not breathe vapor or mist. Use in well-ventilated areas or wear proper respiratory protection. Isocyanate is irritating to the eyes, skin and respiratory system, and may cause sensitization by inhalation or skin contact.
- GREAT STUFF PRO™ Gaps & Cracks is very sticky and will adhere to most surfaces and skin. Do not get foam on skin. Wear gloves, and safety glasses or goggles. Cured foam must be mechanically removed or allowed to wear off in time.
- The contents are under pressure. The can may burst if left in areas susceptible to high temperatures, such as motor vehicles, or near radiators, stoves or other sources of heat. Do not place can in hot water. Do not puncture, incinerate or store at temperatures above 120°F (49°C).

### [www.insulateyourhome.com](http://www.insulateyourhome.com)

FOR TECHNICAL INFORMATION: 1-866-583-BLUE (2583)

FOR SALES INFORMATION: 1-800-232-2436

THE DOW CHEMICAL COMPANY

Dow Building Solutions • 200 Larkin • Midland, MI 48674

STYROFOAM™ Brand Extruded Polystyrene Foam Insulation is combustible. Protect from high heat sources. A protective barrier or thermal barrier may be required as specified in the appropriate building code.

THERMAX™ Polyisocyanurate Sheathing 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 barrier.

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, 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 particle filter may be required to maintain exposure levels below ACGIH, OSHA, WEEL or other applicable limits. Provide adequate ventilation. Contents under pressure. Consult the instructions and Material Safety Data Sheet carefully before use.

GREAT STUFF PRO™ Insulating Foam Sealant contains 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 gloves, and safety glasses or goggles. Provide adequate ventilation or wear proper respiratory protection. Contents under pressure.

CAUTION: These products are 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 call Dow at 1-866-583-BLUE (2583) or contact your local building inspector. In an emergency, call 1-989-636-4400.

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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