

RESNET® Standards Public Comment and Proposed Change Form

Comment/Explanation*:

Include your justification for your proposed change to the draft standard below.

The majority of comments will be directed to the absence of “Integrally-Insulated Mass Walls” from the proposed draft. These walls, which are typically constructed of Concrete Blocks or, alternatively, of 3D Concrete Printed Construction, are the mainstay construction method for High Wind Zone areas (Florida hurricanes), along with block basement walls and block foundation walls in some regions, as well as 3D printed homes which are growing in popularity across the country. The pre-expanded injection foam used to insulate these walls can, in the case of flooding or wind-driven rain, become wet—and then dry out without harming the insulation. It’s a very popular, widely-used insulation technique, particularly in central/south Florida.

Integrally-insulated mass walls can readily be inspected via inspection holes along the tops of the walls to visually verify the presence of insulation in each insulated section of the wall or, alternatively, inspection holes in top plates of 3D printed walls. Literally, a small “pigtail” of foam will be visually evident at each test hole drilled along the top of the wall to verify the wall is fully-filled with foam, which is installed under the pressure of compressed air, flowing throughout the wall filling head joints, cores, etc.

Further, infrared thermography is a solid, well-recognized method of verifying insulation in these walls as well. Astonishingly, this method is disallowed in the text of the proposed addendum.

Also oddly, the allowance for encapsulated attics and crawlspaces is excluded from an accepted construction method. Both of these options are popular in many areas of the country and help achieve a very energy efficient construction design. Since this language is not highlighted in red, however, no comments are suggested. Although, the committee should be urged to revisit this egregious limitation to construction techniques that are more energy efficient.

Lastly, according to ASHRAE Fundamentals, the R-value of an air space with thicknesses of 0.5 to 4.0 inches is 1.0, not 0, as indicated in section 4.2.2.3.2.3.

Proposed Change to the Draft Standard*

Use “~~strikethrough~~” and “underline” formatting to indicate all proposed changes. Changes must be shown with “~~hard-formatting~~” ~~strikethrough~~ and underline, not “track changes”.

Draft PDS-01
RESNET/ICC 301-2022 Addendum D-202x
Appendix A Insulation Installation Grading Update

Modify Standard 301-2022 Section 3.2 as follows:

3.2. Definitions.

Air Barrier - One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the Building Thermal Envelope and its assemblies.

Assessed R-Value – The R-Value of the installed insulation excluding the impacts of Properly Installed and Not Properly Installed insulation grading.¹

Building Thermal Envelope - Building element assemblies that enclose conditioned space or provide a boundary between conditioned space and exempt or unconditioned space.

Continuous Air Barrier - A combination of materials and assemblies that restrict or prevent the passage of air through the Building Thermal Envelope and its assemblies.

Continuous Insulation (ci) - Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior, or is integral to any opaque surface, of the Building Thermal Envelope.

Infiltration Volume²⁰ – The sum of the following spaces of the subject Dwelling Unit:-

- The Conditioned Space Volume, excluding any Attics, basements, crawlspaces, and adjacent mechanical closets.
- The Conditioned Space Volume and Unconditioned Space Volume of the following adjacent spaces if included²¹ during the airtightness measurement of the continuity of the enclosure's air barrier system: Attics, crawlspaces and the full depth of their floor assemblies above, basements and the full depth of their floor assemblies above, and adjacent mechanical closets and the full width of their wall assemblies between them and the subject Dwelling Unit.

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Not Properly Installed (NPI)- Insulation that has been evaluated in accordance with Appendix A and does not meet the requirements for Properly Installed insulation, without regard to the amount required to meet the design intent.

Properly Installed (PI)- Insulation that has been evaluated as Properly Installed in accordance with Appendix A, without regard to the amount required to meet the design intent.

Modify Section 3.3 as follows:

3.3 Acronyms.

NPI – Not Properly Installed

PI – Properly Installed

Modify Standard 301-2022 Table 4.2.2(1) as follows:

Table 4.2.2(1) Specifications for the Energy Rating Reference and Rated Homes

Building Component	Energy Rating Reference	Rated Home
Above-grade walls separating Conditioned Space Volume from outdoor environment or Unconditioned Space Volume	Type: wood frame Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2) Solar Absorptance = 0.75	Same as Rated Home Same as Rated Home Same as Rated Home ^a Values from Table 4.2.2(4) shall be used to determine Solar Absorptance, except where test data are provided for wall surface in accordance with ASTM C1549 or ASTM E903 using the ASTM G197 air-mass 1.5 sun-facing global vertical solar spectral irradiance for the measurement of Solar Reflectance. ³³ The Solar Absorptance value is obtained by subtracting the measured Solar Reflectance value from the number one (Solar Absorptance = 1 – Solar Reflectance) Same as Rated Home
Above-grade walls separating Conditioned Space Volume from Unrated Heated Space, Multifamily Buffer Boundary, or Non-Freezing Space	Type: wood frame Gross Area: same as Rated Home U-Factor: 0.292 for IECC Climate Zones 1&2, 0.089 for IECC Climate Zones 3-8. Solar Absorptance = 0.75	Same as Rated Home Same as Rated Home Same as Rated Home ^a Values from Table 4.2.2(4) shall be used to determine Solar Absorptance, except where test data are provided for wall surface in accordance

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	Emittance = 0.90	with ANSI/CRRC S100. Same as Rated Home
Ceilings above Conditioned Space Volume and below an Attic, Unconditioned Space Volume, Non- Freezing Space, Unrated Heated Space, or Multifamily Buffer Boundary	Type: wood frame Gross Area: same as Rated Home ceiling area U-Factor: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home ^a
Conditioned basement walls	Type: same as Rated Home Gross Area: same as Rated Home R-Value: from Table 4.2.2(2) with the insulation layer on the interior side of walls	Same as Rated Home Same as Rated Home Same as Rated Home ^a
Floors over Unconditioned Space Volume, Non-Freezing Space, Unrated Heated Space, or Multifamily Buffer Boundary	Type: wood frame Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home ^a
Floors over outdoor environment	Type: wood frame Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home ^a
Ceilings above Conditioned Space Volume and below an Attic, Unconditioned Space Volume, Non- Freezing Space, Unrated Heated Space, or Multifamily Buffer Boundary	Type: wood frame Gross Area: same as Rated Home ceiling area U-Factor: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home ^a
Attics	Type: vented with aperture = 1ft ² per 300 ft ² ceiling area Attic roof assemblies shall be uninsulated, while the ceiling below the Attic shall be insulated according to Table 4.2.2(2)	Same as Rated Home Same as Rated Home ^a
Foundations	Type: same as Rated Home Gross Area: same as Rated Home U-Factor / R-Value: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home ^a
Crawlspaces	Type: vented with net free vent aperture = 1ft ² per 150 ft ² of crawlspace floor area. Crawlspaces walls shall be uninsulated, while the floor above the crawlspace shall be	Same as the Rated Home, but not less net free Ventilation area than the Reference Home unless an Approved ground cover in accordance with IRC 408.3.1 is used,

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	insulated according to Table 4.2.2(2) as a “Floor over Unconditioned Space Volume.” a U-Factor: from Table 4.2.2(2) for floors over Unconditioned Space Volume or outdoor environment.	in which case, the same net free Ventilation area as the Rated Home down to a minimum net free vent area of 1ft2 per 1,500 ft2 of crawlspace floor area. Same as Rated Home ^a
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Notes:

a. The U-Factor for the building components in the Rated Home shall be calculated using the Assessed R-Value, in accordance with Appendix A and Appendix B. The impacts of insulation grading shall be included in the simulation, but not be included where reporting U-Factors of building components.

Modify Standard 301-2022 Section 4.2.2.3 as follows:

4.2.2.3. Insulation Inspections: All enclosure elements for the Rated Home shall have their insulation’s Assessed R-Value determined in accordance with this Standard: first, and then Insulation shall be rated as Grade I, II, III or uninsulated shall be inspected to determine if the insulated assembly is uninsulated, Properly Installed, or Not Properly Installed in accordance with the on-site inspection procedures in Normative Appendix A.¹

4.2.2.3.1. The insulation of in the Energy Rating Reference Home enclosure elements shall be modeled as Grade I Properly Installed. The insulation elements of the Rated Home shall either be inspected according to procedures in accordance with Normative Appendix B and evaluated in accordance with Normative Appendix A or if Where insulation is confirmed to be present but not fully inspected, the insulation shall be modeled as Grade III Not Properly Installed and shall be recorded as “not inspected” in the rating documentation.

Exceptions:

a. Modular and manufactured housing using In-plant Primary Inspection Agency (IPIA) inspections for modular and manufactured housing shall be considered as an acceptable alternative for the Energy Rating inspection where the manufacturer of the home includes the on-site inspection procedures for insulation details and requirements in Appendix A and Appendix B in their Design Approval Primary Inspection Agency (DAPIA) packages, which are used by IPIAs for their factory inspections.

b. The Assessed R-Values for nonstructural materials or for Structural Insulated Panels (SIPs), Insulated Concrete Forms (ICFs) and other pre-manufactured assemblies when accompanied by supporting test data consistent with ASTM C177, ASTM C518, ASTM C1114, ASTM C1363 or ASTM C976.

Thermographic inspection is permitted to be used to determine that an assembly is insulated and achieves a Grade II Not Properly Installed rating if the person doing the inspection is an American Society of Nondestructive Testing (ASNT)

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Non-Destructive Test (NDT) Level III thermographer or a licensed engineer or if the person doing the inspection is working under the direction of an ASNT NDT Level III thermographer or a licensed engineer. Thermographic inspection shall ~~not be used to an acceptable option to~~ determine if an assembly achieves a Grade I Properly Installed rating. Alternatively, for Integrally-Insulated Mass Walls insulated with Foam-in-Place Insulation, the presence of test holes along the tops of the walls will suffice as visual verification that the wall is Properly Installed with insulation, evidenced by small pieces of foam that exit the test holes during the pressure-injected insulation process.

4.2.2.3.2. Insulation Assessment.

~~4.2.2.3.2.1 Insulated surfaces categorized as “Grade I” Properly Installed shall be modeled with the Assessed R-Value that is determined in accordance with Appendix A. ¹such that the insulation R-Value is considered at its measured (for loose fill) or labeled including other adjustments,¹ for the insulated surface area (not including framing or other structural materials which shall be accounted for separately).~~

~~4.2.2.3.2.2 Insulated surfaces categorized as “Grade II” shall be modeled such that there is no insulation R-Value for 2 percent of the insulated surface area and its measured or labeled value, including other adjustments,² for the remainder of the insulated surface area (not including framing or other structural materials).~~

Insulated surfaces categorized as “Grade III” Not Properly Installed shall be modeled with the Assessed R-value that is determined in accordance with Appendix A for 90% of the insulated surface area and such that there is no insulation R-Value for 5 10 percent of the insulated surface area.³ ~~and its measured or labeled value, including other adjustments,³ for the remainder of the insulated surface area (not including framing or other structural materials).~~

Areas of an assembly shall not be modeled separately solely based upon insulation grading. Where an insulated surface is categorized as Not Properly Installed, all insulated surface area with the same Assessed R-value, orientation, floor level, and insulation material shall be categorized as Not Properly Installed.

~~4.2.2.3.2.3 Insulated surfaces categorized as uninsulated shall be modeled with an R-Value of R 1.0. R-0. Insulation grading shall not be applied to enclosure elements that are categorized as uninsulated.~~

~~4.2.2.3.2.4 Other building assembly materials including framing, sheathing and air films, shall be assigned aged or settled R-V values according to the ASHRAE Handbook of Fundamentals. In addition, the following accepted conventions shall be used in modeling Rated Home insulation enclosures:~~

- a. Insulated wood-framed enclosure elements shall be evaluated and modeled such that framing members and cavities are treated as separate surface areas. Cavity insulation shall be modeled as contributing only to the thermal performance of the cavity surface area. Continuous insulation

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~~shall be modeled as contributing to the thermal performance of the cavity and framing member surface areas combined, or the total assembly area covered by the continuous insulation. The framing and cavity paths shall also include the R-Value of other building materials covering the interior and exterior sides of the assembly. Enclosure elements shall not be modeled using the sum of Assessed R-Values of continuous and cavity insulation materials.³ Integrally-Insulated Mass Walls constructed of Concrete Block shall be modeled via code-required Series-Parallel Heat Transfer calculations to include both the insulated portion and webs of the insulated substrate. Insulation that does not cover framing members shall not be modeled as if it covers the framing. Insulated surfaces that have continuous insulation, including rigid foam, fibrous batt, loose fill, sprayed insulation or insulated siding, covering the framing members shall be Assessed and modeled according to Section 4.2.2.3 and combined with the cavity insulation, framing and other materials to determine the overall assembly R-Value.~~

b. ~~The base R-Value of f~~Fibrous batt insulation that is compressed to less than its full rated thickness in a completely enclosed cavity shall be evaluated ~~assessed according to the manufacturer's documentation. In the absence of such documentation, use R-Value correction factor (CF) for Compressed Batt or Blanket from AGCA Manual J, 8th edition, Appendix 4. as described in Appendix A Section A1.1 and modeled with an Adjusted Performance R-Value.~~

c. Areas of an assembly having different insulation types, orientation, or R-Value ~~(including uninsulated areas in excess of 5 percent of any otherwise insulated building component)~~ shall be modeled separately with the applicable R-Value, orientation, and assembly areas associated with each different insulation situation.

d. The overall thermal properties of steel-framed walls, ceilings and floors shall be calculated in accordance with the modified zone method specified by Chapter 27, ASHRAE *Handbook of Fundamentals* or tested in accordance with ASTM Standard C1363. Modification of test results to add or subtract R-Values to the tested assembly that reflect differences between the tested assembly and proposed assemblies is authorized when such differences are continuous and occur outside of the cavity.

Strike ALL of RESNET/ICC 301-2022 Appendix A and replace with the following:

Normative Appendix A

Inspection Procedures for Insulation Grading and Assessment

1. Insulation Installation Assessment

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To meet the requirements of proper insulation installation (Properly Installed (PI), the insulation material shall be installed in accordance with the requirements outlined in this Appendix for the applicable insulation type. Installations not complying with the requirements of this Appendix shall be considered Not Properly Installed (NPI) and shall be given an insulation grade of Not Properly Installed (NPI) per Section 4.2.2.3.2 of this Standard. Determination of the installed insulation's Assessed R-Value shall be performed in accordance with Appendix B, Inspection Procedures for Minimum Rated Features.

1. Batt and Blanket Insulation

1. Insulation R-Value Assessment

The Assessed R-Value of fibrous batt insulation shall include the effects of compression. Where compressed to less than its full rated thickness in a completely enclosed cavity, the Assessed R-Value shall be determined according to the manufacturer's documentation. In the absence of such documentation, use "Estimated R-values for Compressed Fiber Glass Batt Insulation" (NAIMA BI506) for assessing the compressed R-Value.

2. Air Barrier Requirements

1. Insulation shall be enclosed with air impermeable materials on all sides except for the following:

a. Insulation installed in vented attics above ceilings shall not require an air impermeable material on the exterior side.

b. Insulation installed under floors directly above an unconditioned basement shall not require an impermeable material on the side facing the basement.

c. Insulation installed in rim or band joists shall not require an air impermeable material on the interior side.

3. Exterior Wall Insulation

1. Batt and blanket insulation shall be correctly sized or cut to fit properly to fill the cavity side-to-side, top-to-bottom, and front-to-back without gaps or voids.

1. Batt and blanket insulation shall be fitted around wiring and plumbing, or other obstructions in the cavity, or be split into layers so that one layer can fit behind the obstruction, and one layer fit in front, to avoid gaps and voids.

2. Insulation shall be placed between the sheathing and the rear of electrical boxes and all other obstructions that are not as deep as the cavity.

2. Wall stud cavity penetrations shall be caulked, foamed or otherwise sealed to provide a substantially air-tight envelope between conditioned and unconditioned space. Electrical, fan or other utility boxes that penetrate the drywall or sheathing separating conditioned space from unconditioned space shall be made airtight, and sealed to

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the surface they penetrate. All gaps in the air impermeable material shall be caulked, taped, or sealed.

3. Batt and blanket insulation shall be installed to fill the available cavity the drywall on the front, and the framing members on each side, and the top and bottom plates without gaps or voids.

Exception: The portion of batt insulation with flanges that are inset stapled to the wallboard side of the stud and held no more than one inch from the wallboard with the remainder of the batt in contact with the drywall. When batt and blanket insulation are cut to fit a non-standard cavity, they shall be friction fit to fill the cavity without gaps or voids.

4. Special Situations—Narrow-framed Cavities

1. Narrow spaces less than 1 inch in width at windows and door jambs, shall be sealed on the interior perimeter with the appropriate low expansion foam, caulk, or other air sealing product so as not to impede drainage.-

2. Narrow spaces 1 inch and greater in width, including between studs at building corners, and at the intersection of interior partition walls to exterior walls, shall be filled with insulation friction fit in the space.

5. Special Situations--Kneewalls and Skylight Shafts

1. Insulation for all kneewall and skylight shafts shall be completely enclosed by vertical and horizontal framing, including an air impermeable material on the attic or unconditioned side of the assembly, and horizontal plates at top and bottom of the insulation.

4. Ceiling Insulation

1. Blocking, dams, or air impermeable material shall be placed at the edge of a change in ceiling height.

1. Exception: Insulation installed uniformly over a change in ceiling height where the R-Value of the insulation does not change. Kneewalls greater than 1 ft in height shall meet requirements of Section A-1.1.3.5.

2. An effective air impermeable material (continuous wind blocks, air chutes, or eave baffles) shall be securely placed in vented attics starting at the outside edge of the top plate, where relevant. Air impermeable materials shall be continuous with edge dam to keep insulation from blocking ventilation and to prevent air movement from bypassing and entering the insulation regardless of venting location. The effective air impermeable material shall extend above the insulation.

3. Special Situations--HVAC Platform

1. Insulation shall be installed under HVAC platforms without gaps or voids. If necessary, HVAC platforms shall be raised to

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accommodate the required ceiling insulation or the Assessed R-Value of the area under the platform shall be determined separately.

4. Special Situations—Vented Attic Access

1. Insulation shall be installed at the access door or assembly using adhesive or mechanical fastener or the Assessed R-Value of the area of the access door shall be determined separately. The perimeter of the attic access shall be gasketed or weather stripped to prevent air leakage of conditioned air to the unconditioned attic and the assembly frame shall be air sealed into the rough opening. When insulation is not installed, or the installed insulation is less than the surrounding areas the installed and Assessed R-Value shall be modeled as a separate energy model entry.

5. Special Situations--Below Roof Deck Assemblies

1. Insulation installed in an unvented attic or unvented enclosed rafter assembly shall be installed with no gaps and voids.-

2. Below roof deck insulation consisting of batts that nominally fill the cavity space between roof framing members shall be stapled, or supported with cabling, tension rods, or other approved support measures which maintain the batt uniformly against the roof deck and do not overly compress the batt.

3. Batt insulation shall be installed in permanent contact with the roof decking (air barrier).

4. Batts supported with cabling, tension rods, or other methods supporting the batt from below shall be installed to avoid compression and provide support at intervals less than or equal to 16", and no further than 8" from the end of the batt. Batts that are directly stapled through the insulation material to the roof deck shall maintain the batt uniformly in full contact against the roof deck.

5. When the batt thickness nominally exceeds the depth of the roof framing members, full-width batts that cover the framing members must be used. Friction fit batts shall not be permitted in this application.

6. In unvented attics, where air permeable insulation is applied directly to the underside of the roof deck, framing for gable ends that separate the unvented attic from the exterior or unconditioned space shall be air sealed and insulated to meet or exceed the required wall R-Value.

7. In vented rafter ceilings, a minimum 1-inch continuous sealed air space shall be maintained to provide ventilation between the insulation and roof sheathing. This separation shall be air sealed to prevent the ventilation air from entering the insulation.

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8. Where air permeable insulation is installed to the underside of unvented roofs, the air impermeable material shall be uniform across the transition of roof to gable wall and to wall below.
5. Floor Insulation
 1. Insulation shall be installed to maintain contact with the underside of the subfloor decking to fill the available cavity space.
 2. Floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing, or continuous insulation which separates the cavity and the unconditioned space below. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the perimeter framing members shall be air sealed.
 3. Special Situations--Rim and Band Joists
 1. Insulation shall be in permanent contact with rim or band joist framing (exterior air barrier) and tightly fitted to intersecting solid floor joists, I-joists or extend through open web floor trusses to the required exterior wall R-Value.
2. Blown or Sprayed Fibrous Loose Fill Insulation
 1. Insulation R-Value Assessment
 1. The Certified Rater shall verify the manufacturer specified density as listed on the installer's insulation installation certificate.
 2. The Certified Rater shall verify the insulation depth indicated as independently measured against manufacturer specified depth. -
 2. Air Barrier Requirements
 1. Insulation shall be enclosed with air impermeable materials on all sides of a cavity assembly, except for the following:
 - a. Insulation installed in ventilated attics above ceilings shall not require an air impermeable material on the exterior side.
 - d. Insulation installed under floors directly above an unconditioned basement shall not require an impermeable material on the side facing the basement.
 - b. Insulation installed in rim or band joists shall not require an air impermeable material on the interior side.
 3. Exterior Wall Insulation
 1. Insulation shall fill the cavity side-to-side, top-to-bottom, and front-to-back without gaps or voids.
 2. Insulation shall be installed so that it will be in full contact with an air impermeable material.
 3. Insulation shall be installed to completely fill around wiring, plumbing, and other obstructions.
 4. Insulation shall fill between the exterior sheathing and the rear of electrical boxes and all other obstructions that are not as deep as the cavity.
 5. Special Situations—Narrow-framed Cavities
 1. Narrow spaces less than 1 inch in width at windows and door jambs, shall be sealed on the interior perimeter with the

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- appropriate low expansion foam, caulk, or other air sealing product so as not to impede drainage.-
2. Narrow spaces 1 inch and greater in width, including between studs at building corners, and at the intersection of interior partition walls to exterior walls, shall be completely filled with insulation fitted in the space.
6. Special Situations--Kneewalls and Skylight Shafts
 1. Insulation shall be installed to the density and thickness required for the kneewall or skylight shaft application.
 2. Insulation for all kneewall and skylight shafts shall be completely enclosed by vertical and horizontal framing, including an air impermeable material on the attic or unconditioned side, and horizontal plates at top and bottom of the insulation.
4. Ceiling Insulation
 1. Blocking, dam, or air impermeable material shall be placed at the edge of a change in ceiling height.
 1. Exception: Insulation installed uniformly over a change in ceiling height where the R-Value of the insulation does not change. Kneewalls greater than 1 ft in height shall meet requirements of Section A-1.2.3.6
 2. Continuous wind blocks, air chutes, eave baffles, or other air impermeable material shall be securely placed in vented attics to keep insulation from blocking ventilation and to prevent air movement from bypassing the air impermeable material and entering the insulation. The air impermeable material shall extend above the insulation.
 3. Insulation shall surround obstructions such as cross-bracing, wiring, conduits, duct boots, and plumbing.
 4. Insulation shall be installed to cover the exterior wall top plate.
 5. Special Situations-- Below Roof Assemblies
 1. If Insulation installed in an unvented attic or unvented enclosed rafter assembly shall be installed with no gaps or voids.
 2. In unvented attics, where insulation is applied to the underside of the roof deck, the gable ends that separate the unvented attic from the exterior or unconditioned space shall be insulated in accordance with the framed insulated exterior wall air sealing and R-Value requirements.
 3. In vented rafter ceilings, a minimum 1-inch continuous sealed air space shall be maintained to provide ventilation between the insulation and roof sheathing. This separation shall be air sealed to prevent the ventilation air from entering the insulation.
 4. Where air permeable insulation is installed to the underside of unvented roofs, the air impermeable material shall be uniform across the transition of roof to wall.
 6. Special Situations--HVAC Platform

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1. Insulation shall be installed under HVAC platforms, without gaps and voids. If necessary, HVAC platforms shall be raised to accommodate ceiling insulation or the area under the platform shall be determined separately.

7. Special Situations—Vented Attic Access
 1. Insulation dams shall be provided at the attic access opening at the appropriate height to ensure that the installed insulation will not fall into the attic access opening and will maintain the R-Value up to and around the opening.
 2. Insulation shall be installed at the access opening using adhesive or mechanical fastener. The Insulation shall be installed at the R-Value for the enclosure element the opening is passing through, or the Assessed R-Value of the area of the access opening shall be determined separately. The perimeter of the rough opening shall be sealed, and the attic access closure shall be gasketed to prevent air leakage of conditioned air to the unconditioned attic. When insulation is not installed, or the installed insulation is less than the surrounding areas the Assessed R-Value shall be modeled as a separate energy model entry.

5. Floor Insulation
 1. Insulation shall be installed to maintain contact with the underside of the subfloor decking to fill the available cavity space.
 2. Floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing, or continuous insulation which separates the cavity and the unconditioned space below. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the perimeter framing members shall be air sealed.

3. ~~Spray Polyurethane Foam~~ Foamed-in-Place Insulation ~~Spray Polyurethane Foam~~ Foamed-in-Place Insulation (General Requirements)

~~Spray polyurethane foam~~ Foamed-in-Place insulation, either spray-applied to open substrates or injected into the cores of integrally-insulated mass wall cavities, shall be evaluated based on the foam thickness and coverage.

1. Insulation R-Value Assessment

The Assessed R-Value shall be determined based on the required average thickness of foam in each assembly and whether it conforms to the requirements for Properly Installed Insulation (PII). A posted insulation certificate detailing the product manufacturer, product name/type, installer as well as other pertinent details relating to installed R-Values/locations etc. may be used to help determine the total Assessed R-value.

A-1.3.1.1 Data Sources:

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To obtain the Adjusted Performance R-Value of aged insulation use the manufacturer's Technical Data Sheet or Evaluation Report (ER) prepared by an approved product certification organization per ISO-17065.

A-1.3.1.2 SPF Average Thickness:

The average thickness of SPF shall be determined as follows:

Average thickness ≥ 0.9 * the required installed certificate R-Value / manufacturer's aged R-Value per inch.

A-1.3.1.3 Measured Average Thickness:

Obtain the average thickness of the SPF installation using calibrated probes or a pin and disc depth gauge, such as described in ASTM C167, and ASTM C1848; these are the definitive methods for measurement.

Alternatively, where structural elements extend through the foam, the thickness may be determined by measuring the space between the surface of framing members and the surface of the foam.

- a. Thickness measurements shall be made randomly and averaged such as set out in ASTM C1848. Alternately, thickness may be measured regularly (once every 300 square feet) evenly distributed (at the top, middle, and bottom of the assembly.) These measurements shall then be averaged to get the measured thickness for the assembly.

A-1.3.1.4 Adhesion and Cracks

- a. Visible cracks less than 1/16" in width shall be sealed with one-component polyurethane foam or similar.
- b. No cracks shall extend from the substrate to the surface of the SPF.
- c. SPF shall be well-adhered to the substrate. If requested, the installer shall provide at least one verification of adequate adhesion to the Certified Rater either on site during the inspection or by way of a daily work record.

A-1.3.2 Specific Requirements for Medium Density Spray Polyurethane Foam (MDSPF) Insulation

A-1.3.2.1 Exterior Wall (Continuous) Insulation

- a. MDSPF can be used as continuous wall insulation on the exterior of a building.
- b. R-Value shall be determined as set out in Section A-1.3.1 and the air barrier shall be evaluated as set out in Section A-1.3.2.
- c. In addition, the MDSPF shall be well bonded to transition membranes, flashings and air barriers of adjacent materials / wall systems / window and door elements.

A-1.3.2.2 Exterior Wall (Interior Cavity Insulation)

- a. MDSPF can be used as cavity wall insulation on the interior of a building or, alternatively, injected into the hollow cores of integrally-insulated mass walls.
- b. R-Value shall be determined as set out in Section A-1.3.1 and the air barrier shall be evaluated as set out in Section A-1.3.2.

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- c. In hybrid walls, consisting of a layer of medium density SPF along with air permeable cavity insulation, a supplemental vapor retarder shall not be required, provided the thickness of medium density SPF conforms to the requirements of IRC Table R702.7.1.
- d. Air permeable insulation in the hybrid wall must follow the requirements of Section A-1.1.

A-1.3.2.3 Basement or Crawl Space

- a. MDSPF can be used as basement or crawlspace wall insulation on either the interior or exterior of a building or, alternatively, injected into the hollow cores of integrally-insulated mass walls..
- b. R-Value shall be determined as set out in Section A-1.3.1 and the air barrier shall be evaluated as set out in Section A-1.3.2.
- c. If MDSPF is applied on the exterior, and the insulation is not installed for any reason, then the uninsulated portion shall be modeled as a separate energy model entry.

A-1.3.2.4 Under Slab

- a. MDSPF can be used as under-slab insulation on a building.
- b. R-Value shall be determined as set out in Section A-1.3.1. Alternately, follow the inspection protocols in Appendix B to assess insulation completeness and coverage.

A-1.3.2.5 Vented Attics

- a. Assess the R-Value of MDSPF when used as insulation on attic floors.
- b. In hybrid assemblies the thickness of fibrous insulation shall be determined separately per Section A-1.1.
- c. R-Value of the foam shall be determined as set out in Section A-1.3.1.
- d. The perimeter of the attic access shall be gasketed or weather stripped to prevent air leakage of conditioned air to the unconditioned attic and the assembly frame shall be air sealed into the rough opening.
- e. Insulation shall be installed at the access door or enclosure element. Where the insulation type is different or insulation is not installed, or the installed insulation is less than the surrounding areas, the enclosure element shall be modeled separately with its applicable Assessed R-Value.

A-1.3.2.6 Unvented Attics

- a. MDSPF can be used as air impermeable insulation in an unvented attic assembly.
- b. R-Value shall be determined as set out in Section A-1.3.1.
- c. Where only air impermeable insulation materials are used in conformance with IRC Section R5.1.1, the MDSPF must be installed directly to the underside and be in substantial contact with the roof deck and it must extend down to the top plate of perimeter

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walls. Gable walls shall be insulated to meet or exceed the required wall R-Value and shall be air sealed.

d. In hybrid assemblies (i.e. combining MDSPF and air permeable insulation), the MDSPF shall be in direct contact with the roof deck, extending down to the top plate of perimeter walls and the thickness of MDSPF shall be sufficient to meet the requirements of IRC Table R806.5 for condensation control.

A-1.3.2.7 Framed Floor Assemblies

a. Medium density SPF installed in framed floor assemblies shall be in contact with either the subfloor above or sheathing or continuous insulation installed on the bottom of the floor framing. The perimeter of the framed floor assembly shall be insulated and the enclosure element shall be air sealed.

b. R-Value shall be determined as set out in Section A-1.3.1 and the air barrier shall be evaluated as set out in Section A-1.3.2.

c. If the assembly is enclosed at the time of inspection, follow the inspection protocols in Appendix B to assess insulation completeness and coverage.

A-1.3.2.8 Rim or Band Joists

a. Medium density SPF installed in rim or band joist applications shall be in continuous contact with all framing members of the rim joist framed assembly. SPF shall extend from the underside of the floor deck above to air barrier of the wall assembly below.

b. R-Value shall be determined as set out in Section A-1.3.1.

A-1.3.3 Specific Requirements for Low Density Spray Polyurethane Foam (LDSPF) Insulation

A-1.3.3.1 Exterior Wall (Continuous) Insulation (Exterior Applications):

LDSPF shall not be used as continuous wall insulation on the exterior of a building.

A-1.3.3.2 Exterior Wall (Interior Cavity Insulation)

a. LDSPF can be used as cavity wall insulation on the interior of a building or, alternatively, injected into the hollow cores of integrally-insulated mass walls..

b. R-Value shall be determined as set out in Section A-1.3.1

c. A supplemental vapor diffusion retarder conforming to IRC Section R702.7 may be required depending on material properties and climate zone. Consult manufacturer's Technical Data Sheet (TDS) or Evaluation Report (ER) for details.

A-1.3.3.3 Basement or Crawl Space

a. LDSPF can be used as basement or crawlspace wall insulation on the interior of a building only (i.e. this product shall not be used on the exterior) or, alternatively, injected into the hollow cores of integrally-insulated mass walls.

b. R-Value shall be determined as set out in Section A-1.3.1.

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A-1.3.3.4 Under Slab:

LDSPF shall not be used as under-slab insulation on a building.

A-1.3.3.5 Vented Attics

- a. Assess the R-value of LDSPF when used as insulation on attic floors.
- b. In hybrid assemblies the thickness of fibrous insulation shall be determined separately per Section A-1.1.
- c. Foam R-Value shall be determined as set out in Section A-1.3.1.
- d. The perimeter of the attic access shall be gasketed or weather stripped to prevent air leakage of conditioned air to the unconditioned attic and the assembly frame shall be air sealed into the rough opening.
- e. Insulation shall be installed at the access door or enclosure element. Where the insulation type is different or insulation is not installed, or the installed insulation is less than the surrounding areas, the enclosure element shall be modeled separately with its applicable Assessed R-Value.

A-1.3.3.6 Unvented Attics

- a. LDSPF can be used as air impermeable insulation in an unvented attic assembly.
- b. R-Value shall be determined as set out in Section A-1.3.1.
- c. Where only air impermeable insulation materials are used in conformance with IRC Section R5.1.1, the LDSPF must be installed directly to the underside and be in substantial contact with the roof deck and it must extend down to the top plate of perimeter walls. In cold climates, a supplemental vapor retarder may be required to meet the requirements of IRC Table R806.5 for condensation control.
- d. In hybrid assemblies (i.e. combining LDSPF and air permeable insulation), the LDSPF shall be in direct contact with the roof deck, extending down to the top plate of perimeter walls and in cold climates a supplemental vapor retarder may be required to meet the requirements of IRC Table R806.5 for condensation control.
- e. In hybrid assemblies the thickness of fibrous insulation shall be determined separately per Section A-1.1.

A-1.3.3.7 Framed Floor Assemblies

- a. LDSPF installed in framed floor assemblies shall be in substantial contact with either the subfloor above or sheathing or continuous insulation installed on the bottom of the floor framing. The perimeter of the framed floor assembly shall be insulated and the enclosure element shall be air sealed.
- b. R-Value shall be determined as set out in Section A-1.3.1 and the air barrier shall be evaluated as set out in Section A-1.3.2.

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- c. If the assembly is enclosed at the time of inspection the inspection protocols in Appendix B shall be followed.

A-1.3.3.8 Rim or Band Joists

- a. LDSPF installed in rim or band joist applications shall be in continuous contact with all framing members of the rim joist framed assembly. SPF shall extend from the underside of the floor deck above to air barrier of the wall assembly below.
- b. R-Value shall be determined as set out in Section A-1.3.1.

4. Foam Plastic Insulating Sheathing (FPIS)

1. General Installation Requirements

1. FPIS shall be installed on the interior or exterior of the building envelope, or integral to any opaque surface of the building envelope as indicated by approved construction plans.
2. FPIS shall be installed without gaps, voids, or misalignments at the joint edges and at penetrations or other obstructions.
 1. When FPIS is installed in multiple layers, joints between boards of each layer shall be staggered as recommended by the insulation manufacturer or listed design.
 3. FPIS shall be installed in contact with the substrate or the framing surface with acceptable fasteners. The fasteners shall not be countersunk or otherwise damage the FPIS, unless specified by the manufacturer's installation instructions in accordance with Section A-1.5.5.1.3.
4. Damage to FPIS during installation in the form of breakage, substantial puncture, and other damage or substantial gaps and voids that results in the material's inability to achieve the specified performance shall be repaired or replaced.
5. When specified as a radiant barrier or reflective insulation, FPIS manufactured with a low-emittance surface shall also comply with the requirements of Section A-1.6 Radiant Barriers or Section A-1.7 Reflective Insulation, as applicable.

2. Assessed R-Value

1. The manufacturer's labeled R-Value of FPIS at the installed thickness shall be used as the Assessed R-Value when FPIS is installed in accordance with the applicable sections of this addendum. When FPIS is installed in layers each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
2. When FPIS is installed in below grade or slab edge applications as part of a frost protected shallow foundation system, the Assessed R-Value shall be calculated in accordance with the manufacturer's labeled R-Value of the material installed.

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3. Continuous Insulation Application Requirements
 1. FPIS shall be installed continuously across all structural members with no thermal bridges other than fasteners and service openings.
 2. When required, FPIS is permitted to be installed in two or more layers with the edge joints between each layer staggered. When FPIS is installed in layers, each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
4. Specific Insulation Application Requirements
 1. In addition to the general requirements contained in Section A-1.4.1, Section A-1.4.5 provides installation requirements applicable to specific FPIS applications described herein. Section A-1.4.5 addresses common FPIS applications but is not intended to serve as an exhaustive list. For applications not listed, the general requirements in Section A-1.4.1 and the manufacturer's installation instructions shall apply.
 2. Above-Grade Exterior Walls
 1. Where FPIS boards are manufactured with specialized joints or edge details (e.g., shiplap joints, interlocking joints), the product shall be installed in accordance with the manufacturer's installation requirements.
 2. FPIS manufactured with integrated structural materials (e.g., nail base, fire-treated plywood) shall be installed in accordance with the manufacturer's installation instruction or listed design.
 3. Above-Deck Roofs
 1. FPIS shall be installed in accordance with the roof covering or shingle manufacturer's installation instructions, including instructions for venting.
 4. Floors Over Unconditioned Space
 1. The edges of FPIS installed between floor joists shall be in contact with the adjoining joists.
 2. FPIS installed across the floor joists in a continuous fashion shall be installed in accordance with Section A-1.4.4.
 5. Basement and Crawlspace Walls
 1. For interior applications, FPIS shall be installed to provide a continuous building thermal envelope.-
 2. If FPIS is installed on the exterior, and the insulation is not installed on a portion of the assembly for any reason, then the uninsulated portion shall be modeled as a separate energy model entry.
 6. Below-Slab
 1. FPIS may be installed below slabs in one or multiple layers. Each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
 7. Slab Edge

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1. FPIS shall be installed vertically from the top of the slab down to the depth proposed or determined or horizontally from the slab edge as proposed or determined.
2. When the slab is poured separately from the exterior foundation wall and slab edge insulation is installed between the floor slab and the foundation wall, FPIS may be installed by cutting the top of the material at a 45-degree angle away from the exterior wall to protect the upper edge with concrete.
3. When the slab is not poured separately from the exterior foundation wall and slab edge insulation is not installed between the unconditioned slab and the conditioned slab so no thermal break is created the two slab edge configurations shall be modeled separately.
8. Kneewall and Skylight Shaft
 1. When FPIS is installed to enclose the unconditioned side of an assembly insulated with air permeable insulation that is otherwise exposed to the unconditioned space, the joint edges of FPIS shall be aligned with the edges of the assembly.
 2. In such hybrid assemblies the thickness of fibrous insulation shall be determined separately per A-1.1.
9. Interior Cavity Spaces (Cavity Wall and Rim / Band Joists)
 1. FPIS installed between framing members shall be installed in contact with the adjoining framing members or other substrate with no gaps or voids.
10. Insulated Header
 1. FPIS shall be installed between the framing members or to one side of the framing members.
11. Attic Hatch and Door
 - a. Assess the R-value of FPIS when used as insulation on attic hatch or door.
 - b. In hybrid assemblies, the thickness of fibrous or other insulation shall be determined separately.
 - c. The perimeter of the attic access shall be gasketed or weather stripped to prevent air leakage of conditioned air to the unconditioned attic and the assembly frame shall be air sealed into the rough opening.
 - d. Insulation shall be installed at the access door or enclosure element and the R-Value shall be determined. Where the insulation type is different or insulation is not installed, or the installed insulation is less than the surrounding areas, the enclosure element shall be modeled separately with its applicable Assessed R-Value.
 - e. The R-Value of the FPIS attached to the attic hatch or door shall be equal to the R-Value of the FPIS at the installed thickness or the insulation shall be evaluated separately.

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5. Structural Insulated Panel
 1. General Requirements
 1. Sealing of all panel joints shall meet the manufacturer's requirements. Where the manufacturer does not have specific joint sealing details, the Structural Insulated Panel Association's (SIPA) typical joint sealing details shall be used (i.e. wall to wall, roof to roof, and roof to wall joints).
 2. In Climate Zones Marine 4, 5, 6, 7 and 8, SIP tape shall be installed on the interior of the structure to satisfy vapor retarder and air barrier requirements. A stamp with the evaluation service report number shall be present on the SIP facer illustrating compliance with applicable requirements.
 3. SIP panels shall be properly aligned with both facer edges fully supported and penetrations extending from the interior to exterior of the panels shall be sealed with expanding foam.
 4. All gaps and penetrations through SIPs including foundation or roof connections shall be air sealed with expanding or foam compatible with the SIP materials. Narrow spaces less than 1 inch in width at windows and door jambs, shall be sealed on the interior perimeter with the appropriate low or non-expanding foam, caulk, or other air sealing product so as not to impede drainage.-
 2. All SIP walls shall have a capillary break installed between the concrete/masonry footing/foundation and the SIP. (i.e. sill seal).
6. Interior Radiation Control Coating (IRCC)
 1. Interior Radiation Control Coating Installation Assessment
 1. The emittance of the IRCC shall be no more than 0.25 as labeled on the material container or manufacturer technical data sheet.
 2. The IRCC shall be sprayed, roller applied to the substrate(s).
 3. The installed IRCC shall be adjacent to an airspace.
 4. The installed IRCC shall be dry to the touch when cured.
 5. The IRCC shall provide full opaque coverage of all surfaces in the assembly.
7. Radiant Barrier
 1. Radiant Barrier Thermal Performance Assessment
 1. The emittance of radiant barriers shall be less than or equal to 0.10 as labeled on the material container or manufacturer technical data sheet.

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2. General Requirements
 1. The low emittance, metallic surface(s) of the radiant barrier shall be adjacent to a ventilated air space and face the interior of the attic.
 2. The radiant barrier shall be laminated to a substrate or securely fastened to the roof assembly.
 3. Radiant barriers shall not be installed on the attic floor or attic floor insulation.
 4. The downward facing surface of the radiant barrier shall be free from contamination or scarring from storage or installation.

3. Roof Assembly Application
 1. Radiant barriers in roof assemblies shall be installed in one of the following methods:
 1. Radiant barrier roof decking with the low emittance material laminated or fastened to OSB or plywood and the material shall be perforated.
 2. Radiant barrier shall be draped over the truss or rafter prior to the installation of decking.
 3. Radiant barrier shall be attached to the side or bottom of the truss top chord or rafter.
 2. The radiant barrier shall also be installed in gable end walls.
 3. The installation of a radiant barrier shall not interfere with attic/roof ventilation.

8. Reflective Insulation
 1. The emittance of reflective insulation shall be less than or equal to 0.10 as labeled on the material container or manufacturer technical data sheet.
 2. General Installation Requirements
 1. Reflective insulation shall be installed in enclosed cavities that are unventilated and the reflective insulation operative side(s) (low emittance) shall face into the cavity. The insulation derives the labeled thermal performance from the material, low emittance surface(s) and the enclosed air space(s).
 2. Where necessary, reflective insulation shall be cut to fit as required to provide coverage without gaps or openings.
 3. Any penetrations or cuts from damage shall be repaired with an acrylic adhesive foil tape.
 4. The Assessed R-Value of the reflective insulation assembly does not include contribution from the air barrier system.
 5. This section does not describe the installation techniques for mass insulation products.
 3. Exterior Wall Reflective Insulation
 1. Reflective insulation shall be attached to the cavity framing member at top bottom and sides.

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2. The reflective insulation shall match the width of the framing and be installed at the depth in the cavity as specified by the manufacturer to attain the required airspace(s) to achieve the required R-Value.
3. For multi-airspace cavity designs, (two or more reflective layers) reflective insulation shall be installed without any gaps where attached to the framing to minimize air exchange between the enclosed air spaces.
4. Special Situations—Non-standard Cavities
 1. Reflective insulation shall be cut to the dimensions of non-standard width cavities and installed in accordance with manufacturer's installation instructions.
 2. Narrow spaces less than 1 inch in width at windows and door jambs shall be sealed on the interior perimeter with the appropriate low or non-expanding foam, caulk, or other air sealing product so as not to impede drainage.-
 3. Spaces one inch to less than two inches in width, such as between studs at the building corners, or at the intersection of interior partition wall to exterior walls, shall have reflective insulation appropriately installed or be filled with appropriate foam, caulk or other air sealing product.
4. Floor Reflective Insulation
 1. Reflective insulation shall be installed either face or side (inset) stapled to the cavity framing.
 2. Reflective insulation shall match the width of the framing and be installed at the depth in the cavity specified by the manufacturer.
 3. For multi-airspace cavity designs, (two or more reflective layers) reflective insulation shall be installed without any gaps where attached to the framing (at the perimeter of the cavity) to minimize air exchange between the enclosed air spaces.
 4. Special Situations—Non-standard Cavities
 1. The reflective insulation shall be cut to the dimensions of non-standard width cavities and installed in accordance with the standard cavity installation instructions. An acrylic adhesive foil tape shall be used to repair penetrations or cuts.
9. Air and Vapor Permeable Insulated Board (AVPIB)
 1. General Installation Requirements
 1. AVPIB shall be installed on the interior or exterior of the building envelope, or integral to any opaque surface of the building envelope as indicated by approved construction plans.
 2. AVPIB shall be installed substantially without gaps, voids or misalignments at the joint edges and at penetrations or other obstructions.

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3. Floors Over Unconditioned Space
 1. The edges of AVPIB installed between floor joists shall be in contact with the adjoining joists.
 2. AVPIB installed across the floor joists in a continuous fashion shall be installed without gaps, voids, or misalignments between AVPIB panels.
4. Basement and Crawlspace Walls
 1. For exterior applications, the foundation wall shall be damp proofed or waterproofed, prior to installing AVPIB. AVPIB may be installed with a protective drainage mat system per manufacturer's instructions which does not impact the rated R-Value.
 2. For interior applications, AVPIB shall be installed in alignment with the insulation of adjoining assemblies.

A-1.9.6.4.3 If AVPIB is not installed on a portion of the assembly for any reason, then the uninsulated portion shall be modeled as a separate energy model entry.

5. Below-Slab
 1. When installed below a slab, AVPIB shall be installed per manufacturer's instructions.
 2. Some AVPIB products may be installed below slabs in one or multiple layers. Each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
6. Slab Edge
 1. AVPIB shall be installed vertically from the top of the slab down to the depth proposed or determined or horizontally inward from the slab edge as proposed or determined.
 2. When the slab is poured separately from the exterior foundation wall and slab edge insulation is installed between the floor slab and the foundation wall, AVPIB may be installed by cutting the top of the material at a 45-degree angle away from the exterior wall to protect the upper edge with concrete.
 3. When the slab is not poured separately from the exterior foundation wall and slab edge insulation is not installed between the unconditioned slab and the conditioned slab so no thermal break is created the two slab edge configurations shall be modeled separately.
7. Kneewall and Skylight Shaft
 1. When AVPIB is installed to enclose the unconditioned side of an assembly insulated with air permeable insulation that is otherwise exposed to the unconditioned space, the joint edges of FPIS shall be aligned with the edges of the assembly. A

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supplemental air barrier may be required if the AVPIB does not qualify as one.

2. In such hybrid assemblies the thickness of the fibrous insulation insulations shall be determined separately per A-1.1.
8. Interior Cavity Spaces (Cavity Wall and Rim / Band Joists)
 1. AVPIB installed between framing members shall be installed in contact with the adjoining framing members or other substrate with no gaps or voids.
9. Insulated Header
 1. AVPIB shall be installed between the framing members or to one side of the framing members.
10. Attic Hatch and Door
 - f. Assess the R-value of AVPIB when used as insulation on attic hatch or door.
 - g. In hybrid assemblies the thickness of fibrous or other insulation shall be determined separately.
 - h. The perimeter of the attic access shall be gasketed or weather stripped to prevent air leakage of conditioned air to the unconditioned attic and the assembly frame shall be air sealed into the rough opening.
 - i. Insulation shall be installed at the access door or enclosure element. Where the insulation type is different or insulation is not installed, or the installed insulation is less than the surrounding areas, the enclosure element shall be modeled separately with its applicable Assessed R-Value.
 1. The Assessed R-Value of the AVPIB attached to the attic hatch or door shall be equal to the labeled R-Value of the AVPIB at the installed thickness.
10. Air and vapor permeable Insulated board (AVPIB)
 1. General Installation Requirements
 1. AVPIB shall be installed on the interior or exterior of the building envelope, or integral to any opaque surface of the building envelope as indicated by approved construction plans.
 2. AVPIB shall be installed substantially without gaps, voids or misalignments at the joint edges and at penetrations or other obstructions.
 3. AVPIB shall be installed in contact with the substrate or the framing surface with acceptable fasteners or furring strips. The fasteners shall not be countersunk or otherwise damage the AVPIB, unless specified by the manufacturer's installation instructions.
 4. Damage to AVPIB during installation in the form of breakage, substantial puncture, and other damage or substantial gaps and voids that results in the material's inability to achieve the specified performance, shall be repaired or replaced.

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2. Assessed R-Value
 1. The manufacturer's labeled R-Value of AVPIB at the installed thickness shall be used as the Assessed R-Value, when AVPIB is installed in accordance with the applicable sections of this addendum. When AVPIB is installed in layers each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
 2. When AVPIB is installed in below grade or slab edge applications, the manufacturer's labeled R-Value at the installed thickness shall be used as the Assessed R-Value, or when not observable use the inspection protocols in Appendix B.
3. Continuous Insulation Application Requirements
 1. AVPIB shall be installed continuously across all structural members with no thermal bridges other than fasteners, flashings, and service openings.
 2. When required, AVPIB shall be installed in two or more layers with the edge joints between each layer staggered. When AVPIB is installed in layers each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
4. Specific Insulation Requirements
5. In addition to the general requirements contained in Section A-1.9.1, Section A-1.9.5 provides installation requirements applicable to specific AVPIB applications described herein. Section A-1.9.5 addresses common AVPIB applications but is not intended to serve as an exhaustive list. For applications not listed, the general requirements in Section A-1.9.1 and the manufacturer's installation instructions shall apply.
 1. Above-Grade Exterior Walls
 1. When installed to the exterior of the building thermal envelope AVPIB shall be installed to the outside of the weather resistant barrier and inside of a minimum vented air gap or as required by manufacturer's instructions.
 2. Above-Deck Roofs
 1. AVPIB shall be installed in accordance with the roof covering or shingle manufacturer's installation instructions, including instructions for venting.
 3. Floors Over Unconditioned Space
 1. The edges of AVPIB installed between floor joists shall be in contact with the adjoining joists.
 2. AVPIB installed across the floor joists in a continuous fashion shall be installed without gaps, voids, or misalignments between AVPIB panels.

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4. Basement and Crawlspace Walls
 1. For interior applications, AVPIB shall be installed in alignment with the insulation of adjoining assemblies.

A-1.9.6.4.3 If AVPIB is not installed on a portion of the assembly for any reason, then the uninsulated portion shall be modeled as a separate energy model entry.
5. Below-Slab
 1. AVPIB may be installed below slabs in one or multiple layers. Each layer shall be evaluated or the inspection protocols in Appendix B shall be used.
6. Slab Edge
 1. When the slab is poured separately from the exterior foundation wall and slab edge insulation is installed between the floor slab and the foundation wall, AVPIB may be installed by cutting the top of the material at a 45-degree angle away from the exterior wall to protect the upper edge with concrete.
 2. When the slab is not poured separately from the exterior foundation wall and slab edge insulation is not installed between the unconditioned slab and the conditioned slab so no thermal break is created the two slab edge configurations shall be modeled separately.
7. Kneewall and Skylight Shaft
 1. When AVPIB is installed to enclose the unconditioned side of an assembly insulated with air permeable insulation that is otherwise exposed to the unconditioned space, the joint edges of FPIS shall be aligned with the edges of the assembly. A supplemental air barrier may be required if the AVPIB does not qualify as one.
 2. In such hybrid assemblies the thickness of the fibrous insulation insulations shall be determined separately per A-1.1.
8. Interior Cavity Spaces (Cavity Wall and Rim / Band Joists)
 1. AVPIB installed between framing members shall be installed in contact with the adjoining framing members or other substrate with no gaps or voids.
9. Insulated Header
 1. AVPIB shall be installed between the framing members or to one side of the framing members.

Modify Standard 301-202 Appendix B as follows:

Normative Appendix B

Inspection Procedures for Minimum Rated Features

<p>Foundation insulation</p>	<p>Determine and record type, gradePI/NPI, location, and thickness of foundation insulation and resultant R-Value.</p>	<p>Use the inspection procedures in Normative Appendix A to determine and record the insulation type <u>and Assessed R-Value.</u> and grade<u>The Assessed R-value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI).</u></p> <p>Visually confirm insulation location as interior, exterior or both¹⁰⁸ sides of the foundation wall, record Assessed R-Value and measure thickness. Visually confirm whether insulation product is installed for 100% of required area/perimeter and visually confirm and record R-Value. If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine and record the R-Value based on installed thickness. For insulation materials that are installed without an <u>observable manufacturer's R-Value mark, or emittance value, the Certified Rater may use the manufacturer's data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the Assessed R-Value or emittance of the installed material.</u></p> <div data-bbox="808 1381 1193 1575" data-label="Diagram"> </div> <p><u>Where the foundation wall has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. Areas of the foundation wall shall not be modeled separately solely based upon insulation grading.</u></p>
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		<p>If 100% of the area/perimeter of the exterior continuous or integrally-insulated mass wall foundation insulation cannot be visually confirmed, inspection <u>shall be allowed</u> according to the below:</p> <ol style="list-style-type: none"> 1. Visually confirm insulation product is installed for a minimum of 25% of the area/perimeter of the foundation insulation specified for insulation, and visually confirm and record R-Value. Where <u>the Assessed</u> R-Value cannot be determined during site observation, the manufacturer's data sheet shall be used. Use the inspection procedures in Normative Appendix A to <u>determine if insulation is PI or NPI. determine and record the grade of insulation.</u> The <u>insulation assessment grade</u> of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the <u>insulation assessment grade</u> recorded shall be the worst case documented. 2. Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. If foundation insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.
<p>Slab-on-grade insulation</p>	<p>Determine and record type, grade<u>PI/NPI</u>, location, and thickness of slab-on-grade insulation and resultant R-Value.</p>	<p>Slab perimeter insulation is installed vertically, either on the outside of the slab extending above and/or below grade or between the foundation wall and the slab itself <u>or separating a slab in conditioned space from a slab in unconditioned space (i.e., garage or entry porch slab)</u>. Under slab insulation is installed horizontally, either along the slab perimeter or underneath the entire slab.</p> <p>Use the inspection procedures in Normative Appendix A to determine and record the insulation type <u>and Assessed R-Value. , and grade</u>. <u>The Assessed R-Value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying</u></p>

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		<p><u>with Section R303.1.1, or based on measured thickness and manufacturer listed R-Value per unit thickness.</u></p> <p>Visually confirm location as horizontal or vertical, record <u>the Assessed</u> R-Value and measure thickness. Visually confirm whether insulation product is installed for 100% of required area/perimeter and visually confirm and record <u>Assessed</u> R-Value. If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness. For insulation materials that are installed without an observable manufacturer's R-Value mark, or emittance value, the Certified Rater may use the manufacturer's data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the Assessed R-Value or emittance of the installed material.</p> <p><u>Where the slab-on-grade has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. Areas of the slab-on-grade shall not be modeled separately solely based upon insulation grading.</u></p> <p>If 100% of the area/perimeter of the slab insulation cannot be visually confirmed, <u>inspection shall be allowed</u> according to the protocol below:</p> <ol style="list-style-type: none">1. Visually confirm insulation product is installed for a minimum of 25% of the area/perimeter of the slab specified for insulation and visually confirm and record R-Value. If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine and record the <u>Assessed</u> R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to <u>determine if insulation is PI or NPI. determine and record the grade of insulation.</u> The <u>insulation assessment grade</u> of the visually confirmed area shall be applied to the rest of the area unless photos show
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		<p>any additional deficiencies, in which case the <u>insulation assessment grade</u> recorded shall be the worst case documented.</p> <p>2. Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type and grade of the insulation installation.</p>
<p>Wall Insulation Installation</p>	<p>Determine and record type, <u>grade</u>PI/NPI, and thickness of framed wall insulation and resultant R-Value.</p>	<p>Use the inspection procedures in Normative Appendix A to determine and record the insulation type and <u>Assessed R-Value</u>. and grade <u>The Assessed R-value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1. or based on measured thickness and manufacturer listed R-Value per unit thickness.</u></p> <p>Visually confirm <u>all areas of framed wall or integrally-insulated mass wall insulation</u> and record <u>the Assessed R-Value</u> and measure thickness. If insulation is observed, but the R-Value cannot be determined during site observation, the manufacturer's data sheet shall be used. <u>For insulation materials that are installed without an observable manufacturer's R-Value mark, or emittance value, the Certified Rater may use the manufacturer's data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the R-Value or emittance of the installed material.</u></p> <p><u>Where the wall has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. Areas of the wall shall not be modeled separately solely based upon insulation grading.</u></p>
		<p>If 100% of the area of the <u>continuous or integrally-insulated mass wall</u> exterior insulation cannot be visually</p>

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		<p>confirmed, inspection <u>shall be allowed</u> according to the protocol below:</p> <ol style="list-style-type: none"> 1. Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and record <u>the Assessed</u> R-Value and measure thickness. If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine and record the <u>Assessed</u> R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to <u>determine if the insulation is PI or NPI. determine and record the grade of insulation.</u> The <u>insulation assessment grade</u> of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the <u>insulation assessment grade</u> recorded shall be the worst case documented. 2. Photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. <p>If exterior insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.</p>
<p><u>Below R_f</u> roof deck insulation</p>	<p>Determine and record type, <u>grade PI/NPI</u>, and thickness of <u>below</u> roof deck insulation and resultant R-Value.</p>	<p>Identify the location of the roof deck insulation. The insulation can be either above or below <u>the</u> roof deck.</p> <p>Use the inspection procedures in Normative Appendix A to determine and record the insulation type <u>and Assessed R-Value. and grade</u> <u>The Assessed R-Value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1, or based on measured thickness and manufacturer listed R-Value per unit thickness.</u></p>

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		<p>Visually confirm whether the insulation product is installed for 100% of required area and visually confirm and record the Assessed R-Value and measure thickness. If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness.</p> <p><u>For insulation materials that are installed without an observable manufacturer's R-Value mark, or emittance value, the Certified Rater may use the manufacturer's data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the R-Value or emittance of the installed material.</u></p> <p><u>Where the roof deck has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. Areas of the roof deck shall not be modeled separately solely based upon insulation grading.</u></p> <p>If 100% of the roof area cannot be visually confirmed, inspect according to the protocol below:</p> <ul style="list-style-type: none">• Visually confirm insulation product is installed for a minimum of 20% of the area specified for insulation and visually confirm and record <u>the Assessed</u> R-Value and measure thickness.• If insulation is observed without a labeled R-Value, the manufacturer's data sheet shall be used to determine the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine the grade of insulation.• The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented.• Collect photos to confirm installation at several site locations and in sufficient detail to
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		<p>confirm thickness, type, and grade of the insulation installation.</p> <ul style="list-style-type: none"> If roof deck insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.
<p><u>Above roof deck insulation</u></p>	<p><u>Determine and record type PI/NPI, and thickness of above roof deck insulation and resultant R-Value.</u></p>	<p><u>Identify the location of the roof deck insulation. The insulation can be either above or below the roof deck.</u></p> <p><u>Use the inspection procedures in Normative Appendix A to determine and record the insulation type and Assessed R-Value. The Assessed R-value of the insulation is the R-Value entered into the energy model before determining if the insulation is Properly Installed (PI) or Not Properly Installed (NPI). The Assessed R-Value can be determined by the manufacturer label, installer certification, such as the 2021 IECC, where an insulation installer has provided a certificate complying with Section R303.1.1, or based on measured thickness and manufacturer listed R-Value per unit thickness.</u></p> <p><u>Visually confirm whether the insulation product is installed for 100% of required area and visually confirm and record the Assessed R-Value and measure thickness.</u></p> <p><u>For insulation materials that are installed without an observable manufacturer’s R-Value mark, or emittance value, the Certified Rater may use the manufacturers data sheet or an insulation certificate that complies with the requirements of the IECC and is left immediately after installation by the installer, to determine the R-Value or emittance of the installed material.</u></p> <p><u>Where the roof deck has different insulation types, orientation, or R-Value, the enclosure element shall be modeled separately with the applicable Assessed R-Value, orientation, and assembly areas associated with each different insulation situation. Areas of the roof deck shall not be modeled separately solely based upon insulation grading.</u></p> <p>If 100% of the roof area cannot be visually confirmed, inspect according to the protocol below:</p> <ul style="list-style-type: none"> Visually confirm insulation product is installed for a minimum of 25% of the area specified for insulation and visually confirm and

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		<p>record <u>the Assessed</u> R-Value and measure thickness.</p> <ul style="list-style-type: none"> • If insulation is observed without a labeled R-Value, the manufacturer’s data sheet shall be used to determine and record the R-Value based on installed thickness. Use the inspection procedures in Normative Appendix A to determine and record the grade of insulation. • The grade of the visually confirmed area shall be applied to the rest of the area unless photos show any additional deficiencies, in which case the grade recorded shall be the worst case documented. • Collect photos to confirm installation at several site locations and in sufficient detail to confirm thickness, type, and grade of the insulation installation. • If roof deck insulation cannot be visually verified immediately after installation, it may be verified through comprehensive photographs that comply with the requirements given above.
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Building Element: Air Leakage		
Rated Feature	Task	On-Site Inspection Protocol
Blower door Test	Determine and record airtightness from a blower door test <u>to assess the continuity of the air barrier system for the calculation of the Energy Rating Index.</u>	Follow Procedure for Measuring Airtightness of Building or Dwelling Unit Enclosure in ANSI/RESNET/ICC 380.