ICC-ES Evaluation Report

ESR-1615

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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

REPORT HOLDER:

BARNHARDT MANUFACTURING COMPANY dba NCFI POLYURETHANES

EVALUATION SUBJECT:

INSULSTAR® AND INSULBLOC® SPRAY-APPLIED POLYURETHANE INSULATIONS

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2015, 2012 and 2009 *International Building Code®* (IBC)
- 2015, 2012 and 2009 *International Residential Code®* (IRC)
- 2015, 2012 and 2009 *International Energy Conservation Code®* (IECC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

- Other Codes (see Section 8)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability
- Water vapor transmission
- Water-resistive barrier
- Fire-resistance-rated construction
- Exterior walls in Type I through IV construction

1.2 Evaluation to the following green code(s) and/or standards:

- 2019 California Green Building Standards Code (CALGreen), Title 24, Part 11
- 2015, 2012 and 2008 ICC 700 *National Green Building Standard™* (ICC 700-2015, ICC 700-2012 and ICC 700-2008)

Attributes verified:

See Section 2.0.

2.0 USES

InsulStar and InsulBloc spray-applied polyurethane foam insulations are used as thermal insulating material. The insulation may be used in any type of construction under the IBC (use on walls required to be of Type I, II, III or IV construction is addressed in Section 4.6) and dwellings under the IRC. The insulations may be used in nonstructural applications in wall and floor/ceiling assemblies, and on the exterior side of foundations and the underside of on-grade slabs; and may be used in attics and crawl spaces when installed as described in Section 4.4. The insulations may be used as vapor retarders (Section 3.5), air barriers (Section 3.4) and as air-impermeable insulation (Section 4.4). The insulations may be used as alternatives to the water-resistive barrier required in IBC Section 1404.2 and IRC Section R703.2 when installed as described in Section 4.5. The insulations may be used in fire-resistance-rated construction when installed as described in Section 4.7.

The attributes of the spray foam insulations as an alternative water-resistive barrier have been verified as conforming to the provisions of (i) CALGreen Section 5.407.1 and (ii) ICC 700-2012 Section 602.1.8, 11.602.1.8 and 12.5.602.1.8; and (iii) ICC 700-2008 Section 602.9 for water-resistive barriers. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

The attributes of the insulations have been verified as conforming to the provisions of ICC 700-2008 Section 703.2.1.1.1(c) as an air impermeable insulation. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.0 DESCRIPTION

3.1 General:

InsulStar® and InsulBloc® are two-component, closed-cell, one-to-one-by-volume spray polyurethane foam systems with a nominal density of 2 pcf (32 kg/m3). InsulStar® and InsulBloc® insulation's liquid components are supplied in

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nominally 55-gallon (208 L) drums, labeled as "A" component or "R" component. The insulation components have a shelf life of six months when stored at temperatures between 70°F (21°C) and 90°F (32°C).

3.2 Surface-burning Characteristics:

The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2 pcf (32 kg/m^3), has a flame-spread index of less than 25 and a smoke-developed index of less than 450 when tested in accordance with ASTM E84 (UL 723). There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.3.2

3.3 Thermal Transmission *R*-values:

The InsulStar® and InsulBloc® insulations have thermal resistance *R*-values, at a mean temperature of 75°F (24°C), as shown in Table 1.

3.4 Air Permeability:

InsulStar® and InsulBloc® spray-applied polyurethane foam insulations, at a minimum thickness of 1 inch (25.4 mm), are considered air-impermeable insulations in accordance with 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) and 2015 IBC Section 1203.3, as applicable, based on testing in accordance with ASTM E283.

3.5 Vapor Retarder:

The foam plastic has a vapor permeance of less than 1 perm [5.7 x 10^{-11} kg /(m^{2}sPa)], when applied at a minimum thickness of $1^5/_{16}$ inches (33 mm) and qualifies as a Class II vapor retarder as defined in IRC Section R202.

3.6 DC 315 Coating:

DC 315 Coating is manufactured by International Fireproof Technology, Inc. / Paint to Protect Inc., (ESR-3702), and is a water-based coating supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums. The coating material has a shelf life of 12 months when stored in factory containers at temperatures between 50°F (10°C) and 80°F (27°C).

4.0 INSTALLATION

4.1 General:

InsulStar® and InsulBloc® insulations must be installed in accordance with the manufacturer's published installation instructions and this report. The manufacturer's published installation instructions and this report must be strictly adhered to, and a copy of the instructions must be available at all times on the jobsite during installation.

4.2 Application:

InsulStar® and InsulBloc® insulations must be spray-applied to a suitable substrate on the jobsite using a volumetric positive displacement pump as identified in the NCFI application manual. Preparation of the substrate must be in accordance with the manufacturer's instructions. The insulation components must be stored at temperatures between 70°F (21°C) and 90°F (32°C) for several days before application. The insulation must not be used in areas that have a maximum in-service temperature greater than 180°F (82°C). The foam plastic must not be used in electrical outlet or junction boxes or in direct continuous contact with water.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: The InsulStar® and InsulBloc® insulations must be separated from the interior of the building by an approved thermal barrier of minimum $^1/_2$-inch-thick (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with and installed in accordance with the applicable code, except when the installation complies with the requirements set forth in Section 4.3.2. There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier. Within an attic or crawl space, installation must be in accordance with Section 4.4.

4.3.2 Application without a Prescriptive Thermal Barrier: The prescriptive 15-minute thermal barrier may be omitted when installation is in accordance with this section. The insulation and coating may be spray-applied to the interior facing of walls and the underside of roof sheathing or roof rafters, and in crawl spaces, and may be left exposed as an interior finish without a prescribed 15-minute thermal barrier or prescribed ignition barrier. The thickness of the foam plastic applied to the underside of the roof sheathing must not exceed $10^1/_4$ inches (260 mm). The thickness of the foam plastic applied to vertical wall surfaces must not exceed $8^1/_4$ inches (210 mm). The foam plastic must be covered on all surfaces with DC 315 Coating (ESR-3702) at a minimum wet film thickness of 18 mils (0.46 mm) [12 mils (0.31 mm) dry film thickness]. The coating must be applied over the InsulStar® or InsulBloc® insulation in accordance with the coating manufacturer's instructions and this report. Surfaces to be coated must be dry, clean and free of dirt, loose debris and other substances that could interfere with adhesion of the coating. The coating is applied in accordance with the manufacturer's published installation instructions.

4.4 Ignition Barrier – Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When InsulStar® and InsulBloc® insulations are installed within attics or crawl spaces where entry is made only for service of utilities; an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC Sections R316.5.3 and R316.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code, and must be installed in a manner so that the foam plastic insulation is not exposed. InsulStar® and InsulBloc® insulations as described in this section may be installed in unvented attics and unvented enclosed rafter spaces in accordance with 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) or 2015 IBC Section 1203.3, as applicable.

4.4.2 Application without a Prescriptive Ignition Barrier: Where InsulStar® and InsulBloc® insulations are installed in accordance with Section 4.4.2.1 or Section 4.4.3, the following conditions apply:

a. Entry to the attic or crawl space is to service utilities, and no storage is permitted.

b. There are no interconnected attic or crawl space areas.

c. Air in the attic or crawl space is not circulated to other parts of the building.

d. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2012 Section R806.5 or 2009 IRC Section R806.4. Under-floor (crawl space) ventilation is provided when required by 2015 IBC Section 1203.4 (2012 IBC Section 1203.3) or IRC Section R408.1, as applicable.

e. Combustion air is provided in accordance with IMC (International Mechanical Code®) Section 701.

4.4.2.1 Application without Intumescent Coating: InsulStar® and InsulBloc® insulations may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces; and in crawl spaces, InsulStar® and InsulBloc® insulations may be spray-applied to the underside of floors and/or vertical surfaces as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 16 inches (406 mm). The thickness of the foam plastic applied to vertical surfaces must not exceed $11^1/_2$ inches (292 mm). The foam plastic insulation may be left exposed and does not require covering with a prescriptive ignition barrier or an intumescent coating. The insulations may be installed in unvented attics as described in this section in accordance with 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4).

4.4.3 Use on Attic Floors: InsulStar® and InsulBloc® insulations may be installed exposed at a maximum thickness of $11^1/_2$ inches (292 mm) between joists in attic floors. The InsulStar® insulation must be separated from the interior of the building by an approved thermal barrier. The ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R316.5.3 may be omitted.

4.5 Water–resistive Barrier:

InsulStar® and InsulBloc® spray-applied polyurethane foam insulations may be used as the water-resistive barrier prescribed in IBC Section 1404.2 and IRC Section R703.2, when installed on exterior walls as described in this section. InsulStar® and InsulBloc® foam plastic must be spray-applied to the exterior side of sheathing, masonry or other suitable exterior wall substrates to form a continuous layer of 1 inch (25.4 mm) minimum thickness. All construction joints and penetrations are to be completely sealed with InsulStar® or InsulBloc®.

4.6 Exterior Walls of Type I, II, III, and IV Construction:

4.6.1 General: When used on walls of Type I, II, III and IV exterior wall construction, the InsulStar® and InsulBloc® spray-applied foam insulations must comply with Section 2603.5 of the IBC and this section (Section 4.6), and the maximum thickness of the insulation must not exceed 5 inches (127 mm). The potential heat of InsulStar® and InsulBloc® spray-applied foam plastic insulations is 1989 Btu/ft^2 (22.6 MJ/m^2) per inch of thickness when tested in accordance with NFPA 259.

4.6.2 Specific Wall Assemblies: Wall assemblies complying with Section 4.6 must be as described in Table 2 or Table 3.

4.7 One-hour Fire-resistance-rated Wall Assemblies (Load-bearing):

InsulStar® and InsulBloc® spray-applied polyurethane foam insulations may be installed on load-bearing one-hour fire-resistance-rated walls (see Figures 1 and 2), provided the system is installed in accordance with the following:

4.7.1 Wood Framing: Minimum nominally 2-by-4 wood studs (kiln dried No. 2 spruce-pine-fir) spaced a maximum of 16 inches (406 mm) on center.

4.7.2 Wall Finish (both faces): Two layers of $^5/_8$-inch-thick (16 mm) Type X gypsum sheathing complying with ASTM C36 or ASTM C1396, 4-feet-wide (1219 mm), installed vertically as follows: Base layer fastened to studs (with joints centered over studs) and plates with 6d coated nails, $1^7/_8$-inch-long (48 mm) spaced 7 inches (178 mm) on center or $1^7/_8$ inches (48 mm) long Type S or W steel screws spaced 6 inches (152 mm) on center. Face layer fastened to base layer at the edges with $1^5/_8$-inch-long (41 mm) Type G screws at 8 inches (203 mm) on center and to studs with $2^1/_2$-inch-long (64 mm) Type S steel screws at 12 inches (305 mm) on center in the field, or face layer fastened to studs with $2^1/_2$-inch-long (64 mm) Type S steel screws at 8 inches (203 mm) on center on the edges and 12 inches (305 mm) on center in the field. Face layer joints must be offset a minimum of 24 inches (610 mm) from base layer joints. All joints, screw or nail heads must be covered with joint tape and two coats of joint compound in accordance with GA-216 or ASTM C840. As shown in Figure 1, the exterior face of the exterior wall can be finished with one layer of $^7/_{16}$-inch (11 mm) oriented strand board (OSB) in lieu of two layers of Type X gypsum sheathing as shown in Figure 2. The OSB must be fastened to studs with $1^7/_8$-inch-long (48 mm), 6d coated nails spaced 7 inches (178 mm) on center.

4.7.3 Insulation: InsulStar® or InsulBloc® foam is applied in the stud cavity at any thickness from partially filling to completely filling the stud cavity.

5.0 CONDITIONS OF USE

The InsulStar® and InsulBloc® insulations 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 InsulStar® and InsulBloc® insulations must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. The instructions within this report govern if there are any conflicts between the manufacturer's published installation instructions and this report.

5.2 InsulStar® and InsulBloc® insulations must be separated from the interior of the building by an approved 15-minute thermal barrier, as described in Section 4.3, except when installation is as described in Section 4.3.2.

5.3 The surfaces to which spray-applied insulations are applied must be protected from the weather during application.

5.4 The spray-applied insulations must be applied by installers certified by NCFI Polyurethanes.

5.5 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with 2015 IBC Section 2603.8 (2012 IBC Section 2603.9), 2009 IBC Section 2603.8 or IRC Section R318.4, as applicable.

5.6 Jobsite certification and labeling of the insulation must comply with 2015 IRC Section N101.10.1 and N1101.10.1.1 (2012 IRC Section N1101.12.1 and N1101.12.1.1 and IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1 or 2009 IRC Sections N1101.4 and N1101.4.1) and 2015 and 2012 IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1 (2009 IECC Sections 303.1.1 and 303.1.1.1), as applicable.

5.7 InsulStar® and InsulBloc® insulations at a $1^5/_{16}$-inch (33 mm) thickness or greater is a Class II vapor retarder as defined in IRC Section R202 and IECC Section 202.

5.8 When InsulStar® and InsulBloc® insulations are used as water-resistive barriers, they must be protected from ultraviolet (UV) light exposure in accordance with NCFI's written instructions.

5.9 When use is on buildings of Type I, II, III or IV, construction must be as described in Section 4.6.

5.10 Use of the insulations in fire-resistance-rated construction must be in accordance with Section 4.7.

5.11 InsulStar® and InsulBloc® insulations are produced in Mount Airy, North Carolina, and Clearfield, Utah, under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated May 2015 including reports of tests in accordance with Appendix X of AC377.

6.2 Reports on room corner fire tests in accordance with NFPA 286.

6.3 Reports on air leakage tests in accordance with ASTM E283.

6.4 Reports on water vapor transmission tests in accordance with ASTM E96.

6.5 Reports on fire tests in accordance with ASTM E119.

6.6 Reports of potential heat tests in accordance with NFPA 259.

6.7 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 January 2016).

6.8 Reports of fire propagation characteristics tests in accordance with NFPA 285.

7.0 IDENTIFICATION

7.1 Components of the InsulStar® and InsulBloc® insulations are identified with the manufacturer's name (NCFI Polyurethanes), address and telephone number; the product trade name (InsulStar® or InsulBloc®), use and application instructions; the density; the flame-spread and smoke-development indices; and the evaluation report number (ESR-1615).

International Fireproof Technology, Inc. / Paint to Protect Inc., DC 315 coating is labeled with the manufacturer's name and address; the product name; the date of manufacture, the shelf life or expiration date; the manufacturer's instructions for application, and evaluation report number (ESR-3702).

7.2 The report holder's contact information is the following:

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MOUNT AIRY, NORTH CAROLINA 27030
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8.0 OTHER CODES

8.1 Evaluation Scope:

In addition to the codes referenced in Section 1.0, the products 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)

8.2 Uses:

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:

- **Application with a Prescriptive Thermal Barrier:** See Section 4.2.1, except the approved thermal barrier must be installed in accordance with Section R314.4 of the 2006 IRC.
- **Application with a Prescriptive Ignition Barrier:** See Section 4.3.1, except attics must be vented in accordance with Section 1203.2 of the 2006 IBC, and crawl space ventilation must be in accordance with Section 1203.3 of the 2006 IBC, as applicable. Additionally, an ignition barrier must be installed in accordance with Section R314.5.3 or R314.5.3 of the 2006 IRC, as applicable.
- **Application without a Prescriptive Ignition Barrier:** See Section 4.3.2, except attics must be vented in accordance with Section 1203.2 of the 2006 IBC or Section R806 of the 2006 IRC, and crawl space ventilation must be in accordance with Section 1203.3 of the 2006 IBC or Section R408 of the 2006 IRC, as applicable.
- **Protection Against Termites:** See Section 5.5, except use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with Section R320.5 of the 2006 IRC.
- **Jobsite Certification and Labeling:** See Section 5.6, except jobsite certification and labeling must comply with Sections 102.1.1 and 102.1.11, as applicable, of the 2006 IECC.

TABLE 1—THERMAL RESISTANCE (*R*-VALUES[1])

THICKNESS (inches)	*R*-VALUES (°F.ft^2.h/Btu)
1	6.8
2	13
3	19
3.5	22
4	25
4.75	30
5	32
6	38
7	45
7.5	48
8	51
9	57
10	64
11	70
11.5	73
12	76
16	102

For **SI:** 1 inch = 25.5 mm; 1 °F.ft^2.h/Btu = 0.176 110 °K.m^2/W.

[1]*R*-values are calculated based on tested *K*-values at 1- and 4-inch thicknesses.

TABLE 2—NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES

Wall Component	Materials[1]
Base Wall System – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete masonry wall 3 – 1 layer $^5/_8$-inch-thick Type X gypsum wallboard complying with ASTM C36 or C1396 on the interior, installed over minimum 3$^5/_8$-inch-deep, No. 20 gage, C-shaped steel studs, spaced a maximum of 24 inches on center. Gypsum wallboard must be attached with No. 6, 1$^1/_4$-inch-long self-tapping screws located 8 inches on center along the perimeter and in the field of wallboard. Gypsum wallboard joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216.
Floorline Firestopping	4 pcf mineral wool in each stud cavity at each floorline, attached with Z-clips
Cavity Insulation – Use either 1, 2 or 3	1 – None 2 – Full cavity depth or less of InsulBloc® or InsulStar® applied using exterior sheathing as substrate and covering the width of the cavity and inside the stud flange 3 – Noncombustible insulation[1]
Exterior Sheathing – Only for Base Wall System No.3 – Use either 1 or 2	1 – $^1/_2$-inch-thick, exterior-type gypsum sheathing 2 – $^5/_8$-inch-thick, exterior-type gypsum sheathing
Exterior Insulation – Use either 1 or 2	1 – None 2 – InsulStar® or InsulBloc® insulation spray-applied foam insulation up to a maximum nominal thickness of 5 inches
Exterior Wall Covering – Use either 1, 2, 3 or 4	1 – Brick - standard nominally 4-inch-thick clay brick; brick veneer anchors – standard types installed a maximum of 24 inches OC vertically on each stud – Maximum 2-inch air gap between exterior insulation and brick 2 – Stucco - minimum $^3/_4$-inch-thick, exterior cement plaster and lath. A secondary water-resistive barrier may be installed between the exterior insulation and the lath. The secondary water-resistive barrier must not be full-coverage asphalt or butyl- based self-adhered membranes. 3 – Minimum 2-inch-thick limestone, natural stone or minimum 1$^1/_2$-inch-thick cast artificial stone. Any standard non-open-jointed installation technique such as ship-lap, etc., may be used. 4 – Terracotta cladding – Use any terracotta cladding system in which the terracotta is a minimum of 1$^1/_4$ inches thick. Any standard non-open-jointed installation technique such as ship-lap, etc., may be used.

For **SI:** 1 inch = 25.5 mm; 1 pcf = 16.018 kg/m^3.

[1]Insulation must comply with the applicable requirements of 2015 or 2012 IBC Section 720.2 (2009 IBC Section 719.2).

TABLE 3—NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES

Wall Component	Materials
Interior Finish	1 layer $^{5}/_{8}$-inch-thick Type X gypsum wallboard complying with ASTM C36 or C1396 on the interior, installed over $^{7}/_{8}$-inch-deep hat channels attached to vertical and horizontal steel framing members. Gypsum wallboard must be attached with No. 6, $1^{1}/_{4}$-inch-long self-tapping screws located 8 inches on center along the perimeter and in the field of wallboard. Gypsum wallboard joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216.
Floorline Firesafing	4 pcf mineral wool spanning from edge of slab to interior face of exterior veneer. Mineral wool to be attached with Z-clips or equivalent.
Panel Framing	Vertical and horizontal steel members with steel pin attachments designed to support the applicable loads in accordance with codes adopted by the jurisdiction where the project is located.
Panel Joints	Maximum 1-inch-wide panel joint with polyurethane backer rod inboard of Dow 790 sealant.
Interior Insulation	Maximum nominal 4-inch-thick InsulBloc spray polyurethane applied to the back of the exterior panels
Exterior Panels – Use either 1, 2	1 – Minimum 1-inch-thick glass-fiber reinforced concrete (GFRC) panels by Clark Pacific 2 – Minimum $2^{1}/_{4}$-inch-thick Clark Composite Architectural Precast Panels (C-CAPP) panels by Clark Pacific
Window Head Detail	Minimum 2-inch-thick, 4 pcf mineral wool insulation completely covering spray foam, attached with 3-inch-by-10-inch-by-14 gauge-by-6-inch-long custom bent plate support clips and a 6-inch-by-2-inch-by-$^{1}/_{8}$-inch-thick aluminum window header. See Figure 3
Window Jamb detail	Minimum 2-inch-thick, 4 pcf mineral wool insulation completely covering spray foam, attached with 3-inch-by-10-inch-by-14 gauge-by-6-inch-long custom bent plate support clips. 1 layer $^{5}/_{8}$-inch-thick Type X gypsum wallboard complying with ASTM C36 or C1396 attached to the structural steel framing and completely covered with 1 layer of minimum $^{1}/_{8}$-inch-thick aluminum flashing. See Figure 4.
Window Sill detail	1 layer $^{5}/_{8}$-inch-thick Type X gypsum wallboard complying with ASTM C36 or C1396 attached to the structural steel framing and completely covered with 1 layer of minimum $^{1}/_{8}$-inch-thick aluminum flashing. See Figure 5

For **SI:** 1 inch = 25.5 mm; 1 pcf = 16.018 kg/m^{3}.

FIGURE 1
NON-SYMMETRICAL ONE-HOUR FIRE RESISTANCE-RATED WALL ASSEMBLY

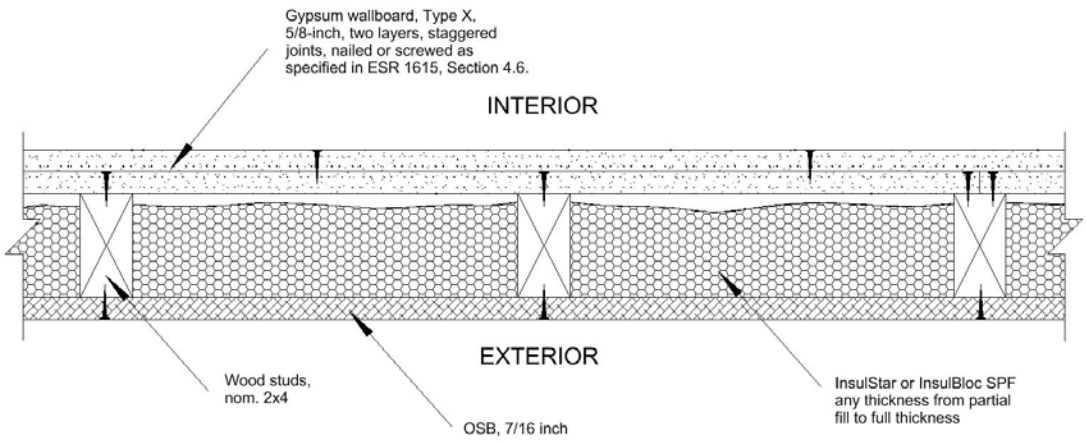


FIGURE 2
SYMMETRICAL ONE-HOUR FIRE RESISTANCE-RATED WALL ASSEMBLY

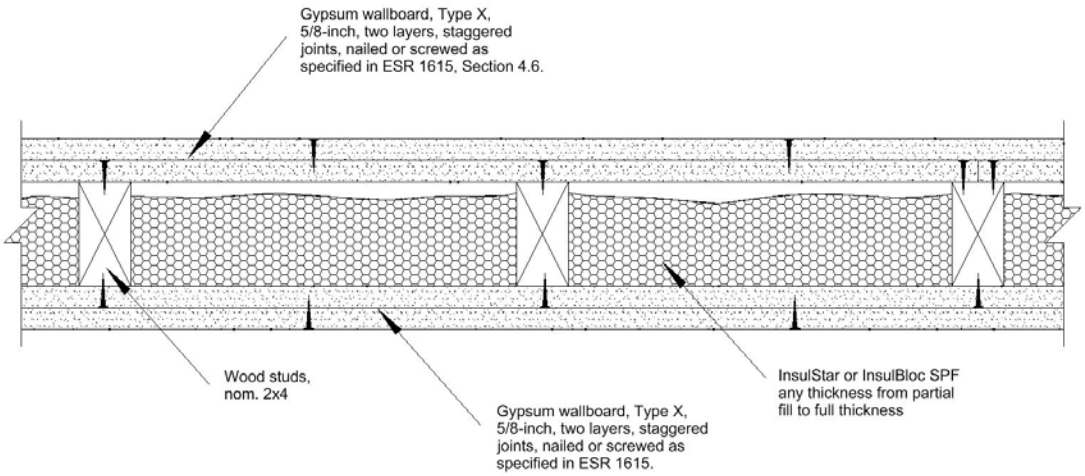
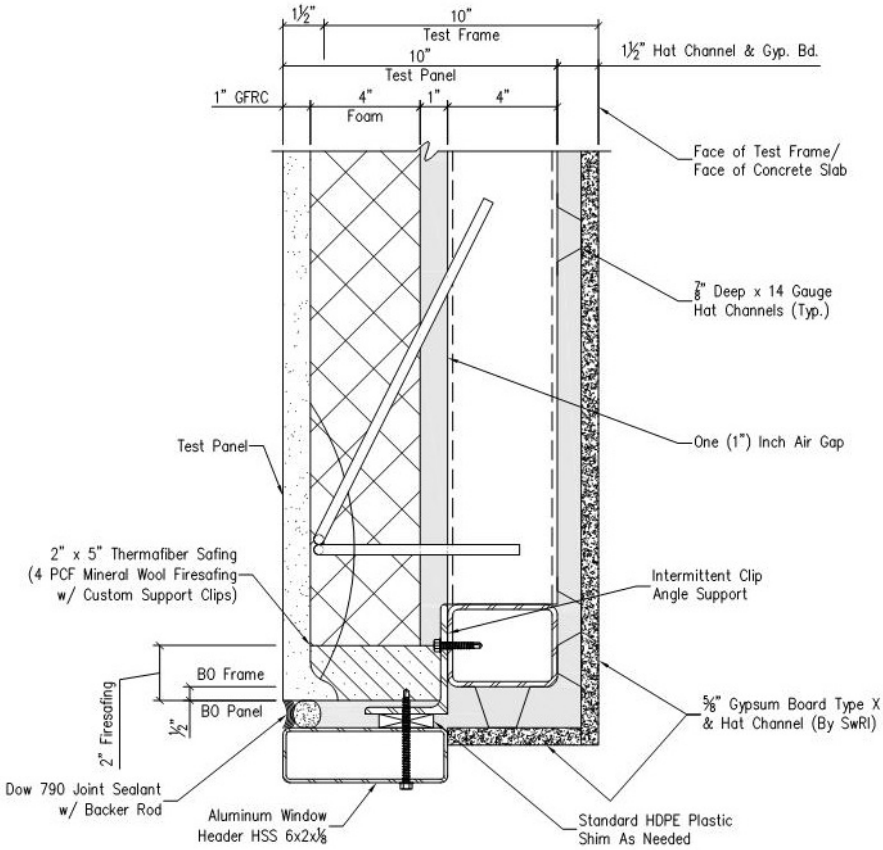
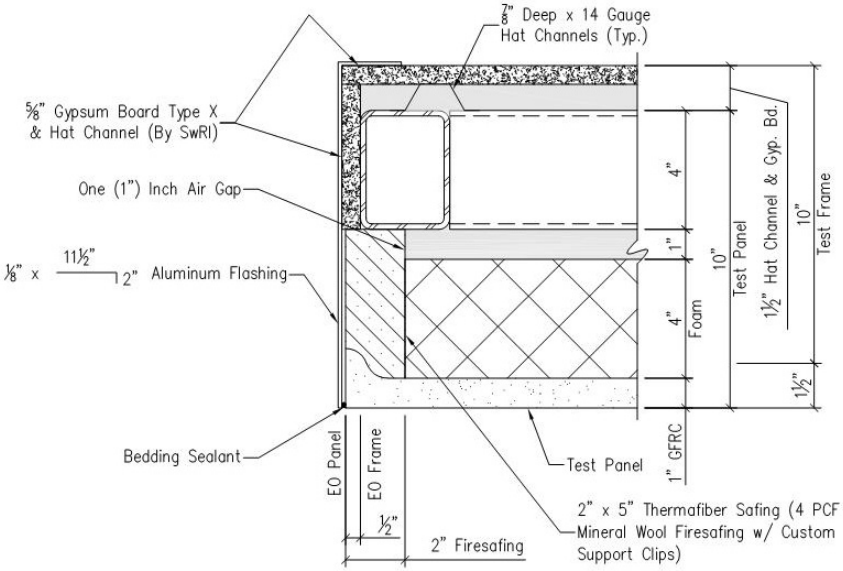


FIGURE 3



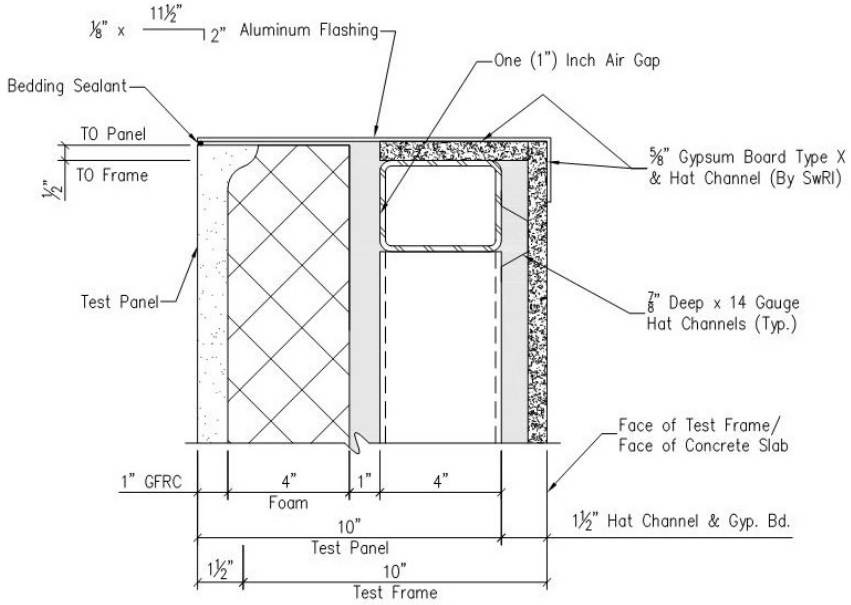
5 / ~ **Detail - Window Head Condition**
SCALE: 3" = 1'-0"

FIGURE 4



7 / ~ **Detail - Window Jamb Condition**
SCALE: 3" = 1'-0"

FIGURE 5



6 / ~ **Detail - Window Sill Condition**

SCALE: 3" = 1'-0"

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation
Section: 07 25 00—Water-resistive Barriers/Weather Barriers

REPORT HOLDER:

BARNHARDT MANUFACTURING COMPANY dba NCFI POLYURETHANES

EVALUATION SUBJECT:

INSULSTAR® AND INSULBLOC® SPRAY-APPLIED POLYURETHANE INSULATIONS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2014 *Florida Building Code—Residential*
- 2014 *Florida Building Code—Building*

Properties Evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability
- Water vapor transmission
- Water-resistive barrier
- Fire resistance-rated construction
- Exterior walls in Type I through IV construction

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the InsulStar® and InsulBloc® spray-applied polyurethane foam insulations described in Sections 2.0 through 7.0 of the evalution report comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, when designed and installed in accordance with the evaluation report under the following conditions:

InsulStar® and InsulBloc® spray-applied polyurethane foam insulations used in exterior walls of multistory buildings located in the High-Velocity Hurricane Zones must comply with Section 2612.3.2.4 of the *Florida Building Code—Building*.

For products falling under Florida Rule 9N-3, verification that the report holder's quality-assurance program is audited by a quality-assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued September 2020.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

BARNHARDT MANUFACTURING COMPANY dba NCFI POLYURETHANES

EVALUATION SUBJECT:

INSULSTAR® SPRAY-APPLIED POLYURETHANE INSULATION

1.0 EVALUATION SCOPE

Conformance to the following:

Seal and Insulate with ENERGY STAR Program, *Definitions and Testing Requirements for Residential Insulation, Version 1.0*

Properties evaluated:

- Thermal resistance
- Surface-burning characteristics

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to certify that the insulation products described in Sections 2.0 through 7.0 of the evaluation report (ESR-1615) have been reviewed for compliance with the applicable codes noted in Section 1.0 of the evaluation report and with the requirements set forth in the Seal and Insulate with ENERGY STAR Program, *Definitions and Testing Requirements for Residential Insulation, Version 1.0*. The insulation product covered by this supplement is defined as "Spray or Pour Foam Insulation."

The requirements for testing laboratory qualifications and product sampling, as well as the specific material and test standards and editions used in this evaluation, are as set forth in the applicable documentation noted in Section 6.0 of the evaluation report.

3.0 DEFINITIONS

The following definitions are from the Definitions and Testing Requirements for Residential Insulation, Version 1.0, and are applicable to the subject of this report.

3.1 General Definition:

Insulation: Any material mainly used to slow down heat flow. It may be mineral or organic, fibrous, cellular, or reflective (aluminum foil). It may be in rigid, semi-rigid, flexible, or loose-fill form.

3.2 Insulation Product Definition:

Spray or Pour Foam Insulation: A thermal insulating material that is sprayed or poured (as a gel or foamy liquid) into place, and expands or sets into a cellular foam and cures at the point of installation through a chemical reaction. Foamed materials include, but are not limited to polyurethane, polyisocyanurate, phenolic, and cementitious insulation.

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3.3 Insulation Performance Definitions:

***R*-value:** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area. For the purposes of the Seal and Insulate with ENERGY STAR program, only Imperial units will be accepted [(h·ft^2·°F)/Btu].

Smoke-Development Index: The characteristic of a material to emit smoke when exposed to flame or fire compared to red oak and inorganic cement.

Flame-Spread Index: The characteristic of a material to resist the spreading of flames when exposed to flame or fire compared to red oak and inorganic cement.

3.4 Thermal Resistance:

The INSULSTAR insulation has thermal resistance *R*-values as noted in Table 1 of ESR-1615, based upon testing.

3.5 Installation:

3.5.1 General: Installation of the INSULSTAR insulation must be in accordance with the requirements set forth in Sections 4.0 and 5.0 (as applicable) of ESR-1615. The insulation is manufactured on-site by spray polyurethane foam applicators meeting the qualification requirements of NCFI Polyurethanes. The following personal protective equipment and ventilation requirements are reprinted from the NCFI Polyurethanes published installation instructions and are provided at the end of this report for informational purposes:

"F. SAFETY

3. PERSONAL PROTECTIVE EQUIPMENT (PPE):

a. Skin: Wear gloves, coveralls, apron and boots as necessary to prevent contact of liquid components or partially-cured SPF with skin. When handling liquid components, gloves should be made of nitrile, neoprene, butyl or PVC.

b. Eyes: Protect eyes while handling liquid components or spraying with safety goggles or safety goggles and a face shield. During spray application, eye protection may be provided by a full-face or hood respirator.

c. Respiration: Firms engaged in the application of NCFI foam systems must have a written respiratory protection program for employees engaged in handling or applying NCFI materials. Depending on the situation, respiratory protection may include dust masks, air-purifying respirators (APR), powered air-purifying respirators (PAPR), or supplied-air respirators (SAR).

4. VENTILATION: Provide ventilation and other engineering controls to exhaust vapors from work areas and to protect building occupants and other trades."

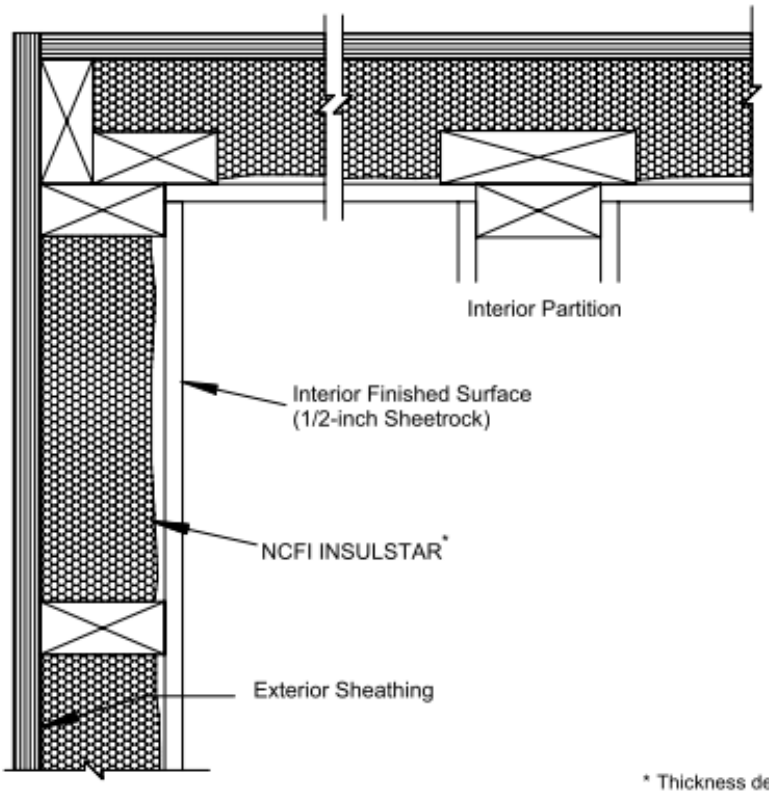
3.5.2 Occupancy Time after Installation: The re-entry or re-occupancy time shall be in accordance with the manufacturer's installation instructions, which state:

"E. RE-ENTRY

NCFI InsulStar reacts and cures within seconds of application. Re-entry times will vary depending on factors including ventilation. Typically, when ventilation is continued for 24 hours following the conclusion of spray application and re-entry may occur at that time."

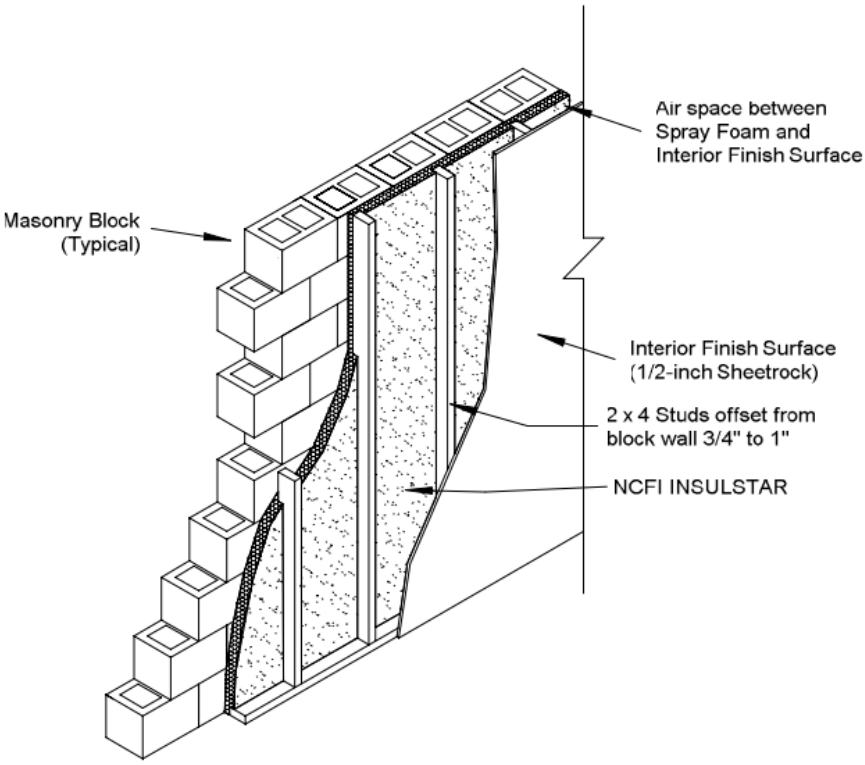
3.5.3 Figures: The figures shown represent general installations of the INSULSTAR insulation in the following applications: above-grade wall, below-grade wall, vented and unvented crawl space, unvented cathedral ceiling, and vented and unvented attic. These figures are for illustration purposes and are not to be construed or used as construction documents.

This supplement expires concurrently with the evaluation report, reissued September 2020.

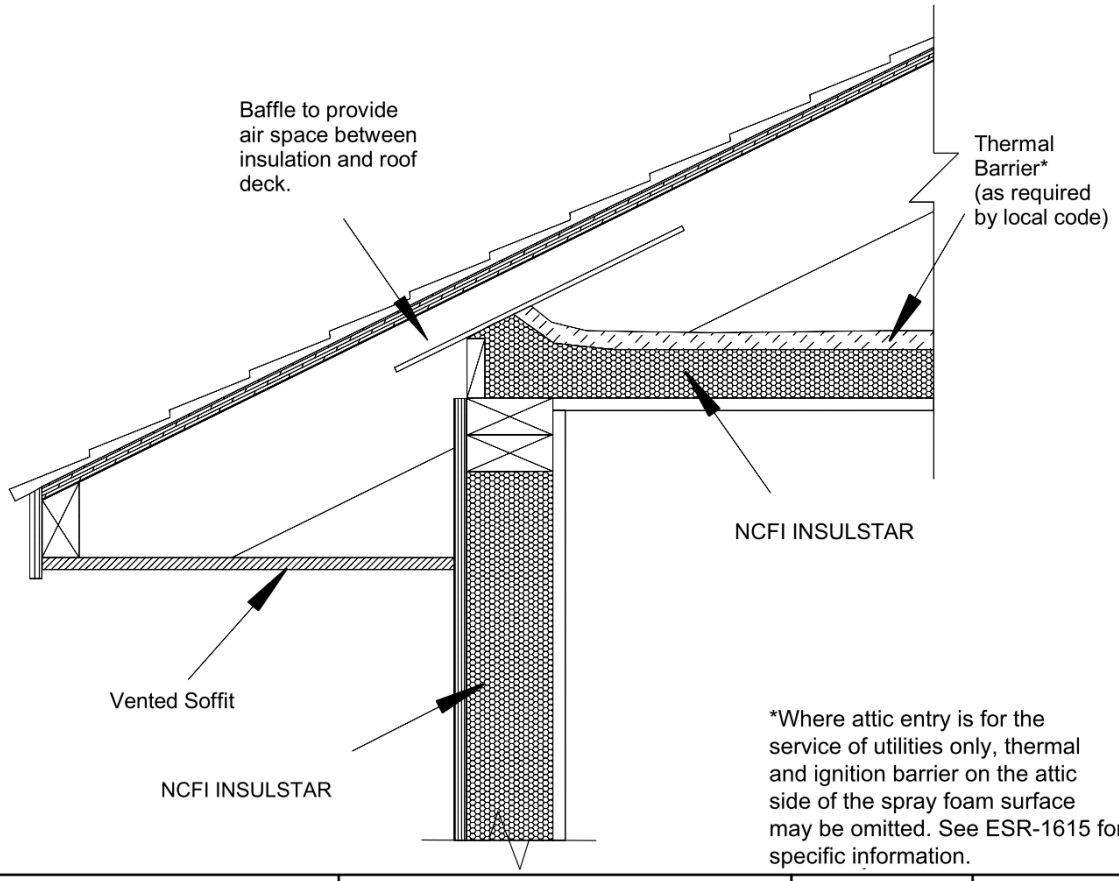


* Thickness determined by design R-value.

NCFI INSULSTAR	ABOVE GRADE WALL INSULATION	NCFI I-1	070413

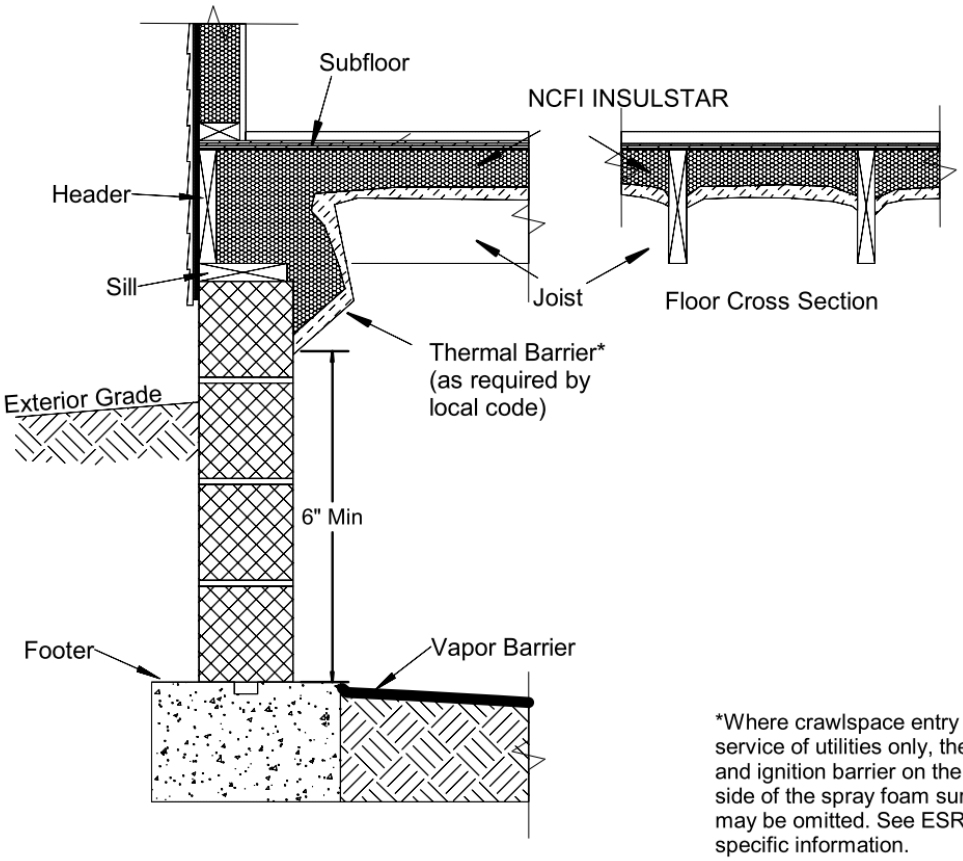


NCFI INSULSTAR	BELOW GRADE WALL INSULATION (Insulation on Interior Side of Wall)	NCFI I-2	053013



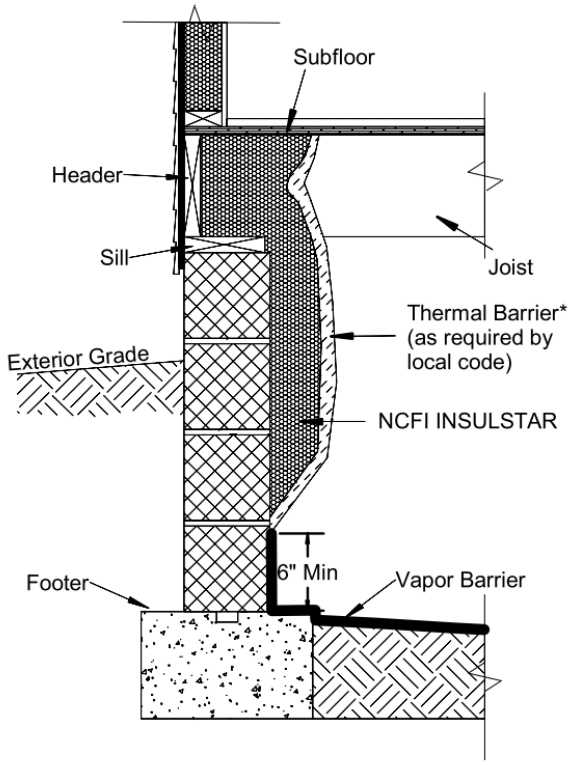
*Where attic entry is for the service of utilities only, thermal and ignition barrier on the attic side of the spray foam surface may be omitted. See ESR-1615 for specific information.

NCFI INSULSTAR	VENTED ATTIC: FLOOR / SOFFIT	NCFI I-3	082212



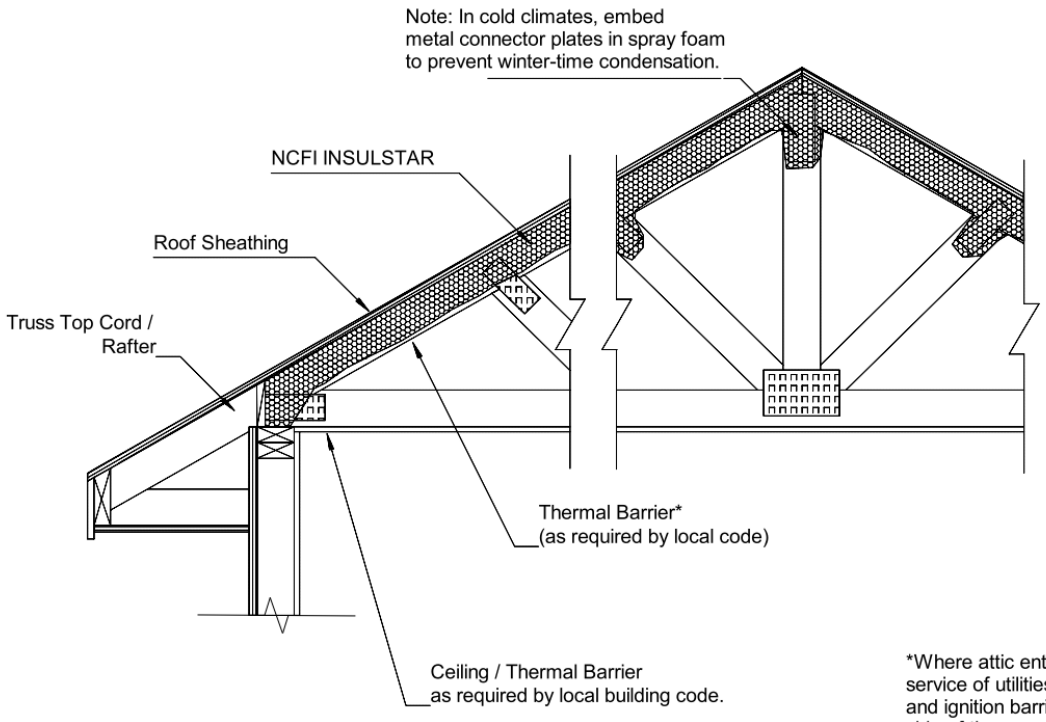
*Where crawlspace entry is for the service of utilities only, thermal and ignition barrier on the crawlspace side of the spray foam surface may be omitted. See ESR-1615 for specific information.

NCFI INSULSTAR	CRAWLSPACE: VENTED	NCFI I-4	082212



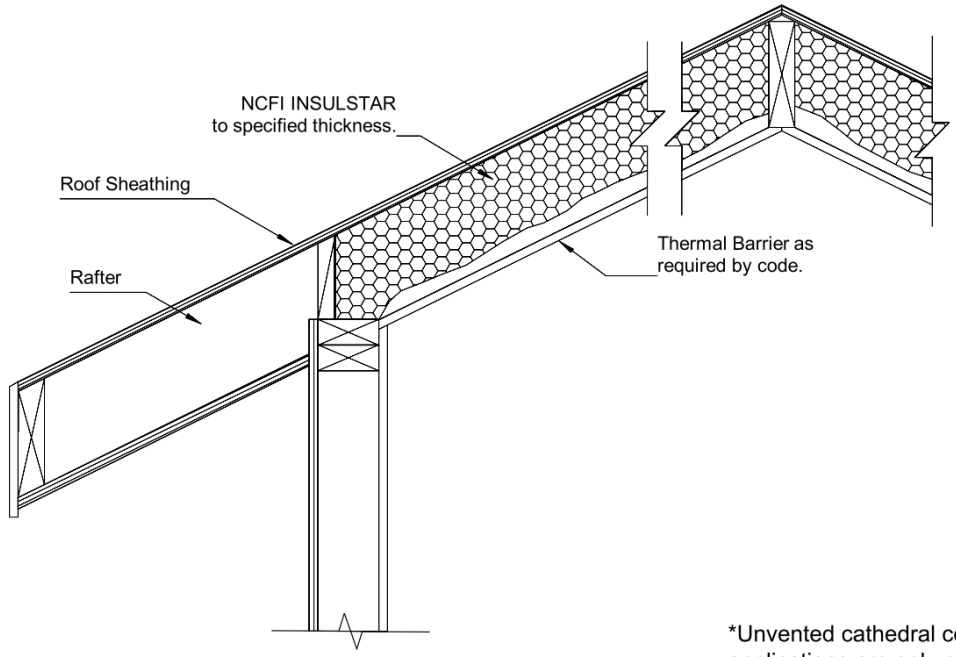
*Where crawlspace entry is for the service of utilities only, thermal and ignition barrier on the crawlspace side of the spray foam surface may be omitted. See ESR-1615 for specific information.

NCFI INSULSTAR	CRAWLSPACE: UNVENTED	NCFI I-5	082212



*Where attic entry is for the service of utilities only, thermal and ignition barrier on the attic side of the spray foam surface may be omitted. See ESR-1615 for specific information.

NCFI INSULSTAR	UNVENTED ATTIC / INSULATED ROOF DECK	NCFI I-6	082212



*Unvented cathedral ceiling applications are only permitted under the IRC when the provisions of Section 806.4 are met.

NCFI INSULSTAR	CATHEDRAL CEILING	NCFI I-7	082212