

# ICC-ES Evaluation Report

**ESR-2142\***

**Underwriters  
Laboratories** ICC-ES/UL  
Dual Report

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## DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 21 00—Thermal Insulation

Section: 07 25 00—Water-Resistive Barriers/Weather Barriers

Section: 07 27 00—Air Barriers

### REPORT HOLDER:

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### EVALUATION SUBJECT:

**STYROFOAM™ BRAND INSULATION BOARDS AND  
DOW FAN-FOLD PRODUCTS**

### 1.0 EVALUATION SCOPE

#### Compliance with the following codes:

- 2012 and 2009 *International Building Code*® (IBC)
- 2012 and 2009 *International Residential Code*® (IRC)
- 2012 and 2009 *International Energy Conservation Code*® (IECC)

#### Properties evaluated:

- Surface burning characteristics
- Attic installations
- Crawl space installations
- Air barrier
- Water-resistive barrier
- Thermal resistance
- Exterior walls in Types I-IV Construction

### 2.0 USES

STYROFOAM brand insulation boards are extruded polystyrene foam plastic boards used as nonstructural thermal insulating material in buildings of Type I, II, III, IV and V construction under the IBC and dwellings under the IRC. The insulation is for use in wall assemblies, ceiling/floor assemblies, door cavities, roofs, foundations, attic and crawlspaces.

Dow fan-fold products are extruded polystyrene foam plastic boards used as nonstructural thermal insulation in

roofs, on foundations or on walls constructed in accordance with the IBC or IRC.

Sto Insul-X™ insulation boards are extruded polystyrene foam plastic boards used as nonstructural thermal insulation on walls constructed in accordance with the IBC or IRC.

STYROFOAM DURAMATE™ Plus, STYROFOAM Residential Sheathing, STYROFOAM Residing Board, STYROFOAM Utilityfit, STYROFOAM SCOREBOARD, STYROFOAM Sheathing Material, STYROFOAM Ship Lap, STYROFOAM Square Edge, STYROFOAM Tongue and Groove, STYROFOAM CAVITYMATE™ Ultra, STYROFOAM Ultra SL, STYROFOAM XPS Insulation, Dow High Performance Underlayment, BLUECOR™, and Dow Protection Board III brand insulation boards may be used as alternatives to the water-resistive barriers specified in the IBC and IRC when installed in accordance with Section 4.3.

### 3.0 DESCRIPTION

#### 3.1 STYROFOAM Brand Insulation Boards:

STYROFOAM brand insulation boards are extruded polystyrene foam plastic complying with ASTM C578. The boards are available as various products having the product names and properties detailed in Table 1. The boards are available in various lengths and widths and in thicknesses up to 4 inches. The actual board thickness provided is determined based on the *R*-value stated for the product.

#### 3.2 Dow Fan-fold Products:

Dow fan-fold products are extruded polystyrene foam plastic insulation provided in “fan-folded” bundles. The boards are available in various lengths and widths and in thicknesses up to 1/2 inch (12.7 mm). Table 2 details the physical properties of the fan-fold products. The actual board thickness provided is determined based on the *R*-value stated for the product.

#### 3.3 Joint-sealing:

WEATHERMATE™ Construction Tape is nominally 2 7/8 inches wide and is used in conjunction with STYROFOAM brand insulation boards and Dow fan-fold products to seal joints between two or more edges of the boards, when the insulation boards are installed as a water-resistive barrier. The installation must be as described in Section 4.3 of this report.

WEATHERMATE™ Flashing Tape with a minimum 4-inch (102 mm) width, and GREAT STUFF™ Pro Gaps & Cracks sealant ([ESR-1961](#)), are used in conjunction with

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STYROFOAM brand insulation boards to seal joints between two or more edges of boards, when insulation boards are installed as an air barrier assembly. The installation must be as described in Section 4.5.2 of this report.

### 3.4 Surface Burning Characteristics:

STYROFOAM brand insulation boards, Sto Insul-X™ insulation boards and Dow fan-fold products have a flame-spread index (FSI) of 25 or less and a smoke-developed index (SDI) of 450 or less when tested in accordance with ASTM E84 at a maximum thickness of 4 inches (102 mm) and a maximum density of 4.0 pcf (64 kg/m<sup>3</sup>).

### 3.5 Thermal Resistance:

STYROFOAM brand insulation boards and Sto Insul-X™ insulation boards have a thermal resistance (*R*-value) as noted in Table 1. Dow fan-fold products have a thermal resistance (*R*-value) as noted in Table 2.

### 3.6 Air Permeability

At a minimum thickness of 1/4 inch (6.35 mm), the insulation boards are considered air-impermeable in accordance with 2012 IRC Section R806.5 (2009 IRC Section R806.4), based on testing in accordance with ASTM E283.

## 4.0 INSTALLATION

### 4.1 General

STYROFOAM brand insulation boards, Sto Insul-X™ insulation boards and Dow fan-fold products must be installed in accordance with the manufacturer's published installation instructions and this report. For the purposes of this report, the term "insulation board" is intended to refer to both STYROFOAM brand insulation boards and Dow fan-fold products.

Except as described in Section 4.2, 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 IRC Section R316.4. The installation of the insulation boards in areas of "very heavy" termite infestation probability must comply with 2012 IBC Section 2603.9 (2009 IBC Section 2603.8) or 2012 IRC Section R318.4 (2009 IRC Section R320.5). Under the IBC, protection against condensation must be provided in accordance with IBC Section 1403.2; under the IRC, a vapor retarder must be provided in accordance with 2012 IRC Section R702.7.1 (2009 IRC Section R601.3). Insulation boards must not be used as a nailing base for finish materials or wall covering materials. Fasteners used to attach exterior finish material over insulation boards must comply with a current ICC-ES evaluation report for proprietary wall covering materials, IBC Section 1404 or 1405, IRC Table 703.4, and the installation instructions from the finish manufacturer. For cementitious exterior wall coating applications, fasteners for insulation board thicker than 1 1/2 inches (38 mm) must be considered for lateral resistance to ensure support for the exterior wall coatings.

Exterior wall assembly, exterior finish or a wall covering in conjunction with insulation boards 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.

When the insulation boards are applied over open framing, vertical butt joints must be over framing members. Vertical tongue-and-groove or shiplap 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 ICC-ES evaluation report on the cementitious exterior wall coating system.

### 4.2 Alternative to Thermal Barrier and Ignition Barrier Requirements:

#### 4.2.1 Application without a Prescriptive Thermal Barrier:

STYROFOAM Brand insulation boards may be installed without a prescriptive 15-minute thermal barrier required by the applicable code when the conditions noted in Table 1 are met. Installation includes use on both walls and ceilings in attics, crawl spaces or basements and in buildings of Use Group U. See Section 4.2.2 for conditions related to the use of insulation in attics and crawl spaces.

#### 4.2.2 Attics and Crawl Spaces:

##### 4.2.2.1 Installation without a Prescriptive Ignition Barrier:

Where ASTM C578 Type X and ASTM C578 Type IV STYROFOAM brand insulation boards, with the maximum nominal thickness identified in Table 1, are installed in an attic or crawl space the prescriptive ignition barrier required by IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4 may be omitted where the following conditions apply:

1. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable; except unvented attic assemblies are permitted under the conditions prescribed in 2012 IRC Section 806.5 (2009 IRC Section 806.4).
2. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable, except unvented crawl spaces are permitted under the conditions prescribed in 2012 IRC Section 408.3.
3. Combustion air is provided in accordance with IMC (*International Mechanical Code*®) Section 701.

##### 4.2.2.2 Attics Only – Installation without a Prescriptive Ignition Barrier:

ASTM C578 Type X and ASTM C578 Type IV STYROFOAM brand insulation boards, with a maximum nominal thickness of 1 inch (25.4 mm), covered with a water-resistive barrier (Weathermate ([ESR-2862](#)), Weathermate Plus ([NER-640](#)) or DuPont Tyvek ([ESR-2375](#)) exposed to the interior of the attic space, may be installed on the walls of an attic (including gable ends and knee walls) (the attic may contain utilities, including but not limited to, mechanical equipment; electrical wiring; fans; plumbing; gas or electric hot water heaters; gas or electric furnaces; etc.) with no coverings (no thermal or ignition barrier) applied, when all of the following conditions are met:

1. Entry to the attic is only to service utilities and no storage is permitted.
2. There are no interconnected attic areas.
3. Air in the attic is not circulated to other parts of the building.
4. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable; except unvented attic assemblies are permitted under the conditions prescribed 2012 IRC Section 806.5 (2009 IRC Section 806.4).
5. Combustion air is provided in accordance with IMC Section 701.

### 4.3 Water-resistive Barrier:

The noted STYROFOAM brand insulation boards (STYROFOAM CAVITYMATE™, STYROFOAM

CAVITYMATE™ Plus, STYROFOAM CAVITYMATE™ SC, STYROFOAM CAVITYMATE™ Ultra, STYROFOAM Ultra SL, STYROFOAM DURAMATE™ Plus, STYROFOAM Residential Sheathing, STYROFOAM Residing Board, STYROFOAM Utilityfit, STYROFOAM SCOREBOARD, STYROFOAM Sheathing Material, STYROFOAM Ship Lap, STYROFOAM Square Edge, STYROFOAM Tongue and Groove and STYROFOAM XPS Insulation) and Dow fan-fold products (Dow High Performance Underlayment, BLUECOR™, and Dow Protection Board III) may be used as alternate water-resistive barriers as prescribed in Section 1404.2 of the IBC or Section 703.2 of the IRC, when installed on exterior walls as described in this section.

STYROFOAM brand insulation boards measuring 4 feet by 8 to 10 feet are installed horizontally or vertically with long joints in contact with one another. Boards measuring 2 feet by 8 feet are installed horizontally. When installed directly on framing members, framing members are spaced a maximum of 24 inches on center. The insulation boards are attached using  $\frac{3}{8}$ -inch-head (9.5 mm) galvanized nails, 1-inch-crown (25.4 mm) galvanized staples or 1-inch-head (25.4 mm) plastic cap nails or equivalent fasteners long enough to penetrate framing a minimum of  $\frac{3}{4}$  inch. Nails or staples must not be over-driven. Fastener spacing for boards measuring 4 feet by 8 to 10 feet is a minimum of 12 inches on center around the perimeter and 16 inches on center in the field; for 2-foot-by-8-foot boards, fastener spacing is a minimum of 12 inches on center on each stud (three fasteners per stud). For window installation, the nailing flange is set against sealant bedding and fastened to the framing with galvanized roofing nails 3 inches from each corner and 8 inches on center. Minimum 3-inch-wide flashing is used to seal the sill of windows, and minimum 2-inch-wide flashing is used to seal jambs and heads. Window installation must be in accordance with the window manufacturer's instructions. See also Figure 1.

Dow fan-fold products must be installed over wood structural sheathing with long joints butted tightly together. The insulation foam board joints must be staggered relative to joints in the structural sheathing. The remainder of the installation is as described above for rigid boards.

For the STYROFOAM brand insulation boards and Dow fan-fold products mentioned in this section, seams and joints between boards must be covered by minimum  $2\frac{7}{8}$ -inch-wide (73 mm) WEATHERMATE™ Construction Tape or equivalent. Penetrations in exterior walls must be sealed with Dow GREAT STUFF™ Gaps & Cracks sealant, or an equivalent expanding spray foam sealant, or an elastomeric sealant. See Figures 2 and 3.

#### 4.4 Use on Exterior Walls in Types I, II, III and IV Construction:

When used on exterior walls of Types I, II, III and IV construction, and when installed in accordance with this report, the assembly must comply with Section 2603.5 of the IBC and must be as described in Table 3; the insulation boards must be installed at a maximum thickness of 3 inches. Alternatively, the insulation boards may be used in Types I, II, III and IV construction when specifically named in another ICC-ES evaluation report, in which case the insulation boards must be installed as described in that report. The potential heat of the ASTM C578 Type X and ASTM C578 Type IV STYROFOAM foam plastic insulation boards and Sto Insul-X™ is 2802 Btu/ft<sup>2</sup> per inch of thickness (31.9 MJ/m<sup>2</sup>).

#### 4.5 Air Barrier:

**4.5.1 Air Barrier Material:** When used as an air barrier material, the insulation boards must be installed in

accordance with The Dow Chemical Company's installation instructions and this report.

**4.5.2 Air Barrier Assembly:** When installed on exterior walls as described in this section, the ASTM C578 Type X and ASTM C578 Type IV STYROFOAM foam plastic insulation is part of an air barrier assembly in accordance with Section C402.4.1.2.2 of the 2012 IECC, based on testing in accordance with ASTM E2357. The assembly qualifies as a continuous air barrier as prescribed in Section C402.4.1 of the 2012 IECC.

The STYROFOAM brand insulation boards, in widths of 1.5 to 4 feet (457 to 1219 mm) and lengths of 8 to 10 feet (2438 to 3048 mm), are installed horizontally over gypsum sheathing or concrete block wall.

When the insulation boards are installed over gypsum sheathing, the boards must be mechanically attached to the wood or steel framing using nails, staples, plastic cap nails or screws. The fasteners must be long enough to penetrate wood framing members a minimum of 0.45 inch (11.4 mm) and steel framing members a minimum of  $\frac{3}{4}$  inch (19 mm).

When installed directly over concrete block walls, the insulation boards are attached to the block wall with mechanical fasteners or Dow GREAT STUFF™ Pro Gaps & Cracks sealant ([ESR-1961](#)). The boards are installed between the rows of brick ties.

Seams and joints between the boards must either be sealed with Dow GREAT STUFF™ Pro Gaps & Cracks sealant ([ESR-1961](#)) or covered by minimum 4-inch-wide (102 mm) WEATHERMATE™ Flashing Tape.

Penetrations in the air barrier assembly must be sealed in accordance with 2012 IECC Section C402.4.2.

Wall coverings must be mechanically attached through the insulation to wall framing or sheathing.

#### 5.0 CONDITIONS OF USE

The STYROFOAM brand insulation boards, Sto Insul-X™ insulation boards and Dow fan-fold products described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** STYROFOAM brand insulation boards, Sto Insul-X™ insulation boards and Dow fan-fold products must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. In the event of a conflict between the installation instructions and this report, this report governs.
- 5.2** This evaluation report and the manufacturer's published installation instructions, when required by the code official, must be submitted at the time of permit application.
- 5.3** A water-resistive barrier complying with the requirements of the applicable code must be provided except when installation is as described in Section 4.3 of this report.
- 5.4** Use of the insulation boards to structurally resist transverse, racking-shear or vertical loading is outside the scope of this report. The walls must be braced in accordance with the requirements of the applicable code.
- 5.5** The insulation boards must not be used as a nailing base for exterior siding materials. All nailing must be into the wall framing as required by the siding manufacturer's instructions or the applicable code.



- 5.6 The insulation boards must be separated from the interior of the building by an approved 15-minute thermal barrier, except as described in Section 4.2.
- 5.7 Where required by the applicable code, a vapor retarder system, which may include the foam plastic insulation, must be installed in the exterior wall, floor, and/or roof ceiling assembly.
- 5.8 Jobsite certification and labeling of the insulation must comply with 2012 IRC Section N1101.12.1, 2009 IRC Section N1101.4 and IECC Section 303.1.1, as applicable.
- 5.9 Use of insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with 2012 IBC Section 2603.9 (2009 IBC Section 2603.8) or IRC Section R318.4. When use is on exterior walls of buildings of Type I, II, III, or IV, construction must be as described in Section 4.4 and Table 3.
- 5.10 STYROFOAM brand insulation boards and Dow fan-fold products are manufactured in Dalton, Georgia; Ironton, Ohio; Channahon, Illinois; LaPorte, Texas; Pevely, Missouri; Varennes, Quebec; and Wyoming, Michigan, under a quality control program with inspections by UL LLC (AA-668).
- 5.11 WEATHERMATE™ Flashing Tape has not been evaluated by ICC-ES for use as flashing under IBC Section 1405.4.

## 6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2012.
- 6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-resistive Barriers (AC71), dated February, 2003 (editorially revised September 2012).
- 6.3 Report of room corner fire tests in accordance with NFPA 286.
- 6.4 Reports of room corner fire tests in accordance with NFPA 286, AC12 Appendix B, for attics and crawlspace in Section 4.2.
- 6.5 Reports of air leakage tests in accordance with ASTM E283 and ASTM E2357.
- 6.6 Reports of potential heat tests in accordance with NFPA 259.
- 6.7 Report of fire propagation tests in accordance with NFPA 285.

## 7.0 IDENTIFICATION

The STYROFOAM brand insulation boards, Sto Insul-X™

insulation boards and Dow fan-fold products described in this report are identified by a label on the board or packaging material bearing the Dow Chemical Company name, product name, plant code or manufacturing address, label of the inspection agency (UL LLC), other information to confirm code compliance, and the ICC-ES evaluation report number (ESR-2142); except for those products that are used in Types I, II, III, and IV construction, which must have the above-noted labeling printed on the board.

## 8.0 OTHER CODES

In addition to the codes referenced in Section 1.0, the products described in this report were evaluated for compliance with the requirements of the following codes:

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

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report, with the revisions noted below:

- **General:** See Section 4.1, except the approved thermal barrier must be installed in accordance with Section R314.4 or R314.5 of the 2006 IRC.
- **Protection against Termites:** See Sections 4.1 and 5.9, except use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with Section 2603.8 of the 2006 IBC and Section R320.5 of the 2006 IRC.
- **Protection against Condensation:** See Section 4.1, except a vapor barrier must be provided in accordance with Sections R318 and N1102.5 of the 2006 IRC.
- **Application without a Prescriptive Ignition Barrier.** See Sections 4.2.2, except attics must be vented in accordance with 2006 IRC Section R806.4 and combustion air must be provided in accordance with 2006 IMC Sections 701 and 703. Additionally, the prescriptive ignition barrier required by Sections R314.5.3 and R314.5.4 of the 2006 IRC may be omitted.
- **Application without a Prescriptive Thermal Barrier:** See Section 4.2. The prescriptive thermal barrier may be omitted based on testing in accordance with 2006 IBC Section 2603.9 and 2006 IRC Section R314.6.
- **Jobsite Certification and Labeling:** See Section 5.8, except jobsite certification and labeling must comply with Section 102.1.2 of the 2006 IECC, when applicable.

TABLE 1—STYROFOAM BRAND INSULATION BOARDS

PRODUCT NAME	ASTM C578 TYPE <sup>1</sup>	R-VALUE, R / INCH (unless otherwise noted) at 75°F (ft <sup>2</sup> -hr-°F/Btu)	Prescriptive Thermal Barrier Requirement (IBC Section 2603.4) (IRC Section R316.4)	Prescriptive Ignition Barrier Requirement (IBC Section 2603.4.1.6) (IRC Section R316.5.3) (IRC Section R316.5.4)
STYROFOAM Ag Board™	IV	5.0	See Note 1	See Note 4
STYROFOAM CAVITYMATE™	X	5.0	See Note 1	See Note 4
STYROFOAM CAVITYMATE™ Plus	IV	5.0	See Note 1	See Note 4
STYROFOAM CAVITYMATE™ SC	IV	5.0	See Note 1	See Note 4
STYROFOAM CAVITYMATE™ Ultra	IV	10.0 at nominal 1 <sup>3</sup> / <sub>4</sub> " 12.0 at nominal 2 <sup>1</sup> / <sub>8</sub> " 14.0 at nominal 2 <sup>1</sup> / <sub>2</sub> " 16.8 at nominal 3" 19.6 at nominal 3 <sup>1</sup> / <sub>2</sub> "	See Note 2	See Note 5
STYROFOAM DECKMATE™ Plus	IV	5.0	See Note 1	See Note 4
STYROFOAM DECKMATE™ Plus FA	IV	5.0	See Note 2	See Note 5
STYROFOAM DURAMATE™ Plus R2	X	2.0 at nominal <sup>3</sup> / <sub>8</sub> "	See Note 1	See Note 4
STYROFOAM DURAMATE™ Plus	X	3.0 at nominal <sup>1</sup> / <sub>2</sub> "	See Note 1	See Note 4
STYROFOAM DURAMATE™ Perforated	X	3.0 at nominal <sup>1</sup> / <sub>2</sub> "	See Note 1	See Note 4
STYROFOAM FREEZERATE™	IV	5.0	See Note 2	See Note 5
STYROFOAM Highload	VI, VII	5.0	See Note 3	See Note 6
STYROFOAM Lightguard Feedstock	VI	5.0	See Note 3	See Note 6
STYROFOAM Panel Core	VI, VII	5.0	See Note 3	See Note 6
	IV, X		See Note 1	See Note 4
STYROFOAM PANELMATE™ Plus	IV	5.0	See Note 1	See Note 4
STYROFOAM PERIMATE™	IV	5.0	See Note 1	See Note 4
STYROFOAM PLAZAMATE™	VII	5.0	See Note 3	See Note 6
STYROFOAM Residential Sheathing R5	X	5.0 at nominal 1"	See Note 1	See Note 4
STYROFOAM Residential Sheathing R4	X	4.0 at nominal <sup>3</sup> / <sub>4</sub> "	See Note 1	See Note 4
STYROFOAM Residential Sheathing R3	X	3.0 at nominal <sup>1</sup> / <sub>2</sub> "	See Note 1	See Note 4
STYROFOAM Residing Board	X	5.0	See Note 1	See Note 4
STYROFOAM Ribbed ROOFMATE™	VI	5.0	See Note 3	See Note 6
STYROFOAM ROOFMATE™	VI	5.0	See Note 3	See Note 6
STYROFOAM SCOREBOARD	IV	5.0	See Note 1	See Note 4
STYROFOAM Sheathing Material	X, IV	5.0	See Note 1	See Note 4
STYROFOAM Ship Lap	X, IV	5.0	See Note 1	See Note 4
STYROFOAM Square Edge	IV	5.0	See Note 1	See Note 4
STYROFOAM Square Edge R3	IV	3.0 at nominal <sup>1</sup> / <sub>2</sub> "	See Note 1	See Note 4
STYROFOAM Square Edge R4	IV	4.0 at nominal <sup>3</sup> / <sub>4</sub> "	See Note 1	See Note 4
STYROFOAM STUCCOMATE™	X	5.0	See Note 1	See Note 4
STYROFOAM Tongue and Groove	IV	5.0	See Note 1	See Note 4
STYROFOAM Ultra SL	IV	10.0 at nominal 1 <sup>3</sup> / <sub>4</sub> " 12.0 at nominal 2 <sup>1</sup> / <sub>8</sub> " 14.0 at nominal 2 <sup>1</sup> / <sub>2</sub> " 16.8 at nominal 3" 19.6 at nominal 3 <sup>1</sup> / <sub>2</sub> "	See Note 2	See Note 5
STYROFOAM UTILITYFIT™	X	5.0	See Note 1	See Note 4
STYROFOAM WALLMATE™	X	5.0	See Note 1	See Note 4
STYROFOAM XPS Insulation	X, IV	5.0	See Note 1	See Note 4
STYROFOAM VALUEMATE™	X	1.5 at nominal <sup>3</sup> / <sub>8</sub> "	See Note 1	See Note 4
STYROFOAM Z-MATE	X	5.0	See Note 1	See Note 4
Sto Insul-X™	IV	5.0	See Note 1	See Note 4

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.

<sup>1</sup>Type IV has a minimum density of 1.55 pcf, Type VI has a minimum density of 1.80 pcf.

Type VII has a minimum density of 2.20 pcf, Type X has a minimum density of 1.30 pcf.

Notes:

1 – When the insulation thickness is 3 inches or less, a thermal barrier is not required. Insulation thicknesses greater than 3 inches require a thermal barrier.

2 – When the insulation thickness is 2 inches or less, a thermal barrier is not required. Insulation thicknesses greater than 2 inches require a thermal barrier.

3 – A thermal barrier is required for all insulation thicknesses.

4 – When the insulation thickness is 3 inches or less, an ignition barrier is not required in attics or crawl spaces. Insulation thicknesses greater than 3 inches require an ignition barrier.

5 – When the insulation thickness is 2 inches or less, an ignition barrier is not required in attics or crawl spaces. Insulation thicknesses greater than 2 inches require an ignition barrier.

6 – An ignition barrier is required for all insulation thicknesses in an attic or crawl spaces.

TABLE 2—DOW FAN-FOLD PRODUCTS

PRODUCT NAME	NOMINAL THICKNESS (inch)	THERMAL RESISTANCE (R-VALUE) at 75°F (ft <sup>2</sup> -hr-°F/Btu)
Dow High Performance Underlayment	<sup>1</sup> / <sub>4</sub>	1.0
	<sup>3</sup> / <sub>8</sub>	1.5
	<sup>1</sup> / <sub>2</sub>	2.0
BLUECOR™	<sup>1</sup> / <sub>4</sub>	1.0
Dow Protection Board III	<sup>1</sup> / <sub>4</sub>	1.0
STYROFOAM RECOVERMATE™ CR	<sup>3</sup> / <sub>8</sub>	1.5

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.

TABLE 3—NFPA 285 COMPLYING WALL ASSEMBLIES FOR MAXIMUM 3-INCH-THICK ASTM C578 TYPE IV STYROFOAM™ INSULATION BOARD

Base Wall System – Use either 1, 2, or 3	1 – Concrete Wall 2 – Concrete masonry wall 3 – 1 layer of <sup>1</sup> / <sub>2</sub> -inch or <sup>5</sup> / <sub>8</sub> -inch Type X Gypsum Wall Board (on interior), installed over steel studs (minimum <sup>3</sup> / <sub>8</sub> -inch deep, minimum No. 20-gage, maximum 16-inch o.c., lateral bracing every 4 ft. vertically)
Floorline Firestopping	4 pcf mineral wool in each stud cavity and at each floorline. Mineral wool to be attached with Z-clips or equivalent (See Figure 4).
Cavity Insulation – Use either 1, 2, or 3	1 – None 2 – Fiberglass batt insulation (faced or unfaced) 3 – Any non-combustible material
Exterior Sheathing– Use either 1, 2 or 3	1 – None 2 – <sup>1</sup> / <sub>2</sub> -inch thick, exterior type gypsum sheathing 3 – <sup>5</sup> / <sub>8</sub> -inch thick, Type X, exterior-type gypsum sheathing
Weather-Resistive Barrier Applied to Exterior Sheathing – Use 1 or 2	1 – None 2 – Any of the following <sup>1</sup> : a. Air Bloc 31MR <sup>2</sup> – Henry Co. b. AIR-SHIELD™ LMP <sup>2</sup> (black only) – W.R. Meadows c. Backstop® NT <sup>2</sup> – Dryvit d. Barritech™ VP <sup>2</sup> – Carlisle e. CCW-705FR with CCW-702WB Primer <sup>2</sup> – Carlisle f. Fire-Resist Barritech™ NP <sup>2</sup> - Carlisle g. Green Guard® Max Building Wrap – Pactiv ( <a href="#">ESR-2906</a> ) h. Perm-A-Barrier® Aluminum Wall Membrane with WB Primer <sup>2</sup> – W.R. Grace i. Perm-A-Barrier® VPS <sup>2</sup> – W.R. Grace j. Tyvek® CommercialWrap® - DuPont ( <a href="#">ESR-2375</a> ) k. Wall Guardian™ FW100A <sup>2</sup> – STS Inc. l. WEATHERMATE™ - Dow Chemical ( <a href="#">ESR-2862</a> ) m. WEATHERMATE™ Plus – Dow Chemical ( <a href="#">NER-640</a> ) Note: All barriers to be installed at recommended application rates per manufacturer's installation instructions.
Exterior Insulation	ASTM C578 Type IV STYROFOAM™ insulation board: <sup>1</sup> / <sub>2</sub> -inch (minimum) to 3-inch (maximum). Insulation board joints may be covered with 4-inch (maximum) wide asphalt or butyl-based flashing tape
Weather-Resistive Barrier <sup>1</sup> Applied to Exterior Insulation – Use 1, 2, 3, 4 or 5	1 - None 2 – Green Guard® Max Building Wrap – Pactiv ( <a href="#">ESR-2906</a> ) 3- Tyvek® CommercialWrap® - DuPont ( <a href="#">ESR-2375</a> ) 4 - WEATHERMATE™ - Dow Chemical ( <a href="#">ESR-2862</a> ) 5 - WEATHERMATE™ Plus – Dow Chemical ( <a href="#">NER-640</a> )
Exterior Veneer – Use 1, 2, 3, 4, 5 or 6	1 – Brick. Use standard nominal 4-inch thick, clay brick. Use standard brick veneer anchors installed vertically on each stud at a maximum of 24-inch o.c. creating a 2-inch maximum air gap between the exterior insulation and brick. 2 – Concrete – Minimum 2-inch thick, with a 2-inch maximum air gap between exterior insulation and concrete. 3 – Concrete masonry units - minimum 4-inch thick, with a 2-inch maximum air gap between exterior insulation and concrete masonry units. 3 – Limestone – minimum 2-inch thick installed using any standard non-open-joint installation technique such as ship-lap. 4 - Natural stone veneer – minimum 2-inch thick installed using any standard non-open-joint installation technique such as ship-lap. 5 – Pre-cast artificial stone complying with ICC-ES AC51 – minimum 1 <sup>1</sup> / <sub>2</sub> -inch thick installed using any standard non-open-joint installation technique such as ship-lap. 6 – Terracotta cladding – minimum 1 <sup>1</sup> / <sub>4</sub> -inch thick installed using any standard non-open-joint installation technique such as ship-lap.
Special Conditions	Use header treatment shown in Figures 5, 6 and 7 for all window and door openings in wall.

<sup>1</sup>A code-complying water-resistive barrier must be provided, either over the sheathing or over the exterior insulation.

<sup>2</sup>This material was evaluated by ICC-ES to comply with Section 2603.5 of the IBC, when used as part of the wall assemblies outlined in Table 3, but has not been evaluated for use as a water-resistive barrier under Section 1404.2 of the IBC and Section 703.2 of the IRC.

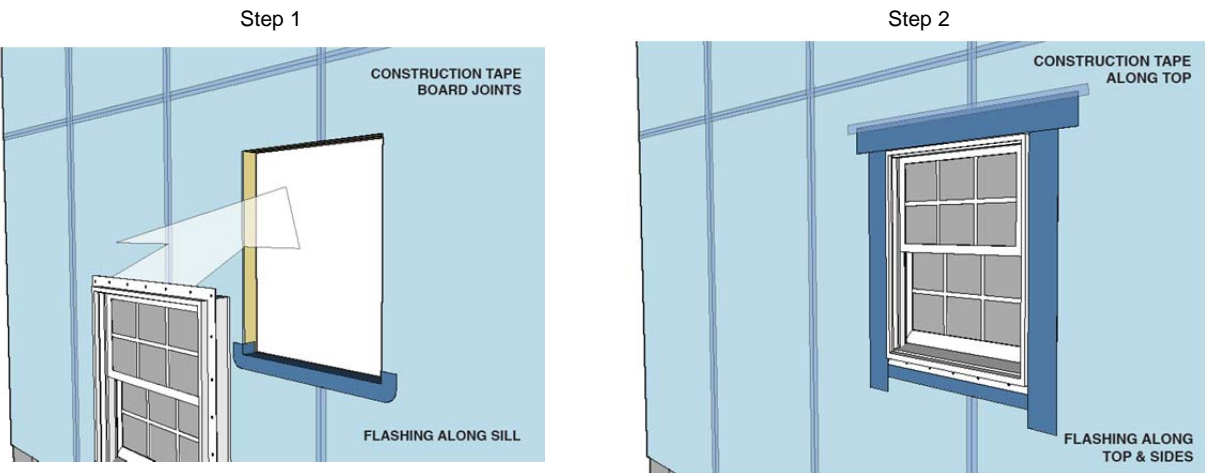


FIGURE 1—TYPICAL WINDOW FLASHING DETAIL

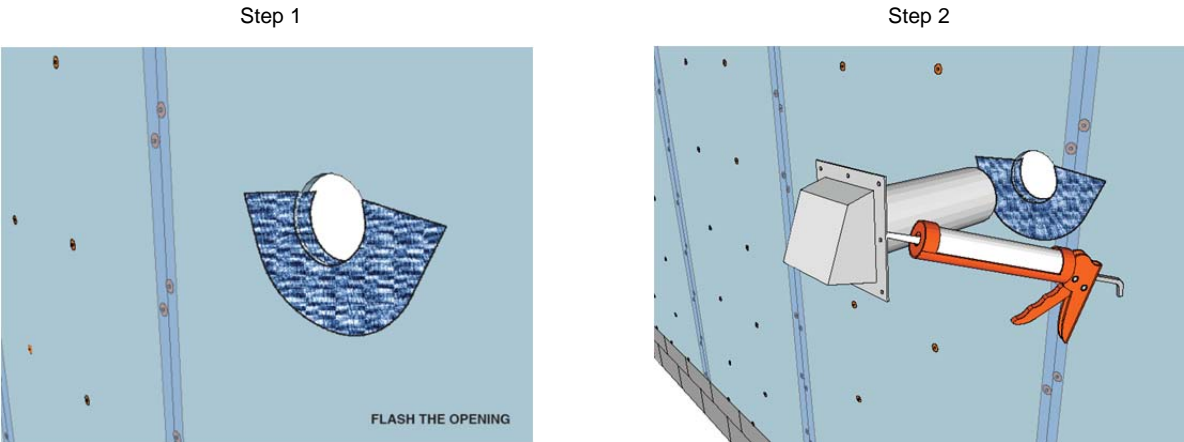


FIGURE 2—TYPICAL PENETRATION FLASHING DETAIL – FLANGED

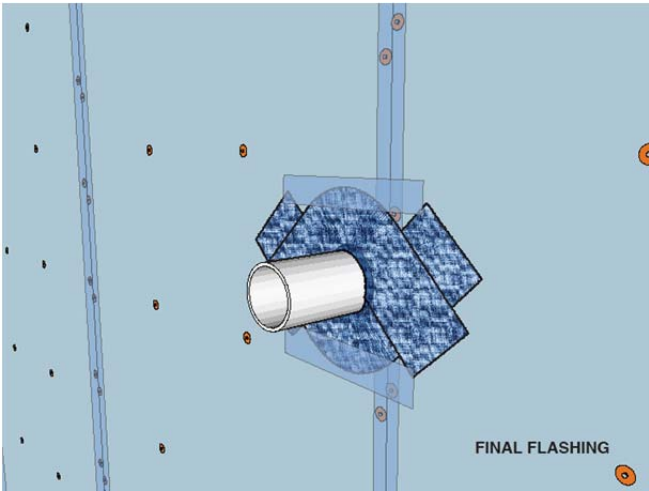


FIGURE 3—TYPICAL FLASHING DETAIL – UNFLANGED

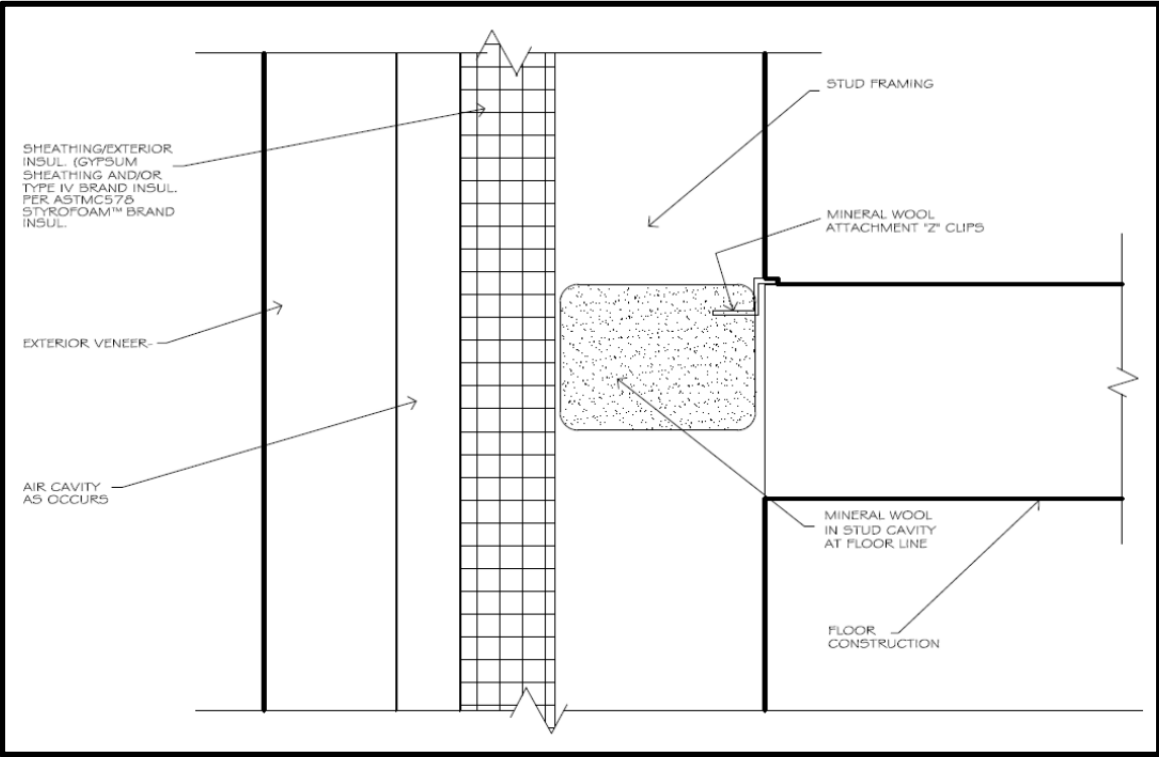


FIGURE 4—FLOORLINE FIRESTOPPING

STEEL STUD/BRICK VENEER - WINDOW HEAD DETAIL

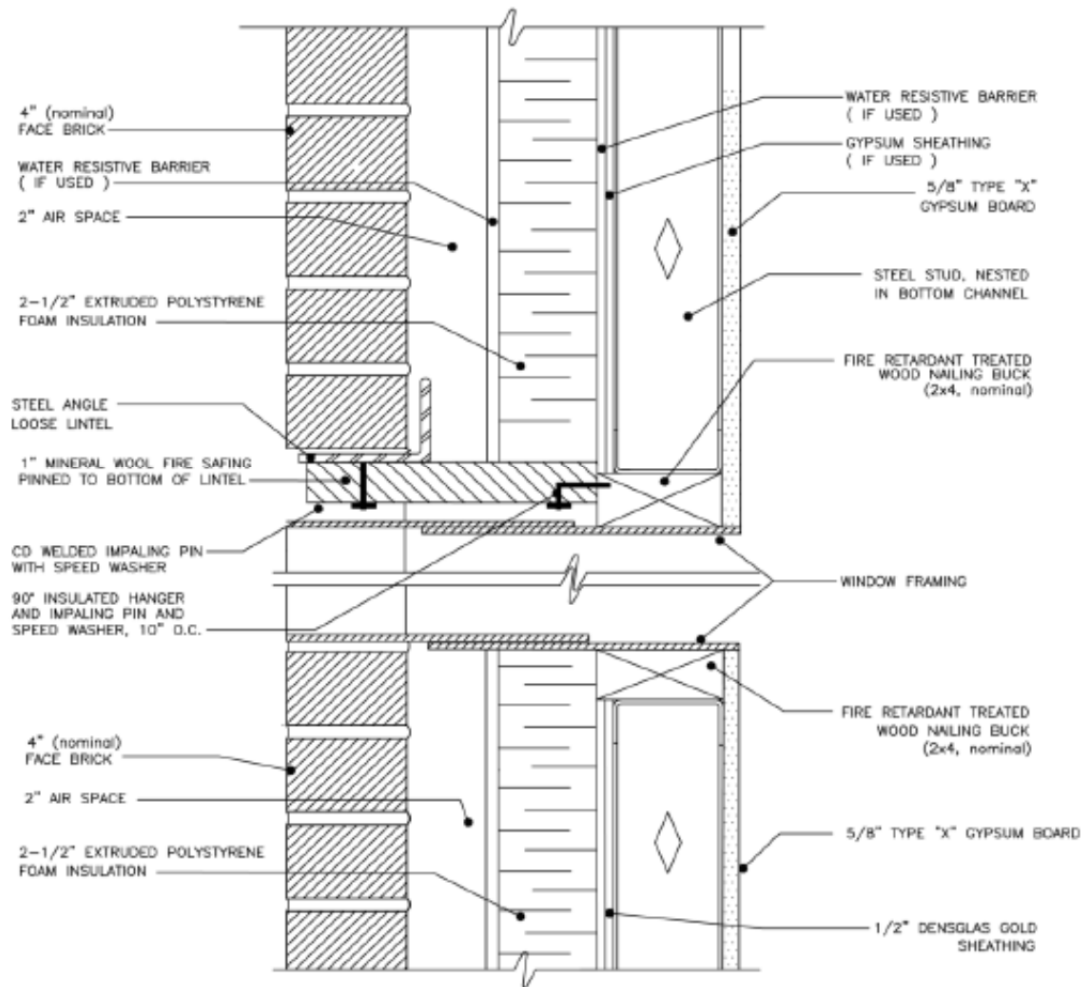


FIGURE 5—WINDOW SILL AND JAMB DETAIL—MINERAL WOOL



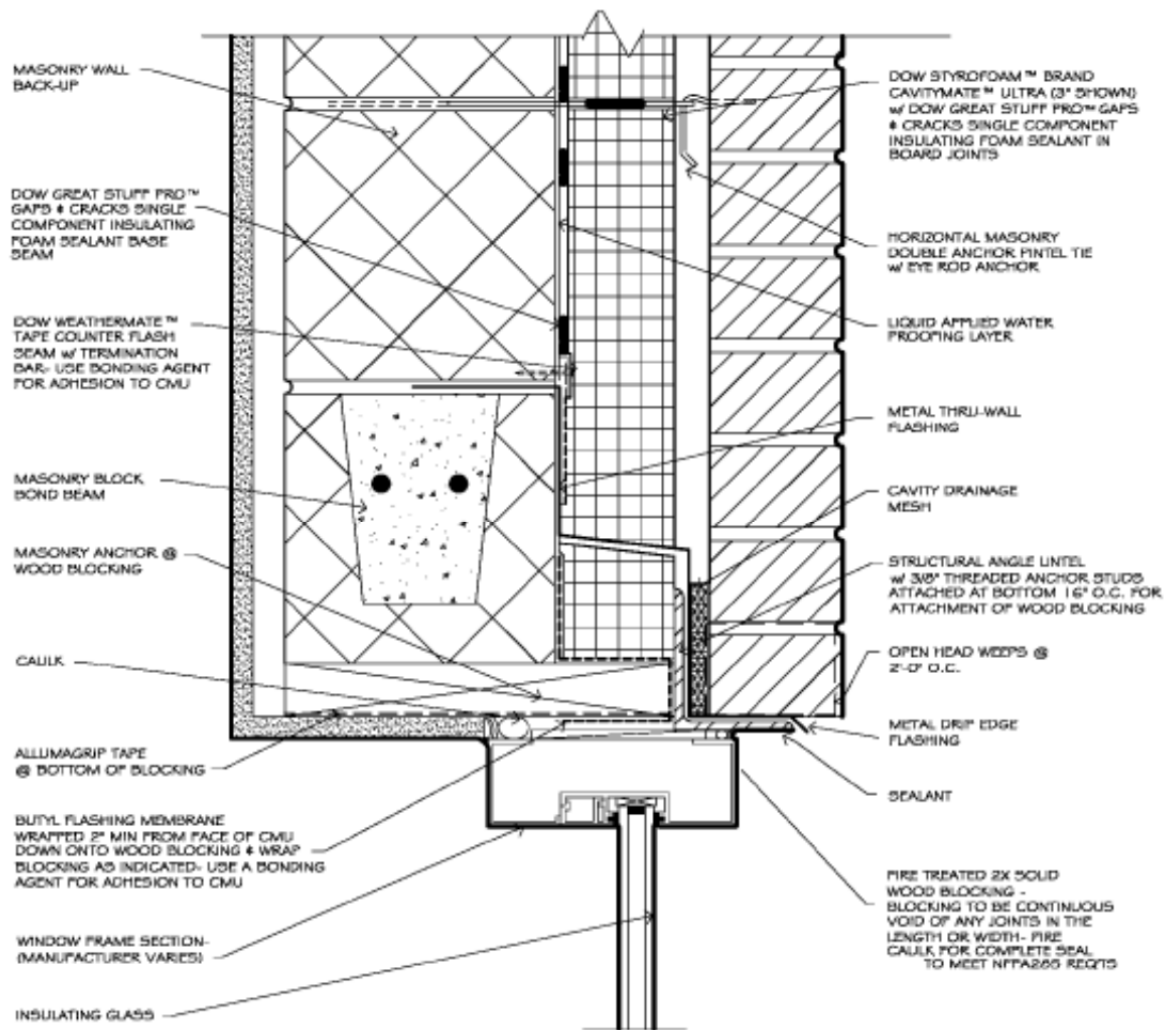


FIGURE 6—WINDOW HEAD DETAIL—FRTW WOOD BLOCKING—MASONRY WALL

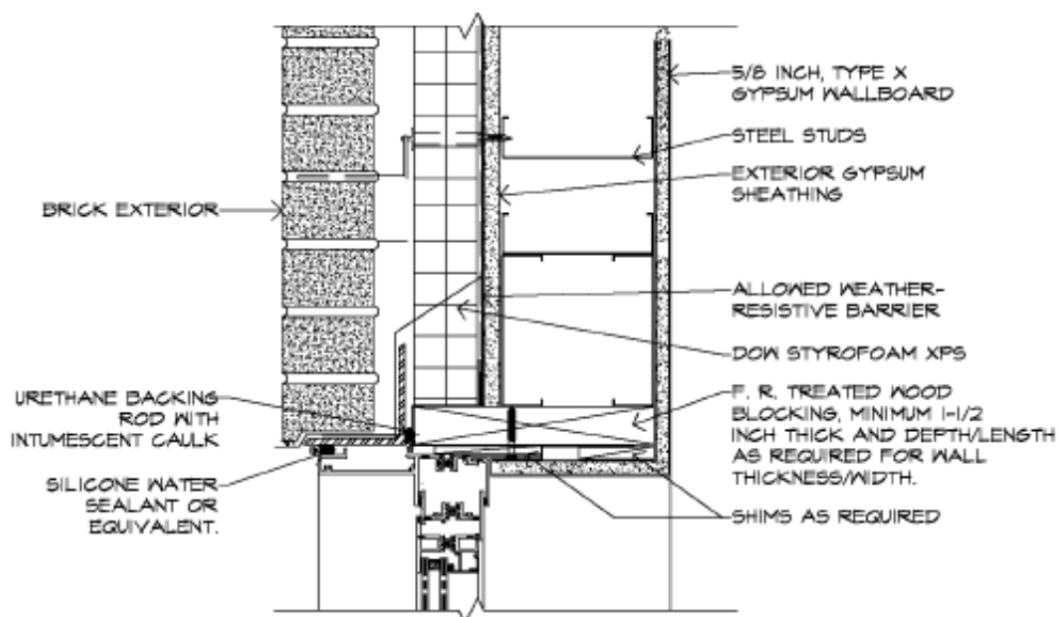


FIGURE 7—WINDOW HEAD DETAIL—FRTW WOOD BLOCKING—FRAMED WALL