ICC-ES Evaluation Report

ESR-5498

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This report also contains:
- **SI Supplement**

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION Section: 07 21 00—Thermal Insulation	REPORT HOLDER: HUNTSMAN BUILDING SOLUTIONS	EVALUATION SUBJECT: ICYNENE CLASSIC 45	

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2021, 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2021, 2018, 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.

Properties evaluated:

- Surface burning characteristics
- Physical properties
- Thermal performance (*R*-values)
- Attic and crawl space installation
- Fire–resistance-rated construction
- Air permeability
- Exterior walls of Types I–IV construction

1.2 Evaluation to the following green standard:

- 2008 ICC 700 *National Green Building Standard*™ (ICC 700-2008)

Attributes verified:

See Section 2.0.

2.0 USES

Icynene Classic 45 are used to provide thermal insulation in buildings and to seal areas such as plumbing and conduit penetrations against air infiltration. The insulations are for use in wall cavities and floor assemblies; and in attic and crawl space installations as described in Section 4.4.

The Icynene Classic 45 insulations are for use in Type V construction under the IBC and dwellings under the IRC; fire-resistance-rated construction when installed in accordance with Section 4.5; and in Types I through IV construction when installed in accordance with Section 4.6.

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:

3.1.1 Icynene Classic 45: Icynene Classic 45 is a low-density, open-cell, polyurethane foam plastic insulation and air barrier system that is 100 percent water-blown with an installed nominal density of 0.5 pcf (8 kg/m^3). The insulation is a two-component, spray-applied product. The two components of the insulation are polymeric isocyanate (A-Component) and proprietary resin (B-Component Icynene Classic 45 Resin). When stored at temperatures between 50°F (10°C) and 100°F (38°C), the components have a shelf life of six months.

3.2 Surface Burning Characteristics:

3.2.1 Icynene Classic 45: When tested in accordance with ASTM E84/UL 723, at a thickness of 6 inches (152 mm) and a nominal density of 0.5 pcf (8 kg/m^3), Icynene Classic 45 have a flame spread index of 25 or less and a smoke-developed index of 450 or less. There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.3.1.2 and Table 2.

3.3 Thermal Resistance:

Icynene Classic 45 have thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

Icynene Classic 45 spray-applied foam plastic insulation is considered air-impermeable insulation in accordance with 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) and 2021, 2018, 2015 and 2012 IRC Sections R202 and R806.5 (2009 IRC Sections R202 and R806.4), at the following thicknesses:

- **Icynene Classic 45:** Minimum, 3 inches (76 mm) based on testing in accordance with ASTM E2178.

3.5 Intumescent Coatings:

3.5.1 No Burn Plus XD: No Burn Plus XD intumescent coating is a latex-based coating supplied in 1-gallon (4L) and 5-gallon (19L) pails and 55-gallon (208 L) drums. The coating material has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 40°F (4.4°C) and 90°F (32.2°C).

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

3.5.3 Fireshell® F10E Coating: Fireshell® F10E coating, manufactured by TPR2 Corporation (ESR-3997), is a water-based intumescent coating supplied in 5-gallon (19L) pails and 55-gallon (208L) drums. The coating material has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 45ºF (7.2ºC) and 95ºF (35ºC).

4.0 INSTALLATION

4.1 General:

The manufacturer's published installation instructions and this report must be strictly adhered to and a copy of these instructions and this evaluation report must be available on the jobsite at all times during installation.

4.2 Application:

4.2.1 General: Icynene Classic 45 foam plastic insulation must be applied on the jobsite using two-component, 1-to-1 ratio, spray equipment specified by Huntsman Building Solutions LLC. The foam plastic must not be sprayed onto a substrate that is wet, or covered with frost or ice, loose scales, rust, oil or grease. The foam plastic insulation must not be used in electrical outlet or junction boxes or in contact with rain or water, and must be protected from the weather during and after application. Where the insulation is used as air-impermeable insulation, such as in unvented attic spaces regulated by 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), the insulation must be installed at a minimum thicknesses noted in Section 3.4. The insulation can be installed in one pass to the maximum thickness. Where multiple passes are required, the cure time between passes is negligible.

4.2.2 Icynene Classic 45: The insulation must be used in areas where the maximum service temperature is no greater than 180°F (82°C). The insulation must be applied when the temperature is at or above 14°F (-10°C) and be protected from the weather during and after application.

4.3 Thermal Barrier:

4.3.1 Icynene Classic 45:

4.3.1.1 Application with a Prescriptive Thermal Barrier: Icynene Classic 45 foam plastic insulations must be separated from the interior of the building by an approved thermal barrier, such as $^1/_2$-inch (12.7 mm) gypsum wallboard installed using mechanical fasteners in accordance with the applicable code, or an equivalent 15-minute thermal barrier complying with the applicable code. When installation is within an attic or crawl space as described in Section 4.4, a thermal barrier is not required between the foam plastic and the attic or crawl space, but is required between the foam plastic insulation and the interior of the building. There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.3.1.2 and Table 2.

4.3.1.2 Application without a Prescriptive Thermal Barrier or Ignition Barrier: The prescriptive 15-minute thermal barrier or ignition barrier may be omitted when installation is in accordance with the following requirements:

4.3.1.2.1 The insulation must be covered on all surfaces with a fire protective coating at the minimum thickness set forth in Table 2.

4.3.1.2.2 The maximum installed thickness of the insulation must not exceed the thicknesses set forth in Table 2.

4.3.1.2.3 The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report.

4.4 Attics and Crawl Spaces:

4.4.1 Icynene Classic 45:

4.4.1.1 Application with a Prescriptive Ignition Barrier: When Icynene Classic 45 foam plastic insulation is installed within attics where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 and 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. The Icynene Classic 45 insulation may be installed in unvented attics when the foam plastic is applied at a minimum thickness of 3 inches (76 mm) in accordance with 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.

4.4.1.2 Application without a Prescriptive Ignition Barrier: Where Icynene Classic 45 foam plastic insulations are installed in an attic or crawl space without a prescriptive ignition barrier, in accordance with Sections 4.4.1.2.1, 4.4.1.2.2, 4.4.1.2.3 and 4.4.1.2.4, the following conditions apply:

1. Entry to the attic or crawl space is only for service of utilities and no storage is permitted.
2. There are no interconnected attic, crawl space or basement areas.
3. Air in the attic or crawl space is not circulated to other parts of the building.
4. Combustion air is provided in accordance with IMC Section 701.
5. Attic ventilation is provided when required by 2021 and 2018 IBC Section 1202.2 (2015, 2012 and 2009 IBC Section 1203.2) or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.
6. Under-floor (crawl space) ventilation is provided when required by 2021 and 2018 IBC Section 1202.4 (2015 IBC Section 1203.4 or 2012 and 2009 IBC Section 1203.3) or IRC Section R408.1, as applicable.
7. If hot work is to be performed, all necessary procedures, precautions and limitations must be observed in accordance with OSHA 1926 Subpart J Standard 1926.352 requirements for hot work (welding / cutting) performed in the vicinity of combustible materials.
8. An installation certificate with the following information must be posted at each entrance:
   - Product name and installation thickness.
   - Manufacturer name, address and contact information.
   - Installation contractor name, address and contact information.
   - Attestation that the product(s) have been installed in accordance with the manufacturer's installation instructions and the requirements of the evaluation report.

- A notice that the certificate is not to be removed or altered.
- A list of limitations for the space including the following:
  - Entry to the space is only to service utilities, and no storage is permitted.
  - FIRE SAFETY WARNING: If hot work is to be performed, all necessary procedures, precautions and limitations must be observed in accordance with OSHA 1926 Subpart J Standard 1926.352 requirements for hot work (welding / cutting) performed in the vicinity of combustible materials.

4.4.1.2.1 Attics— Icynene Classic 45: In attics, Icynene Classic 45 foam plastic insulation may be spray-applied to the underside of the roof sheathing and/or rafters, as described in this section. The thickness of the foam plastic applied to the underside of the roof sheathing must not exceed 14 inches (356 mm). The thickness of the spray foam insulation applied to vertical wall surfaces must not exceed 5.5 inches (140 mm). The insulation must be covered on all surfaces with one of the coatings described in Section 3.5. The coating must be applied over the 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 one coat with low-pressure airless spray equipment. The coating must be applied to a thickness as follows:

- No Burn Plus XD at a minimum thickness of 6 wet mils (0.15 mm) [4 dry mils (0.1 mm) dry film thickness], applied at a rate of 0.4 gallon (1.5 L) per 100 square feet (9.2 m^2).
- DC 315 at a minimum thickness of 4 wet mils (0.1 mm) [3 dry mils], applied at a rate of 0.3 gallon (1.1 L) per 100 square feet (9.2 m^2).

The coatings must be applied when ambient and substrate temperature is at least 60°F (16°C) and no more than 95°F (35°C). All other surfaces (including glass) must be protected against damage from the coating. The insulation may be installed in unvented attics when the foam plastic is applied at a minimum thickness of 3.5 inches (89 mm) as described in this section in accordance with 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) and 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.

4.4.1.2.2 Attics—Icynene Classic 45: When Icynene Classic 45 is applied in unvented attics conforming to 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) and 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), the insulation may be applied to the underside of roof sheathing and/or rafters to a minimum thickness of $3^1/_2$ inches (90 mm) and may be applied to vertical wall surfaces to a minimum thickness of $3^1/_2$ inches (90 mm). Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 20 inches (508 mm). The insulation may be left exposed to the attic without a prescriptive ignition barrier or an intumescent coating.

The attic must have attic access complying with IRC Section R807, horizontally placed in the floor, and opening outward toward the living space. Items penetrating the roof deck or walls, such as skylight wells and vents, must be covered with a minimum of $3^1/_2$ inches (90 mm) of the Icynene Classic 45insulation.

4.4.1.2.3 Crawl Spaces: In crawl spaces, Icynene Classic 45 insulation may be spray-applied to vertical walls and the underside of floors, as described in this section. The thickness of the foam plastic applied to the underside of the floors must not exceed 14 inches (356 mm). The thickness of the spray foam plastic insulation applied to vertical wall surfaces must not exceed $3^1/_2$ inches (88.9 mm). The foam plastic does not require an ignition barrier or a coating.

4.4.1.2.4 Use on Attic Floors: When used on attic floors, Icynene Classic 45 foam plastic insulation may be installed at a maximum thickness of $11^1/_2$ inches (292 mm) between joists in attic floors. The insulation must be separated from the interior of the building by an approved thermal barrier. The coatings specified in Section 4.4.1.2.1 and the ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R316.5.3, may be omitted.

4.5 One-hour Fire-resistance-rated Assemblies:

4.5.1 Icynene Classic 45:

4.5.1.1 Assembly 1 (Limited Load-bearing Wood Stud Wall): Minimum nominally 2-by-4 [$1^1/_2$ by $3^1/_2$ inches (38 mm by 89 mm)] southern pine (G = 0.55), No. 2 grade studs spaced 16 inches (406 mm) on center with a base layer of $^1/_2$-inch-thick (12.7 mm) wood fiber sound board installed horizontally on each face with vertical joints located over the studs, attached with 6d box nails, 2 inches (51 mm) long and spaced 24 inches (610 mm) on center along the studs, and a second layer of $^5/_8$-inch-thick (15.9 mm) Type X gypsum wallboard installed vertically on each face, attached with 8d box nails, $2^1/_2$ inches (64 mm) long and spaced 7 inches (178 mm) on center along the studs. The stud cavity contains Icynene Classic 45 insulation nominally 2 inches (51 mm) thick.

Axial loads applied to the wall assembly must be limited to the least of the following:

- 1,805 pounds (8029 N) per stud.
- Design stress of 0.78 *F*′c.
- Design stress of 0.78 *F*′c at a maximum l_e/d of 33.

4.5.1.2 Assembly 2 (Limited Load-bearing Wood Stud Wall): Minimum nominally 2-by-4 [$1^1/_2$ by $3^1/_2$ inches (38 mm by 89 mm)] southern pine (G = 0.55), No. 2 grade studs spaced 16 inches (406 mm) on center with two layers of $^1/_2$-inch-thick (12.7 mm) Type X gypsum wallboard installed vertically with joints staggered on each face, attached with 8d box nails, $2^1/_2$ inches (64 mm) long and spaced 7 inches (178 mm) on center along the studs for the face layer and 6d cement coated box nails, 2 inches (51 mm) long and spaced 24 inches (610 mm) on center along the studs. The stud cavity contains Icynene Classic 45 insulation nominally 2 inches (51 mm) thick.

Axial loads applied to the wall assembly must be limited to the least of the following:

- 1,805 pounds (8029 N) per stud.
- Design stress of 0.78 *F*′c.
- Design stress of 0.78 *F*′c at a maximum l_e/d of 33.

4.5.1.3 Assembly 3 (Floor/Ceiling): Minimum nominally 2-by-10 [$1^1/_2$ by $9^1/_4$ inches (38 mm by 235 mm)] Douglas fir, No. 2 grade wood joists spaced 24 inches (610 mm) on center, with minimum 1-by-3 [$^3/_4$ by $2^1/_2$ inches (19.1 by 64 mm)] spruce bridging at mid-span. Floor decking must be minimum $^1/_2$-inch-thick (12.7 mm) exterior grade plywood installed perpendicular to joists and fastened with 2-inch-long (51 mm) ring shank nails 6 inches (152 mm) on center at the joints and 12 inches (305 mm) on center at the intermediate joists. Plywood joints must occur over joists. Icynene Classic 45 insulation must be applied to the underside of the plywood deck between the joists to a depth of 5 inches (127 mm). Two layers of minimum $^5/_8$-inch-thick (15.9 mm), Type X gypsum wallboard must be attached perpendicular to the joists on the ceiling side of the assembly. The first layer must be attached with $1^1/_4$-inch-long (32 mm), Type W drywall screws, spaced 24 inches (610 mm) on center. The second layer must be applied perpendicular to the joists, offset 24 inches (610 mm) from the base layer. The second layer must be attached with 2-inch-long (51 mm), Type S drywall screws spaced 12 inches (305 mm) on center. Additional fasteners must be installed along the butt joints of the second layer, securing the two layers together. These fasteners must be $1^1/_2$-inch-long (38 mm), Type G drywall screws placed 2 inches (51 mm) back from each end of the butt joint and spaced 12 inches (305 mm) on center. The wallboard joints on the exposed side must be treated with paper tape embedded in joint compound and topped with an added coat of compound, and the fastener heads must be coated with joint compound in accordance with ASTM C840 or GA-216.

4.5.1.4 Assembly 4 (Non-loadbearing Steel Stud Wall): Nominally 6-inch-deep (152.4 mm), No. 18 gage, galvanized steel studs spaced 16 inches (406.4 mm) on center, are friction-fit into No. 18 gage galvanized steel floor and ceiling track with a layer of $^5/_8$-inch-thick(15.9 mm),Type X gypsum board applied to the interior side with the long edge parallel to steel studs and secured using No. 6, $1^1/_4$-inch-long (31.7 mm), self-drilling drywall screws spaced 8 inches (203 mm) on center around the perimeter and 12 inches (305 mm) on center in the field. The gypsum board joints must be treated with vinyl or casein, dry or premixed joint compound applied in two coats to cover all exposed screw heads and gypsum board butt joints, and a minimum 2-inch-wide (51 mm) paper, plastic, or fiberglass tape embedded in the first layer of compound over butt joints of the gypsum board. The stud cavity is filled with Icynene Classic 45 insulation up to 6 inches (152 mm) thick. DensGlass® Exterior Sheathing, $^1/_2$ inch (12.7 mm) thick, is installed parallel to steel studs with vertical joints offset a minimum of 16 inches (406 mm) from the vertical joints of the gypsum board and the horizontal joints offset a minimum of 24 inches (610 mm) from the horizontal joints of the gypsum board. The sheathing is attached using No. 6, $1^1/_4$-inch-long (31.7 mm), self-drilling drywall screws spaced 8 inches (203 mm) on center around the perimeter and in the field. Hohmann & Barnard DW-10 brick ties, 6 inches (152 mm) long by $1^1/_2$-inches (38 mm) wide, are spaced 16 inches (406.4 mm) on center vertically on each steel stud, and secured, using two $1^5/_8$-inch-long (41.3 mm) self-drilling screws, through 4-inch (102 mm) red clay brick [$3^1/_2$ inches (88.9 mm) by $2^1/_4$ inches (57.1 mm) by $7^3/_4$ inches (197 mm)] laid in a running bond pattern with Type S mortar, leaving a nominally 1-inch (25.4 mm) air gap between the brick and the exterior sheathing.

Optional: It is permitted to add code-complying, expanded polystyrene (EPS), extruded polystyrene (XPS), foil-faced, rigid polyurethane board stock or polyurethane spray foam on the exterior of the wall (between the DensGlass® sheathed wall and the brick), while maintaining the 1-inch (25.4 mm) air space. The length of the brick ties must be increased to account for the thickness of the insulation.

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

4.6.1 General: When used on exterior walls of Types I, II, III or IV construction, the assembly must comply with 2018, 2015, 2012, and 2009 IBC Section 2603.5 and this section, and the Icynene Classic 45 insulation

must be installed at a maximum thickness described in Table 3. The potential heat of Huntsman Building Solutions insulations tested in accordance with NFPA 259 is as follows:

- **Icynene Classic 45:** 494 Btu/ft^2 (5.6 MJ/m^2) per inch of thickness

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

5.0 CONDITIONS OF USE:

The Icynene Classic 45 spray-applied polyurethane foam plastic insulation described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 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.

5.2 The insulation must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. If there is a conflict between the installation instructions and this report, this report governs.

5.3 The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, except as noted in this report.

5.4 Since the performance of Icynene Classic 45, when installed in unvented attics without a code-prescribed ignition barrier or an intumescent coating, is based on fire performance of an unvented attic, the installation must be approved by the code official as conforming with the provisions of Section 4.4.1.2.2 and Conditions 1 to 5 of Section 4.4.1.2.

5.5 When Icynene Classic 45 insulation is installed under Section 4.4.1.2.2 of this report, a certificate must be placed in the attic stating that the foam plastic insulation has been installed in accordance with Conditions 1 through 5 of Section 4.4.1.2 and the terms of Section 4.4.1.2.2 of ESR-5498; any alterations to the attic or insulation must be consistent with those requirements.

5.6 The insulation must not exceed the thicknesses and densities noted in this report.

5.7 The insulation must be protected from the weather during and after application.

5.8 The insulation must be applied by licensed dealers and installers certified by Huntsman Building Solutions LLC.

5.9 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IRC Section R318.4 or IBC Section 2603.8, as applicable.

5.10 Jobsite certification and labeling of the insulation must comply with 2021, 2018, 2015 IRC Sections N1101.10.1 and N1101.10.1.1 (2012 IRC Sections N1101.12.1 and N1101.12.1.1 or 2009 IRC Sections N1101.4 and N1101.4.1) and 2021, 2018 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.

5.11 When installed in accordance with Section 4.4.1.2 of this report, the associated installation certificate(s) containing the required information referenced in Section 4.4.1.2 must be installed at each entrance to the crawlspace or attic, as applicable. The certificate(s) must be red in color and constructed of durable materials, such as metal, plastic, or laminated paper.

5.12 When used in unvented attics in accordance with Section 4.4.1.2 of this report, installation with a vapor diffusion port in accordance with 2021 IBC Section 1202.3, Item 5.2 or 2021 and 2018 IRC Section R806.5, Item 5.2 is outside the scope of this report.

5.13 A vapor retarder must be installed in accordance with the applicable code.

5.14 Icynene Classic 45 foam plastic insulation is manufactured in Mississauga, Ontario, Canada and Arlington, Texas, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated June 2023.

6.2 Reports of tests in accordance with AC377 Appendix X and Appendix C].

6.3 Test report on air leakage rate in accordance with ASTM E2178.

6.4 Reports of room corner fire testing in accordance with NFPA 286.

6.5 Test reports in accordance with ASTM E119.

6.6 Test report in accordance with NFPA 285, and related engineering analysis.

6.7 Reports of tests in accordance with NFPA 259.

6.8 Reports of fire tests in accordance with ASTM E970.

6.9 For Icynene Class 45, an engineering evaluation, including full-scale fire testing, small-scale testing and fire modeling (Section 4.4.1.2.2).

7.0 IDENTIFICATION

7.1 All packages and containers of Icynene Classic 45 insulation must be labeled with the Huntsman Building Solutions LLC name and address; the product name; component designation (A or B); the flame spread index and the smoke-developed index; the expiration date; the name of the inspection body (ICC-ES); and the evaluation report number (ESR-5498).

No Burn Plus XP Intumescent coating described in Section 3.5.1 is identified with the manufacturer's name and address, the product trade name and use instructions.

The International Fireproof Technology, Inc. / Paint To Protect Inc. DC 315 coating described in Section 3.5.2 is identified with the manufacturer's name and address, the product trade name, date of manufacture, shelf life or expiration date, the manufacturer's application instructions and the evaluation report number (ESR-3702).

Fireshell F10E 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 the evaluation report number (ESR-3997).

7.2 The report holder's contact information is as follows:

HUNTSMAN BUILDING SOLUTIONS
3315 EAST DIVISION STREET
ARLINGTON, TEXAS 76011
(817) 640-4900
www.huntsmanbuilding.com

TABLE 1—THERMAL RESISTANCE (*R*-VALUES)[1,2]

THICKNESS (inches)	Icynene Classic 45 *R*-VALUE (°F•ft²•h/Btu
1	3.7
2	7.4
3	11
3.5	13
4	14
5	18
5.5	20
6	22
7	25
7.5	27
8	29
9	32
9.5	34
10	36
11.5	41
13.5	—
14	50

For **SI:** 1 inch = 25.4 mm, 1°F·ft²·h/Btu = 0.176 110°K·m²/W.

[1] *R*-values are calculated based on tested *K* values at 1- and 3.5-inch thicknesses.
[2] *R*-values greater than 10 are rounded to the nearest whole number.

TABLE 2—USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER[1]

INSULATION TYPE	MAXIMUM THICKNESS (in.) (Walls & Vertical Surfaces)	MAXIMUM THICKNESS (in.) (Ceilings, Underside of Roof Sheathing/Rafters & Floors)	FIRE-PROTECTIVE COATING MINIMUM THICKNESS & TYPE (Applied to all Foam Surfaces)[2]	MINIMUM THEORETICAL APPLICATION RATE OF FIRE-PROTECTIVE COATING[3]	TESTS SUBMITTED
Icynene Classic 45	8½	14	DC315 14 mils WFT / 9 mils DFT	0.88 gal / 100 ft^2	NFPA 286
	7 1/2	11 1/2	Fireshell F10E 21 mils WFT / 14 mils DFT	1.31 gal / 100 ft^2	NFPA 286

For **SI:** 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft^2 = 0.093 m^2; NA = not applicable.

[1]See Section 4.3.1.2.
[2]See Sections 3.5.2 and 3.5.3.
[3]As reported in the manufacturer's application instructions. Actual application rate, based on specific project conditions, must be in accordance with the manufacturer's application instructions.

TABLE 3—NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES[1,2]

WALL COMPONENT	MATERIALS
Base Wall System – Use either 1, 2 or 3	1 – Concrete wall. 2 – Concrete masonry wall. 3 – Minimum 3 5/8-inch-deep (92 mm), No. 20 gage, C-shaped steel studs, spaced a maximum of 24 inches on center with lateral bracing every 4 feet (1219 mm) as required by code. Sheathing shall be a described in Exterior Sheathing below.
Floorline Firestopping	Minimum 4 pcf mineral wool in each stud cavity at each floorline, attached with Z-clips. Thickness must match stud cavity depth.
Cavity Insulation – Use either 1, 2, 3, 4 or 5	1 – None. 2 – Partial cavity fill with a maximum air space of 2 inches (51 mm) or full cavity depth not exceeding 7 5/8 inches (194 mm) of Icynene Classic 45(ESR-5498); MD-R-210 (ESR-3493); MD-C-200 (ESR-3199); or Proseal (ESR-3500). 3 – Any insulation qualified as noncombustible in accordance with ASTM E136. 4 – Glass fiber batt insulation[a]. 5 – Mineral fiber insulation[a]. [a] Insulation must comply with the applicable requirements of 2018, 2015 or 2012 IBC Section 720.2 (2009 IBC Section 719.2).
Exterior Sheathing – Only for Base Wall System No.3 – Use either 1 or 2	1 – Minimum 1/2-inch-thick (12.7 mm),), glass mat gypsum sheathing complying with ASTM C1177. 2 – Sheathing shall be attached with No. 6, 1 1/4- inch-long (32 mm)self-tapping screws located 8 inches (203 mm) on center along the perimeter and 12 inches 302 mm) on center in the field of wallboard. Joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216.
Exterior Insulation	Maximum thickness of 5 1/2 inches (140 mm) of Proseal Eco (MD-R-210) (ESR-3493) or Proseal (ESR-3500).
Exterior Wall Covering – Use either 1, 2, 3, 4, 5, 6 or 7	1 – Brick - standard nominally 4-inch-thick (102 mm) clay brick; brick veneer anchors – standard types installed a maximum of 24 inches OC vertically on each stud[b]. 2 – Stucco - minimum 3/4-inch-thick (19.1 mm), exterior cement plaster and lath with a secondary water-resistive barrier may be installed between the exterior insulation and the lath. 3 – Natural stone (limestone, granite, marble, sandstone), minimum 2-inch-thick (51 mm)[c]. 4 – Cast artificial stone, minimum 1 1/2-inch-thick (38 mm), complying with AC51 and subject of a current ICC-ES evaluation report[c]. 5 – Terracotta cladding, minimum of 1 1/4–inch-thick (32 mm)[c]. 6 – Precast concrete panels, minimum of 1 1/2–inch-thick (32 mm)[c]. 7 – Concrete masonry units (CMU), minimum of 1 1/2–inch-thick (38 mm)[c]. [b] The maximum air gap between exterior insulation and cladding shall be 2 inches (51 mm). [c] Any standard non-open-jointed installation technique such as ship-lap, etc., may be used.

[1] When used on exterior walls of Types I, II, III or IV construction, the specific wall assembly must comply with 2018, 2015, 2012, and 2009 IBC Section 2603.5.
[2] The exterior wall assemblies described in Table 3 comply with 2018, 2015, 2012 and 2009 IBC Section 2603.5.5.

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

REPORT HOLDER:

HUNTSMAN BUILDING SOLUTIONS, LLC

EVALUATION SUBJECT:

ICYNENE CLASSIC 45

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 Icynene Classic 45 described in Sections 2.0 through 7.0 of the evaluation report (ESR-5498) 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 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.

ICC-ES, the Certification Body, has verified that the test results were issued by laboratories accredited as required by the Conditions and Criteria for Recognition of Insulation Certification Bodies for the ENERGY STAR Program.

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.

Residential Buildings: Single family homes (attached or unattached), multifamily buildings with 4 units or fewer, or multifamily buildings (e.g., condominiums and apartments) with 3 stories or less in height above grade.

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.

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 heptane 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.

4.0 Insulation Performance:

4.1 Thermal Resistance:

Icynene Classic 45 has the thermal resistance *R*-values as noted in Table 1 of ESR-5498, based upon testing.

4.2 Surface Burning Characteristics:

Smoke-Development Index: See Section 3.2.1 of ESR-5498 for the smoke-development index of the insulation material.

Flame-Spread Index: See Section 3.2.1 of ESR-5498 for the flame-spread index of the insulation material.

5.0 Installation:

Installation of Icynene Classic 45 must be in accordance with the requirements set forth in Sections 4.0 and 5.0 (as applicable) of ESR-5498 and Huntsman Building Solution's Installation Instructions dated October 8, 2024, which are reprinted on pages 11 through 31. The installation instructions address use in the following locations of the residence:

- Above grade wall (inside)
- Above grade wall (outside)
- Below grade wall (inside)
- Crawlspace wall (under house)
- Roof or rafters (cathedral ceiling)
- Attic floor
- Attic knee wall
- Ceiling of basement or crawlspace

This supplement expires concurrently with the evaluation report, reissued June 2024 and revised November 2024.

HUNTSMAN
BUILDING SOLUTIONS

RESIDENTIAL SPRAY FOAM PRODUCT APPLICATION GUIDE FOR HOMEOWNERS

OVERVIEW OF HEALTH AND SAFETY FACTORS TO TAKE INTO ACCOUNT WHEN USING SPRAY POLYURETHANE FOAM (SPF)
This application guide pertains to the spray polyurethane foam insulation products offered by Huntsman Building Solutions for residential use. It serves as a general reference for homeowners. Contractors are advised to consult the complete Application Guides for each specific product to obtain detailed installation parameters and requirements. When applying SPF, it is essential to prioritize health and safety. The subsequent sections address potential hazards associated with SPF application, the proper handling of chemical components, safety practices on the job site, and the necessary personal protective equipment for handling and installing SPF chemicals. This information is derived from the Center for Polyurethane Industries' Guidance on Best Practices for the Installation of Spray Polyurethane Foam, which can be accessed at https://www.americanchemistry.com. For more extensive information regarding the health and safety considerations of SPF, additional resources, guidance documents, and training materials are available at www.spraypolyurethane.org.

QUALITY ASSURANCE – INSTALLER QUALIFICATIONS
Only contractors authorized by Huntsman Building Solutions in the art of applying spray polyurethane foam insulation can install the products.

OVERVIEW OF SPRAY POLYURETHANE FOAM'S COMPONENT MATERIALS HEALTH RISKS
Spray polyurethane foam insulation is created through the combination of methylene diphenyl diisocyanate (MDI) and a polyol mixture. Given that these materials may pose health risks, only contractors approved by Huntsman Building Solutions in the application of spray polyurethane foam insulation, and equipped with the appropriate personal protective equipment (PPE) as outlined below, are permitted to handle and install these products. For a visual summary of the required PPE for applicators and assistants, please refer to Figure 1. For further details regarding potential health effects, consult the Material Safety Data Sheets (MSDS) for A-PMDI and B-Side Resin provided by HBS.

RESPIRATORY PROTECTION
In the course of application, the concentration of airborne chemicals may surpass the established exposure guidelines. Consequently, access to the work area and the handling of raw materials is restricted to trained and authorized contractors equipped with appropriate personal protective equipment (PPE). Indoor applications generally necessitate the use of Supplied Air Respirators (SAR), while outdoor applications may call for Air Purifying Respirators. For additional guidance on selecting respirators, please consult the NIOSH Respirator Decision Logic, which is accessible online at www.cdc.gov/niosh/docs/2005-100/pdfs/05-100.pdf.

EYE PROTECTION
It is essential to wear suitable eye protection to safeguard the eyes from accidental splashes of liquids, reactive foams, and other aerosols and particulates that may be encountered during application. When dealing with liquid SPF chemicals in open containers, workers should utilize safety goggles or a combination of safety goggles and face shields to shield their eyes. Additionally, during the application of SPF, eye protection can be enhanced by using a hooded or full-face respirator. Furthermore, having a portable eyewash station readily accessible in the rig or truck, as well as in the immediate work area, and ensuring it is properly covered, can provide additional safety.

CLOTHING & GLOVES
Workers are required to don suitable protective attire whenever there is a risk of direct exposure to SPF component chemicals, particularly during the handling of raw materials and the application of SPF. Applicators and their assistants generally utilize disposable coveralls to prevent spray and mist from coming into contact with their skin and clothing. Fabric gloves that are completely coated with nitrile, neoprene, butyl, or PVC are usually effective in safeguarding SPF applicators. To ensure adequate skin protection, personal protective equipment (PPE) must be worn in a way that leaves no skin exposed.

RE-ENTRY & RE-OCCUPANCY TIMES FOR INTERIOR APPLICATIONS
Only trained, approved and properly protected workers can access the work area during application and for a determined period afterwards. The work area shall be ventilated in accordance with applicable guidance, notably the US Environmental Protection Agency (EPA)'s ''Ventilation Guidance for Spray Polyurethane Foam Application'', the American Chemistry Council's Center for the Polyurethanes Industry's "Good Practices – Engineering Controls and Ventilation", as well as Federal Regulations for Safety and Health during Construction. Re-entry periods for sprayers, helpers, informed trade workers and contractors will vary depending on the product and ventilation rate being used. For homeowners and building occupants, Huntsman Building Solutions recommends a 24-hour re-occupancy time after the application of SPF when appropriate ventilation is used. Homeowners are encouraged to visit www.spraypolyurethane.org and www.huntsmanbuildingsolutions.com for up to date information about spray foam application standards.

Figure 1 – PPE Guidance for applicators and helpers

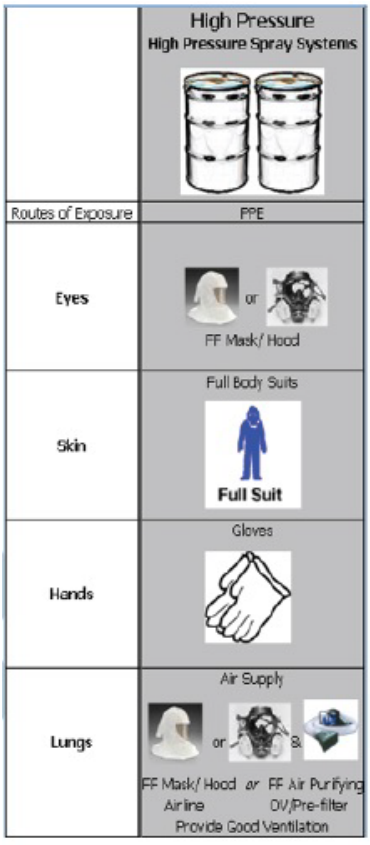


Figure 1 Source: Center for Polyurethane Industries' Guidance on Best Practices for the Installation of Spray Polyurethane Foam

GENERAL PROCESSING GUIDELINE

HBS spray polyurethane foam (SPF) insulation requires heat from the proportioner to complete the chemical reactions necessary to create foam meeting the specifications on the Technical DataSheet. Fully functional primary heaters and hose heat are needed to process the materials. Please consult the Huntsman Building Solutions Technical Service Department for further assistance.

SUBSTRATE PREPARATION

All surfaces to be sprayed must be free of oil, grease, waxes, rust scale, loose dirt and water. In addition, the substrate must be structurally sound. The moisture content ofwood substrates must not exceed 19% before foam is applied. Some metal surfaces may require sandblasting and priming prior to foam spraying to ensure adequate adhesion. Consult a Huntsman Building Solutions Technical Service Representative for additional information on surface preparation. When in doubt about the potential foradhesion to a substrate, build a mock-up and spray the foam under similar conditions to that expected in the field, then test for adhesion and cohesion.

Applying foam insulation to concrete:

- Concrete and masonry must be fully cured and “bone-dry.”
- Oils – wash with detergent and allow to dry
- Salt or calcium deposits – wash with detergent and allow to dry
- Muriatic acid can be an effective cleaning agent for preparing concrete substrates prior to spraying foam. Follow the label instructions for dilution and application.

Applying foam insulation to galvanized steel:

- Oils or passivators – clean with solvent, wash with water based cleaner/degreaser, brush blasting may be necessary.
- Do not use hydrocarbon solvents like mineral spirits to clean galvanized metal.
- White rust – wire brushing or scrubbing with a stiff brush or abrasive pad.
- Prime using a DTM (direct to metal) bonding primer suitable for galvanized metal.

Applying foam over previously painted surface:

- Glossy surfaces – sand or abrade surfaces.

Applying foam over bare steel/metal:

- Rust scales – wire brushing or scrubbing with a stiff brush or abrasive pad.
- Corrosion – clean then prime with suitable bonding primer.
- Glossy or very smooth surfaces – sand or abrade surfaces.

Applying foam over stainless steel:

- Oils – wash with minerals spirits and then prime with a suitable primer. Brush blasting, sanding or abrading may be necessary as foam requires a mechanical bond.

Applying foam over aluminum:

- Oils, Hydrated Alumina – clean with solvent, never use a caustic solution, and prime with a high adhesion bonding primer suitable for aluminum.

Applying foam over glass:

- Oils – wash with detergent
- Glossy or very smooth surfaces – sand or abrade surfaces.
- UV degradation – prime glass surface with suitable primer.

Asphalt and Tar:

- Solvents – allow to cure and for solvent to evaporate, prime with suitable primer.

Rigid Polyurethane Foam:

- UV degradation – remove surface of foam with wire brush or wire grinding wheel.

Polypropylene, polyethylene, some silicones and some ceramic surfaces:

- Spray polyurethane foam may not adhere without a mechanical attachment to these substrates.

FOAM APPLICATION

In preparation for spraying, workers will perform an off-target test spray to verify the processing pressure, primary heater and hose temperature settings. Foam application temperatures and pressures can vary widely depending on temperature, humidity, elevation, substrate, equipment and other factors. While processing,the applicator must continuously observe the characteristics of the sprayed foam and adjust processing temperatures and pressures to maintain proper cell structure, adhesion, cohesion and general foam quality.

Spraying sections too thick, too fast may result in charring of the foam, or in extreme conditions a fire may result. Therefore, the maximum thickness per pass and proper wait times between passes should be respected to avoid fire hazards, including spontaneous combustion, resulting from excessive heat generation. Thin foam layers often result in poor physical properties, reduced coverage and poor chemical reaction due to low exothermic heat generated from the chemical reaction, which is needed to create proper cell formation. When multiple layers are necessary to achieve the proper R-value, cross-hatching should be done. This technique aids in proper cohesion of passes.

The temperature of the substrate has a major effect on the foam density and adhesion. Certain compromises are necessary to spray in cold weather. The “COLD WEATHER PROCESSING” section offers more information on this topic. If in doubt about the substrate or the ambient conditions, a trial application should be done tocheck foam quality and spray performance. Water on the substrate from rain, fog, condensation, etc. will react chemically with the isocyanate, adversely affecting the physical properties, performance and adhesion of the foam. Application on substrates with high relative humidity can also adversely affect the physical properties of the foam.

EXTERIOR FOAM APPLICATION

Climatic conditions are an important factor that should be considered when preparing to apply foam to the exterior of a structure. Ambient and substrate temperatures should be monitored. Foam should only be applied when ambient and substrate temperatures are inside the range for the foam system being used. Foam should only be applied to substrates with less than 19% moisture content. It is best to apply foam when the humidity is less than 80% and the wind is less than 10 mph to maintain properadhesion. Pay close attention to the temperature of the substrate when applying foam to the exterior of a structure.

Use windscreens downwind, the foam can travel long distances because the particles may separate when airborne. Windscreens can also be configured around scaffolding and man-lifts. It may also be necessary to enclose and preheat the area to the acceptable temperature range for the foam system being used. In preparation forspraying, a test spray should be performed to ensure that the proper processing temperatures and pressures are set. The specified settings per the TDS are general starting parameters, it is important to observe the foam and the reaction time of the reacting mass and make additional adjustments as needed.

COLD STORAGE APPLICATIONS

Cold storage facilities require vapor barriers. Vapor barriers are typically applied to the warm side of the insulation system. Closed-cell spray foam is classified as a class II vapor barrier above a certain thickness. When spraying in freezers, use 1” (25mm) lift passes. Thicker passes in deep freezers can lead to severe cracking. Freezers require closed-cell 2 lb foam, using lower density foam or an over catalyzed foam can also lead to severe cracking. Proper surface preparation may be necessary prior to the application of closed-cell spray foam in cold storage applications. Contact the Huntsman Building Solutions Technical Service Department for more information about cold storage applications.

Materials used to construct refrigerated rooms are affected by temperature changes, like all common building materials. Gradual lowering of the temperature is designed to eliminate problems stemming from these temperature changes while at the same time withdrawing construction moisture, and testing the vapor barrier and mechanical system.

HOW TO AVOID OVER SPRAY

Over spray with spray foam occurs for a variety of reasons such as spraying the product too cool, applying the product to a substrate that is too cold, not spraying perpendicular to the surface, and high wind conditions. Flash coating to warm the surface is not a recommended practice and may create unwanted over spray. Flash coats are very thin and may not have enough exothermic reaction present to properly cure. Excessive over spray may lead to blisters or delaminating of additional passesof foam or coating. Over spray can travel long distances and may adhere to objects left unprotected such as windows, buildings and automobiles. Protect anything that should not get foamed.

LIMITATIONS OF USE

Spray foam insulation described in this Application Guide is a combustible material with a maximum continuous service temperature of 180°F (82°C). Spray foam insulation should not be used in direct contact with chimneys, flues, steam pipes, recessed lighting or other heat emitting devices. Consult the listing or label of such materials for clearance to combustibles. A minimum clearance of 3” (76mm) should be maintained when applying around recessed lighting or other heat emitting devices (IRC Section R302.14), and it’s important to avoid spraying inside electric outlets or junction boxes. Where factory-built chimneys pass through insulated assemblies, an insulation shield made of steel having a thickness of not less than 0.0187 inch (No 26 gage) shall be installed to provide clearance between the chimney and the insulation. Insulation shields provided as part of a listed chimney system shall be installed in accordance with the chimney manufacturer’s installation instructions (IRC Section 1005.8). For applications for spray-applied insulation around ductwork, attic hatches, pull-down stairways, windows, pipes or plumbing see to the applicable code. Properly prep and secure any material or surface that should not get insulated. If in doubt about the substrate temperature or surface conditions, a trial application should be conducted to check foam quality and spray performance. Water on the surface from rain, fog, condensation, etc. will react chemically with the isocyanate, adversely affecting the foam and physical properties, particularly adhesion.

COLD WEATHER PROCESSING

Low temperatures affect the foaming process in two ways.

1. Chemical reactions can be slowed due to reduced exothermic energy within the expanding mass, which could lead to poor cell structure, dripping and voids from slowplastic formation
2. This reduced temperature often leads to reduced yield.

The temperature and type of substrate has a greater influence on the quality of the foam than the temperature of the air because the rate of heat transfer from liquid to air is much slower than the rate from liquid to substrate. If the substrate temperature is too low, or it is a highly conductive material such as metal or concrete, the heat produced by the chemical reaction may be drawn into the substrate so rapidly that plastic formation and cell generation becomes very slow, thus reducing yield. It is not agood practice to use the heated chemicals to warm the surface (flash coat). Instead, if the substrate to be sprayed is too cold to produce proper foam, the substrate should be heated using an indirect-fired heater or the foam should be sprayed on a warmer substrate on a warmer day. No open flame or direct heating is permitted during the spraying process.

THERMAL AND UV PROTECTION

Combustible spray foam insulation must be separated from the living space by a thermal barrier in accordance with applicable codes. This product must not be used when the continuous service temperature of the substrate or foam is above 180°F (82°C). Spray foam must be protected fromdirect exposure to sunlight; incidental exposure during construction may cause surface discoloration but will not degrade the performance of the foam.

VENTILATION

Ventilate during spray foam application and for a minimum of 24 hours following the application or until no objectionable odor remains. If not adequately ventilated duringand shortly after application, the odors can be absorbed in adjacent materials such as fibrous insulation, wood framing and household or stored items. Sheet plastic should be placed over any absorbent material that cannot be removed during the spray and ventilation operation.

CHEMICAL STORAGE

Spray foam insulation's B-side resin is packaged in totes or in closed-head metal drums. A-PMDI is packaged in totes or in closed-head metal drums. Products' B-side resin and A-side isocyanate should be stored within their respective temperature ranges as described in Table 1 below. The storage temperature for containers of chemicals used to make spray foam insulation is very important. Installers storing these chemicals should refer to manufacturer information to confirm proper storage practices. The materials should be kept away from direct sunlight. The transfer pump should be removed and the bungs of the A-PMDI and B-side drum tightly closed after use. B-side resin's shelf life should be respected. See the products' B-side SDS for additional information.

LOCATIONS/APPLICATIONS

HBS offers closed-cell and open-cell spray foam products that can be used as a nonstructural thermal insulating material in some or all Types of construction (Types I, II, III, IV & V) under the IBC, and in dwellings under the IRC. Please refer to the appropriate product ESR evaluation report for the specific Types of construction each product can be used in. Closed-cell spray foam insulation can be used installed inside or outside. Such applications include, but are not limited to, external walls, within wall cavities, floor/ceiling assemblies, attics and crawl spaces when installed in accordance with applicable codes. Open-cell spray foam insulation is only intended to be used indoors and above grade. Its applications include within wall cavities, floor/ceiling assemblies and attics when installed in accordance with applicable codes. Local codes should be consulted regarding appropriate thermal and ignition barriers for use with the product where applicable. For additional information, refer to the products' respective Evaluation Service Reports on Huntsman Building Solutions' website.

UNVENTED CRAWL SPACE APPLICATIONS

HBS spray foam insulation shall be applied directly to the crawl space walls, bands of the floor system and in direct contact with framing materials. Do not use separator sheets between the insulation and the concrete/block masonry wall, as this will provide paths for air leakage around the insulated layer. Building Codes require that exposed earth in an unvented crawl space be covered with a continuous Class I Vapor Retarder to avoid excessive moisture loads in the crawl space. The Class I Vapor retarder shall be sealed or taped, its edges shall extend at least 6'' up the crawl space wall and shall be attached and sealed to the wall and spray foam applied overtop to prevent any air leakage. Refer to Figure 2 for typical details.

TERMITE INSPECTION GAP

The use of insulation in "very heavy" termite infestation probability areas shall comply with 2021 IBC Section 2603.8 & 2021 IRC Section R318.4. As such, in areas where the probability of termite infestation is "very heavy", extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundation walls or slab foundations located below grade. The clearance between foam plastics installed above grade and exposed earth shall be not less than 6 inches (152mm). Refer to local codes that may require a gap at the top of the foundation walls for termite inspection purposes. The SPF & Pest Management industry developed a solution to maintain building performance and permit visual termite inspection. One solution that provides the inspection gap (no foam) on the top (if required) and 6'' gap on the bottom of the foundation wall is not to install spray foam over the band joist and mudsill. In this case, the framing members must be caulked at all the joints between the band joists, floor joists, the floor sheathing above, and to the top of the foundation, as can be seen on Figure 3. A non-rigid removable insulation would then be placed between the joists to insulate the band joist and the mudsill. This will allow for the periodic inspections required to maintain termite warranties/bonds. Moreover, in very heavy termite infestation areas, it is not recommended to install spray foam directly on the soil as it may be an at-risk area that would require access for visual inspection.

Figure 2

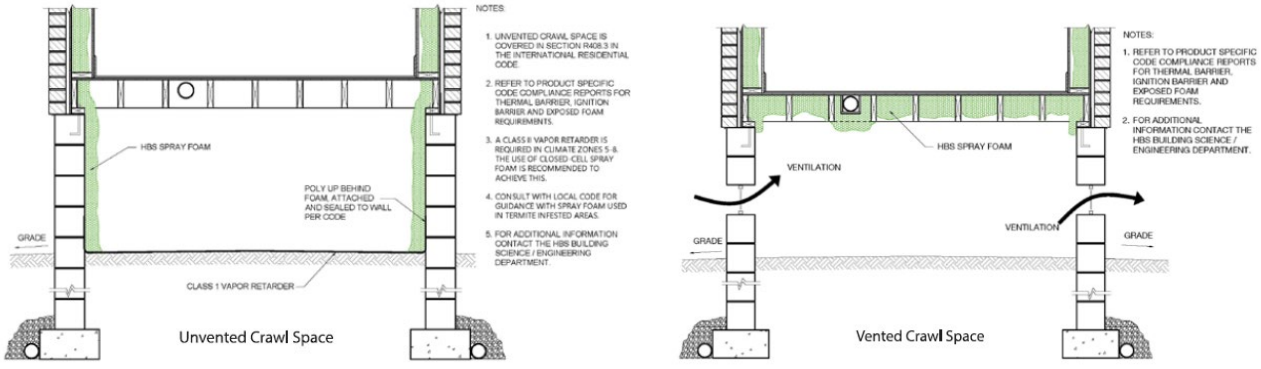
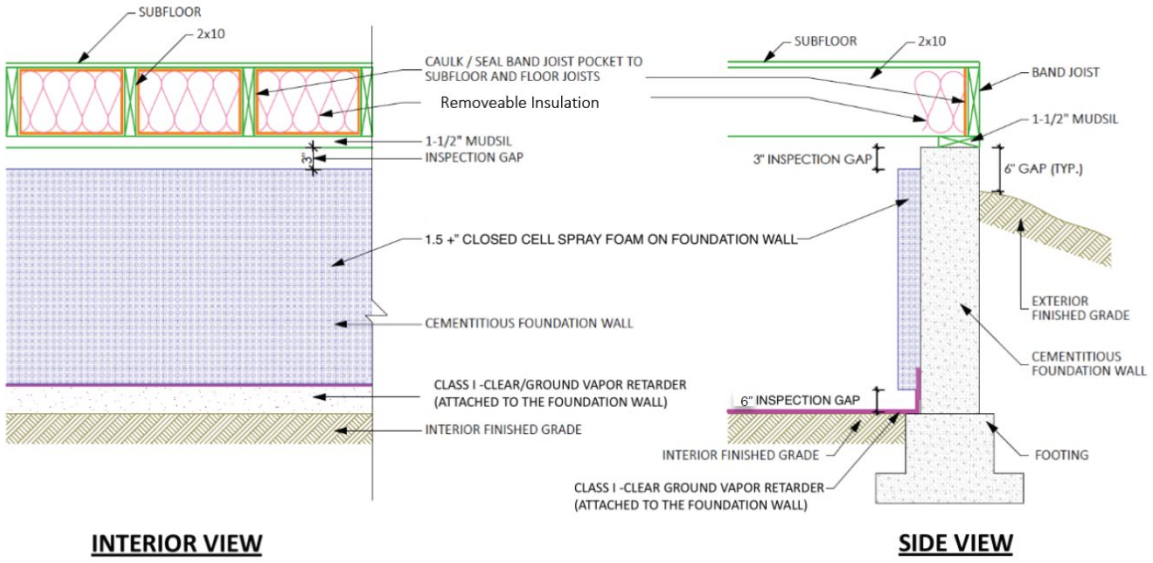


Figure 3 – Unvented/Sealed Crawlspace with 1.5'' + Closed-Cell Spray Foam on Foundation Wall and Removable Insulation on Band Joist



FOR MORE INFORMATION
Visit www.huntsmanbuildingsolutions.com or call 817-640-4900 for more information on health, safety and environmental protection with respect to polyurethanechemicals.

Disclaimer: The information herein is to assist customers in determining whether our products are suitable for their applications. We request that customers inspect andtest our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, expressed or implied, including any warrantyof merchantability or fitness, nor is protection from any law or patent inferred. All patent rights are reserved. The foam product is combustible and must be protected inaccordance with applicable codes. Protect from direct flame and spark contact, around hot work for example. The exclusive remedy for all proven claims is replacement of our materials.

APPENDIX A

Construction drawings representing typical assembly details and locations where spray foam is certified to be used in residential buildings.

10003 Woodloch Forest Drive
The Woodlands, Texas 77380
Phone: (817) 640-4900
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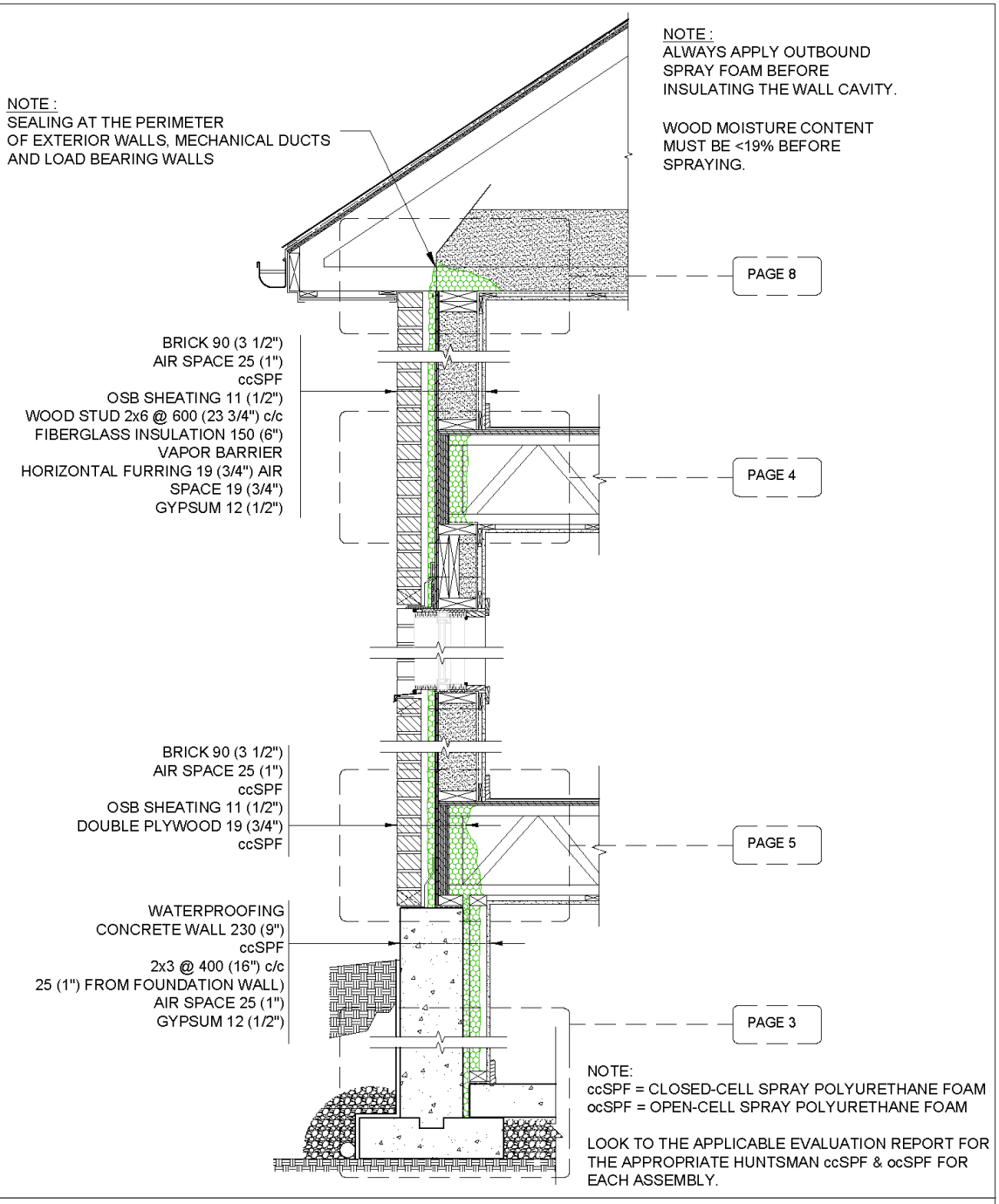

2x6 WALL - BRICK
SYSTEM SECTION

HUNTSMAN
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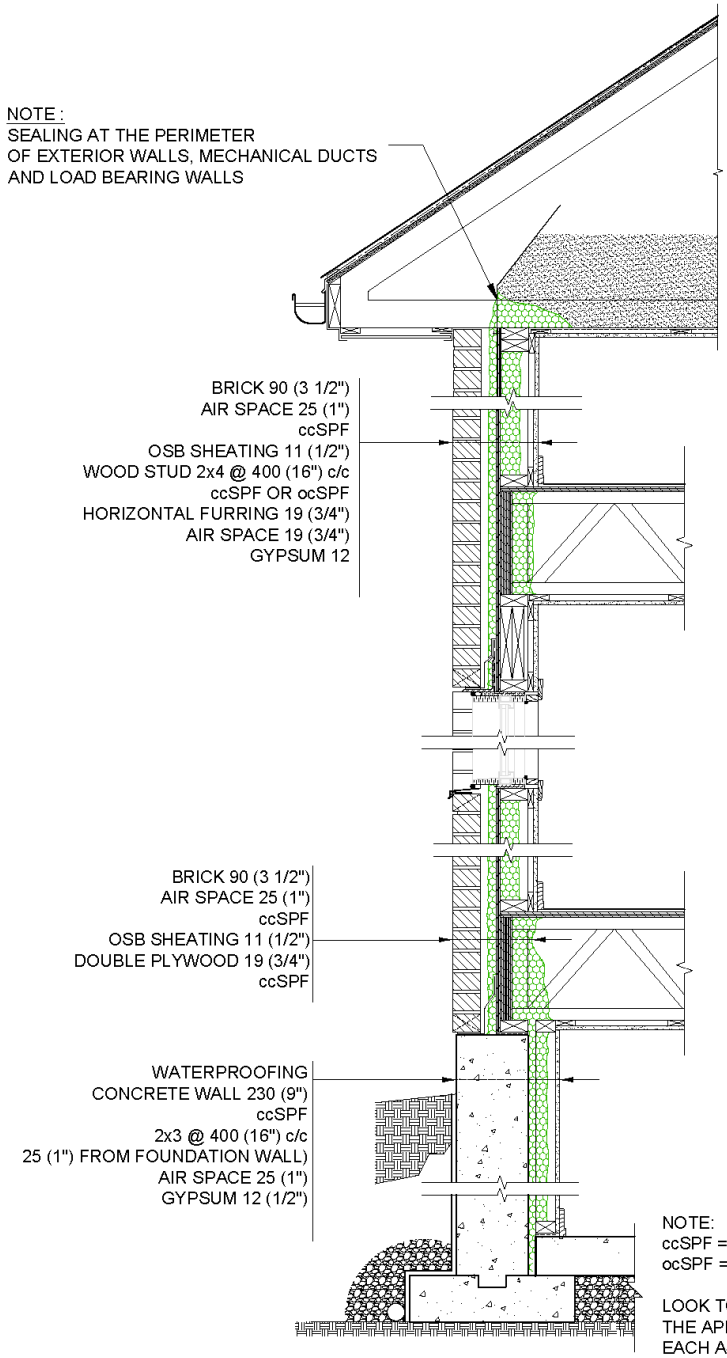
1-888-783-0751 www.huntsmanbuildingsolutions.com

TYPICAL DETAIL
WOOD FRAMING

Scale: 1:20
Page 1
08-09-2023



2x4 WALL - BRICK
SYSTEM SECTION

HUNTSMAN
BUILDING SOLUTIONS
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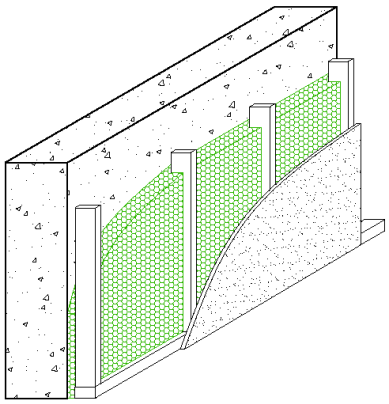
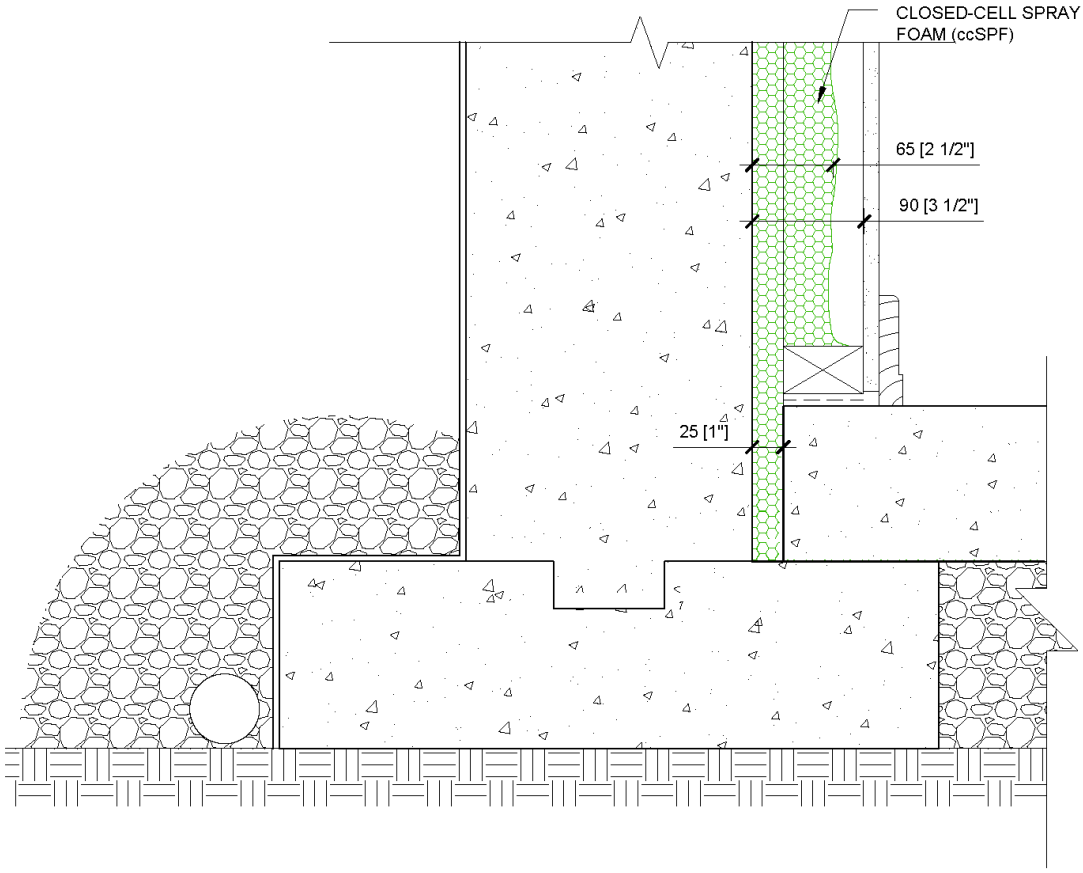
TYPICAL DETAIL
WOOD FRAMING

Scale: 1:20
Page 2
08-09-2023



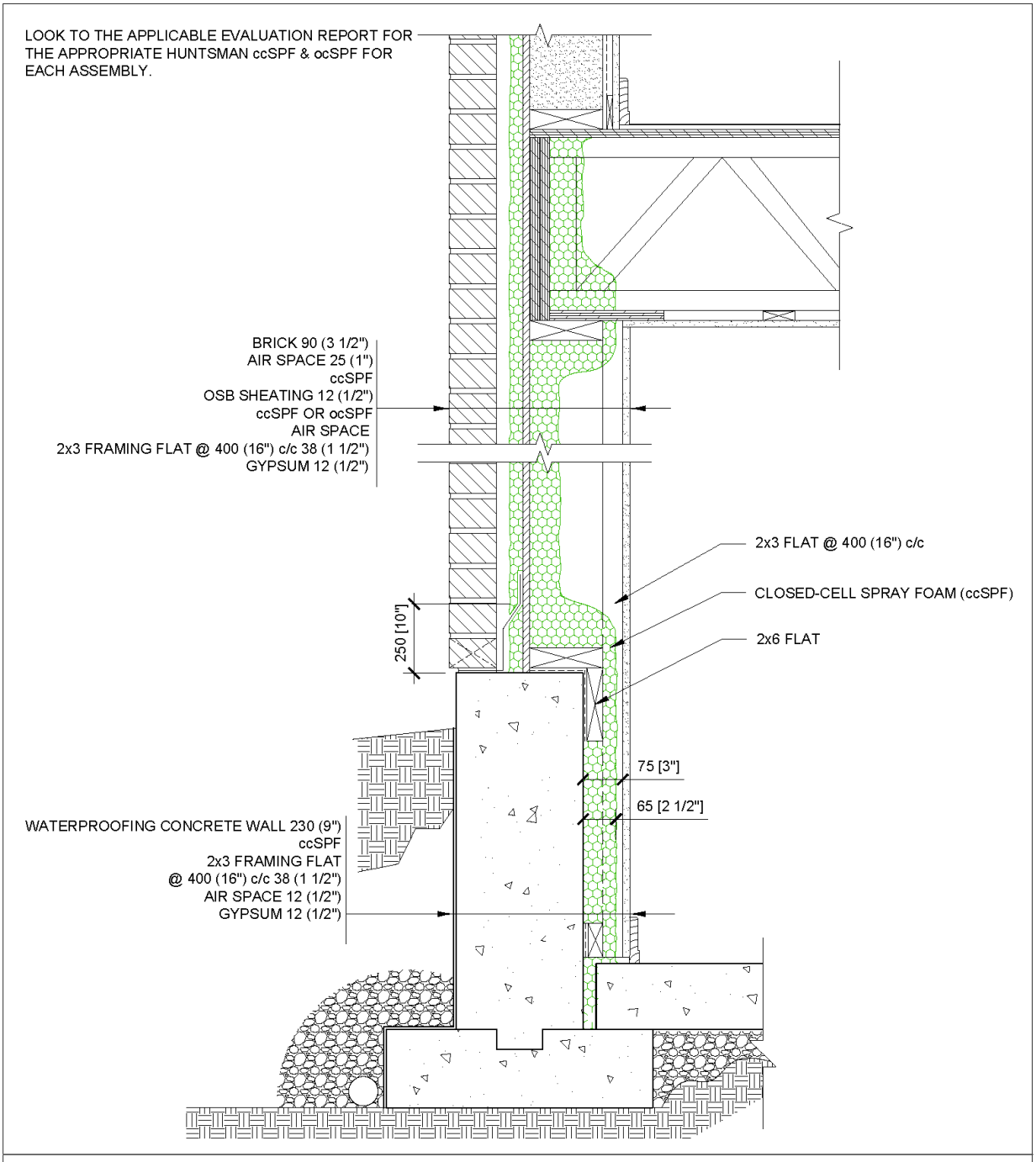


FOUNDATION

HUNTSMAN BUILDING SOLUTIONS
1-888-783-0751 www.huntsmanbuildingsolutions.com

TYPICAL DETAIL
WOOD FRAMING

Scale: 1:5
Page 3
08-09-2023

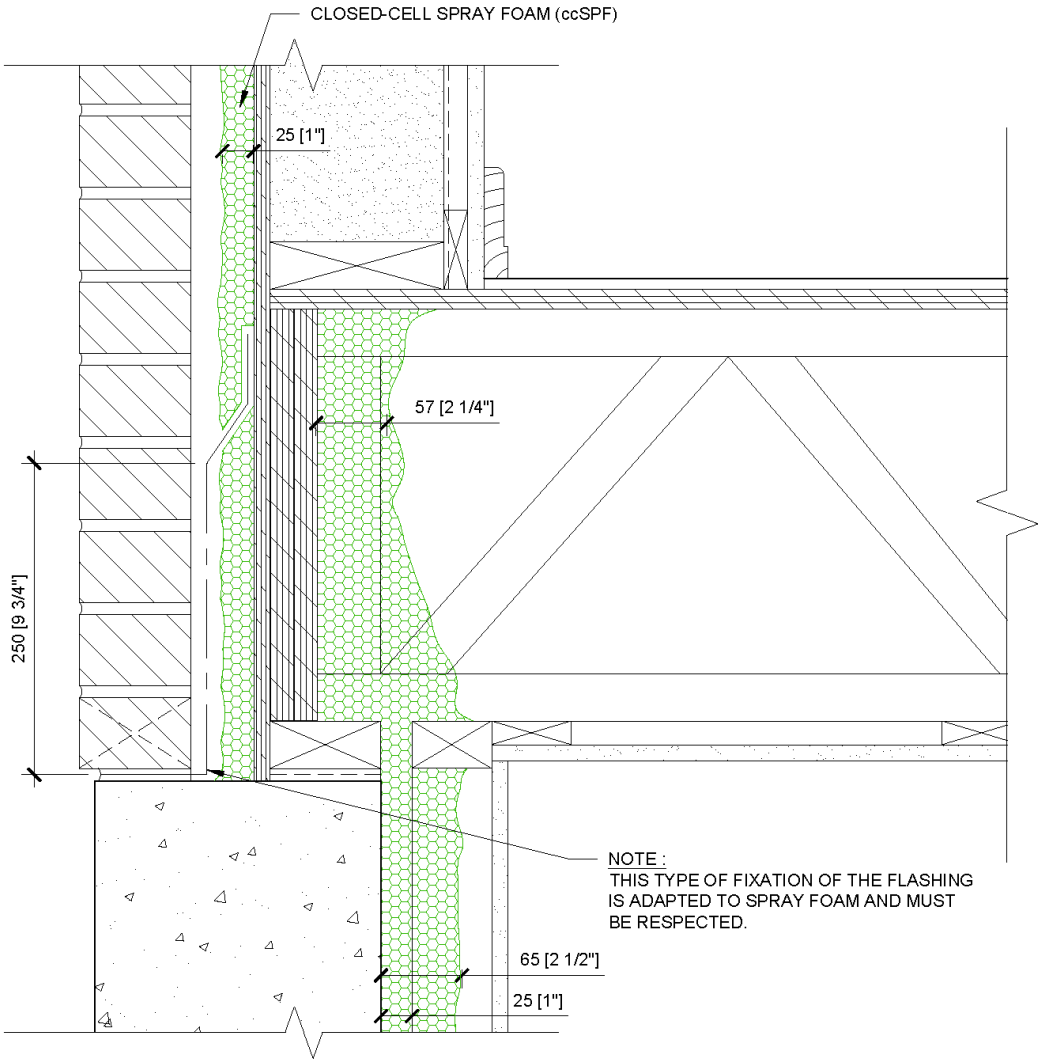


2x6 WALL - BRICK
FOUNDATION KNEE WALL

HUNTSMAN BUILDING SOLUTIONS
1-888-783-0751 www.huntsmanbuildingsolutions.com

TYPICAL DETAIL
WOOD FRAMING

Scale: 1:10
Page 4
08-09-2023



2x6 WALL - BRICK
RIM JOIST - FOUNDATION

HUNTSMAN BUILDING SOLUTIONS
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TYPICAL DETAIL
WOOD FRAMING

Scale: 1:5
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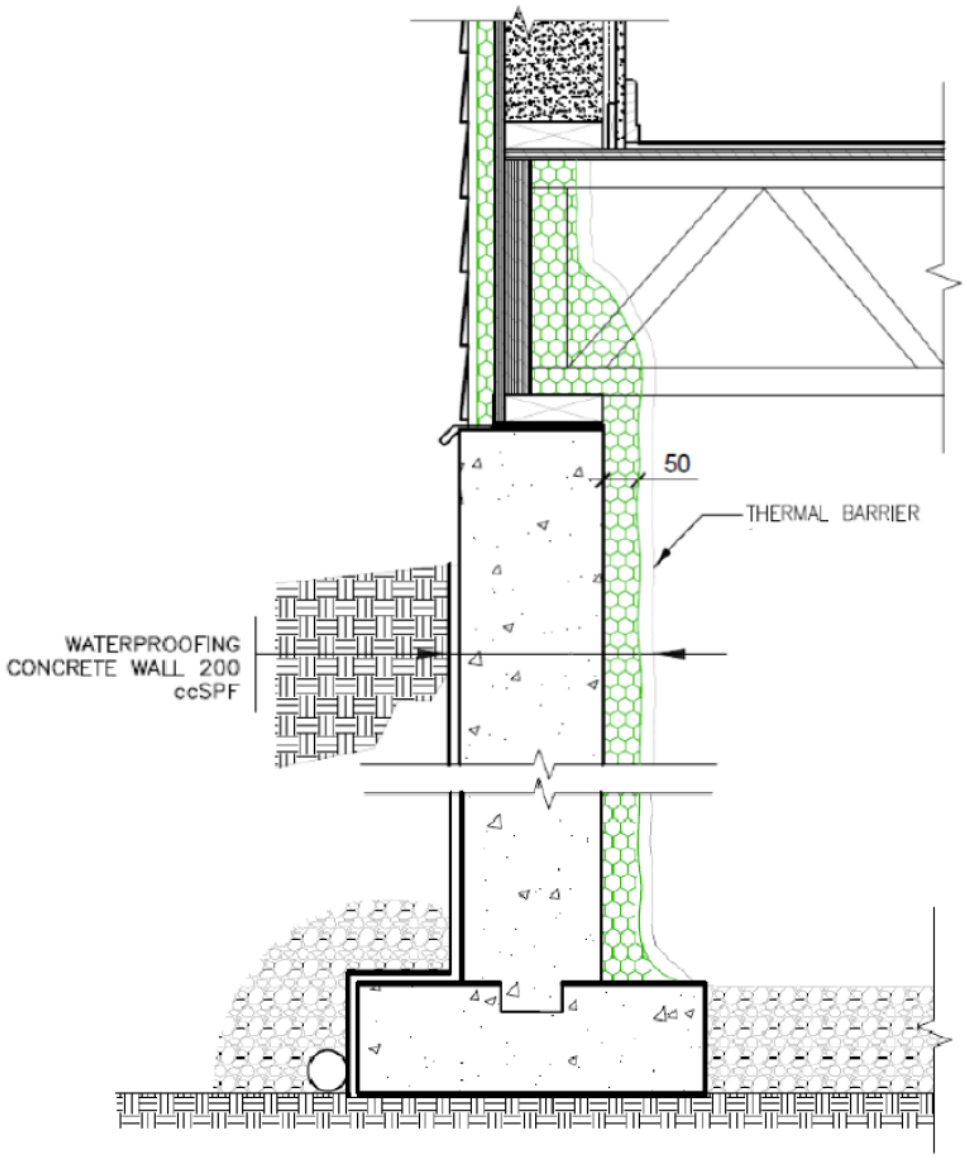
08-09-2023



NOTE:
LOOK TO THE APPLICABLE EVALUATION REPORT FOR THE APPROPRIATE HUNTSMAN ccSPF & ocSPF FOR EACH ASSEMBLY.

UNVENTED CRAWLSPACE

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TYPICAL DETAIL
WOOD FRAMING

Scale: 1:10
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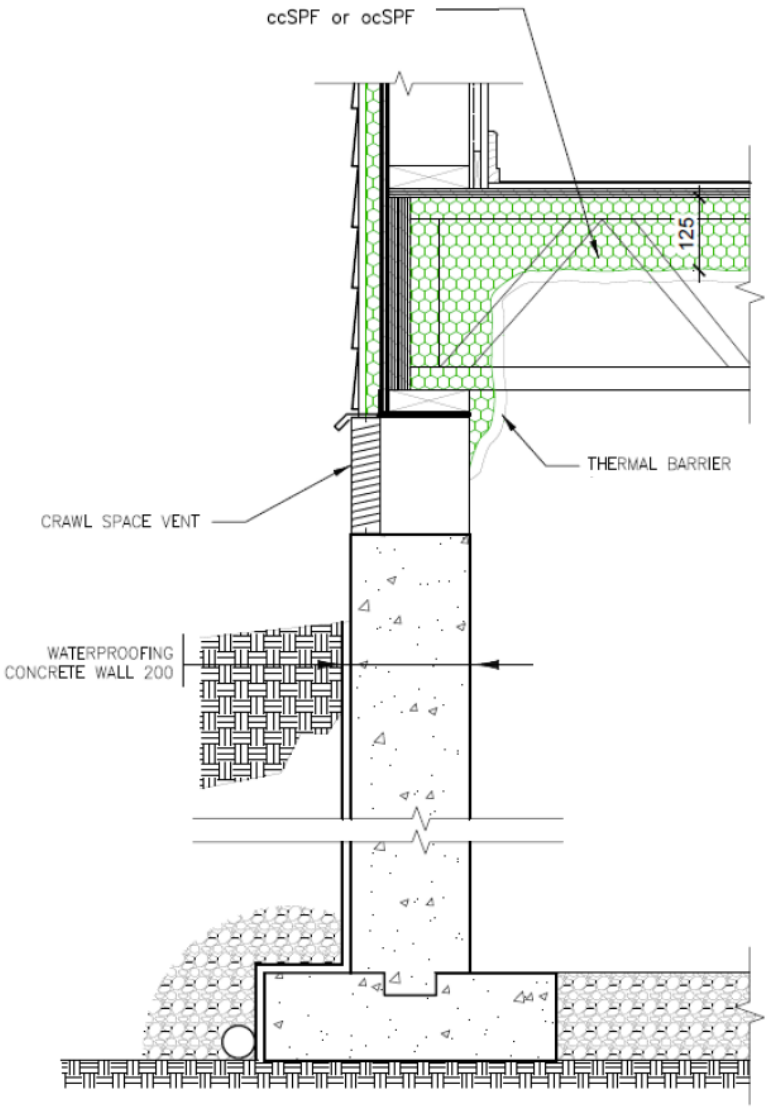

NOTE:
LOOK TO THE APPLICABLE EVALUATION REPORT FOR THE APPROPRIATE HUNTSMAN ccSPF & ocSPF FOR EACH ASSEMBLY.

VENTED CRAWLSPACE CEILING

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TYPICAL DETAIL
WOOD FRAMING

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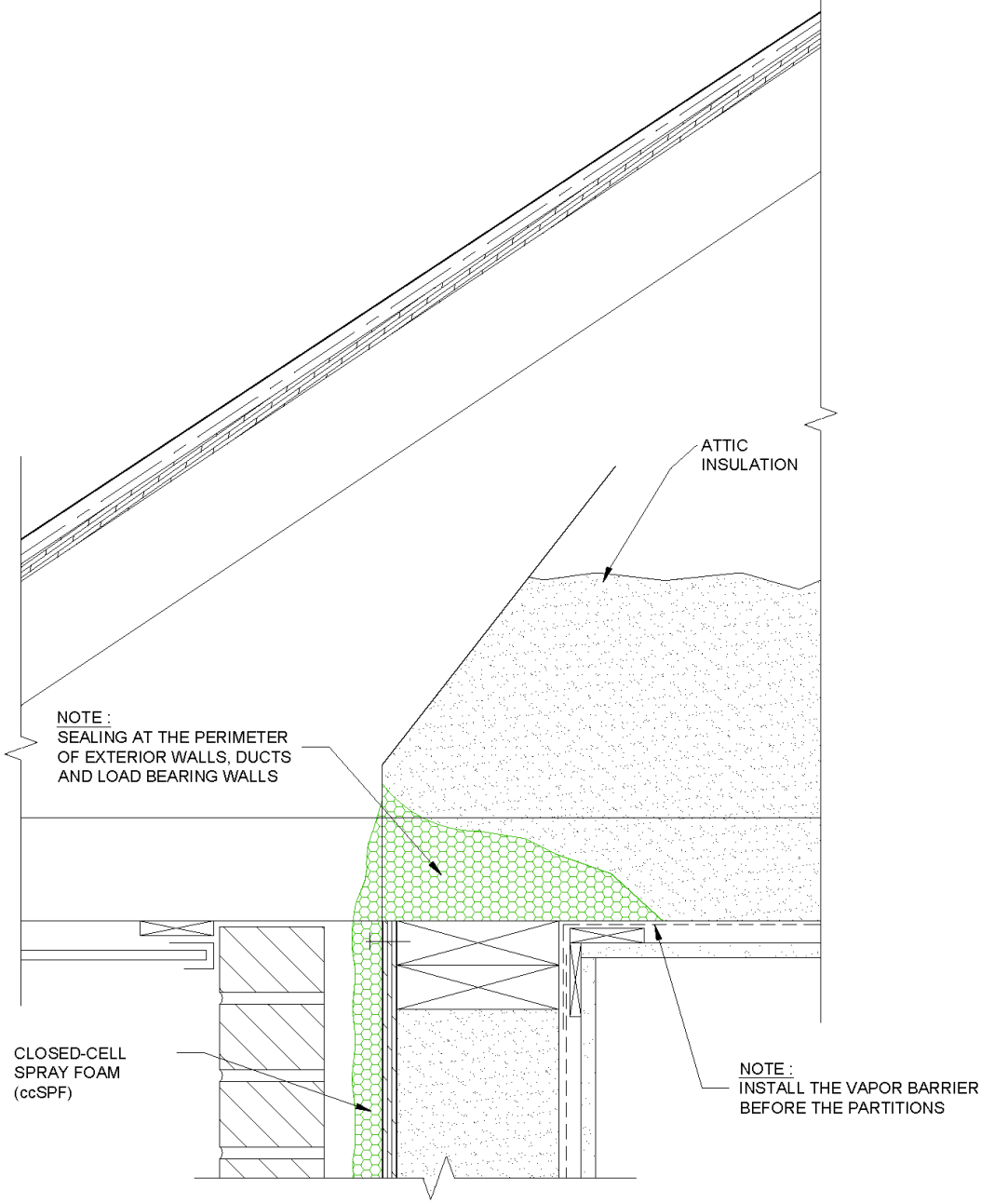

2x6 WALL - BRICK
ATTIC JUNCTION

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TYPICAL DETAIL
WOOD FRAMING

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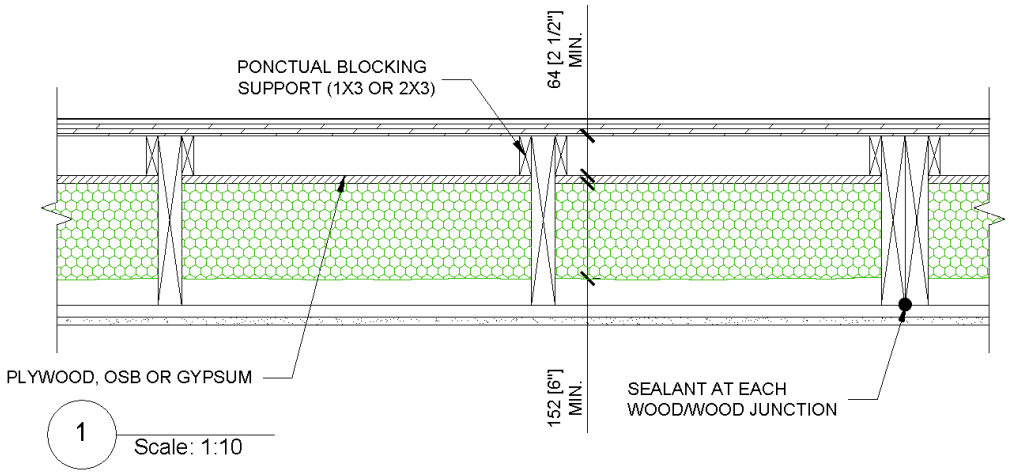

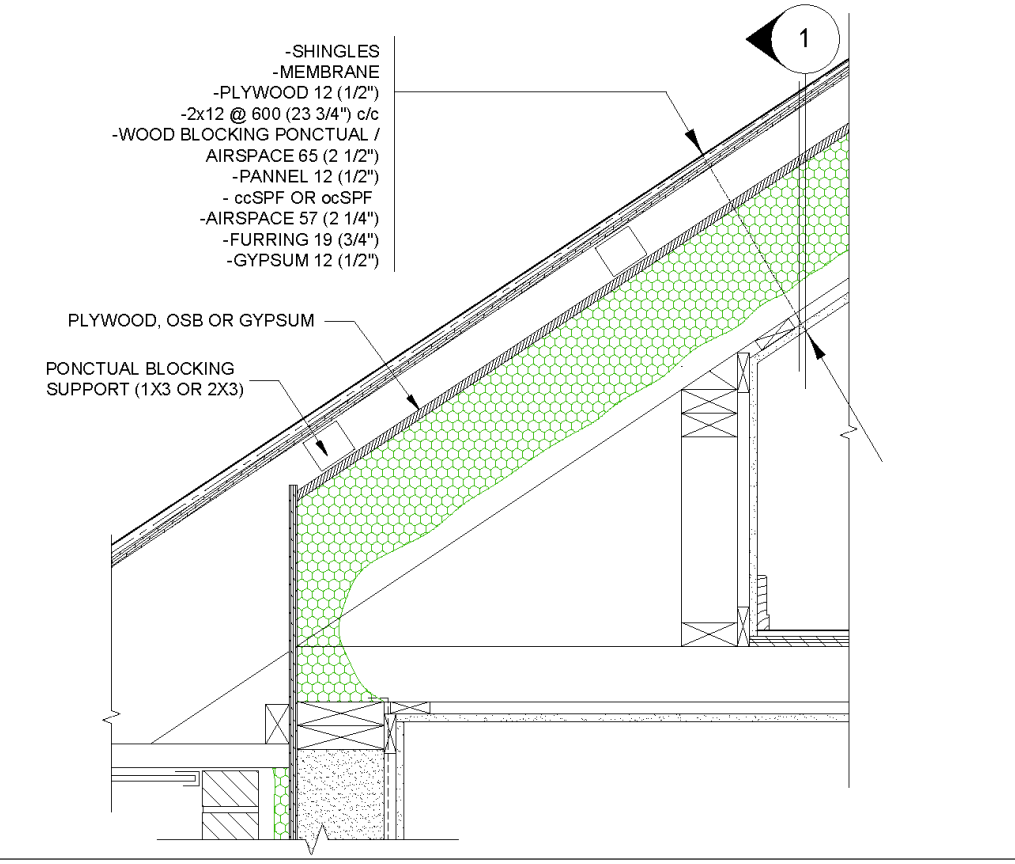

2x6 WALL - BRICK
CATHEDRAL VENTILATED -KNEE WALL

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TYPICAL DETAIL
WOOD FRAMING

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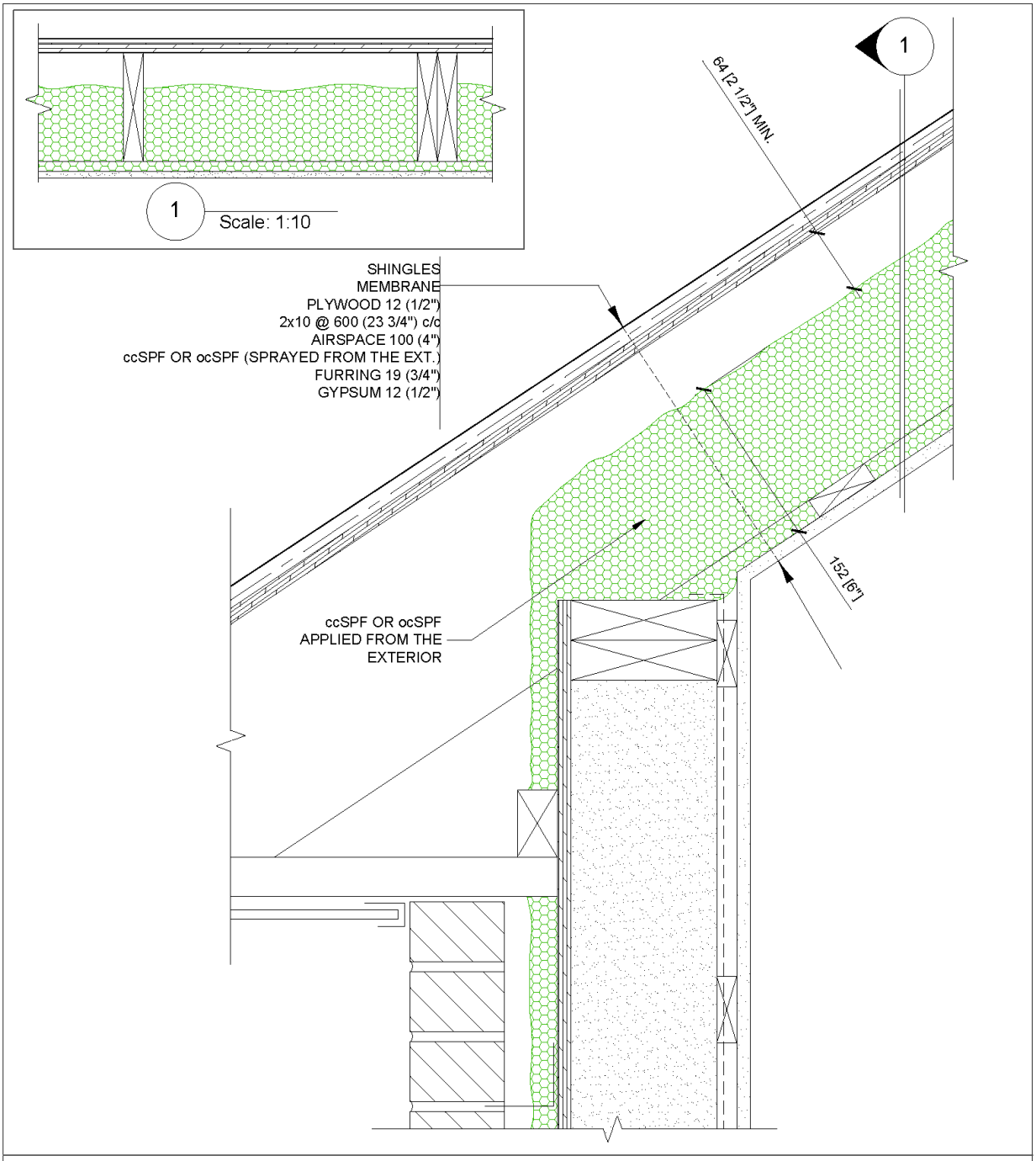

2x6 WALL - BRICK
VENTILATED CATHEDRAL ROOF EXT.

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TYPICAL DETAIL
WOOD FRAMING

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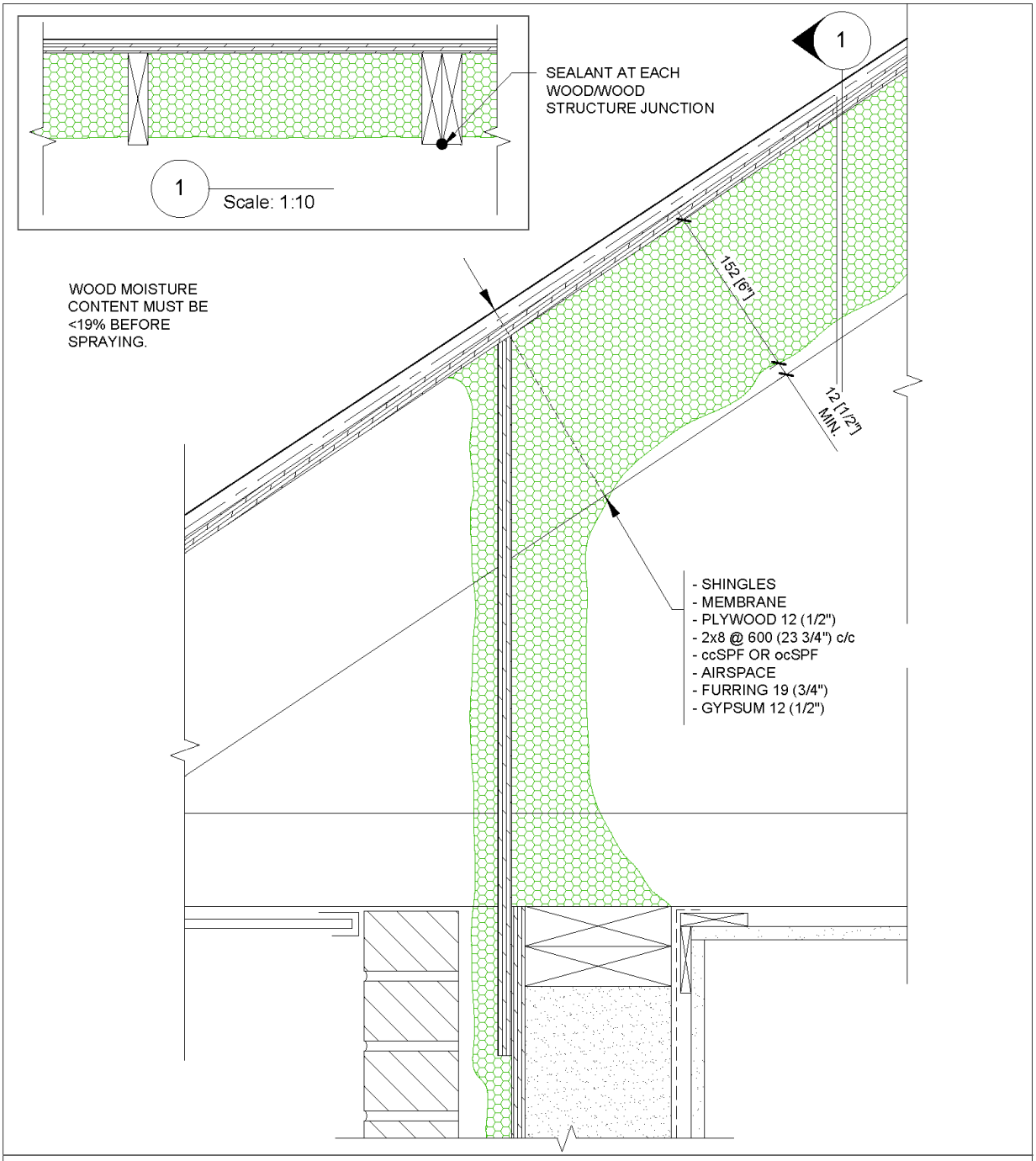

2x6 WALL - BRICK
UNVENTED ROOF

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TYPICAL DETAIL
WOOD FRAMING

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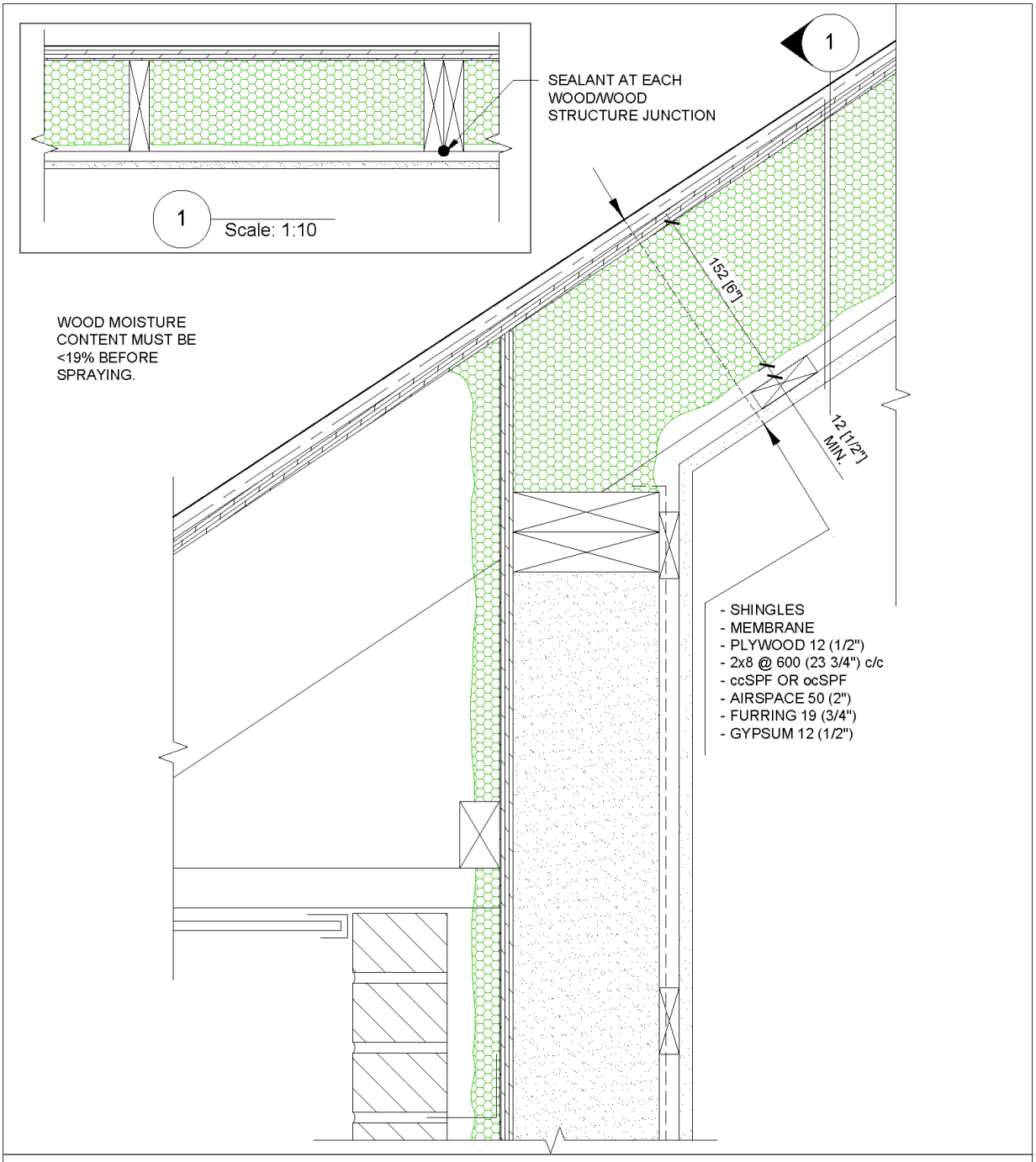

2x6 WALL - BRICK
UNVENTED CATHEDRAL ROOF

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TYPICAL DETAIL
WOOD FRAMING

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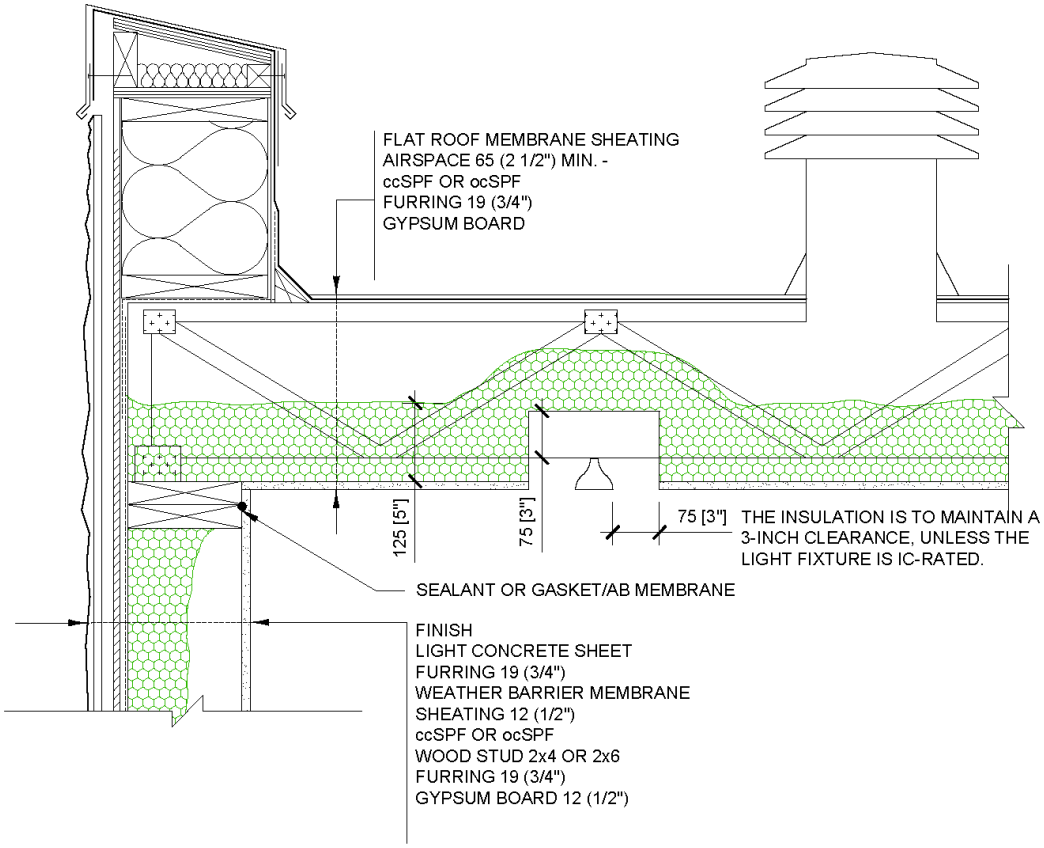

FLAT ROOF - VENTILATED

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TYPICAL DETAIL
WOOD FRAMING

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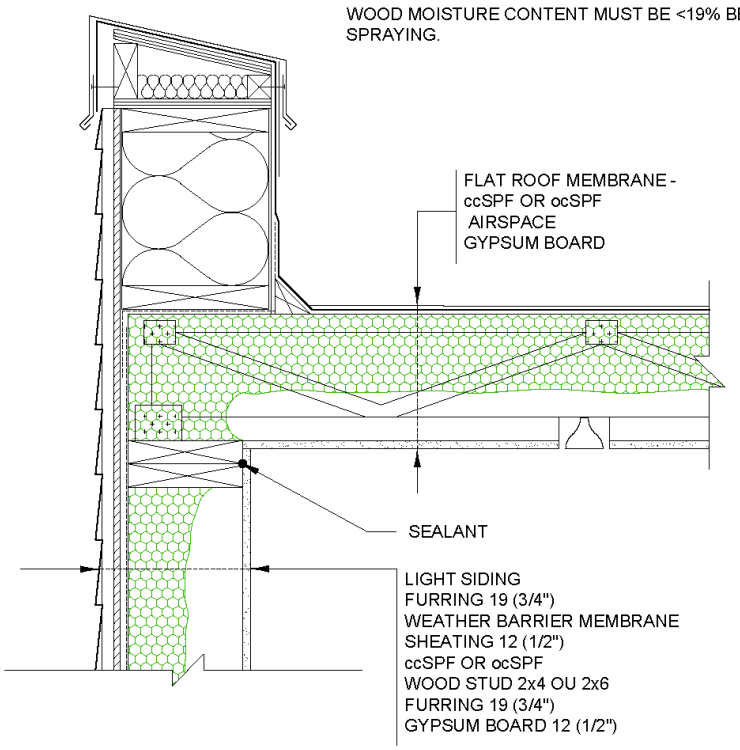

FLAT ROOF - UNVENTILATED

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TYPICAL DETAIL
WOOD FRAMING

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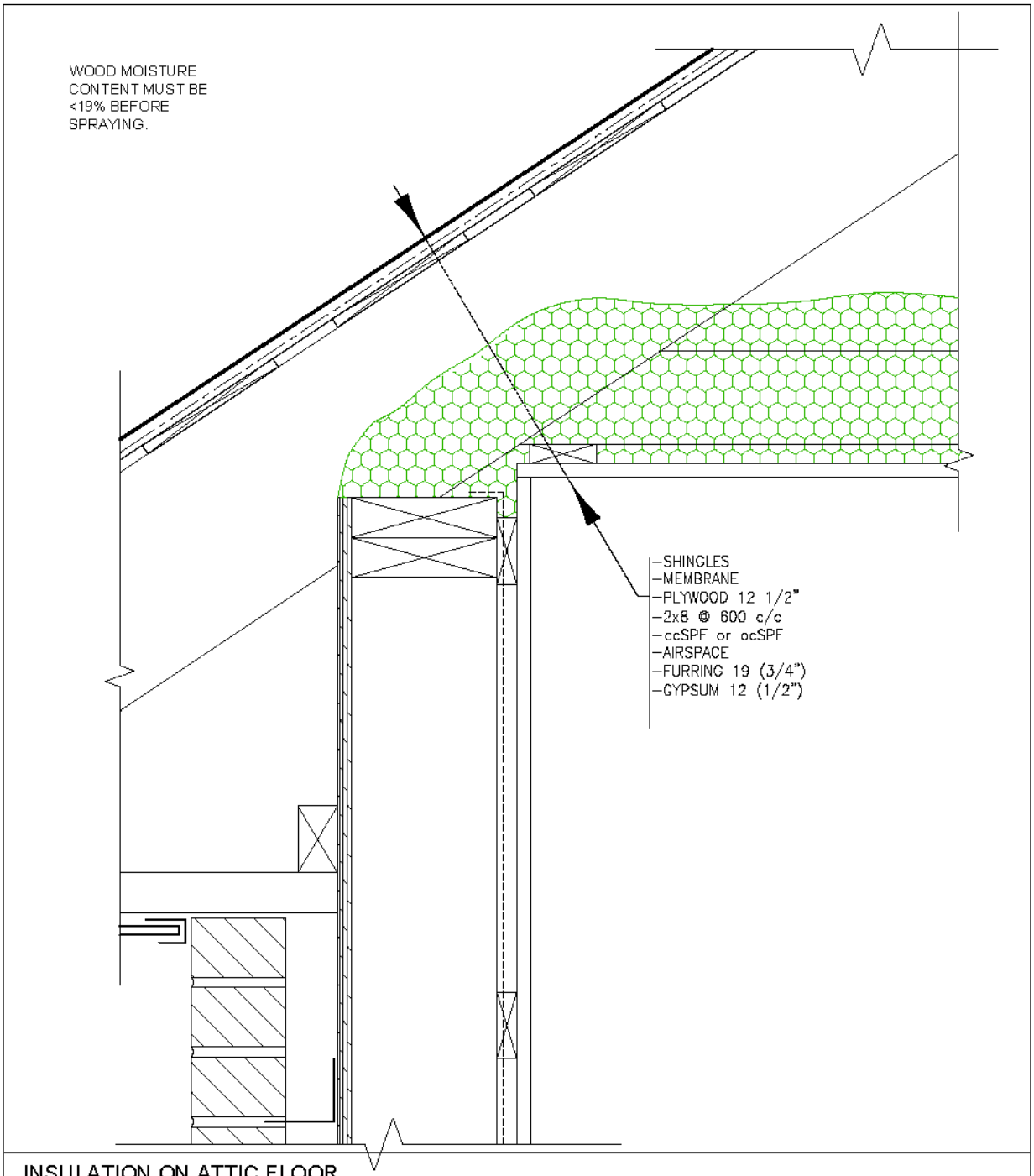

INSULATION ON ATTIC FLOOR

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TYPICAL DETAIL
WOOD FRAMING

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