

# ICC-ES Evaluation Report

**ESR-1566\***

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**DIVISION: 07 00 00—THERMAL AND MOISTURE  
PROTECTION**
**Section: 07 21 00—Thermal Insulation**
**Section: 07 22 00—Roof and Deck Insulation**
**Section: 07 25 00—Water-resistive Barriers/Weather  
Barriers**
**REPORT HOLDER:**

**STAR R FOAM MANUFACTURING, INC.**  
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**EVALUATION SUBJECT:**
**STAR R FOAM INSULATION BOARDS**
**1.0 EVALUATION SCOPE**
**Compliance with the following codes:**

- 2009 and 2006 *International Building Code*® (IBC)
- 2009 and 2006 *International Residential Code*® (IRC)
- 2009 and 2006 *International Energy Conservation Code*® (IECC)

**Properties evaluated:**

- Physical properties
- Surface burning characteristics
- Water resistance
- Thermal performance (*R*-value)
- Attic and crawl space installation

**2.0 USES**
**2.1 General:**

The Star R Foam plastic insulation boards described in this evaluation report are used as a general, nonstructural, thermal insulation material. Other uses include installation on exterior walls; in wall cavities; in door cavities; as a component of classified roof assemblies; at the exterior perimeter of foundations and basements; as architectural shapes; and in attics and crawl spaces. When used as the core or sandwich panels, the insulation boards must be specifically recognized in a current evaluation report.

**2.2 STAR R Foam EPS Insulation Boards:**

The Star R Foam expanded polystyrene (EPS) insulation boards may be used in roof covering assemblies when

specifically recognized in the current ICC-ES report for the roof-covering system. The evaluation report for the roof covering material must recognize the expanded polystyrene foam plastic insulation as part of a Class A, B or C roof assembly tested in accordance with ASTM E 108 or UL 790.

The Star R Foam EPS insulation boards may be used as a core material in doors that do not require a fire-resistance rating when installed in accordance with IBC Sections 2603.4.1.7 and 2603.4.1.8, 2009 IRC Sections R316.5.5 and R316.5.6 (2006 IRC Sections R314.5.5 and R314.5.6).

**2.3 STAR R Foam EIFS Grade (SWG) Insulation Boards:**

The Star R Foam EIFS Grade (SWG) insulation boards are used as nonstructural thermal insulation as a component in exterior insulation and finish wall systems (EIFS). The insulation is used on the outside faces of exterior walls when an ASTM C 578, Type I, expanded polystyrene foam plastic board is specified in a current ICC-ES evaluation report for an EIFS.

**2.4 STAR R One-Coat Stucco Insulation Boards:**

The Star R One-Coat Stucco insulation boards are used in one-coat cementitious exterior wall coating systems recognized in an evaluation report in which a generic ASTM C 578, Type I or Type II, expanded polystyrene foam plastic board is specified.

**2.5 Star R Gard Boards:**

The Star R Gard boards may be used as an alternative to the water-resistive barriers specified in the IBC and IRC, when installed as set forth in Section 4.2.

**3.0 DESCRIPTION**
**3.1 General:**

Star R Foam insulation boards have a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 450 when tested in accordance with ASTM E 84. See Figure 1 for product descriptions.

**3.2 Star R Foam EPS Insulation Boards:**

Star R Foam EPS boards are molded closed-cell, expanded polystyrene foam plastic boards. The boards are available as Types I, II, VIII or IX boards complying with ASTM C 578, and have densities and thermal resistance values as shown in Table 1. The boards are available in various lengths and widths and in thicknesses up to 5 inches (127 mm) with square, shiplap, or tongue-and-groove edges.

**\* Corrected August 2011**

### 3.3 Star R Foam EIFS Grade (SWG) Insulation Board:

Star R Foam EIFS Grade (SWG) insulation boards have a minimum density of 0.90 pcf (14.4 kg/m<sup>3</sup>). The boards comply as Type I in accordance with ASTM C 578, and are available in various thicknesses up to 4 inches (127 mm) with square, shiplap, or tongue-and-groove edges. The boards have more restrictive requirements than the EPS board for conditioning, product dimensions, marking and packaging. For thermal resistance properties, see Table 1.

### 3.4 Star R One-Coat Stucco Insulation Board:

Star R One-coat Stucco boards are maximum 1½-inch thick (38 mm), nominal 1.5 pcf (24 kg/m<sup>3</sup>) density, EPS insulation boards with square, shiplap or tongue-and-groove edges. The boards are available in various lengths and widths. The boards comply as Type II in accordance with ASTM C 578. For thermal resistance properties, see Table 1.

### 3.5 Star R Gard Board:

Star R Gard boards are ½- to 1-inch thick (12.7 to 25.4 mm), nominal 1 pcf (16 kg/m<sup>3</sup>) density, EPS insulation boards, complying with ASTM C 578, Type I, with nominal 1 mil (0.25 mm) thick, nonperforated polypropylene (PP) film laminated to both faces. The boards are 4 feet (1220 mm) wide by 8 feet (2438 mm) long, and have either square, shiplap or tongue-and-groove edges.

### 3.6 Star R Tape:

Star R Tape must be used with the Star R Gard boards when the board is used as an alternative water-resistive barrier as described in Section 4.2. The tape consists of a polyethylene backing with a rubber-based adhesive, and has a nominal thickness of 9 mils (0.23 mm) and a width of 2 inches (51 mm). The tape is supplied in 36-yard (32 918 mm) rolls.

## 4.0 INSTALLATION

### 4.1 General:

Installation shall comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions must be available at the jobsite at all times during installation.

Except as described in Section 4.4, the interior of the building must be separated from the insulation boards by an approved 15-minute thermal barrier as required in IBC Section 2603.4 or 2009 IRC Section R316.4 or R316.5 (2006 IRC Section R314.4 or R314.5). The installation of the insulation boards in areas of "very heavy" termite infestation probability must comply with IBC Section 2603.8 or IRC Section R320.5, as applicable. A vapor retarder complying with the requirements set forth in accordance with IBC Section 1405.3 or 2009 IRC Section R601 (2006 IRC R318). The insulation board may be applied to exterior faces of walls to a maximum thickness of 1½ inches (38 mm), except insulation board thicknesses greater than 1½ inches (38 mm) may be permitted if such installation is recognized in a current ICC-ES evaluation report on a wall covering. The attachment of finish materials over the insulation board must allow for a minimum 1-inch (25.4 mm) penetration of the fasteners into wood framing. Sheathing or a wall covering over the insulation must be structurally adequate to resist horizontal forces perpendicular to the wall. All walls must be braced in accordance with IBC Sections 2308.9.3 and 2308.12.4 or IRC Section R602.10, as applicable.

Insulation boards must not be used as a nailing base for finish materials or wall covering materials. Fasteners used to attach conventional wood, metal or plastic siding

through insulation not exceeding a 1½-inch (38 mm) thickness, must have sufficient length to penetrate 1 inch (25.4 mm) into structural wood framing or to protrude through structural sheathing or structural steel framing beneath. Attachment must comply with a current evaluation report for proprietary wall covering materials, or with the applicable code for code-described wall-covering materials.

When the insulation boards are applied over open framing, vertical butt joints must be over framing members. Vertical tongue-and-groove joints need not be over framing members, provided joints are staggered a minimum of one stud space from adjacent courses. For cementitious exterior wall coating systems, unbacked joints are permitted only when specified in the evaluation report on the cementitious exterior wall coating system.

### 4.2 Water-resistive Barrier—Star R Gard Boards:

**4.2.1 General:** When installed in accordance with this section, the Star R Gard boards may be used as an alternative to Type I felt complying with ASTM D 226. The boards must be covered with an approved exterior wall covering.

When Star R Gard boards with square, shiplap, or tongue-and-groove joints along the long edges are installed vertically, the joints must occur over framing. When the long edges of boards are installed horizontally, the long edges must have tongue-and-groove, or shiplap joints as shown in Figure 1.

The Star R Gard boards are installed directly to framing and fastened to exterior framing spaced a maximum of 24 inches (610 mm) on center, except where further limited by the requirements for the wall covering. Fasteners used to attach the boards to framing must be either 6d ring shank nails with a 0.93-inch-diameter (24 mm) plastic washer, or 16-gage staples having a 1-inch-wide (25.4 mm) crown and 2-inch-long (51 mm) legs. Joints between boards, corners created with the board and fastener locations must be taped with Star R tape centered over the joint, corner and fastener. Star R Gard boards must be installed with a corrosion-resistant weep screed. See Figure 2 for installation details.

For exterior plaster complying with IBC Section 2512 or IRC Section R703.6, the length of the fasteners used to attach the lath must be proportionally increased based on the thickness of the Star R Gard boards. The increase in fastener length is to maintain penetration into framing that is equivalent to that of fasteners attaching the lath without insulation.

**4.2.2 Penetrations:** Flashing of flange-type window penetrations when Star R Gard boards are used as a water-resistive barrier must be accompanied by installation of flashing recognized in an ICC-ES evaluation report as complying with AC148, completely covering the framing sill and extending a minimum of 6 inches (51 mm) up the sides of the opening and approximately 1½ inches (38 mm) beyond the face of the foam board at the front of the window opening. The flashing must be flush with the inside edge of the framing members on the inside of the wall. The flashing extending outside of the Star R Gard boards must be folded over the front face of the foam board. See Figure 2 for details.

Flashing of pipe penetrations must be accomplished by sealing around the pipe with sealant complying with ASTM A 920, Type S, Grade NS, Use-NT, Use-A, Use-O. Flashing of other penetrating items must be in accordance with the wall covering manufacturer's published installation instructions.

### 4.3 Cementitious Exterior Wall Coatings:

Star R Gard boards and Star R One-Coat Stucco insulation boards may be used with cementitious exterior wall coatings when installed in accordance with this section (Section 4.3).

When used with a cementitious exterior wall coating recognized in an ICC-ES evaluation report, the Star R Gard boards are an alternative to 1-inch-thick (25.4 mm), 1.5 pcf density (24 kg/m<sup>3</sup>), EPS foam plastic insulation specified in the ICC-ES evaluation report on the coating. When installed in accordance with Section 4.2, the Star R Gard boards may also be used as an alternative to Type I felt complying with ASTM D 226 or Grade A, B or C building paper as specified in UBC Standard 14-1. Star R Gard boards used in conjunction with stucco systems where the Star R Gard boards are not used as the water-resistive barrier, the Star R Gard boards are not required to be taped.

When used with ICC-ES-recognized cementitious exterior wall coatings, the Star R One-Coat Stucco boards are an alternative to 1-inch-thick (25.4 mm), 1.5 pcf density (24 kg/m<sup>3</sup>), EPS foam plastic insulation specified in the ICC-ES evaluation report on the coating. The Star R One-Coat Stucco boards must be installed, with a water-resistive barrier, directly to open framing with blocked insulation board joints, or must be installed over solid sheathing. Conditions in the cementitious exterior wall coatings evaluation report for the foam plastic insulation, such as orientation, tongue-and-groove edges, square edges and taping, must be observed.

The cementitious exterior wall coating to be applied must be approved for use by the wall coating manufacturer.

When application is over any wood-based sheathing, a water resistive barrier must be provided and must be one layer of the Star R One-Coat Stucco or Star R Gard insulation boards, having horizontal tongue-and-groove edges as described in Sections 3.4 or 3.5, respectively, over one layer of Grade D building paper having a minimum water-resistance rating of 60 minutes.

### 4.4 Special Uses—Attics and Crawl Spaces:

Star R Foam insulation boards, as described in Section 3.2, or Star R Gard boards, as described in Section 3.5, installed on either the exterior or interior side of framing, may be used on vertical surfaces in attics and crawl spaces without a covering being applied to the interior side of the foam plastic, provided all of the following conditions are met:

1. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable.
2. Combustion air is provided that complies, as applicable, with Section 701 of the 2009 *International Mechanical Code*<sup>®</sup> 2006 IMC (Sections 701 and 703.1 of the 2006 *International Mechanical Code*<sup>®</sup>), or 2009 IRC Section M1701 (2006 IRC M1703) the IRC.
3. Under-floor (crawl space) air ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.
4. Star R Foam EPS boards have a maximum density of 1 pcf (16 kg/m<sup>3</sup>) and a maximum thickness of 4 inches (102 mm); or a maximum density of 2 pcf (32 kg/m<sup>3</sup>) and a maximum thickness of 2 inches (51 mm); or a maximum density of 1.5 pcf (24 kg/m<sup>3</sup>) and a maximum thickness of 2.6 inches (66 mm).
5. Star R Gard boards have a maximum density of 1 pcf (16 kg/m<sup>3</sup>) and a maximum thickness of 1 inch (25.4 mm).

### 4.5 Star R Foam EIFS Grade (SWG) Insulation Board:

Type I Star R Foam EIFS Grade (SWG) insulation boards must be installed as part of an exterior cementitious wall covering, an EIFS system, or other proprietary wall system, when installation is in accordance with an ICC-ES evaluation report on the wall covering system.

### 5.0 CONDITIONS OF USE

The Star R Foam EPS insulation boards described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0, subject to the following conditions:

- 5.1 The boards must be manufactured, identified and installed in accordance with this report, the manufacturer's published installation instructions and the applicable code. If there is a conflict between the manufacturers's published installation instructions and this report, this report governs.
- 5.2 Star R EPS insulation boards, EIFS Grade (SWG) insulation boards and One-Coat Stucco insulation boards must be covered with an approved exterior wall covering. A water-resistive barrier complying with IBC Section 1404.2 or IRC Section R703.2, as applicable, must be installed as specified for the approved assembly.
- 5.3 When the Star R Gard boards are installed on the exterior face of exterior walls as an alternative to the required water-resistive barrier, as described in Sections 4.2 and 4.3, the boards must be covered with an approved exterior wall covering.
- 5.4 The exterior wall covering spanning between wall framing members must provide the necessary structural resistance to wind and seismic forces.
- 5.5 Insulation boards must not be used as a nailing base for exterior siding materials. All nailing must be made through the insulation into the wall framing or structural sheathing as required by the siding manufacturer's published installation instructions or the applicable code.
- 5.6 Except as noted in Section 4.4, the insulation boards must be separated from the interior of the building with an approved 15-minute thermal barrier complying with IBC Section 2603.4 or 2009 IRC Section R316.4 or R316.5 (2006 IRC Section R314.4 or R314.5), as applicable.
- 5.7 Use of the foam plastic insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IBC Section 2603.8 and 2009 IRC Section R318 (2006 IRC Section R320.5), as applicable.
- 5.8 For buildings in which the Star R Gard boards are used as a water-resistive barrier, all plans must be accompanied by drawings, consistent with the illustrations in this report, that include the following:
  - a. Installation at all openings, corners and insulation board terminations.
  - b. Location, configuration and method of sealing at fastener locations, of joints between boards and at corners.
  - c. Typical cross section, showing all components of the wall.
  - d. Typical wall pipe and window penetrations.
- 5.9 The Star R Foam EPS insulation boards, Star R Foam EIFS Grade (SWG) insulation boards and Star R One-Coat Stucco insulation boards are produced in

Anthony, Texas; Fort Worth, Texas; and Kingman, Arizona under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668).

- 5.10 The Star R Gard boards are produced in Fort Worth, Texas, and Kingman, Arizona, under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668).

**6.0 EVIDENCE SUBMITTED**

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated February 2011.
- 6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Weather-resistive Barriers (AC71), dated February 2003 (Editorially Revised March 2011).
- 6.3 Reports of room-corner fire tests in accordance with UL 1715.
- 6.4 Analysis of room corner fire tests.

**7.0 IDENTIFICATION**

- 7.1 **General:** Packages of insulation boards are labeled with the name and the address of the manufacturer (Star R Foam Manufacturing, Inc.); the product name; the date of manufacture; manufacturing location identification number (1149- Fort Worth, Texas; 1149D- Kingman, Arizona; and 1149B- Anthony, Texas); the nominal board density; the flame-spread index (25 or less); the smoke-developed index (450 or less); the thermal-resistance value (*R*-value); the evaluation report number (ESR-1566); and the name of the inspection agency (Underwriters Laboratories Inc.). Boards greater than 1-inch-thick (25.4 mm)

intended for use in attics or crawl spaces in accordance with Section 4.4 are labeled on one edge with, "A/C".

- 7.2 **STAR R Foam EIFS Grade (SWG) Insulation Boards:** In addition to the identification described in Section 7.1, Star R Foam EIFS Grade (SWG) insulation boards are identified along one edge, and on both faces of one board from each package, with the name of the exterior coating (EIFS) company and the EIFS company's evaluation report number.

- 7.3 **STAR R One-Coat Stucco Boards:** In addition to the identification described in Section 7.1, STAR R One-Coat Stucco boards are identified along the short, square edge, with the board type (Type II); the nominal density (1.5 pcf); the Star R Foam name; the evaluation report number (ESR-1566); and the name of the inspection agency ( Underwriters Laboratories Inc.).

- 7.4 **Star R Gard Boards:** In addition to the identification described in Section 7.1, packages of Star R Gard boards include a lot number. Also, the Star R Gard boards are identified on one face with the manufacturer's name (Star R Foam); the product name (Star R Gard); the manufacturing location (Fort Worth, Texas and Kingman, Arizona); the evaluation report number (ESR-1566); and the name of the inspection agency ( Underwriters Laboratories Inc.).

- 7.5 **Star R Tape:** Rolls of Star R Tape are identified with the product name (Star R Tape); and the evaluation report number (ESR-1566).

**TABLE 1—DENSITIES AND R-VALUES FOR INSULATION BOARDS**

EPS CLASSIFICATION	NOMINAL DENSITY (pcf)	MINIMUM DENSITY (pcf)	R-VALUE FOR 1-INCH THICKNESS AT 75°F [(hr·ft <sup>2</sup> ·°F)/Btu]
Type I	1.00	0.90	3.6
Type VIII	1.25	1.15	3.8
Type II	1.50	1.35	4.0
Type IX	2.00	1.80	4.2

For SI: 1 inch = 25.4 mm, 1 pcf = 16.02 kg/m<sup>3</sup>, 1°F·ft<sup>2</sup>·hr/Btu = 0.176 m<sup>2</sup>·K/W, 1°F = 1.8°C+32.

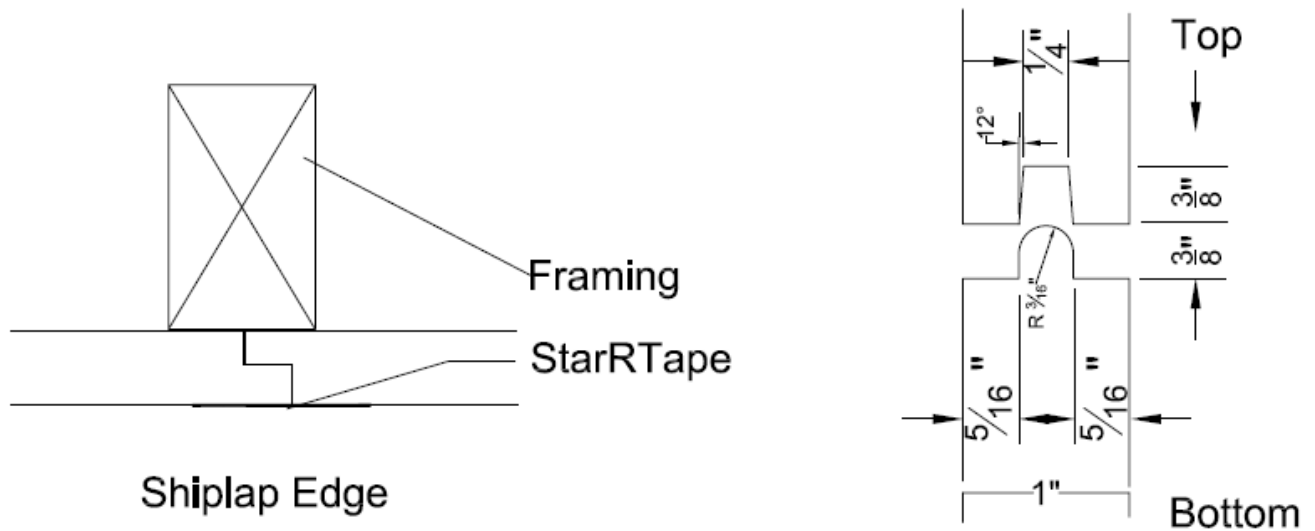


FIGURE 1—DESCRIPTION OF SHIPLAP AND TONGUE-AND-GROOVE EDGES

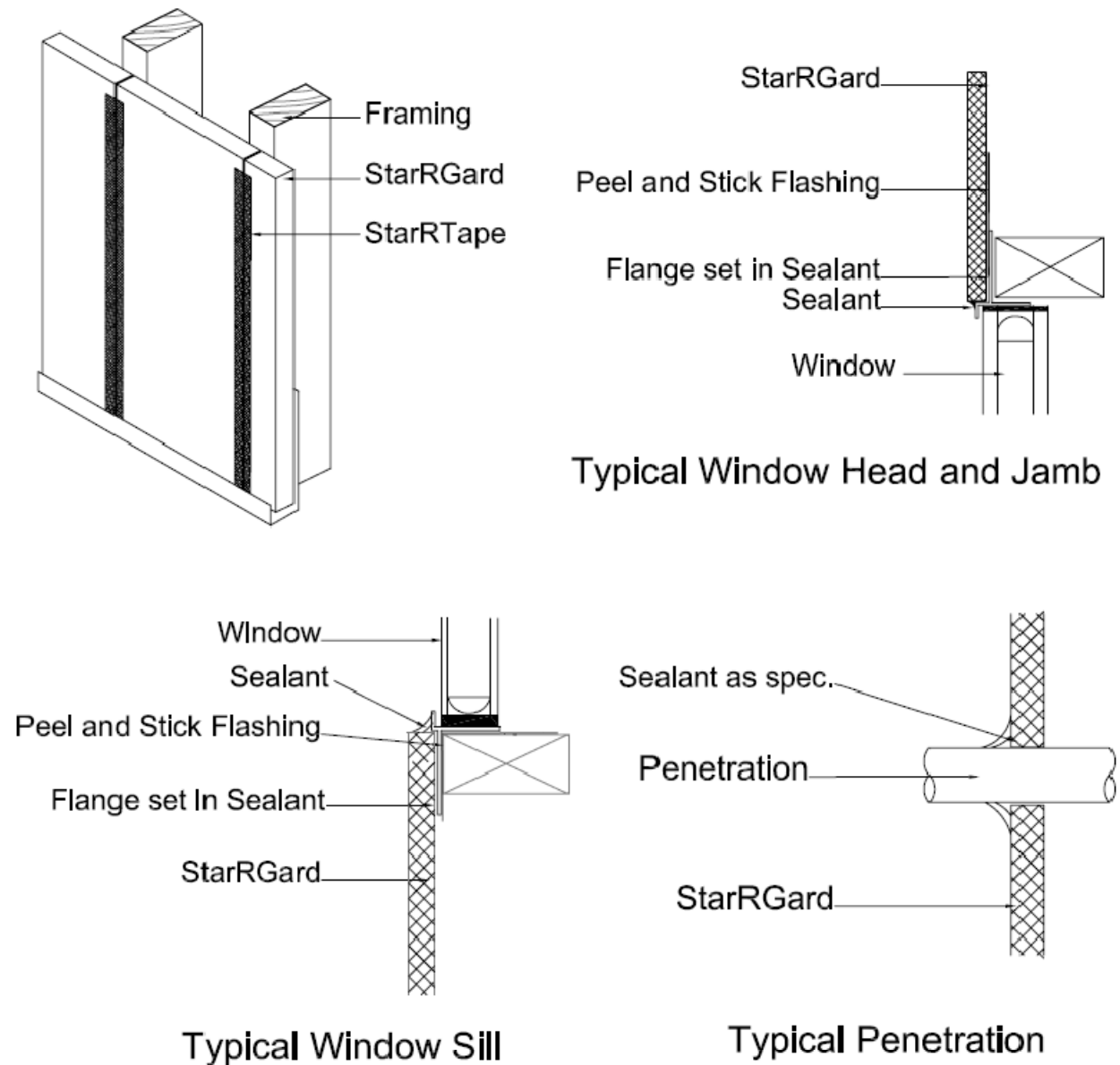


FIGURE 2—TYPICAL STARRGARD INSTALLATION